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## “On the last day of the last month, I will go”: A qualitative exploration of COVID-19 vaccine confidence among Ivoirian adults



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### ABSTRACT

The authorization of several high-efficacy vaccines for use against the novel SARS-CoV2 virus signals a transition in the global COVID-19 response. Vaccine acceptance is critical for pandemic control and has a variety of context-specific drivers that operate at the individual, group, and sociopolitical levels. Social and behavior change interventions can influence individual knowledge, attitudes, and intentions as well as community norms to facilitate widespread vaccine uptake. While considerable research has been done to explore vaccine confidence in high-income populations as well as with respect to childhood vaccinations, much work remains to be done in understanding attitudes and intentions in low and middle income countries for adult or novel vaccines. We conducted in-depth interviews with individuals who had recovered from COVID-19 (n = 8), people who had lost a family member to COVID-19 (n = 4), and health providers (n = 17). We also conducted focus group discussions with members of the general population (n = 24 groups) to explore social norms and community perceptions related to COVID-19, including prevention behaviors, stigma, and vaccines. Researchers collected data in Abidjan, Côte d'Ivoire, in November 2020. In considering whether to accept a future COVID-19 vaccine or not, individuals in the study weighed perceived risk of the vaccine against the severity of the disease. Perceived severity of rumored side effects or safety issues of vaccines were also a factor. Convenience was a secondary, albeit also important, consideration. While concerns about vaccine safety tended to produce an expressed intention to delay vaccination, conspiracy theories about those developing and promoting vaccines and their motives led people to say they would opt out entirely. Behavior change interventions must raise awareness and address misunderstandings about the purpose of vaccines, transparently communicate about vaccine safety and development processes, and engage trusted influencers to build an enabling environment for COVID-19 vaccine roll out.

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### 1. Introduction

The world passed 260 million documented cases of COVID-19 and 5.2 million deaths by late 2021 [1]. The pandemic has had severe effects on health, with disruptions in routine health services as well as the direct effects of a COVID-19 case-fatality ratio that varies between 0.1% and 20% depending on the country context [2,3]. The authorization of several high-efficacy vaccines for use against the novel SARS-CoV2 virus signals a transition point in the management of the COVID-19 pandemic [4]. While demand will continue to outpace supply for some time, equitable vaccine distribution hinges on addressing vaccine confidence among hesi-

tant populations. Based on a reproduction rate (Ro) of 2.2, at least 60% of people in a given setting will need to be vaccinated or have natural immunity to achieve epidemic control, with recent estimates up to 90% [5,6]. The emergence of more transmissible variants may increase the proportion of the population that must be vaccinated or achieve immunity through natural infection [7].

Vaccine hesitancy is an individual decision to delay or avoid vaccines that are available, and it has a variety of drivers that operate at the individual, interpersonal, and contextual levels [8,9]. These drivers are commonly grouped into three categories called the “three Cs” framework: complacency, confidence, and convenience [10]. Complacency is the group of factors related to perceived risk and severity of the illness – whether people believe they will be infected or that the virus will be serious if they are infected – that influence the motivation to protect oneself through

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a vaccine. Confidence encompasses beliefs about the ability of the health system and health providers to offer a safe vaccine, to behave in a trustworthy manner, or to have benevolent motives. Convenience summarizes factors around cost of the vaccine, ability to understand when one is eligible and how to obtain the vaccine, and whether vaccines are delivered in a culturally acceptable or convenient place. Individual factors (knowledge, beliefs, attitudes, sociodemographic characteristics) intersect with issues at the structural level (vaccine supply, costs, modes of delivery, history, and policies) and together influence confidence and complacency [11]. A 2020 report from the World Health Organization (WHO) frames these types of drivers of vaccine hesitancy in terms of whether there is an enabling environment, and then also examines social influences such as norms and the media environment [8,12]. In the case of COVID-19, the extent of misinformation about the virus and associated vaccine development is complex and unprecedented, with rumors circulating widely that minimize the existence or threat of the virus itself and the safety of the vaccines [13,14]. Intention to be vaccinated against COVID-19 occurs within the context of abuses in medical research and intractable distrust in governments [15–19]. In April 2020, controversial statements from scientists about vaccine trials in Africa led to widespread condemnation of a colonial mindset that would consider African volunteers as “guinea pigs.” [20] The pandemic and related rumors have reduced coverage and acceptance of routine services including immunizations, a catastrophic outcome causing untold collateral damage to children and youth [3,21,22].

