



Original Research

Attitudes and Practices of Travelers Regarding COVID-19 Vaccine and Adverse Reactions

Attitudes et pratiques des voyageurs vis-à-vis du vaccin COVID-19 et de ses effets indésirables

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ABSTRACT

Objective. In the context of the global COVID-19 pandemic, COVID-19 vaccines were made available to different countries. This study aimed to assess travelers' attitudes and practices toward the COVID vaccine and adverse events. **Methods.** A survey was conducted using a questionnaire from April 1 to June 30, 2021, among travelers who came for their COVID-19 test at the Institut Pasteur of Côte d'Ivoire. **Results.** A total of 527 travelers agreed to participate in this study, including 336 men and 161 women. Overall, 26% of respondents had already received their COVID-19 vaccine, while 76% of respondents responded they did not want to be vaccinated. The age of those most vaccinated (116) ranged from 25 to 64 years with a small proportion for those over 65 years (0.8%). Travelers (41) to France were the most vaccinated. All vaccinated persons (135) had a high level of education and were either Christian (89 persons), Muslim (45 persons) or animist (1 person). Adverse events related to the COVID vaccination were reported in seven individuals. These included muscle pain, fever and nausea. **Conclusion.** Negative attitudes towards vaccines are a major public health concern. In view of these results, for awareness raising, vaccination campaign may be focused on youth and people over 65 years of age. Public health messages containing information about vaccine safety should be tailored to address this vaccine hesitancy.

RÉSUMÉ

Objectif. Dans le contexte de la pandémie mondiale de COVID-19, des vaccins COVID-19 ont été mis à la disposition de différents pays. Cette étude visait à évaluer les attitudes et les pratiques des voyageurs envers le vaccin COVID et les effets indésirables. **Méthodes.** Une enquête a été menée à l'aide d'un questionnaire du 1er avril au 30 juin 2021, auprès des voyageurs venus pour leur test COVID-19 à l'Institut Pasteur de Côte d'Ivoire. **Résultats.** Au total, 527 voyageurs ont accepté de participer à cette étude, dont 336 hommes et 161 femmes. Dans l'ensemble, 26 % des répondants avaient déjà reçu leur vaccin contre la COVID-19, tandis que 76 % des répondants ont répondu qu'ils ne voulaient pas être vaccinés. L'âge des personnes les plus vaccinées (116) variait de 25 à 64 ans avec une faible proportion pour les plus de 65 ans (0,8%). Les voyageurs (41) en France étaient les plus vaccinés. Toutes les personnes vaccinées (135) avaient un niveau d'instruction élevé et étaient soit chrétiennes (89 personnes), musulmanes (45 personnes) ou animistes (1 personne). Des événements indésirables liés à la vaccination contre la COVID ont été signalés chez sept personnes. Ceux-ci comprenaient des douleurs musculaires, de la fièvre et des nausées. **Conclusion.** Les attitudes négatives envers les vaccins sont un problème majeur de santé publique. Au vu de ces résultats, dans un souci de sensibilisation, la campagne de vaccination pourra être centrée sur les jeunes et les personnes de plus de 65 ans. Les messages de santé publique contenant des informations sur la sécurité des vaccins doivent être adaptés pour répondre à cette réticence à la vaccination.

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INTRODUCTION

The COVID-19 pandemic has spread throughout the world, negatively impacting various aspects of society. One of the most promising strategies to reduce the virus, and save lives, is to develop an effective and safe vaccine. Researchers around the world have been working collaboratively to achieve this goal with several vaccine candidates being tested [1]. However, the issue of vaccine hesitancy is present in the population. In Switzerland, a population-based study was conducted to identify factors associated with vaccine hesitancy and to understand how the COVID-19 pandemic may have altered this hesitancy [2]. Similar studies conducted in France aimed at assessing attitudes towards the COVID-19 vaccine among health professionals in French Guiana in order to adjust the campaign to increase vaccine adherence [3]. In Africa, a survey on perception of COVID-19 vaccination was conducted between March 2020 and March 2021 in 22 countries [4,5]. All of these surveys indicate a genuine commitment by countries to find ways to gain acceptance of the Covid-19 vaccine in order to protect the maximum number of people.

