Determinants of COVID-19 vaccination acceptance among workers at an oil company, Pointe-Noire (Congo)

Abstract

Objective: To identify the determinants of acceptance for vaccination against COVID-19. **Materials and Methods:** This was an analytical cross-sectional study, conducted from May to June 2021 among oil company workers. The data was collected using a questionnaire designed with KoboCollect software, the link to which was emailed to the workers. **Results:** Of the company's 703 workers, 224 (31.86%) consented to the study, of whom 172 (76.78%) were men and 52 (23.21%) were women. The vaccination acceptance rate was 45.09%. The median age of workers who accepted vaccination was 42 years compared to 37 years for those who did not. There was no influence on sex (p=0.64549), marital status (p>0.05), previous COVID-19 infection (p=0.11588), and information received on COVID-19 and vaccination (p=0.58804). On the other hand, education level (p=0.04230); 55.7% of managers (p=0.000001), 50% of clerical staff (p=0.02846), 57.83% of staff with COVID-19-related deaths in their environment (p=0.00328) and 68.06% of workers with vaccinated surroundings (p=0.00000) were in favor of vaccination. The main reasons for refusing vaccination or hesitation were the lack of regression on vaccines and the fear of developing side reactions **Conclusion:** The refusal/hesitation rate is a concern. Several barriers have been identified, and efforts should be intensified to overcome these barriers.

Keywords: COVID-19, vaccines, acceptance, determinants, oil company, Pointe-Noire.

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Introduction

New coronavirus disease (COVID-19) is a major threat to people around the world. Its advent in 2019 has resulted in an unparalleled global effort to control and curb its spread. Current non-specific interventions, such as social distancing, personal hygiene and quarantine, can slow the spread of the virus and flatten the epidemic curve [1]. The COVID-19 pandemic cannot stop unless collective immunity is established within the population. Such a situation is usually acquired through community infection or vaccination [2]. As a result, high immunization coverage is required to achieve collective immunity and thus end the COVID-19 pandemic. The development and deployment of a vaccine is therefore one of the most promising strategies in this crisis. In December 2020, several vaccines were authorized to prevent COVID-19 infection [3] and more than 50 vaccine candidates for Covid-19 vaccination were under development [4].

The launch of the COVID-19 vaccination program began on March 25, 2021 in the Republic of Congo with the BBIBP-CorV vaccine (Sinopharm, Beijing CNBG) and the Sputnik V or Gam-COVID-Vac vaccine. [5]. During the initial phase of the launch of the vaccination programme, beneficiaries over the age of 18 were advised to receive at least two doses within 28 days. The vaccine is free and participation in the vaccination campaign is voluntary. Despite these efforts on the part of the government, the public response, especially at the beginning of the first phase of vaccination, was no less dismal. The overall national participation rate was about 0.89%, while only 0.2% of the expected population was fully vaccinated as of May 04, 2021 [6].

The above figures suggest that the population was unaware of the vaccination program or was afraid or hesitant to do so. At this stage, the connotation of hesitancy to take a vaccine can easily be seen as a “delay in approval or refusal of vaccination” and one of the top ten global health risks, as proposed by the World Health Organization’s Strategic Advisory Committee of Immunization Experts [7]. Reluctance to be vaccinated and misinformation in many countries are barriers to population coverage and vaccination [8, 9].

However, no studies have been reported on the acceptance of the COVID-19 vaccine in the Congo, particularly among workers as a known labour force. Therefore, the objective of this study was to identify the determinants of acceptance for COVID-19 vaccination among workers at an oil exploration and production company in Pointe-Noire.

Materials and methods

The study was conducted by TotalEnergies Congo, an oil exploration and production company based in the Pointe-Noire department. This was a cross-sectional descriptive study conducted from May 15 to June 15, 2021 for a duration of one (1) month.

The study population, recruited on a comprehensive sampling method, consisted of workers working in administrative sites at Pointe-Noire, onshore sites (Djeno oil terminal) and offshore sites, present at the time of the survey and agreed to participate.

The data was collected using an anonymous self-administered questionnaire developed with the KoboCollect software and the link to the questionnaire was emailed to all company workers. The online approach is currently being used to avoid further physical contact as it may pose a risk of spreading COVID-19 infection.