In Côte d'Ivoire, for example, less than half of people in an online survey reported that they would accept the vaccine if available, while rumors and conspiracy theories circulated about the origin and response to COVID-19 and the safety of vaccines [23,24]. In spring 2021, Côte d'Ivoire received half a million doses of the AstraZeneca vaccine through the COVAX program and moved through a phased roll-out, beginning with health workers, teachers, security and military, followed by international travelers, people over age 50, and those with chronic illnesses or preexisting conditions that put them at higher risk, and, finally, the general public – yet uptake lagged [25,26]. In the long term, addressing the structural inequities and socio-economic and political factors that undermine trust in the public health response is critical for creating an enabling environment for vaccine roll-out [11]. In the short term, however, social and behavior change (SBC) interventions are needed to influence individual knowledge, attitudes, and intentions as well as community norms to facilitate widespread vaccine uptake [27]. Risk communication and community engagement (RCCE) interventions draw on SBC approaches to address population fears, build trust in health providers and public health responders, and partner with trusted local influencers to promote positive attitudes and norms toward specific behaviors that prevent disease transmission. Critical to successful RCCE is a nuanced understanding of context-specific knowledge, attitudes, beliefs, intentions, and norms that precede and enable protective behaviors [27,28]. While considerable research has been done to explore vaccine confidence in high-income populations as well as with respect to childhood vaccinations against diseases like polio or measles, there remains a need to understand the nuances and lived realities of those in low and middle income countries (LMICs), particularly for novel and adult vaccinations [29]. Apart from a few recent online surveys in the region, the specific factors influencing vaccine confidence toward COVID-19 vaccines specifically in Côte d'Ivoire are not well understood [30,31].

In light of these ongoing gaps, the USAID-funded Breakthrough ACTION project conducted a study to investigate perceptions of and barriers to accepting a COVID-19 vaccine among health workers and the general population in Côte d'Ivoire. Data were collected as part of a larger qualitative study on stigma related to COVID-19

implemented in late 2020, before COVID-19 vaccines were available in Côte d'Ivoire. This analysis was conducted to identify perspectives on COVID-19 vaccines from those who had direct exposure to COVID-19 as well as those who did not to inform programmatic efforts promoting vaccine uptake in Côte d'Ivoire.

## 2. Methods

### 2.1. Sample

We conducted in-depth interviews (IDIs) with individuals who had recovered from COVID-19, people who had lost a family member to COVID-19, and health workers (some of whom had also survived COVID-19). Health workers were included both as key informants on COVID-19 related topics and as potentially stigmatized individuals due to perceptions around elevated risk of exposure among health workers to COVID-19. Health workers are among the earliest eligible for the COVID-19 vaccines and may have insight on their own or their patients' vaccine confidence. Health workers included doctors, nurses, and other providers (such as pharmacists) who worked at COVID-19 treatment centers or participated in rapid response teams as well as health workers who did not work in COVID-19 units. We differentiated between those who had treated COVID-19 patients and those who had not, to explore whether proximity to COVID-19 patients affected their perceptions or experience of COVID-19 stigma. We also conducted focus group discussions (FGDs) with members of the general population to explore social norms and community perceptions related to COVID-19, including prevention behaviors, stigma, and vaccines. Sample size was determined based on standard guidance for qualitative research [32,33]. Focus groups were mixed gender, age, and educational background. Participants were men and women over the age of 18.

We used purposive sampling to recruit participants with the help of focal persons at COVID-19 testing and treatment centers and in communities using standard recruitment scripts. Participants were recruited in four COVID-19 treatment centers set up by the government for the management of COVID-19 patients in Abidjan. Study collaborators within the Ministry of Health tasked with follow up of COVID-19 patients recruited participants based on the criteria outlined in the research protocol. During the recruitment process, participants were asked a set of questions to determine their experiences with COVID-19. If they had survived COVID-19 themselves or had lost a family member to COVID-19, they were invited to participate in IDIs. Health workers were invited to participate in IDIs regardless of whether they had survived COVID-19 or treated COVID-19 patients. All others were invited to participate in FGDs, with separate FGDs for those who indicated they knew someone personally who had had a positive COVID-19 test. FGD participants came from six distinct neighborhoods in Abidjan.