Côte d'Ivoire is not immune to this vaccine hesitancy. In an article published on September 7, 2021, the World Bank states that one month after the launch of the vaccination campaign with great fanfare, the great enthusiasm generated by the delivery of 504,000 doses of AstraZeneca vaccine on February 26, 2021, quickly gave way to major concerns caused by a very low level of support from the target population. The National Security Council decided to expand access to the COVID-19 vaccine to all Ivoirians over the age of 18 to accelerate the pace. No major change, but distrust of vaccines remains high in Abidjan (Côte d'Ivoire) where wild rumors are spreading like wildfire on social networks. While they are able to accommodate up to 300 people per day, the vaccination centers in the capital and its surroundings are struggling to reach 20 people. In the immediate future, tens of thousands of Ivoirians must be convinced of the effectiveness of the vaccines and, above all, the wild rumors about the harmful, even fatal, side effects of the vaccines must be put to rest.

This study is part of that effort. We thought it would be interesting to explore attitudes and practices regarding the COVID-19 vaccine, adverse events, and compliance with barrier measures among travelers who came to the Institut Pasteur of Côte d'Ivoire for their COVID-19.

MATERIALS AND METHODS

Study framework and inclusion criteria

This study was carried out using a questionnaire administered to travelers who came for their COVID-19 tests to the COVID management center at the Institut Pasteur of Côte d'Ivoire (Cocody/Abidjan). This center was devoted to travelers for solving the different problems related to COVID-19 tests and to manage emergency cases.

Prior to conducting the survey, free and informed consent was sought from the travelers. Only those who gave

consent were included in this study. Inclusion was done as travelers came to the center over a three-month period.

Survey

The surveys were conducted from April to June 2021 using a semi-structured survey. The main information sought included sociodemographic status, destination, COVID-19 vaccine, adverse events after vaccine administration, herbal use in the last 12 months prior to the survey, herbal use against these adverse events, and compliance with barrier measures. The language used for the interviews was mainly French. In some cases, a translator was used for travelers who did not speak French.

Data processing and statistical analysis

The data were recorded on Excel sheet. For the statistical analysis of the data, p-values were obtained from chi-square tests at the 5% threshold. When the conditions for the application of chi-2 were not met (number of cells less than 5 and/or total number of cells less than 30), a Fisher's exact test at the 5% threshold was applied.

RESULTS

Socio-demographic characteristics of travelers surveyed

A total of 527 travelers were interviewed during the three months of the surveys (Table I).

Table I: Socio-demographic characteristics of travelers surveyed

Characteristics	Number	%
Gender		
Men	366	69,45
Women	161	30,55
Total		100
Age		
[0-24]	47	8,93
[25-40]	228	43,26
[41-64]	231	43,83
> 65	21	3,98
Total		100
Marital status		
Bachelor	193	36,62
Married	329	62,43
Divorced	1	0,19
Widow / Widower	4	0,76
Total		100
Education level		
None	1	0,19
Koranic	2	0,38
Primary	13	2,47
Secondary school	37	7,02
Superior	474	89,94
Total		100

The majority of those interviewed were men (69.45%). Travelers to France (28.46%) were the most numerous. The most represented age groups were 41-64 (43.83%) and 25-40 years (43.26%). The percentage of married persons (62.42%) was higher than the percentage of single persons (36.63%), for a low proportion of widows and widowers (0.74%) and divorced persons (0.19%). The

level of education reveals that the travelers surveyed have a higher level of education (89.94%) (Table I). The other levels, i.e., unschooled, Koranic, primary and secondary, represent 0.19%, 0.38%, 2.47% and 7.02% respectively. When considering the occupation of the travelers, a diversity was noted. Entrepreneurs (13.85%), traders (12.66%), company directors (12.33%), students (8.54%) and health workers (6.45%) are in the majority.