The questionnaire consisted of three main sections. The first section collected information on the socio-professional characteristics of respondents, including age, sex, marital status, level of education, function, work site. The second section collected information on advice received related to immunization, previous COVID-19 infection, care of a person infected with COVID-19, death related to COVID-19 in their environment, and anti-flu vaccination.COVID-19 in the community. The third section collected information on the acceptance of COVID-19 vaccination.

The data processing software Graphpad Prism version 5.0.0.288 and Microsoft Excel version 8 were used for data processing and graph development.

The calculation of the position (median and mean) and dispersion (variance and standard deviation) parameters of the quantitative variables, as well as the frequency calculation for the qualitative variables, constituted the univariate analysis of this study.

The bivariate analysis was made by calculating the P-values with the data comparison program which uses the chi2 $^{or\ Mann-}$Whitney test.The p-value was set at less than or equal to 0.05.

Results

Out of a total of 703 oil company workers who received the online questionnaire, 224 completed it (participation rate of 31.86%). Of the 224 participants, 101 respondents (45.09%) were willing to receive the COVID-19 vaccine, while 123 (54.91%) were not willing to be vaccinated.

The age extremes were 21 and 60 years with an average age of 39.88 8.14 years. The median age was 39 years. The sex ratio (F/H) was 0.30.

Table I shows the distribution of the frequency of acceptance of COVID-19 vaccination by the different characteristics of the participants.

Employees who accepted COVID-19 vaccination were older (Figure 1). Their median age was 42 years, while they were 37 years old in the group who refused COVID-19 vaccination (p=0.0000).

The population in this survey was predominantly male (76.79%). The distribution of acceptance of COVID-19 vaccination was equal in both sexes.

Executives who represented the majority of the population participating in this survey were more favourable to vaccination (55.70%) than non-managers (24.00%). The same was true for workers who held positions in the company's administrative offices (50.00%) compared to 34.29% of those who worked on the company's onshore or offshore yards. In addition, the percentage of acceptance increased gradually with the level of education of workers.

Based on the worker's personal history and experience with COVID-19, workers who had had a loved one who had died of COVID-19 or had been vaccinated against COVID-19 were more likely to accept COVID-19 vaccination. Vaccination acceptance rates were also found to be higher than 45% among workers who sought advice on COVID-19 vaccines or who had been previously infected with COVID-19 or who provided care to a COVID-19 patient. In these latter situations, the differences observed with their colleagues who did not have this history were not significant. Table III presents the distribution of acceptance of COVID-19 vaccination based on workers' history and experience with COVID-19.

In this study, the reasons why workers were not willing to be vaccinated are presented in Figure 2. Among the reasons given, 26.83% mentioned the lack of regression in vaccines and fears of adverse effects of the vaccine (21,14 %). The fact that COVID-19 was not serious was cited as a source of refusal (13.01%) just as workers were waiting to see how the vaccine would react in those who had already been vaccinated (13.01%). The least of the reasons was that some workers believed that COVID-19 management was effective in the Congo.

Discussion

This study is one of the first estimates of COVID-19 vaccination intent among workers in the Congo. These results can be used to inform future projections of vaccine use in particular and in general across the population.

The prospective nature of this study ensures optimum quality of the results found. The collection of information being contemporary of the described events, has made it possible to guarantee the reliability of the information thus avoiding any notification bias. The exhaustive nature of the study made it possible to minimise selection bias. However, it is worth considering the possible limitations of the study and one of the main limitations is the cross-sectional design of the study and the lack of available data on non-respondents. Another limitation is that this study does not involve causality, as it does not use methods of causal identification. Finally, the use of an online survey could have an impact on the generalization of the study to the general population.

The results showed that 54.91% of company workers did not want to be vaccinated against COVID-19 compared to 45.09% of the sample who were willing to receive the COVID-19 vaccine. This vaccination acceptance rate was close to those found in Nigeria [10] and Egypt among health workers [11] and slightly lower than the 50.5% and 53.6% found in Saudi Arabia [12] and Uganda respectively [13]. On the other hand, some studies have found vaccination acceptance rates ranging from 66% to 86% [14-19].

Two reasons could explain this low observed rate. First, this study was conducted less than two months after health authorities launched the national COVID-19 vaccination campaign. During this period, the spread of anti-vaccination misinformation on various social media platforms has intensified, This could have created doubts about the available vaccines not approved by the European Medicines Agency and the US Federal Agency for Food and Medicinal Products. Second, the low number of new confirmed cases of COVID-19 in the country, which in turn could alleviate workers' concerns and contribute to weakening immunization intentions.