### 2.2. Setting

Researchers collected data in Abidjan, Côte d'Ivoire, in November 2020. The research protocol was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board (IRB#13757) and the Ivoirian national research ethics committee (Comité National d'Éthique des Sciences de la Vie et de la Santé, CNESVS). Interviewers obtained written informed consent from all participants prior to data collection.

### 2.3. Data collection

In line with recommended COVID-19 safety procedures, IDIs and FGDs were conducted outdoors or in a large room with open

windows, typically at community centers or offices where participants' privacy and confidentiality could be ensured. FGDs were limited to six people to facilitate physical distancing. All participants were provided with masks and hand sanitizer. Researchers read the consent form to participants. Those who were willing to participate signed the signature page, which was retained by the research team, while the participant kept the rest of the consent form. Participants each used a separate disinfected pen to sign the consent form. Participants were instructed to contact the study coordinator if they had any questions or if they received a positive COVID-19 test in the two weeks following the research activity to facilitate contact tracing. No cases were reported as part of the study.

Ivoirian researchers with advanced degrees in sociology or demography and extensive experience in qualitative research facilitated the IDIs and FGDs. The principal investigator and Ivoirian lead researcher trained the team in research ethics using content informed by the Johns Hopkins IRB and the CITI (Collaborative Institutional Training Initiative) program. The training covered topics from the Belmont report such as respect for persons, beneficence, justice, and informed consent [34]. The principal investigator and Ivoirian lead researcher ensured adherence to the study protocol. The FGDs lasted one hour and 59 min on average, and IDIs lasted an average of 43 min. FGD guides explored general attitudes and norms toward COVID-19, including self-efficacy and response efficacy to perform recommended prevention behaviors as well as perceptions of people infected or perceived to be at risk for COVID-19. IDI guides took a narrative approach to elicit individuals' stories about the personal effects of COVID-19, including their emotions and experiences from the point of infection through diagnosis, treatment, recovery, and re-entry to the community. Guides also explored the financial, psychosocial, and stigma-related consequences for those who had lost a family member to COVID-19. For health workers, guides also explored their experiences treating COVID-19 patients where applicable. Guides contained questions on vaccine intention, specifically whether people in the community would get vaccinated if a vaccine were developed and why or why not. The interview guide for health workers contained an additional question exploring whether the health workers themselves would get vaccinated and their reasoning. Researchers conducted the IDIs and FGDs in French and audio-recorded them. Data collection occurred from November 11–25, 2020. Interviews and discussions were then transcribed word-for-word in French. The research team validated all transcripts through spot checking, by comparing five minutes of audio to the transcription in three different places for each IDI or FGD. Any deviation from the audio led to a full review where the transcriber listened to the entire FGD or IDI again and updated the transcription. Then three different sections were spot-checked; the revision process repeated until the transcription was deemed accurate and was approved.

#### 2.4. Analysis

The research team facilitated a five-day participatory data analysis workshop, gathering 14 people including the interviewers, representatives from the national government, and staff from the Breakthrough ACTION research and programmatic teams. During the workshop, participants read sections of transcripts and discussed themes and insights in small groups. They then presented their insights to the large group, and the entire team consolidated themes and gathered illustrative quotations to identify key insights. Following this preliminary thematic analysis, the interviewers coded the transcripts using a codebook informed by the interview guides (deductive) as well as by insights from the analysis workshop (inductive). The coding team double-coded 19% of transcripts, meeting to resolve discrepancies and ensure standard

application of the codes. During the data analysis workshop and subsequent coding and analysis, saturation was determined to have been reached given that themes were recurring across transcripts. The current analysis looks at the subset of data related to vaccine knowledge, attitudes, and norms. Data related to COVID-19 vaccination were read, synthesized into themes and then organized according to the 3 Cs theoretical framework.

