DETERMINANTS OF PARENTS' INTENTION TO VACCINATE THEIR CHILDREN AGED 12–17 YEARS AGAINST COVID-19 IN NORTH KIVU (DRC)

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Abstract: background

Vaccinating children against COVID-19 is an essential public health strategy in order to reach herd immunity and prevent illness among children and adults. Parents are facing tremendous stress in relation to the COVID-19 pandemic and the effectiveness of the COVID-19 vaccination program for children. In this study, we aimed to investigate parents' willingness to vaccinate their children against COVID-19 in North Kivu province (DRC).

Methods*: A cross-sectional survey between 1 December 2021 to 20 January 2022 in six health zones (Goma, Karisimbi, Butembo, Beni, Kamango, and Katwa) was conducted in the province of North Kivu. In each health zone, we selected five clusters (Health area) using the method of probabilistic selection proportional to population size. In total, 522 parents participated in our study.*

Results*: Overall, 32.8% of parents intended to vaccinate their children. In the multivariate analysis, a younger age of parents (aOR: 2.40, CI: [1.50–3.83]), a higher level of fear that "a member of my family" could contract COVID-19 (aOR: 2.35, CI: [1.38–4.02]), a higher level of perceived vulnerability to COVID-19 within the family (aOR: 1.70, CI: [1.005–2.2881]), a higher level of perceived susceptibility to COVID-19 within the family (aOR: 3.07, CI: [1.80–5.23]), and a history of vaccination against COVID-19 among parents (aOR: 16.47, CI: [8.39–32.33]), were all significantly associated with the intention of parents to have their children or adolescents vaccinated.* ***Conclusion:*** *The willingness of parents to vaccinate their children against COVID-19 was low in North Kivu. In this region there is an undeniable need to reassure the population about vaccine safety for both children and adults. Public health authorities should also address widespread misinformation about vaccines in a timely manner.*

Keywords: *parents' intentions to vaccinate; coronavirus disease; children*

1. INTRODUCTION

On 11 March 2020, the World Health Organization (WHO) declared the coronavirus disease (COVID-19) a worldwide pandemic. Approximately a year and a half since its emergence in Wuhan, China, over 194 million cases and 4 million deaths have been reported in at least 177 countries globally (WHO, 2022). The COVID-19 pandemic is still ongoing. As of 16 June 2022, there have been 82,306 confirmed cases of COVID-19, including 1225 deaths, in the DRC.
At first, most COVID-19 vaccines were only recommended for people aged 18 and over. As many countries enter a new stage of management in the shifting sands of the COVID-19 pandemic, the emphasis of the spread of the disease and its prevention is moving to the younger generations (Fazel et al., 2021). This emphasis reflects the downshift in the average age of those becoming infected with the virus, with it being described as becoming a "disease of the young" (Lin et al., 2021).

As the infection rate rises in children, eligibility for the COVID-19 vaccine has been extended to children ages 12–15 in the United States. In June 2021, the Chinese National Health Commission also approved the emergency use of its national inactivated COVID-19 vaccines on minors aged 3 to 17 (Rudan et al., 2021). The role of vaccination for adolescents is now taking center stage in many higher resource countries, particularly as older and more vulnerable populations have been vaccinated and severe illness is largely a vaccine-preventable outcome (Fazel et al., 2021). A number of countries have, in the first half of 2021, started to offer the vaccination to their adolescent populations, most notably Israel, the USA, and recently the UK, where those over the age of 16, and younger adolescents with certain co-morbidities, have been offered the vaccine (Kostoff et al., 2021).

Multiple population-based SARS-CoV-2 seroprevalence and viral shedding studies have investigated whether children and adolescents are infected at the same rate as adults, but the results have been mixed, possibly because of the studies being conducted at different time points in the pandemic when populations were subjected to different public health and social distancing measures (Gaythorpe et al., 2021). A seroprevalence survey conducted in India during June–July 2021, after the second wave (Delta variant), showed that seropositivity in children 6–18 years was similar to that in older age groups, except in those older than 60 years in whom the immunization rate was high (Murhekar et al., 2021). Overall, it appeared that whether schools were open or closed, infection rates in children and adults were similar. Thus, it appears that children of all ages can become infected and can spread the virus to others.