COVID-19 Vaccine

Of the 527 travelers surveyed, 135 people had been vaccinated against COVID-19, a proportion of 26% (Figure 1). Considering gender, 87 men (16.50%) and 48 women (9.10%) were vaccinated. We note that there is no significant difference ($X^2 = 1.8376$; $P = 0.1752$) between gender for Covid-19 vaccine. Thus, gender did not influence vaccination. The most vaccinated age groups were 25-64 years with 116 persons (22.01%) and 15-24 years with 15 persons (2.85%). A low proportion of vaccinated persons over 65 years old was noted (0.8%). Travelers to France were the most vaccinated with 41 persons (7.78%). In terms of religion, 89 people (16.88%) practicing the Christian religion were vaccinated, compared to 45 Muslims (8.53%). Only 0.2% of animists (1 person) were vaccinated. The difference between religion for vaccination was not significant ($X^2 = 4.085$; $P = 0.5372$). Religion did not influence vaccination. Considering the level of education, 130 people (24.64%) with a higher academic level were vaccinated. For this other parameter, the difference is significant ($X^2 = 15.252$; $P = 0.0042$) between the levels of education. The most educated people were vaccinated.

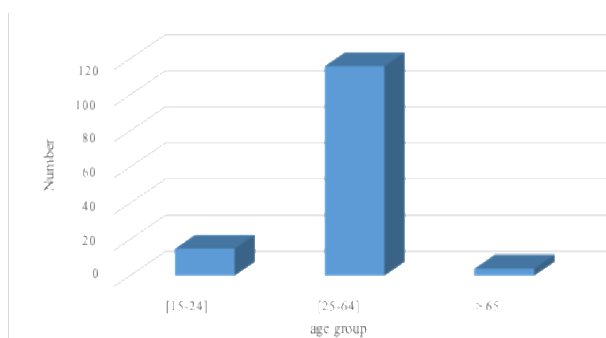


Figure 1: Number of people vaccinated by age group

COVID-19 vaccine side effects and practices

Of the 135 vaccinated persons recorded during the survey, side effects related to the COVID-19 vaccine were reported in seven persons, i.e., a proportion of 1.33%. The age of these people varied between 25 and 64 years with five men and two women. The effects observed were mainly muscle pain and fever (4 people) and nausea (3 people). For muscle pain and fever, some people used paracetamol on the advice of a doctor, while others did not use any medication. The pain and fever dissipated over time. As for nausea, only one person used a lemon-based tea to deal with it, for the other cases of nausea no medication was used.

Of the 527 travelers interviewed, only 114 people (21.63%) had used traditional medicine in the 12 months preceding the survey. Of these, 106 people (20.11%) used herbal medicines or ready-to-use herbal remedies for their health needs and 34 people had been vaccinated against COVID. There was no significant difference ($X^2 = 1.054$; $P = 0.305$) between using herbal medicine and taking the vaccine. Herbal medicine use did not influence vaccine uptake.

COVID vaccine and barrier measures

Vaccinated (135) and non-vaccinated (392) individuals reported compliance with the barrier measures of wearing a mask (100%), hand washing (100%), use of hydroalcoholic gel (100%) and physical distancing (100%). A highly significant difference ($X^2 = 126.55$; $P < 0.001$) was observed between vaccine uptake and compliance with barrier measures. Vaccine uptake was not a barrier to compliance with barrier measures.

DISCUSSION

This study was conducted to identify the attitudes towards the COVID-19 vaccine and the practices towards side effects of travelers who came for their Covid-19 test at the COVID management center of the Institut Pasteur of Côte d'Ivoire.