Consistent with previous findings of the United States of America [20] of Australia [21] and Saudi Arabia [12] regarding the acceptance of COVID-vaccines19, this study found that concerns about the lack of backsliding on vaccines and the fear of adverse reactions were the most important predictors of vaccine rejection. Workers at this company also identified the fact that COVID-19 was not serious and the expectation related to the onset of reactions in those who have already been vaccinated. Together, these findings support the results of previous studies on vaccine uptake during the influenza pandemic [22].

Contrary to the findings of this study, other works suggests that there is no link between worker acceptance and age [12, 15, 23]. It can therefore be argued that the risk of being infected with

COVID-19 and the importance of vaccination is best perceived by workers over the age of 42, executives in the company with a level of education. The executives of this company should be exemplary to promote the membership of the members of their teams and also follow the policy of encouragement of vaccination prescribed by the high management of the company.

In terms of sex, unlike other authors [10, 12,16, 23], gender has not been a determining factor in the acceptance of COVID-19 vaccination although in the country men are the most infected with COVID-19 [6]. The same was true for marital status, the acceptance rate for COVID-19 vaccination was quite similar among married workers compared to single workers. This finding was also made in Indonesia [15], Saudi Arabia [12] and Nigeria [10].

In our study, immunization of a worker's immediate family member against COVID-19 or the death of a person in the COVID-19 worker's immediate family were factors in the acceptance of vaccination. The rate of acceptance of vaccination among workers who had already experienced this experience in their surroundings was much higher among their colleagues who had not experienced it. This could be explained by the fact that the severity of the disease, which is fatal, and the safety of the vaccines were better perceived by these workers. For similar reasons, the intention to vaccinate against COVID-19 was also higher among workers who had previously had COVID-19, but the differences observed were not significant with those who had never had the disease. This is contrary to the finding in Nigeria where the authors found that a pre-COVID-19 infection was a significant factor in vaccine acceptance [10].

However, the request for advice on COVID-19 vaccines and the care provided to a person with COVID-19 were not acceptance factors in our study because vaccination acceptance rates were low (less than 50%) and equivalents in the other group of workers. On the other hand, the authors in Nigeria found that a notion of COVID-19 in the community was a significant factor in the acceptance of vaccination [10]. As for the request for information on COVID-19 vaccines, the authors in Vietnam found that it was associated with a higher acceptance rate among health care workers [14]. These differences could be explained, on the one hand, by the fact that at the time of the study, the COVID-19 pandemic in Congo had a low incidence and fatality rate. On the other hand, the vaccines approved and made available by the country's health authorities were not approved by the European Union and the United States of America, since the workers of this company, which is a French multinational, were very cosmopolitan and moving.

Conclusion

This study showed that the rate of non-acceptance of COVID-19 vaccination was a concern in this population of workers. It also identified the reasons for this refusal and/or hesitation. Faced with this reality, it becomes imperative to target communication with the workers of this company in particular and with all workers and the general population. The goal of this heightened awareness of well-identified language elements will be to engage workers massively in COVID-19 vaccination, which remains one of the most effective ways to end this pandemic.

References

1. Chen, R., Zhang, Y., Huang, L., Cheng, B. H., Xia, Z. Y., & Meng, Q. T. (2020). Safety and efficacy of different anesthetic regimens for parturients with COVID-19 undergoing Cesarean delivery: a case series of 17 patients. *Canadian Journal of Anesthesia/Journal canadien d'anesthésie*, *67*(6), 655-663.
2. World Health Organization (WHO)Vaccines and immunization. Available online at: https://www.who.int/health-topics/vaccines-and-immunization#tab=tab_11 (accessed October 11, 2021
3. Centers for Disease Control and Prevention. Different COVID-19 *Vaccines | CDC. Available online at: https://www.cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines.html (accessed November 31, 2021)*
4. World Health Organization (WHO). COVID-19 vaccines. The push for a COVID-19 vaccine. Available online at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/covid-19-Vaccines?gclid=Cj0KCQjw2or8BRCNARIsAC_ppyYWO0oDbvpd9sqLLJWdKFEjk55hNRAllDrsejAc9bXJtb4lzTWr5F8aAoa8EALw_wcB (accessed October 11, 2021)
5. World Health Organization (WHO). Response to the COVID-19 outbreak in Congo. SITREP No. 137 of 1 April 2021. Available online at: https://www.afro.who.int/sites/default/files/2021-09/SITREP_N_137-COVID-19-CONGO_du_31_Mars%202021%20VS%20AMD.pdf (accessed November 11, 2021)
6. World Health Organization (WHO). Response to the COVID-19 outbreak in Congo SITREP No. 141 of 04 May 2021. Available online at: https://www.afro.who.int/sites/default/files/2021-

09/SITREP_N_141-COVID-19-CONGO_du_04_MAI%202021%20VF.pdf (accessed November 11, 2021).