Although the majority of COVID-19 vaccines are only approved for use in adults aged 18 years and above, an increasing number of vaccines are now also being authorized for use in children. Some countries have given emergency use authorization for mRNA vaccines to be used in the adolescent age group (aged 12–17 years), including BNT162b2, developed by Pfizer, and mRNA 1273, developed by Moderna. As COVID-19 vaccines are available for children aged 12 and under, it is time to assess parents' perspectives on COVID-19 vaccination for their children. Parental acceptance of COVID-19 vaccination is crucial to help public health systems reach the recommended threshold for achieving herd immunity in order to halt the spread of the epidemic.

It should be noted that in the Democratic Republic of Congo, in general and in the province of North Kivu in particular, children and adolescents play a role in the transmission of the disease, thus requiring their consideration in the vaccination against COVID-19. So, before the country makes a pronouncement on this state of affairs, we wanted to conduct this study with the aim of investigating the parental acceptability of COVID-19 vaccination for their children and the factors affecting their acceptability.

2. Methods

2.1. Recruitment and Participants

We conducted a cross-sectional survey between 1 December 2021 to 20 January 2022 in six health zones (Goma, Karisimbi, Butembo, Beni, Kamango and Katwa) of the province of North Kivu. In each health zone, we selected five clusters (Health area) using the method of probabilistic selection proportional to population size. The survey teams selected four random starting points in each of the selected clusters. Starting from a random starting point, survey teams visited consecutive households and listed all relatives aged 18 and over who were permanent residents of the area. Eligible persons present in the household were invited to participate in the survey. Thus, a minimum of 15 individuals from each health area and 75 individuals from each health zone were enrolled.

2.2. Measures

Data were collected using a structured questionnaire, which included 19 items divided into three sections. In the first section, socio-demographic and other general information were investigated through the following items: age, sex, region, number of household members (including the respondent), number of children, age and school attendance for each child, parent's level of education, relationship to the child, and presence or absence of chronic disease in the child.
The second section investigated perceptions of COVID-19 and COVID-19 vaccination, which can be viewed as important predictors of parents' intentions to participate to the vaccination on the basis of the existing literature: "I think COVID-19 is a serious disease", "My family or I could get COVID-19", "I am concerned that I or a member of my family will contract COVID-19", "I think me and my children are vulnerable to COVID-19", "Did you know that children under the

age of 18 are currently not eligible for vaccination against COVID-19 in the DRC?", "In your opinion, are COVID-19 vaccines mandatory for children and adolescents under the age of 18?", "Have you ever been vaccinated against COVID-19" (and if yes, "with which vaccine?"). The response options were "Yes", "No" and "I don't know" for each item.

The third section investigated willingness to vaccinate children against COVID-19, through a question about the parents' intention to vaccinate their children when vaccines become available in the DRC. Then, those who declared that they would vaccinate or had already vaccinated their children were asked to provide one or several explanations of their choice among the following: "The vaccine can prevent my child from getting COVID-19", "The vaccine is safe for my child", "My child is at higher risk of COVID-19 infection", "My child is at higher risk of COVID-19 infection", "Vaccinating my child will protect people around my child from catching COVID-19 infections", "I would follow the advice of my child's pediatrician/general practitioner to obtain his opinion on his vaccination". Conversely, those who refused to vaccinate their children or those who were undecided were asked to provide one or several explanations of their choice among the following: "COVID-19 is not a serious illness", "The vaccine may not work and may give my child COVID-19 disease", "The vaccine can give my child an illness other than COVID-19", "The sting can be painful for my child", "If it does not suit me, I will not have my child vaccinated", "There could be side effects from the COVID-19 vaccine", "I don't believe in vaccines in general", "I prefer my child to fight COVID-19 naturally, without using a vaccine", "I prefer to keep my child at home to reduce the risk of contracting COVID-19", "I don't think it was properly tested for children before rolling out to the public", "I prefer to get vaccinated myself and protect my child against the infection", "My child is too young to be vaccinated".