For all travelers (527), the proportion of people who had received the COVID-19 vaccine was 26%. This low rate reflects the population's reluctance to be vaccinated. Vaccine hesitancy refers to the delay or refusal of vaccination despite the availability of vaccines. There is a large number of literature on vaccine hesitancy, which emphasizes that it depends on both individual factors (emotions, values, risk perception, knowledge or beliefs) and social, cultural, political and historical factors [6]. This vaccine hesitancy has been demonstrated in several countries. France stood out before the Covid-19 period as one of the countries where suspicion towards vaccines was the strongest [7,8]. In Guyana, towards the end of February 2021, a survey of health workers showed that only 679 of 4151 health workers (16.4%) and 3,800 of 294,071 inhabitants (1.3%) were vaccinated against Covid-19 [4]. In Canada, Eve Dubé and Noni MacDonald [9] showed that the relative lack of awareness of COVID (mRNA) vaccines, their development and rapid distribution could contribute to changes in vaccine hesitancy. A study conducted on perceptions of Covid-19 vaccination in Africa showed that the lowest levels of acceptance were reported in some french speaking countries in West and Central Africa [4].

The lowest uptake rate was observed among women (9.10%). These results are similar to the results of studies conducted in metropolitan France and other countries such as Israel and Switzerland where women were more reluctant to be vaccinated against Covid-19 than men [2,10,11]. The most vaccinated age group was 25-64 years (22.01%). This age group corresponds to that of adults. In the United States, a study conducted by Reiter [12] on the acceptability of a COVID-19 vaccine in adults (n = 2006) showed that 69% of participants were willing to be vaccinated against COVID-19. Some studies have suggested that there may be higher acceptance among

older populations compared to younger age groups [4], which is contrary to the results of this study which pointed a low proportion of vaccinated individuals over the age of 65 (0.8%). These different results could reflect the estimated acceptability of a COVID-19 vaccine in Côte d'Ivoire and can be used to guide projections of future vaccine use at a time when countries are more focused on the COVID-19 vaccine than on PCR tests for travel.

Regarding the relationship between religion and the COVID vaccine, all those vaccinated during the survey were either Christians or Muslims. Thus, religion did not influence vaccination. These results are contrary to the overall published results on the relationship between religion and the COVID-19 vaccine. It is also known that some religious communities are under-vaccinated. This is the case, for example, for Jewish and Orthodox Protestant communities [13]. In the United States, religious people are reportedly more fearful of vaccines than others [14]. In times of crisis and uncertainty, many people turn to religion more than usual to find answers to their questions and comfort [14]. However, according to some authors, religious communities are sometimes likely to question the legitimacy of science and, more specifically, to propagate erroneous information about vaccines [14]. These different results should lead us to rethink the relationship between religion and vaccine hesitancy.

The most vaccinated individuals had a higher level of education. On a global scale, negative attitudes and perceptions towards vaccination often come from people from low socioeconomic backgrounds, ethnic and religious minorities, especially if they have a low level of education, are young, take care of children at home and are female [15,16,17].

Adverse events related to COVID-19 vaccination were reported in seven mainly male individuals whose ages ranged from 24 to 64 years. Muscle pain, fever and nausea were the main symptoms observed. These same symptoms have already been mentioned in the pharmacovigilance report established by "info covid19.lu"[18] in November 2021 on adverse events related to the COVID-19 vaccine registered in "EudraVigilance". According to this report, the vast majority of adverse events are not serious, with transient symptoms (a few days) of no consequence, such as fever, chills, injection site reaction (localized rash, pain), myalgias, arthralgias, headaches, digestive symptoms (nausea, vomiting, diarrhea), malaise that is not serious, feelings of dizziness, blood pressure problems, fatigue that may be intense for several days, and adenopathy (lymph nodes) that may be painful. These reactions are known adverse reactions and are described in the vaccine package insert. These reactions are normal and indicate an activation of the immune system. They usually disappear within a few days, with or without symptomatic treatment. In terms of gender and age, this same report states that for all vaccines combined, side effects were predominantly experienced by women, which is contrary to the results obtained in this study. The age range (25 to 59 years) for adverse events is similar to that obtained in this study.