A total of 156 individuals participated in this qualitative study as outlined in Table 1. We conducted 29 IDIs and 24 FGDs (with 127 FGD participants). There were 89 men and 67 women. Seventeen of the IDIs were with health workers.

In the following sections, we examine perceptions of vaccines against the SARS-CoV2 virus by exploring various ideational factors that serve as barriers to vaccination. We also identify specific facilitators that participants indicated might motivate them to voluntarily accept the vaccine.

### 3. Results

Just as the literature identifies three categories of determinants of vaccine hesitancy – complacency, confidence and convenience – we found that the participants in our study weighed perceived severity of rumored side effects or safety issues (confidence) against perceived risk and severity of the disease (complacency) in their decisions to accept the COVID-19 vaccine or not. Convenience was a secondary, albeit also important, consideration. Complacency primarily took the form of low risk perception based on the conviction that COVID-19 only affects Westerners or does not exist at all. Low confidence manifested as conspiracy theories about the origin and purpose of the vaccines, such as causing sterility or deliberate infection. Beliefs related to confidence and complacency were both strongly fueled by rumors and misinformation spread online and person-to-person.

#### 3.1. Confidence

Participants expressed mistrust in the COVID-19 vaccines as well as in those developing, authorizing, and delivering the vaccines. Misinformation and conspiracy theories abounded, with individuals and groups questioning the origin and purpose of COVID-19 vaccines. Health workers tended to express concerns about the safety of vaccines that were rapidly developed and deployed. Non-health workers shared similar concerns but tended to focus on distrust of those developing and delivering the vaccines.

*Confidence or lack of confidence in the safety of the vaccine itself.* Participants questioned the safety of COVID-19 vaccines, particularly emphasizing their rapid development. One individual who had recovered from COVID-19 described this rumor, saying:

*“People say that the vaccine won't be good quality. That is what people say. We're not experts, but they say it takes 10 years to make a vaccine and, before it is on the market, it requires lots and lots of experience.”* (COVID-19 survivor, female)

Other participants likewise expressed the belief that a quick vaccine must have cut corners or taken shortcuts on safety. This concern was shared by health workers, including one who said, *“COVID-19 has only been around for a year. . . even a vaccine in normal circumstances if you are sure about the pathology, there is a whole process to put in place, it takes at least two years to develop a vaccine”* (health worker, male). Another issue with vaccine safety that intersected with misinformation was the source of the vaccine. Extrapolating from lingering rumors about contaminated masks from China, an individual who had recovered from COVID-19 said she would trust a vaccine from France but was afraid of products from China because,

**Table 1**  
Study participants by type and sex.

Activity	Population type	Total		
Focus Group Discussion	General population	12 groups (24 females, 36 males)		
	Knew someone with COVID-19	12 groups (32 females, 35 males)		
Individual interview	Did not know someone with COVID-19	12 groups (32 females, 35 males)		
	General population	Female	Male	Total
	Recovered from COVID-19	4	4	8
	Lost a family member to COVID-19	1	3	4
	Health workers			
	Recovered from COVID-19	3	3	6
	Did not directly treat COVID-19 patients	0	5	5
	Directly treated COVID-19 patients	3	3	6

“there are too many rumors. People published things, they said that the masks from China were contaminated and that you shouldn’t use them or you would be infected. Interviewer: So, for you, if the vaccine came from France, then you might... Participant: Yes, without hesitation.” (COVID-19 survivor, female)

In answering a question about whether he would accept a COVID-19 vaccine, she referred to masks, suggesting that people may not conceptually differentiate vaccines from masks or other products designed for COVID-19 prevention. This participant also felt greater trust in vaccines from France than from China, perhaps due to specific rumors about China being associated with the spread of COVID-19 (as the participant stated) as well as failing to consider the rigorous global authorization processes. Taken together, these participants expressed low confidence in the safety of vaccines based on the country of origin as well as how vaccines are tested and authorized.