2.3. Data Collection

The data were collected in the household by structured face-to-face interviews, with the respondents using a questionnaire previously pre-tested and configured on the ODK tool. The time required to fill in the questionnaire was about 15 min.

2.4. Data Analysis and Statistics

Variables were described as absolute frequencies and percentages. The determinants of the intention to vaccinate the child or adolescent were evaluated by univariate and multivariate analyses. The results of the multivariate analyzes were presented as odds ratio (OR) with standard error (SE) and 95% confidence interval (95% CI). A step-by-step, bottom-up Wald analysis was performed to define the variables to be included in the final multiple logistic regression model, according to the results of the univariate models. Statistical significance was set at $p < 0.05$. Data were collected using Microsoft Excel (Microsoft Corporation). All analyses were performed using SPSS version 25 software.

2.5. Ethics

Ethical approval was granted to the study by the Institutional Ethics Committee of the University of Lubumbashi, DRC (letter of approval no. UNILU/CEM/104/2022). Informed consent was obtained prior to participation in the study. Anonymized data were used for analysis, interpretation, and reporting.

3. Results

This table shows that 55% of the parents were under 40, 56.3% were female, 46.2% had a secondary education, and 39.1% were Protestant.

Table 1. Distribution of respondents according to their sociodemographic characteristics.

Sociodemographic Characteristics of the Interviewee	Effective	Percentage
Age		
40 and over	235	45.0
Under 40	287	55.0
Sex		
Female	294	56.3
Male	228	43.7
Study level		
Primary education	63	12.1
No formal education	51	9.8
Secondary education	241	46.2
Some college and higher education	167	32.0
Religion		
Other(s) to be specified	24	4.6
Catholic	184	35.2
Revival church	73	14.0
Muslim	32	6.1
Protestant	204	39.1
Traditional beliefs	5	1.0

Table 2. Distribution of respondents according to their perception of COVID-19.

Perception of COVID-19 by Parents	Effective	Percentage
COVID-19 is a serious illness	409	78.7
My family or I could get COVID-19	313	60.0
I am concerned that I or a member of my family will contract COVID-19	353	67.6
I think me and my children are vulnerable to COVID-19	98	18.8

In relation to the perception of COVID-19, 409 or 78.7% of parents think that the COVID-19 is a serious illness, 60% say they or their family could get COVID-19, 67.6% fear they or a family member may contract COVID-19, and 18.8% think they and their children are vulnerable to COVID-19.

Table 3 shows that 70.7% of respondents know that children under 18 are not eligible for vaccination against COVID-19 in the DRC, nearly 40.0% think COVID-19 vaccines are necessary for children and adolescents under 18, and 32.8% think that if the vaccine against COVID-19 is authorized for children in the country in the future, they will have them vaccinated.

Table 3. Distribution of perception on vaccination and intention to want to have their children or adolescents vaccinated.

Perception of COVID-19 by Parents	Effective	Percentage
Currently, children under the age of 18 are not eligible for vaccination against COVID-19 in the DRC. Did you know?		
Yes	369	70.7
No	153	29.3
Are COVID-19 vaccines necessary for children and adolescents under 18?		
Yes	207	39.7
No	315	60.3
If the vaccine against COVID-19 is authorized in the country in the future in children, will you vaccinate them?		
Yes	171	32.8
No	351	67.2

As demonstrated in Table 4, 94.7% of parents agreed to have their children or adolescents vaccinated for the simple reason that the vaccine can prevent their children from contracting COVID-19, 57.3% think the vaccine is safe for their children, 26.3% noted that their children are at higher risk of COVID-19 infection, and 9.4% say they would follow the recommendations of the Ministry of Public Health to have children vaccinated.