7. MacDonald, N. E. (2015). Vaccine hesitancy: Definition, scope and determinants. *Vaccine, 33*(34), 4161-4164.
8. Lane, S., MacDonald, N. E., Marti, M., & Dumolard, L. (2018). Vaccine hesitancy around the globe: a three year assessment of data from the annual WHO/UNICEF Joint Reporting Form. *Vaccine, 36*(26), 3861-3867.
9. Larson, H. J., Clarke, R. M., Jarrett, C., Eckersberger, E., Levine, Z., Schulz, W. S., & Paterson, P. (2018). Measuring trust in vaccination: A systematic review. *Human vaccines & immunotherapeutics, 14*(7), 1599-1609.
10. Josiah, B. O., & Kantaris, M. (2021). Perception of Covid-19 and Acceptance of Vaccination in Delta State Nigeria. *The Nigerian Health Journal, 21(2),* 60-86.
11. Mohamed-Hussein, A. A., Makhlouf, H., Abd El Aal, H., Kholief, K., Saad, M. M., & Abdellal, D. A. (2021). A national survey of potential acceptance of COVID-19 vaccines in healthcare workers in Egypt. *medRxiv* Available online at:

https://doi.org/10.1101/2021.01.11.21249324 (accessed december 18, 2021)

12. Qattan, A., Alshareef, N., Alsharqi, O., Al Rahahleh, N., Chirwa, G. C., & Al-Hanawi, M. K. (2021). Acceptability of a COVID-19 vaccine among healthcare workers in the Kingdom of Saudi Arabia. *Frontiers in Medicine*, 8, 83.
13. Echoru, I., Ajambo, P. D., & Bukenya, E. M. (2020). Acceptance and risk perception of *COVID-19* vaccine in Uganda: A Cross sectional study in Western Uganda. *Research square*. Available at online at: *https://doi.org/10.21203/rs.3.rs-78780/v1*
14. Huynh, G., Tran, T. T., Nguyen, H. T. N., & Pham, L. A. (2021). COVID-19 vaccination intention among healthcare workers in Vietnam. *Asian Pacific Journal of Tropical Medicine, 14(4),* 159-164 ;
15. De Harapan, H., Wagner, A. L., Yufika, A., Winardi, W., Anwar, S., & Gan, A. K. (2020). Acceptance of a COVID-19 vaccine in Southeast Asia: a cross-sectional study in Indonesia. *Front Public Health. 8:* 381 ;

16. Al-Sanafi, M., & Sallam, M. (2021). Psychological determinants of COVID-19 vaccine acceptance among healthcare workers in Kuwait: A cross-sectional study using the 5C and vaccine conspiracy beliefs scales. *Vaccines,* 9(7), 701
17. Xu, B., Gao, X., Zhang, X., Hu, Y., Yang, H., & Zhou, Y. H. (2021). Real-world acceptance of COVID-19 vaccines among healthcare workers in perinatal medicine in China. *Vaccines,* 9(7), 704 ;
18. Faezi, N. A., Gholizadeh, P., Sanogo, M., Oumarou, A., Mohamed, M. N., Cissoko, Y., ... & Kafil, H. S. (2021). Peoples' attitude toward COVID-19 vaccine, acceptance, and social trust among African and Middle East countries. *Health Promotion Perspectives,* 11(2), 171
19. Suresh, A., Konwarh, R., Singh, A. P., & Tiwari, A. K. (2021). Public awareness and acceptance of COVID-19 vaccine: An online cross-sectional survey, conducted in the first phase of vaccination drive in India *Research square*. Available at online at: https://doi.org/10.21203/rs.3.rs-324238/v1
20. Daly, M., & Robinson, E. (2020). Willingness to vaccinate against COVID-19 in the US: Longitudinal evidence from a nationally representative sample of adults from April-October 2020. *medRxiv*.. doi: 10.1101/2020.11.27.20239970 ,
21. Dodd, R. H., Cvejic, E., Bonner, C., Pickles, K., McCaffery, K. J., Ayre, J., ... & Nickel, B. (2021). Willingness to vaccinate against COVID-19 in Australia. *The Lancet Infectious Diseases, 21*(3), 318-319. doi: 10.1016/S1473-3099(20)30559-4
22. Bish, A., Yardley, L., Nicoll, A., & Michie, S. (2011). Factors associated with uptake of vaccination against pandemic influenza: a systematic review. *Vaccine,* 29(38), 6472-6484.
23. Barry M, Temsah M-H, Alhuzaimi A, Alamro N, Al-Eyadhy A, Aljamaan F, et al. (2021). COVID-19 vaccine confidence and hesitancy among health care workers: A cross-sectional survey from a MERS-CoV experienced nation.PLoS ONE 16(11): e0244415. https://doi.org/10.1371/journal.pone.0244415