In general, people who were not staunchly against COVID-19 vaccines took a “wait and see” approach and planned to keep track of the outcome of widespread vaccinations in the US, Europe and Africa. One participant described his intention to delay vaccination, saying,

“If the vaccine is available for 3 months, on the very last day of the third month, I’ll go [get vaccinated].” (general population, male)

This quotation illustrates how people might reconcile anticipated regret – missing the opportunity to get vaccinated – with concerns around vaccine safety. Delaying vaccination to see how it affects others is then the sensible course of action, from the point of view of this participant.

**Confidence in the government and public health responders.** Participants who were ambivalent or cautious about the vaccine expressed a desire for transparency about the vaccine origins, testing process, and efficacy. One health worker described the need for trusted information and careful consideration of who should promote vaccines, saying,

“Opinion is divided; everything is a question of communication. It depends on the way in which the message is communicated, who communicates it, when the message is communicated and how.” (health worker, female)

The question of who promotes the vaccines in the country posed an issue for various participants in the study, with people dwelling on potential nefarious motives. A participant in an FGD said:

“From the beginning we said that the community saw that the government fabricated the numbers to get their money, that is what people said. So, today, these rumors influence things. People even said that if the government said there was a vaccine, no one would get vaccinated. You see? Today we are in a total haze where no one trusts anyone.” (general population, male)

Trust – both in the Ivorian government and in foreign governments and companies – was a consistent theme, with people believing that foreigners created the SARS-CoV2 virus and subsequently vaccines to make money. An FGD participant summarized that,

“Africans have already made up their minds that, no matter what the whites say, they just want to profit off them, it is like they are guinea pigs, in fact.” (general population, male)

This same participant directly linked this conspiracy theory to an opt-out form of hesitancy rather than an intention to delay, going on to say,

“they come put something in [Africans’] bodies and then several years later they develop vaccines to make money from it, so there isn’t a single head of household that will allow his child to be vaccinated with the COVID vaccine.” (general population, male)

An individual who had recovered from COVID-19 said, “People say that the vaccine doesn’t allow you to have children, that it is something they are experimenting with once again” (COVID-19 survivor, male) and went on to say that he would not be “ready” to get the vaccine because of the rumor. The “once again” in the quotation is a striking commentary on the history and legacy of mistrust and exploitation during scientific research lingering in the minds of participants.

Alongside the rumor that the COVID-19 vaccine would cause sterility was the general belief that it would deliberately infect or kill people, as summarized by a participant who felt that,

“if there is a Corona vaccine, it is to kill us or to make us sterile. If we, women, especially those of us who haven’t had children yet get it, we’ll become sterile. If that’s the case, I won’t get it.” (general population, female)

An individual in an FGD explained the resistance to vaccination linked to rumors on social media about deliberate infection from COVID-19 vaccines, saying:

“What they say is what we retain because, at the beginning, on social media, we heard that they are developing a vaccine, that they found a vaccine for coronavirus, but there’s a ‘but’ there. The vaccine isn’t to cure or to prevent coronavirus. On the contrary, it is to give us coronavirus. So, I can’t say vaccinate me. I won’t accept it because, after everything I’ve heard, I can’t be part of it.” (general population, female)

The idea that COVID-19 itself was designed to control the population was extended to COVID-19 vaccines, specifically the perception that vaccines were promoted to exterminate African people. A health worker who survived COVID-19 summarized the videos circulating on social media, saying,

“there are all the videos we have been intoxicated with that say that they are going to come experiment on Africans, that the vac-

*cine is to kill blacks, etc. . . It is true that we are intellectuals, but deep inside there is still a certain distrust.*" (health worker, female)

A participant in an FGD likewise said that *"this vaccine is going to come and contaminate so that we die like people are dying in the West"* (general population, male) pointing to this same belief that the vaccine is a vehicle for infection, not prevention. While health workers tended to feel that the general population would not easily accept the vaccine, many shared the viewpoint of the following health worker who had treated COVID-19 patients and said, *"I will be vaccinated because I believe in science first, and then I believe in this disease, so I will accept to be vaccinated"* (health worker, female).