Table 4. Distribution of respondents according to the reasons for wanting to have their children vaccinated.

If Yes, What Are the Reasons for Wanting to Vaccinate Your Children?	Effective	Percentage
The vaccine can prevent my child from getting COVID-19	162	94.7
The vaccine is safe for my child	98	57.3
My child is at higher risk of COVID-19 infection	45	26.3
My child is at higher risk of COVID-19 infection, vaccinating my child will protect those around my child from catching COVID-19	31	18.1
I would follow the advice of my child's pediatrician/general practitioner to obtain his opinion on his vaccination	21	12.3
I would follow the advice of my child's EPI to have my child vaccinated	22	12.9
I would follow the recommendations of the Ministry of Public Health to have children vaccinated	16	9.4
If the vaccine is free	22	12.9
If the vaccine is offered to my child when he visits his doctor/pediatrician and he does a regular follow-up	19	11.1
If my child's vaccination against COVID-19 allows my child to travel	22	12.9

Table 5. Distribution of respondents according to reasons for not wanting to have their children vaccinated.

If not, Reasons for Not Wanting to Have Your Child Vaccinated against COVID-19	Effective	Percentage
COVID-19 is not a serious illness	53	15.1
The vaccine may not work and may give my child COVID-19 disease	212	60.4
The vaccine can give my child an illness other than COVID-19	146	41.6
The sting can be painful for my child	35	10.0
If it does not suit me, I will not have my child vaccinated	33	9.4
There could be side effects from the COVID-19 vaccine	40	11.4
I don't believe in vaccines in general	33	10.0
I prefer my child to fight COVID-19 naturally, without using a vaccine	101	28.8
I prefer to keep my child at home to reduce the risk of contracting COVID-19	23	6.6
I don't think it will be properly tested in children before rolling out to the public	18	5.1

I prefer to get vaccinated myself and protect my child against infection	13	3.7
My child is too young to be vaccinated	14	4.0

In relation to the reasons for not wanting to have their child or teenager vaccinated against COVID-19, 60.4% of parents thought that the vaccine may not work and may give their children COVID-19, 41.6% thought the vaccine could give their children an illness other than COVID-19, 28.8% preferred that their children fight COVID-19 naturally, without using any vaccine, 15.1% said that COVID-19 is not a serious disease, and 3.7% thought it would be better to get vaccinated themselves in order to protect their children from infection.

Table 6. Factors influencing parents' decision to vaccinate children against COVID-19.

Associated Factors	Intention to Want to Have the Child or Teenager Vaccinated		OR [95% CI]	*p*
	Yes	No		
Age				
Under 40	114(39.7)	173(60.3)	2.06 [1.41–3.01]	<0.0001
40 and over	57(24.3)	178(75.7)		
Sex				
Male	88(38.6)	140(61.4)	1.60 [1.11–2.31]	0.012
Feminine	83(28.2)	211(71.8)		
Study level				
Secondary and university	145(35.5)	263(64.5)	1.87 [1.15–3.02]	0.010
No level and primary	26(22.8)	88(77.2)		
I think COVID-19 is a serious disease				
Yes	140(34.2)	269(65.8)	1.34 [0.85–2.13]	0.21
No	31(27.9)	80(72.1)		
My family or I could get COVID-19				
Yes	121(38.7)	192(61.3)	1.98 [1.34–2.93]	0.001
No	50(24.2)	157(75.8)		
I am concerned that I or a member of my family will contract COVID-19				
Yes	41(41.8)	57(58.2)	1.62 [1.03–2.54]	0.036
No	130(30.8)	292(69.2)		
I think me and my children are vulnerable to COVID-19.				
Yes	69(41.3)	98(58.7)	1.47 [1.01–2.15]	0.005
No	120(28.9)	251(71.1)		
COVID-19 vaccines are required for children and adolescents under 18				
Yes	160(77.3)	47(22.7)	94.01 [47.5–186.42]	<0.0001
No	11(3.5)	304(96.5)		
Have you ever been vaccinated against COVID-19				
Yes	62(82.7)	13(17.3)	14.79 [7.83–27.93]	<0.0001
No	109(24.4)	338(75.6)		
Presence of a chronic disease in the child or adolescent				
Yes	53(43.4)	69(56.6)	1.84 [1.21–2.79]	0.004
No	118(29.5)	282(70.5)		

