Journal of Biosciences and Medicines, 2025, 13(2), 230-242
https://www.scirp.org/journal/jbm
ISSN Online: 2327-509X
ISSN Print: 2327-5081

Obstacles to Vaccination against COVID-19 among the Population Living in the Kindu Health Zone

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How to cite this paper: Katawandja, A.L., Ilemba, J.Y., Eradi, I.R.B. and Ntela, S.-D.M. (2025) Obstacles to Vaccination against COVID-19 among the Population Living in the Kindu Health Zone. *Journal of Biosciences and Medicines*, **13**, 230-242.
https://doi.org/10.4236/jbm.2025.132018

Received: November 27, 2024
Accepted: February 11, 2025
Published: February 14, 2025

Abstract

Introduction: Vaccination faces several obstacles in the fight against COVID-19, yet it has been identified as one of the most effective means of preventing new epidemics of COVID-19. The aim was to contribute to improving vaccination coverage against COVID-19 in the Kindu health zone. **Method:** We conducted a cross-sectional descriptive study with an analytical focus, using a questionnaire that enabled us to carry out a survey from October 03 to 30, 2022. Our target study population was residents of the Kindu health zone. A total of 420 subjects participated in our study, including 42 per site. **Results:** The study revealed a low proportion of vaccinated subjects (38.3%) and a high proportion of non-vaccinated subjects (61.70%). Non-belief in the efficacy of vaccines ($p = 0.001$), infodemia ($p = 0.001$) and respect for ethnic norms ($p = 0.001$) were identified as perceived barriers to vaccination. Fear of being branded with the "666" beast badge ($p = 0.004$) as the perceived severity. Respondents' perceptions of mass vaccination against COVID-19 are mixed, and their opinions and expectations of COVID-19 vaccination in the town of Kindu are divided. **Conclusion**: In order to increase the proportion of people vaccinated against COVID-19, it is suggested here to increase the population's ability to detect false information through a well-structured communication and health education program.

Keywords

COVID-19, Vaccination, Obstacles, Kindu

1. Introduction

Pandemic coronavirus disease 2019 (COVID-19) is a respiratory infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), provisionally named new coronavirus 2019 or 2019-nCoV [1].

In epidemiological terms, global data on COVID-19 as of November 01, 2022 show that there are 627,104,342 confirmed cases worldwide, including 6,567,552 deaths. Europe is in first place, with 260,921,358 confirmed cases, while Africa is in last place, with 11,668,790 confirmed cases, including 253,427 deaths. According to the Center for Disease Control and Prevention (Africa CDC), the top five African countries most affected by COVID-19 are: South Africa with 4,028,160 positive cases, Morocco with 1,265,572 cases, Tunisia with 1,146,152 cases, Egypt with 515,667 cases and Libya with 507,034 cases [2].

The epidemiological bulletin of the multisectoral committee for the fight against COVID-19 states that as of November 01, 2022, the Democratic Republic of Congo had reported a cumulative total of 93,335 confirmed and 2 probable cases, including 1359 deaths. Maniema province ranks fifteenth out of the 26 provinces, with a total of 354 cases, including 11 deaths [3].

In terms of management of SARS COV2 infection, there is currently no curative drug treatment. Individual, collective and environmental preventive measures are taken to limit the spread of the virus. These measures range from the simplest (good hand and respiratory hygiene, compulsory wearing of a mask covering the mouth and nose) to the most complex, including physical distancing (being at least two meters away from a person, confinement, curfew). On the pharmacological front, several drugs are used according to the protocols adopted by each country. Nevertheless, the World Health Organization (WHO) has set out guidelines, which are still evolving, for certain molecules in the fight against COVID-19, notably hydroxychloroquine, corticosteroids, IL-6 antagonists (tocilizumab or sarilumab), ivermectin, lopinavir/ritonavir, remdesivir, vitamin C, azithromycin and vitamin E [4].

In addition to being a global health crisis, COVID-19 is also a socio-economic catastrophe: it has led to a substantial reduction in the workforce and an increase in unemployment worldwide [5].