List of tables and figures

Table I: Distribution of COVID-19 vaccination acceptance frequency by socio-professional characteristics.

	Acceptance			
	No	Yes		
Variables	**N (%)**	**N (%)**	**Total N (%)**	**P. value**
Sex				
Female	30 (57.68)	22 (42.31)	52 (23.41)	0.64549
Male	93 (54.07)	79 (45.93)	172 (76.79)	
Function				
Executive	66 (44.30)	83 (55.70)	149 (66.52)	0.00001
Non-Executive	57 (76.00)	18 (24.00)	75 (33.48)	
Marital status				
Single	44 (54.32)	37 (45.68)	81 (36.16)	0.89380
Married	79 (55.24)	64 (44.76)	143 (63.84)	
Level of education				
Baccalaureate	26 (74.29)	9 (25.71)	35 (15.62)	0,04230
License	38 (61.29)	24 (38.71)	62 (27.68)	
Master/Doctorate	59 (46.46)	68 (53.54)	127 (56.70)	
Work site				
Office	77 (50.00)	77 (50.00)	154 (68.5)	0.02846
on/offshore sites	46 (65.71)	24 (34.29)	70 (31.25)	

Table II: Distribution of COVID-19 Vaccine Acceptance based on Illness Experience

	Acceptance			
	No	Yes		
Variables	**N (%)**	**N (%)**	**Total N (%)**	**P. value**
Request Guidance on COVID-19 Vaccination				
No	69 (56.56)	53 (43.44)	122 (54.46)	0.58804
Yes	54 (52.94)	48 (47.06)	172 (76.79)	
Previous COVID-19 infection				
No	104 (57.46)	77 (42.54)	181 (80.80)	0.11588
Yes	19 (44.19)	24 (55.81)	43 (19.20)	
COVID-19 Patient Care				
No	103 (55.08)	84 (44.92)	187 (83.48)	0.90875
Yes	20 (54.05)	17 (45.95)	37 (16.52)	
COVID-19 related deaths in the environment				
No	88 (62.41)	53 (37.59)	141 (62.95)	0.00328
Yes	35 (42.17)	48 (57.83)	83 (37.05)	
COVID-19 vaccination in the environment				
No	100 (65.79)	52 (34.21)	152 (67.86)	0.00000
Yes	23 (31.94)	49 (68.06)	72 (32.14)	