The results given above showed a statistically significant association of the intention to have the adolescent vaccinated with the following risk factors: age below 40 years (OR = 2.06, 95% CI:[1.41–3.01]), male gender (OR = 1.60, 95% CI: [1.11–2.31]), some high school and higher education (OR = 1.87, 95% CI: [1.15–3.02]), the fact that the parent thinks she/he and her/his family could contract COVID-19 (OR = 1.98, 95% CI [1.34–2.93]), the parent fears that she/he or a member of her/his family will contract COVID-19 (OR = 1.62, 95% CI:[1.03–2.54]), thinking that she/he and her/his children are vulnerable to COVID-19 (OR = 1.47 95% CI: [1.01–2.15]), thinking that the vaccine is necessary for the child or adolescent (OR = 94.01, 95% CI: [47.5–186.42]), the fact that the parent is already vaccinated (OR = 14.79, 95% CI: [7.83–27.93]), and the presence of a chronic disease in the child or adolescent (OR = 1.84, 95% CI: [1.21–2.79]).

Table 7. Logistic regression of the different explanatory variables of the parents' intention to have their children or adolescents vaccinated.

Factors Explaining the Intention to Have the Adolescent Vaccinated	AT	ES	Wald	P	Exp(B)	CI for Exp(B) 95%	
						Inferior	Superior
Age (<40 vs. ≥40)	0.89	0.239	13.40	0.000	2.40	1.50	3.83
Fearing that I or a family member will get COVID-19 (Yes vs. No)	0.86	0.274	9.75	0.002	2.35	1.38	4.02
Thinking that me and my children are vulnerable to COVID-19 (Yes vs. No)	0.53	0.269	3.92	0.048	1.70	1.005	2.2881
My family or I could get COVID-19 (Yes vs. No)	1.12	0.272	17.08	0.000	3.07	1.80	5.23
Have you ever been vaccinated against COVID-19 (Yes vs. No)	2.80	0.344	66.23	0.000	16.47	8.39	32.33
Constant	−3.42	0.48	49.72	0.000	0.033		

The age of the parent being < 40 years (aOR: 2.40, CI: [1.50–3.83]), fearing that the parent or a member of his/her family will contract COVID-19 (aOR: 2.35, CI: [1.38–4.02]), thinking that the parent and the children are vulnerable to COVID-

19 (aOR: 1.70, CI: [1.005–2.2881]), believing that the family or the parent could contract COVID-19 (aOR: 3.07, CI: [1.80–5.23]), and having been vaccinated against COVID-19 (aOR: 16.47, CI: [8.39–32.33]) were significantly associated with the intention to have the children or adolescents vaccinated. Thus, the model for predicting the intention to have the child or adolescent vaccinated can be written as follows:

$$\mathbf{P = (Y = \text{to have adolescent vaccinated}/X = xi) =} \frac{e^{-3.42-0.89.x1+0.86.x2+0.53.x3+1.12.x4+2.80.x5}}{1+e^{-3.42-0.89.x1+0.86.x2+0.53.x3+1.12.x4+2.80.x5}}$$

The values of the area under the curve (AUC) in Figure 1 indicate an ability to predict the parents' intention to have the child or adolescent vaccinated in the order of 74.4% (AUC between 0.74 and 0.82).