There was a significant drop in sales for 78% of companies in April 2020 compared with the same period in 2019. Some 46.5% of companies sent agents back on short-time working (42.6%); some permanent agents were only laid off (12.4%). The accommodation, catering and tourism sectors are those most affected [6]. Three major actions justify the economic crisis linked to COVID-19: China's entry into containment, the closure of several production plants in the countries and difficulties in supply chains in several industries [7].

COVID-19 also had a negative impact on human relations, with negative affective and emotional impacts. Various strategies were taken to combat the disease, but these had a negative social impact: social distancing, confinement, the suspension of handshaking during greetings, etc. Although life-saving, these measures

deprived Africans of their warmth of community life [8].

Vaccine acceptance and uptake were also positively associated with COVID-19 knowledge, worry or fear regarding COVID-19, higher income, younger age, and testing negative for COVID-19. However, chronic disease and female gender reduced the odds of vaccine acceptance. The main reasons underpinning vaccine refusal in low- and middle-income countries including Nigeria, were misinformation, religious fanaticism, fear of side effects, cost, convenience of location, and lack of confidence in vaccine effectiveness, and environment [9].

The adverse health, economic and social effects caused by SARS COV2 infection prompted scientists, laboratories and pharmaceutical companies to implement a vaccine as a matter of urgency. Thus, several types of vaccine received approval already towards the end of 2020, in December while another fifty or so were still in development, with the ultimate aim of halting the progression of COVID-19 [5].

Vaccination, as one of the ways of preventing susceptible and infectious diseases, is therefore required. Vaccines have been identified as one of the most effective means of preventing new outbreaks of COVID-19. In addition, a successful long-term response to COVID-19 is estimated when herd immunity of 52% to 82% is achieved, but this can only be achieved through widespread vaccination. This protects individuals who have been vaccinated and also induces indirect protection (herd immunity) for the whole community by preventing person-to-person transmission [10].

Vaccination is a therapeutic procedure involving the introduction into a healthy subject of a pathogen (virus, bacterium, parasite, etc.) or one of its constituents, rendered non-offensive (inactivated or by attenuating its virulence) with the aim of stimulating the inoculated subject's immune system [7]. The various vaccines against SARS COV2 a COVID-19 infection are divided into four groups, namely: inactivated or live attenuated vaccines, protein-based vaccines containing harmless fragments of protein or protein envelope, viral vector vaccines containing harmless virus, RNA and DNA vaccines [11].

In the process of developing anti-COVID-19 vaccines, the WHO has authorized several of them under the Emergency Use Label (EUL) protocol. Seven vaccines have obtained WHO clearance for use in emergency mode. These are: Pfizer/BioNTech Comirnaty® vaccine, December 31, 2020; SII/COVISHIELD and AstraZeneca/AZD1222 vaccines, February 16, 2021; Janssen/Ad26.COV2.S vaccine developed by Johnson & Johnson, March 12, 2021; Moderna's anti-COVID-19 vaccine (mRNA 1273), April 30, 2021. Sinopharm's COVID-19 vaccine, May 7, 2021; Sinovac-CoronaVac vaccine, June 1, 2021; and Bharat Biotech's COVAXIN (BBV152) vaccine, November 3, 2021 [12].

Liberia was the first African country to have good COVID-19 vaccination coverage, reaching 66.2%, followed by Rwanda with 65.05% of the total population vaccinated. On the other hand, other African countries did not even reach half of the total vaccinated population. This was the case for Uganda with 27.02%, Gabon

with 10.77%, Mali with 9.34%, Senegal with 7.29% and Burundi with 0.18% for the period from October 30 to November 03, 2022 [13].

It was on April 19, 2021 that the National Minister of Public Health, Hygiene and Prevention officially launched the COVID-19 vaccination campaign in the Democratic Republic of Congo at the University Clinics of Kinshasa [14]. This preventive activity then continued in five other selected provinces: Haut-Katanga, Kongo-Central, Lualaba, Nord-Kivu and Sud-Kivu. Thanks to the COVAX mechanism, the country has received its first doses of anti-COVID-19 vaccine: some 1.7 million doses of Oxford-AstraZeneca, manufactured by the Serum Institute of India, have been delivered to the Congolese authorities. As of November 03, 2022, the DRC had achieved 3.76% vaccination coverage [13].