In this study, paracetamol was used by some people to cope with muscle pain and fever. According to the WHO

[6], antipyretics such as paracetamol can be administered in the appropriate dosage and frequency as recommended by the prescribing physician (or manufacturer). Paracetamol relieves pain and reduces fever. The study also found a low (0.2%) use of herbal medicines to address adverse events related to the COVID-19 vaccine. This low rate could be related to the pathology involved. COVID-19 is a new disease that is not well known to the population.

The vaccine is not a barrier to compliance. In France, the program of anticipation of possible vaccination scenarios and preliminary recommendations on target populations [19] considers that vaccines, once they have demonstrated their safety and efficacy, will be the best tool for prevention and control of the pandemic, in addition to the indispensable barrier measures and possible treatments. In Côte d'Ivoire, in the communiqué of the National Security Council of September 09, 2021, after the administration of 1477179 doses of vaccine, to continue the intensification of the sensitization on the respect of the barrier measures, by associating in particular, the Prefectural Body, the Elected Officials, the National Chamber of Kings and Traditional Chiefs, the Religious Guides, the Associations and the NGOs. The respect of barrier measures is an essential practice in the fight against COVID-19, despite the convincing results of the vaccine.

CONCLUSION

A significant number of travelers were still hesitant about the COVID-19 vaccine as the epidemic intensified. A low rate of vaccine-related adverse events (fever, muscle pain, and nausea) was recorded. These reactions are known adverse events and are described in the vaccine package insert. They are usually resolved within few days, with or without symptomatic treatment. Men were more favourable to the vaccine. The age group most vaccinated was between 25 and 64 years. Religion was not a barrier to vaccination. The most educated people were vaccinated. Barrier measures were followed by all travelers. The results of this study may guide projections of future vaccine as countries move toward COVID-19 vaccine rather than travel PCR testing.

CONFLICTS OF INTEREST

The authors declare that they have no conflict of interests.

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AUTHOR CONTRIBUTIONS

KMW and DM conceived the study. KKB, ABJC, DTFB, YSS, GKJ and KDKR designed the survey. KKB performed the survey. All authors analysed the data, discussed the results and drafted the manuscript, the main contributor being KKB. All the authors read and approved the final manuscript.