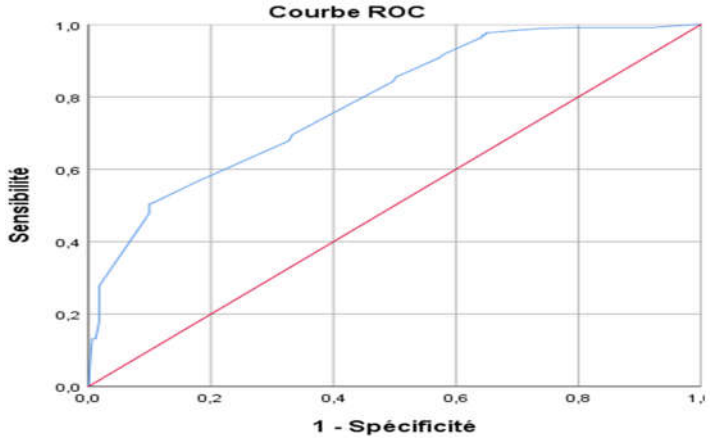

Figure 1. ROC curve of factors explaining parents' intention to have the child or adolescent vaccinated.

4. Discussion

The vaccination of children and young people against COVID-19 remains highly controversial, with considerable policy differences internationally. The vaccination of younger age groups was not an initial plan when the original SARS-CoV-2 virus variant emerged, as children and young people (CYP) appeared to be very mildly affected by COVID-19. However, new mutations have resulted in the increased virulence of SARS-CoV-2. This led to an increase in the population vaccination coverage threshold required for the prevention of viral spread, and eventually to levels above 80% vaccination coverage in the general population. Additionally, due to the successful roll-out of vaccination to older and at-risk populations, the virus has begun to circulate in greater numbers among younger populations, which has become a new concern (Mkony et al., 2014; Snape and Viner, 2020).

This study investigating the parental acceptance of COVID-19 vaccination in the Democratic Republic of the Congo is one of the first studies conducted in an African region providing preliminary data to inform policy-making and service planning. The proportion of willing parents in DRC is considerably lower (32.8%) compared to other countries as per studies from England (89%) (Bell et al., 2020), New Zealand (80%) (Jeffs et al., 2021), China (73%) (Zhang et al., 2020), the USA (65%) (Goldman, Yan, Seiler, Parra Cotanda, et al., 2020), Canada (63%) (Humble et al., 2021), Japan (42.9%) (Yoda and Katsuyama, 2021), and Turkey (42%) (Akarsu, Canbay Özdemir, et al., 2021). In African countries, parental intention ranged from 92% in Zambia (Carcelen et al., 2022), to 73.3% in Ghana (Kyei-Arthur et al., 2022), and 65.6% in Egypt (Al-Wutayd et al., 2022).

Several reasons may explain these discrepancies in the prevalence of intention to accept COVID-19 vaccination in children and adolescents. With the different settings of the medical system and the composition of studies in different countries, there is great heterogeneity among will rates, which makes direct comparisons difficult. Differences between respondents across regions reflected different policies and cultural contexts regarding COVID-19 (Al-Jayyousi et al., 2021). For example, 92% of Zambian parents tended to have their children vaccinated (Carcelen et al., 2021), whereas a cross-sectional study in Turkey showed a vaccination rate from ages 20 to 85 of only 10.4% (İkişık et al., 2021). Overall, we recommend that various interventions be undertaken to improve parents' willingness to vaccinate their children in different countries and regions given the varying willingness rates and backgrounds of COVID-19.

The most important reasons for parents to accept the vaccine were the belief that the vaccine could protect against the disease, the belief that the vaccine could prevent their child from getting COVID-19, and the beliefs that the "vaccine is safe for my child", and "my child was at higher risk for COVID-19 infection", which is consistent with the studies conducted in the USA and Turkey (Akarsu, Canbay, et al., 2021; Goldman, Yan, Seiler, Parra, et al., 2020; Yılmaz and Sahin, 2021). On the other hand, the most critical reasons for parents to refuse to vaccinate their children were the parents' belief that the vaccine may not work and may give their children COVID-19 disease, the belief that the vaccine could give their children an illness other than COVID-19, and the belief that their children should fight COVID-19 naturally, thus believing that they did not need the vaccine, which is consistent with the American study and the UK study.