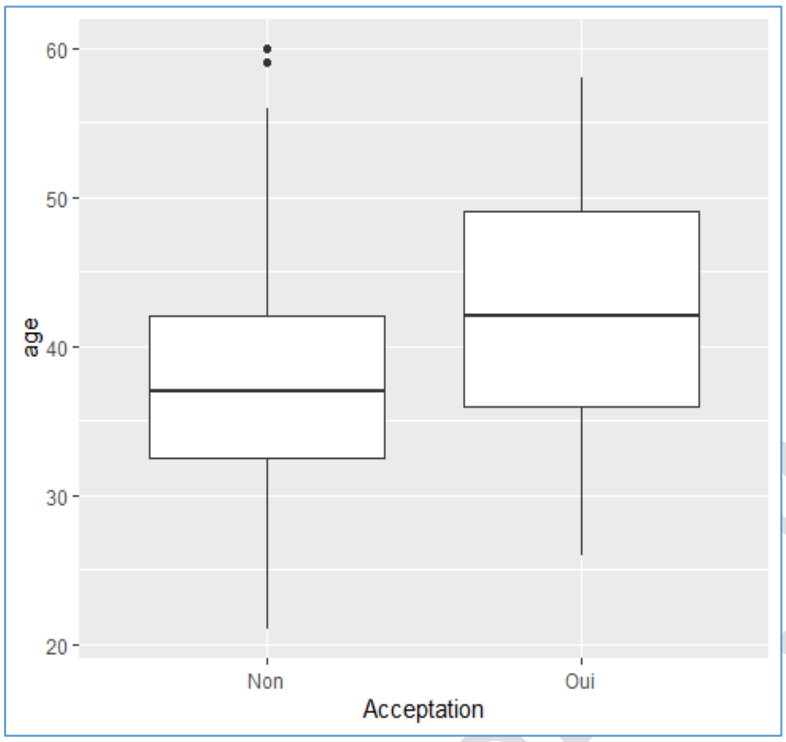

Figure 1: Distribution of Acceptance by Age of Participants

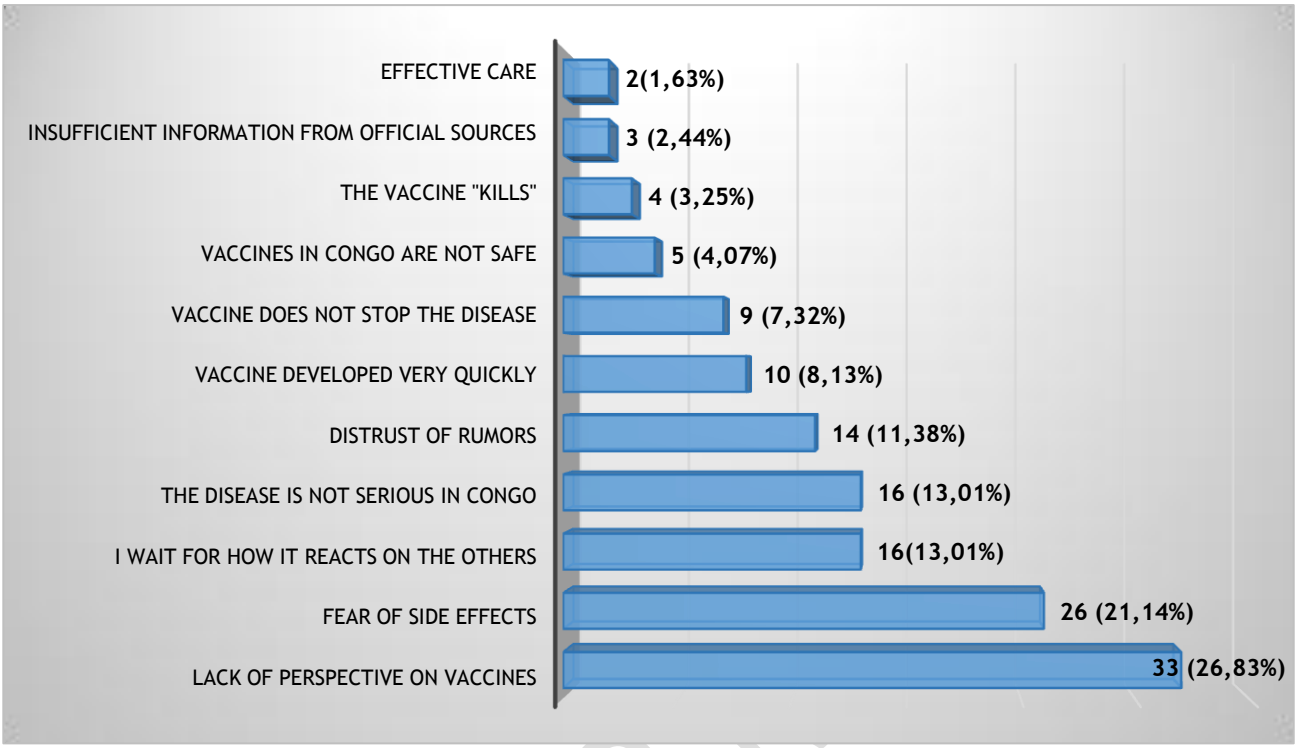

Figure 2: Reasons for not accepting COVID-19 vaccination