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REFERENCES

1. Centers for Disease Control and Prevention (2000). Different COVID-19 Vaccines. Accessed on 1st December 2020.
2. Kremer D, Lopes SM, Ménard A *et al.* Quels sont les facteurs associés à l'hésitation vaccinale dans la population suisse et dans quelle mesure l'hésitation vaccinale est-elle particulière dans le contexte du COVID ? UNIL, Faculté de biologie et de médecine, 3e année de médecine, 2020-2021 Module B3.6 - Immersion communautaire
3. Granier S, Brureau K, Breton J *et al.* Attitudes et intentions à l'égard du vaccin Covid-19 chez les professionnels de santé de Guyane. *Bulletin épidémiologique hebdomadaire*. 2022 ; (Cov_14):29.
http://beh.santepubliquefrance.fr/beh/Cov_14/2022_Cov_14_1.html
4. Tulloch O, Roldan de Jong T, Bardosh K. « Synthèse de données : Perceptions de la vaccination contre la covid-19 en Afrique : données des sciences sociales et comportementales, mars 2020 - mars 2021 » Brighton : Social Science in Humanitarian Action (SSHAP) 2021 ; DOI : 10.19088/SSHAP.2021.030
5. Ouedraogo Salam , Ouedraogo E Wm , Bamouni J , Sawadogo Nongoba , Sawadogo Abdoulaye , Ouedraogo Hamadé , Zabsonre P. Vaccination coverage and reasons for acceptance or hesitation in vaccination against COVID-19 in patients with cardiovascular disease in Ouahigouya. *Health Sci. Dis*: 2022; 23 (11) 90-94. Available free at www.hsd-fmsb.org
6. Organisation mondiale de la Santé. Manuel mondial pour la surveillance des manifestations post-vaccinales indésirables. 2015; 122p
7. Wellcome Global Monitor ; Gallup. How does the world feel about science and health? London: Wellcome Trust; 2018 ; 132p <https://wellcome.org/sites/default/files/wellcomeglobal-monitor-2018.pdf>
8. Larson HJ, de Figueiredo A, Xiaohong Z *et al.* The state of vaccine confidence: Global insights through a 67-country survey. *EBioMedicine* 2016 ; 12 :295-301
9. Eve Dubé & Noni E MacDonald How can a global pandemic affect vaccine hesitancy? *Expert Review of Vaccines*, 2020; 19:10, 899-901, DOI: 10.1080/14760584.2020.1825944
10. Dror AA, Eisenbach N, Taiber S *et al.* Vaccine hesitancy: The next challenge in the fight against COVID-19. *European Journal of Epidemiology*. 2020 ; 35(8) :775-9.
11. Mueller J, Olivier C, Luevano CD *et al.* Étude transversale des intentions de vaccination contre la grippe saisonnière et la Covid-19 des professionnels de santé : quels leviers pour la promotion vaccinale ? *Bull Epidémiol Hebd*. 2020; (2):2-9.
http://beh.santepubliquefrance.fr/beh/2021/Cov_2/2021_Cov_2_1.html
12. Paul L. Reiter, Michael L. Pennell, Mira L. Katz. Acceptability of a COVID-19 vaccine among adults in the United States: How many people would get vaccinated? *Vaccine* 38 2020 ; 6500–6507
13. Fournet N, Mollema L, Ruijs W.L. *et al.* Under-vaccinated groups in Europe and their beliefs, attitudes and reasons for non-vaccination; two systematic reviews. *BMC Public Health*, 2018; 18(1), 17p
<https://bmcpubhealth.biomedcentral.com/articles/10.1186/s12889-018-5103-8>
14. Olagoke AA, Olagoke OO, and Hughes AM. Intention to Vaccinate Against the Novel 2019 Coronavirus Disease: The Role of Health Locus of Control and Religiosity. *Journal of Religion and Health*, 2021; 60, (1) pp. 65-80.
<https://link.springer.com/article/10.1007/s10943-020-01090-9>
15. Paul E, Steptoe A, and Fancourt D. Attitudes towards vaccines and intention to vaccinate against COVID-19: Implications for public health communications. *The Lancet Regional Health Europe*, 2021; 1, 10 p.
[https://www.thelancet.com/journals/lanep/article/PIIS2666-7762\(20\)30012-0/fulltext](https://www.thelancet.com/journals/lanep/article/PIIS2666-7762(20)30012-0/fulltext)
16. Finney Rutten LJ, Zhu X, Leppin A. *et al.* Evidence-Based Strategies for Clinical Organizations to Address COVID-19 Vaccine Hesitancy. *Mayo Clinic Proceedings, Advance online publication*, 2020; 20 p.
[https://www.mayoclinicproceedings.org/article/S0025-6196\(20\)31487-7/fulltext](https://www.mayoclinicproceedings.org/article/S0025-6196(20)31487-7/fulltext)
17. Barmania S, and Reiss M. Health promotion perspectives on the COVID-19 pandemic: The importance of religion. *Global Health Promotion*. Article Online First, 2020; 8p.
<https://journals.sagepub.com/doi/full/10.1177/1757975920972992>
18. Info covid19.lu. Suivi des effets indésirables des vaccins. Rapport de pharmacovigilance 2021 ; 10 p.
19. Haute Autorité Santé. Stratégie de vaccination contre le COVID-19 Anticipation des scénarios possibles de vaccination et recommandations préliminaires sur les populations cibles. 2020; www.has-sante.fr