Mass vaccination against COVID-19 in Maniema was officially launched on Thursday March 03, 2022, and involved all 18 health zones in the province at 98 selected sites, including 10 in the Kindu health zone. The expected target for mass vaccination against COVID-19 was 14,063 adults, vaccinated at a rate of 100 per day for 14 days at the 10 sites. At the end of the campaign, only 3,595 people were vaccinated during the planned 14 days, to which 3 days of mop-up were added [15].

Our aim in conducting this study was to determine the proportion of the study population vaccinated and unvaccinated, and to identify obstacles to vaccination against COVID-19 in the Kindu health zone,

2. Methods

Our study of obstacles to COVID-19 vaccination was conducted in the Kindu health zone. We conducted a cross-sectional descriptive study with an analytical focus, using a questionnaire that enabled us to carry out a survey from October 03 to 30, 2022.

Our target population consisted of Kindu city residents living within the geographical boundaries of the Kindu health zone. We proceeded by quota sampling, which corresponded to the health area of the Kindu health zone. We surveyed 420 people, 42 per fixed campaign vaccination site.

We went to each anti-COVID vaccination site corresponding to the health area of the Kindu health zone at 08:00 and recruited respondents according to whether they came to the facility. Each site was visited on two successive days, with the exception of Sunday. The questionnaire consisted essentially of five parts: socio-demographic characteristics of the population, advantages of being vaccinated against COVID-19, reasons (barriers) for not being vaccinated against COVID-19 here in Kindu, fears about the COVID-19 vaccine and reasons for being vaccinated against COVID-19.

The data generated enabled us to calculate proportions, averages, standard deviations and extremes. The data were first entered into Excel 2010 and then exported to SPSS version 20 software, which enabled us to use bivariate analysis to search for associations between variables; the association was deemed statistically

significant when the p-value was less than 5% (p-value<5%). To this end, the research protocol was submitted to the national ethics committee of the Democratic Republic of Congo for approval under number 394/CNES/BN/PMMF/2022 for 01/10/2022.

3. Results

3.1. Proportion of Respondents Vaccinated against COVID-19

According to the figure below, 420 people took part in this study, during which 161 respondents had already received the COVID-19 vaccine, *i.e.* a proportion of 38.3% compared with 61.7% of those not vaccinated (Figure 1).

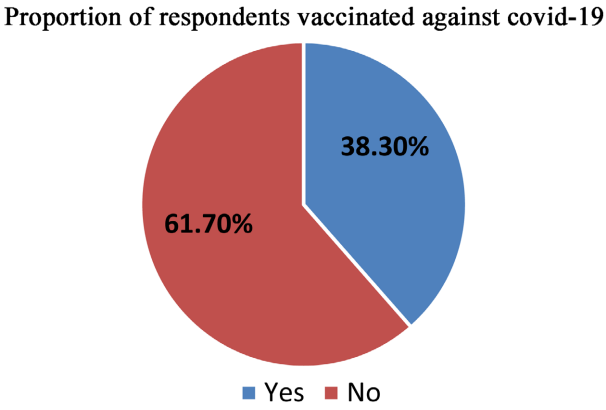

Figure 1. Distribution of respondents according to whether or not they had been vaccinated against COVID-19.

3.2. Socio-Demographic Data and COVID-19 Vaccination Statutes

As shown in Table 1, the majority of unmarried respondents (83.2%) did not vaccinate (p = 0.001); the majority of primary level respondents did not receive the COVID-19 vaccine (p = 0.021); those working in the private sector were predominantly unvaccinated against COVID-19 (p = 0.001). Respondents from so-called traditional religions did not accept vaccination (p = 0.001).

Table 1. Socio-demographic characteristics and COVID-19 vaccination statutes.