Health workers described serious consequences as a result of vaccine misinformation and mistrust. Specifically, they felt that this lack of confidence had already affected vaccination efforts for other illnesses. Participants described that people in their communities had become more resistant to routine vaccinations already approved for use, such as childhood vaccines like the polio vaccine. A nurse said,

*"Since the rumors started circulating throughout Ivoirian territory saying that the whites sent vaccines to introduce the virus into bodies rather than cure people, the women in my community have refused to vaccinate their children."* (health worker, male)

A doctor described a rumor that people had been given COVID-19 while being vaccinated at the hospitals, going on to say that the mothers

*"refused to have their children vaccinated. It even had an impact on vaccination campaigns because people said that they've put COVID in the polio vaccine, etc. So people refused [to vaccinate] their children."* (health worker, female)

Health workers indicated that this resistance to routine vaccination and care may be waning as time goes on, as in the case of one health worker who described that *"people didn't come to the hospital for treatment, but thank God, it's over and they come now"* (health worker, female). People in FGDs often discussed the topic of vaccines in light of their experience with childhood immunization campaigns, either citing vaccines as a safe and effective way to prevent childhood illnesses or describing reticence they observed in the community to have children receive COVID-19 vaccines.

### 3.2. Complacency

Health workers tended to have a stronger sense risk perception, along with those who survived COVID-19 or lost a family member. Those in the latter groups also described a clear sense that COVID-19 is a severe illness. On the other hand, members of the general population in the study tended to have low risk perception of COVID-19 and low awareness of COVID-19 vaccines as a way to prevent infection.

Perceived risk of contracting COVID-19. Health workers and participants who had lost family members to COVID-19 tended to be more open to a COVID-19 vaccine, with health workers commonly saying they think the population in general would hesitate but that they themselves would accept it. Occupational exposure for health workers was a key issue. One health worker who had treated COVID-19 patients acknowledged various conspiracy theories about the vaccines, but indicated, *"I'm exposed, so if there is a vaccine and they want to vaccinate me, no problem"* (health worker, female). Another health worker cited a desire to protect family members from COVID-19, saying *"I'm a health worker, exposed, super exposed. . . so I will get vaccinated to protect myself and to pro-*

*tect my family"* (health worker, male). Other participants similarly described vaccines as a way to protect others, rather than themselves.

At the same time, participants rarely mentioned the concept of a vaccine until specifically asked. Though a variety of COVID-19 prevention and treatment methods were covered during the discussions, vaccines were not spontaneously mentioned. One participant who had lost a family member to COVID-19, once prompted, indicated he would probably not get the vaccine, saying, *"I don't think so, I haven't really thought about it yet"* (individual who lost a family member, male). Once directly asked, people frequently misunderstood or mischaracterized the purpose of vaccination. One participant said that *"if the person doesn't have COVID, they will refuse because they will surely say that they are healthy, why go? They're not sick. Why go to the hospital?"* (general population, male). One person who had recovered from COVID-19 pointed out the reduced risk perception, saying that early in the pandemic,

*"we took it very seriously because we were a little bit afraid, but now everything has returned to normal. So we say, ok, that's something that has passed, so I don't think about it much."* (COVID-19 survivor, male)

He went on to say that the disease is *"no longer scary"* and that he would probably not get the vaccine. The waning risk perception illustrated by this quotation intersects with health workers' observations that patients who had been avoiding routine vaccinations are now returning.

People in FGDs also expressed a preference for treatment once sick as opposed to a vaccine that would prevent the illness. Participants – with the exception of health workers – at times thought the vaccine would function as a cure once sick. For those with low risk perception, the motivation to get a vaccine that might be unsafe or could have side effects was lower than awaiting a treatment that could cure them in the event they became infected.

## 4. Perceived severity of the illness

Besides occupational exposure or a sense of personal risk, the main reason many participants gave as a motivator for getting the vaccine was a sense of the seriousness of the illness. One health worker who had survived COVID-19 said she would get the vaccine *"for fear of getting sick again, of getting this disease again"* (health worker, female). Another individual who had recovered from COVID-19 shared a proverb describing that someone who has seen a lion runs away faster than someone who has just heard tell of a lion, going on to explain,

*"I've seen, I know what it is, I know how dangerous that disease is. So, if there is something that I need to do to protect myself and especially my children who are fragile, vulnerable people, I will do it. Yes, I will do it."* (COVID-19 survivor, female)

Direct exposure to COVID-19 appeared to make people more open to vaccination. Vaccines were seen by some participants as a way to avoid death and manage fear. One FGD participant said that *"soon it will be one year that coronavirus, that COVID exists, so, today, no one wants to die, so we could accept the vaccine"* (general population, male).