	Respondents vaccinated against COVID-19 yes/no		p value
	Yes (n = 161) n (%)	No (n = 259) n (%)	
Age range (years)			
18 - 32	68 (27.4)	180 (72.6)	0.063
33 - 78	93 (54.1)	79 (45.9)	
Sex			
F	126 (40.6)	184 (59.4)	0.975
M	35 (31.8)	75 (68.2)	

Continued

Marital status			
Single	16 (16.8)	79 (83.2)	0.001
Married	145 (45.5)	174 (54.5)	
Widowed	0 (0)	6 (100)	
Level of education			
Primary	8 (29.6)	19 (70.4)	0.021
Secondary	72 (33.2)	145 (66.8)	
Higher (University)	81 (46.0)	95 (54.0)	
Municipality of residence			
Kasuku	77 (38.3)	124 (61.7)	0.536
Mikelenge	84 (38.4)	135 (61.6)	
Profession			
Government employee	53 (55.2)	43 (44.8)	0.001
Private/liberal agent	102 (32.0)	216 (68.0)	
None	6 (100)	0 (0)	
Religion			
Christian	123 (41)	177 (59.0)	0.001
Muslim	17 (23.3)	56 (76.7)	
Traditional	2 (12.5)	14 (87.5)	
None	19 (61.3)	12 (38.7)	

3.3. Types of Vaccines and Reasons for Vaccination

Table 2 shows that, the Johnson & Johnson vaccine (42.2%) was the one most used by our respondents, but there was no statistically significant difference (p = 0.889) with the other types of vaccine against COVID-19; regarding the choice of the type of vaccine, better efficacy (36.0%) was judged to be the main motivation compared with the others, but the difference was not statistically significant (p = 0.746); the same applies to the reason for vaccination: in 36.6% of cases, fear of contracting COVID-19 was the main motivation, but the difference was not statistically significant.

3.4. Distribution of Respondents According to Their Perception of COVID-19 Vaccines

In Table 3, we present distribution of respondents according to their perception of COVID-19 vaccines.

Table 3 shows that some respondents who had not been vaccinated perceived the anti-COVID-19 vaccine as a source of trade (p = 0.001), but also as a means of securing the workplace (p = 0.001); infodemia (100%), lack of belief in

Table 2. Types of vaccines and reasons for vaccination.

	Respondents vaccinated against COVID-19 (n = 161)		p value
	n	%	
Types of vaccines			
Astrazeneca	11	6.8	0.882
Johnson Johnson	68	42.2	
Moderna	42	26	
P-Fizer	6	3.7	
Sinonvac	12	7.5	
Unknown	22	13.7	
Reasons for choice of vaccine			
None	5	3.1	0.746
Better efficiency	58	36	
Influence of a loved one	41	25.5	
Vaccinator's preference	17	10.6	
Protection against COVID-19	6	3.7	
Single dose	34	21.1	
Motivations for vaccination			
None	5	3.1	0.919
Work constraints	6	3.7	
Fear of contracting COVID-19	59	36.6	
Ease of travel	12	7.5	
Influence of a relation	6	3.7	
Opportunity	10	6.2	
Fear of death from COVID-19	53	32.9	
Respect government orders	10	6.2	

Table 3. Distribution of respondents according to their perception of COVID-19 vaccines.

Variables	Respondents vaccinated against COVID-19 yes/no			P value
	Total n = 420 (%)	Yes n (%)	No n (%)	
Perceived benefits				
None	177 (42.1%)	13 (7.3%)	164 (92.7%)	0.001
COVID-19 seen as a source of trade	6 (1.4%)	0 (0%)	6 (100%)	
Gift of herd immunity	74 (17.6%)	51 (68.5%)	23 (31.1%)	
Ease of travel	23 (5.5%)	12 (52.2%)	11 (47.8%)	
Opportunity	11 (2.6%)	6 (54.5%)	5 (45.5%)	