### 4.1. Convenience

Financial access was a facilitator that participants mentioned, saying that the main thing needed for vaccine uptake is free access: *"if it isn't too expensive or it is free, then people will accept it. You will see the hospital will be full every day"* (general population, female). The need for affordable and convenient access was a recurrent

theme across health worker interviews and FGDs. Furthermore, the idea that a vaccine could enable a return to normal activities was appealing, with cost always in the background:

*“Ivoirians like to be relaxed, have fun, be playful. So, I think that if a vaccine has been found, maybe the cost will deter some people, otherwise, if they say that there is a vaccine, right away, everyone will jump to get vaccinated.”* (general population, male)

The suggestion that the vaccine should be free was often framed, as in this quotation, not as the main determinant but a secondary or enabling factor for vaccine intention.

In summary, participants who expressed an intention to be vaccinated or thought others like them would get vaccinated cited as motivators perceived risk and perceived severity, a desire to protect others, and the possibility that vaccines would provide a way back to normalcy. Those who were “on the fence” about vaccination tended to be uncertain about the purpose of vaccines and had concerns about vaccine safety in light of the rapid development. Conspiracy theories and distrust in vaccine policymakers and distributors appeared to drive intention to refuse the COVID-19 vaccine. Convenience was typically mentioned as a recommendation that the vaccines be offered for free.

#### 4.2. Discussion

Consistent with other literature on vaccine hesitancy and recent surveys in the region, this study suggests that people who express resistance to COVID-19 vaccinations do so in part because they perceive the risk to be low (complacency) and/or they distrust the government as well as vaccine manufacturers and promoters (confidence) [8,10]. An online cross-sectional survey conducted in the Democratic Republic of Congo, for example, indicated that among respondents with low intention to receive a COVID-19 vaccine, barriers included lack of trust in the vaccine as well as beliefs that the vaccine was designed to kill or sterilized people in Africa [31]. The same study found that belief in the existence of COVID-19, a critical determining factor in one’s perception of risk, was associated with vaccine acceptance [31]. Similarly, a recent study in Cameroon identified barriers to vaccine confidence that correspond with our findings, including the influence of misinformation in traditional and social media, perceptions that pharmaceutical companies were profit driven and testing products in Africa, and questions about the testing and authorization processes for the vaccines [30]. This belief that COVID-19 is not a threat but COVID-19 vaccines are is strongly influenced by the communication environment and is a major barrier to vaccine acceptance.

Convenience also played a role with participants mentioning cost as a potential barrier, but convenience did not appear to be a primary factor in vaccine intention. With the exception of health workers, few participants in this study were aware of vaccination as a prevention method for COVID-19. In fact, vaccines were rarely top-of-mind for participants. While COVID-19 vaccines were not approved or available at the time of interviews, it does highlight the uphill battle that faces the vaccine roll-out as it begins to take shape across the world [35]. Risk communicators can lay the groundwork for vaccine acceptance through education and transparency about vaccine eligibility, timelines, cost, and anticipated side effects. One way to message on the COVID-19 vaccines is to situate the development of COVID-19 vaccines in a long history of research and technological advances. This would enable people to view the one-year timeline not as cutting corners, but as the culmination of years of research on similar viruses and vaccines. This type of messaging can be challenging for people to understand or believe, so focusing on the urgency of the pandemic and informing people about the regulatory processes may be a straightforward

option for those with low risk perception or those who need reassurance about how the vaccines have been tested.