Continued

Effective protection against severe forms	76 (18.1%)	41 (53.9%)	35 (46.1%)	
Securing one's job	5 (1.2%)	0(0%)	5(100%)	
Free and accessible vaccines	48 (11.5%)	33 (68.8%)	15 (31.2%)	
Perceived barriers				
None	45 (10.8%)	17 (37.8%)	28 (62.2%)	0.001
Fear of side effects	57 (13.6%)	12 (21%)	45 (79%)	
Doubts about vaccine safety	122 (29.0%)	53 (43.4%)	69 (56.6%)	
low awareness	77 (18.3%)	50 (64.9%)	27 (35.1%)	
Infodemia	5 (1.2%)	0 (0%)	5 (100%)	
Lack of belief in the efficacy of the vaccine	22 (5.2%)	0 (0%)	22 (100%)	
No belief in the existence of COVID-19 in Kindu	70 (16.7%)	23 (32.9%)	47 (67.1%)	
Fear of being infected or infecting others	16 (3.8%)	6 (37.5%)	10 (62.5%)	
Observance of ethnic convictions	6 (1.4%)	0 (0%)	6 (100%)	
Perceived seriousness				
None	73 (17.4%)	32 (43.8%)	41 (56.2%)	0.004
Fear of becoming sterile	28 (6.7%)	17 (60.7%)	11 (39.3%)	
Fear of death	225 (53.6%)	87 (38.7%)	138 (61.3%)	
Fear of being watched at a distance	45 (10.7%)	14 (31.1%)	31 (68.5%)	
Fear of being branded with the "666" badge of the beast	39 (9.3%)	6 (15.4%)	33 (84.6%)	
Fear of being paralyzed	10 (2.3%)	5 (50%)	5 (50%)	

the efficacy of the efficacy of vaccines (100%), respect for ethnic norms (100%), were identified as major barriers to vaccination, as the difference was statistically significant compared to other barriers (p = 0.001). In terms of perceived seriousness, fear of being branded with the by the beast badge. In terms of perceived severity, the fear of being branded with the "666" beast badge was identified more than any other barrier, and the tests were statistically significant (p = 0.001). tests were statistically significant (p = 0.004); fear of catching viral hepatitis viral hepatitis, being infected with COVID-19, being infected with HIV, the fear of catching poliomyelitis emerged as the most likely factors preventing our respondents from being vaccinated (p = 0.001).

4. Discussion

Proportion of vaccinated and unvaccinated people

At the end of this study, we found a vaccination rate of 38.30% among respondents in the Kindu health zone. This result differs from that found among emergency medical services professionals in the USA, where the vaccination rate was 69.8% [16]. This difference can be explained by the fact that our survey was aimed

at the general population, who unfortunately did not receive the right information during the awareness campaign, whereas the Gragory *et al.* survey was aimed at emergency medical service (EMS) professionals. This category of healthcare professionals is always on the front line of emergency care and is therefore exposed to infection by COVID-19. Hence, it is important to have mass vaccination for EMS.

Bivariate analysis

In the bivariate analysis, we found that respondents who were single (p = 0.001), had a primary level of education (p = 0.021), worked in the private/liberal sector (p = 0.001), and were of traditional religion (p = 0.001) did not receive the majority of COVID-19 vaccinations in our study environment. This finding differs, in terms of marital status, from the study carried out in Uganda, in which married students were more likely than unmarried students not to be vaccinated [17]. A meta-analysis by Limbu *et al.* showed that race and ethnicity, marital status, employment and profession were significantly associated with reluctance to be vaccinated [18]. Bard *et al.* found that married people were less likely to vaccinate, unemployed people were more likely to hesitate to vaccinate [19]. Religious health fatalism, *i.e.* the belief that the outcome of a person's health status is an absolute will of a higher power beyond the person's own control, is a disincentive to participation in health promotion programs, health care utilization and health decision-making [20].