While concerns about vaccine safety tended to lead to an expressed intention to delay vaccination, conspiracy theories about those developing and promoting vaccines and their motives led people to say they would opt out entirely. This insight, to our knowledge, has not been identified in prior studies in the region and warrants further study. In light of this, risk communicators and the global health community must face the damage done by scientists and practitioners who frame Africa as a testing ground for vaccines. Participants in this study made specific mention of the French researchers who went on the record in April 2020 describing reasons for doing vaccine trials in Africa, with the WHO condemning their remarks as racist and colonial [36]. This persistent narrative – that vaccines are tested by Westerners on Africans or used by Westerners to control population and thus are not safe – is understandable in light of the history of medical trials in sub-Saharan Africa [16,37]. Participants, in quotations expressing their distrust of the vaccines, made reference to prior medical experiments perpetrated on African populations. Even rumors about harmful vaccines causing sterility are not new and can seriously undermine vaccine campaigns and cause harm [17]. While reckoning with these historical realities, the global health community must ensure that vaccines against SARS-CoV2 are distributed equitably across the globe and avoid vilifying vaccine hesitancy while doses are monopolized by wealthy countries [38]. In this specific case, hardest hit areas like the United States and the United Kingdom are serving as a testing ground for the rest of the world, and positive outcomes in these areas can reassure hesitant citizens in countries receiving vaccines later.

The stories that participants in our study told to summarize vaccine misinformation had a certain cadence, generally following the template: “the origin or purpose of the COVID-19 vaccine is to [*be tested on us, kill us, sterilize us*] therefore [*the vaccines are not safe, we should wait and see, we should not take them*].” Yet the RCCE response often takes a fact or statement-based, institutional, biomedical approach. While accurate messaging may not be as sensational as conspiracy theories, vaccine messaging must strive for emotional resonance and salience, such as through testimonials and “leveraging anticipated regret” [12]. This appeal promotes the belief that inaction may lead to a negative outcome (getting sick or infecting a loved one) which will lead to regret for having missed the opportunity to be vaccinated [12]. Communication and community engagement can influence perceptions and norms to the extent that trusted influencers are involved and the true concerns of the population addressed [39,40]. Participants themselves underlined the need to consider who should deliver the messages about vaccines in order to convince those who are uncertain. One survey of social media users in Côte d’Ivoire in November 2020 suggested that 53% of people would opt to take a COVID-19 vaccine if offered [23]. The same study indicated that the most influential group for those who were planning not to get the vaccine were friends and family, followed by the government (differentiated from politicians) and health workers. It is critical to engage local communities and local governments not only to influence beliefs, but to provide an enabling environment for vaccine uptake, such as government messaging on the fact that the vaccines are free and offering certificates of achievement for places of business where employees have all been vaccinated. Measures to communicate a social norm around vaccination, such as engaging journalists to showcase people being vaccinated, can lay the groundwork for vaccine roll-out in settings where mistrust is the current reality. Finally, we must complement SBC work with supply-side efforts to address accessibility, with a strong commitment to global vaccine equity.

The research team shared vaccine-related insights from this study with stakeholders in Côte d’Ivoire in order to demonstrate

the need for awareness campaigns that would specifically address different barriers to vaccine confidence and uptake. The campaign is currently underway with the support of the Breakthrough ACTION project.

This study had several limitations. The main limitation was that it occurred at a particular point in time during a rapidly evolving pandemic, when perceptions and beliefs were changing in real time, and before COVID-19 vaccines were available in Côte d'Ivoire. However, situating the study eight months into the response allowed participants to reflect on their experiences during different phases and offer insights on vaccine confidence before the roll-out formally began. Second, the study did not include rural locations. When data were collected, 95% of COVID-19 cases were in Abidjan, the capital of Cote d'Ivoire, where the study took place [1]. However, with resurgence of the virus because of new variants and economic reopening, rural settings may be increasingly affected by the pandemic. Future studies should take into account rural populations. Third, the FGDs were mixed gender, and the analysis did not take into account differences in perspectives between men and women. Future research on vaccine acceptance in a setting like Côte d'Ivoire should prioritize and explore the influence of gender on study findings.

## 5. Conclusions

This study provides context-specific insight to barriers and motivators for COVID-19 vaccine uptake in Côte d'Ivoire. RCCE interventions must raise awareness and address misunderstandings about the purpose of vaccines, transparently communicate about vaccine safety and development processes, and engage trusted influencers to build an enabling environment for COVID-19 vaccine roll out.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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