Vaccination benefits perceived by respondents among the unvaccinated

Despite not having received the vaccine, some respondents perceived the COVID-19 vaccine as a source of trade (p = 0.001), but also as a means of securing the workplace (p = 0.001). From the analysis of this result, it is clear that some respondents in our environment do not have the right information about the real benefits of the COVID-19 vaccine. According to the meta-analysis by Limbu *et al.* perceived benefits were inversely associated with reluctance to be vaccinated against COVID-19. The result of this study is consistent with the health belief model and suggests that individuals are likely to vaccinate when they do not see benefits to these behaviors [18]. Thus, it is imperative to multiply efforts to ensure that communication about vaccines leads to a reduction in misinformation. Vaccination plays an essential role in mitigating the impact of COVID-19 and other diseases. Previous research has linked misinformation, including that spread on social media, to increased hesitancy and lower vaccination rates [21].

Barriers and perceived seriousness of COVID-19 vaccination among the unvaccinated

Non-belief in the efficacy of COVID-19 vaccines, infodemia and adherence to ethnic norms were identified as perceived barriers to COVID-19 vaccination, the difference being statistically significant (p = 0.001) compared with the other barriers listed.

Fear of being branded with the "666" beast badge was also identified as perceived severity, the difference being statistically significant (p = 004).

Magadmi *et al.* identified fear of side effects (79.9%) as the major obstacle to

COVID-19 vaccination in their study population [22]. The widespread dissemination of rumors and conspiracy theories about COVID-19 vaccines on the media (radio, television,...), on social networks (Facebook, WhatsApp, Twitter,...) in 2021 is eloquent proof that there was an audience for this type of content, perhaps fueled by mistrust of scientific discoveries and decisions made by countries' health and government authorities [21]. Added to this are the contradictions between the scientists on the appropriateness of the COVID-19 vaccine, on the one hand those who are in favor and on the other hand those who are against.

Studies have shown that much of the information about vaccines on popular social media sites are anti-vaccination messages posted by very active groups reluctant to vaccinate. Around April 2020, there was a strong media reaction in the DRC when it was announced by the head of the Congolese COVID working group that clinical trials of COVID-19 vaccine were planned in the DRC. People feared that the Congolese would be used as guinea pigs. To calm the situation, the head of the COVID working group had to explain on television that only vaccines that had already been tested in Europe and the USA would be tested [23].

Our results are also evidence that the population of the Kindu health zone was also affected by the misinformation. It is therefore more urgent than ever for the World Health Organization to influence decision-makers in social networks to implement some sort of filter to limit the spread of information that is damaging the world's population, especially in terms of healthcare.

5. Limit of the Study

This study has its limitations, in particular that of not having researched the factors associated with non-vaccination, of having limited the collection of data only in the health zone of Kindu while the town of Kindu has two zones of health, to have recruited the participants who attended the structures selected for the survey.

6. Conclusion

This study shows a low vaccination rate, and a high rate of refusal to vaccinate against COVID-19. Some factors were identified as being linked to refusal to be vaccinated, notably marital status, level of education, profession and religion. Some non-vaccinated respondents identified non-belief in the efficacy of vaccines, infodemia, respect for ethical standards as perceived barriers, and fear of being branded with the "666" beast badge as perceived severity. Infection with viral hepatitis, HIV, COVID-19 and poliomyelitis were identified as perceived susceptibility by our respondents. Some unvaccinated respondents attributed perceived advantages to vaccination against COVID-19 as a source of trade and a means of securing the workplace.

Ethical Approval and Consent to Participate

Before the start of data collection, the protocol for this study was submitted to the DRC's national ethics committee and received approval under the number

394/CNES/BN/PMMF/2022 for 01/10/2022. Participants had given their free and informed consent.

Availability of Data and Materials

Data sets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Our Study's Contribution to Knowledge

To create a pool of former COVID-19 vaccinees, "vaccine experts", who will share their experience of the vaccine with those who are hesitant.

Authors' Contributions

Dr Antoine Lufimbo Katawandja is the principal investigator under the coordination of Professor Simon-Decap. Pr Imani Ramazani and Dr Jimmy YUMA ILEMBA contributed to the writing of the article.

Funding

The present research submitted to your journal has not benefited from any external funding from any donor in the conceptualization, design, data collection, analysis, publication decision or preparation of the manuscript.

Acknowledgements

We would like to express our deep gratitude to all those who agreed to take part in this survey.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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