In a study conducted by Soukaina Ennaceur, the main reasons for the refusal of the COVID-19 vaccine in children were the fear of side effects and doubt regarding the effectiveness of the vaccine. Concerns about the efficacy and safety of the

vaccine were linked to the rapid vaccine development process and exposure to negative information about the vaccine via social media (Ennaceur, 2022). In fact, during the COVID-19 pandemic, a wide range of misinformation and inaccurate data were disseminated in the media (COVELLO, 2010), causing a decrease in parental trust and acceptance of the COVID-19 vaccine. This situation could be controlled through transparent communication on the development of the vaccine, its safety, and its effectiveness in populations including children. Identifying this misinformation in a limited time is the responsibility of public health authorities, and is necessary to protect populations from being impacted by such unverified rumors.

Our multivariable logistic regression findings indicate that for parents aged below 40 years old, concern that the parent or a member of her/his family could contract COVID-19, thinking that the parent and her/his children are vulnerable to COVID-19, thinking that a family member or other relative could contract COVID-19, and having been already vaccinated against COVID-19, were significantly associated with the intention to have their child or adolescent vaccinated. Concern about being infected with COVID-19 was also significantly associated with vaccine acceptance among children and adolescents. This corroborates with other findings elsewhere. One study found that 92% of caregivers feared contracting the disease or their family becoming infected, and of these, 93% would have their children vaccinated (Zhang et al., 2020). According to the health beliefs model, those who were more worried about or fearful of COVID-19 might be more likely to seek relief for their adverse emotional state by accepting the vaccine, including for their children (Wong et al., 2020). Positive vaccine perceptions predict parents' willingness to vaccinate their children against COVID-19. Aligned with research on adults' willingness to take COVID-19 vaccines (Kaplan and Milstein, 2021; Schwarzinger et al., 2021), confidence in vaccines, and more specifically confidence in the efficacy and safety of vaccines against COVID-19, as well as parental vaccination against COVID-19, positively predict parental intention to vaccinate.

Parents' willingness to get vaccinated was one of the predictors in our results. The more the parents were likely to get vaccinated themselves, the more they were likely to vaccinate their children. Overall, the acceptance of vaccination may reflect to a large extent their confidence in COVID-19 vaccines. Several studies have also reported that participants were more reluctant to have their children vaccinated than to vaccinate themselves (Aldakhil et al., 2021; Brandstetter et al., 2021; Chen and He, 2022). Parents are the decision makers in childhood vaccination. In an effort to improve the uptake of COVID-19 vaccination among children, strategies may need to be targeted at reducing the vaccine hesitancy of parents and improving their uptake in the first place. However, it should be noted that Humble's study suggested that parents' intentions regarding COVID-19 vaccination are better predicted by past decisions about influenza vaccination than routine childhood vaccination (Hetherington et al., 2021). This may be due to parental concerns about the effectiveness or necessity of the influenza vaccine versus routine childhood vaccines, given the historically low rates of influenza vaccination uptake in children.

The age of the parents and caregivers was an explanatory factor in the child or adolescent's desire for vaccination. The same trend was also observed in some studies (Babicki et al., 2021; Bagateli et al., 2021; Hetherington et al., 2021; Montalti et al., 2021). One possible explanation could be the parents' perception of a low risk of contracting COVID-19. In another study, factors including increased parental age, male gender of the parent, college education or higher, and a higher income, were all associated with willingness to allow their children to receive the COVID-19 vaccine (Davis et al., 2020).

The limitations of this study that should be considered include the fact that the study cannot be representative of all parents in the country, which limits the generalizability of our results. The design of the study being cross-sectional also constitutes a limit of the inference on the causality of the associated factors, and it will not allow researchers to capture any changes in COVID-19 vaccine acceptability over time.

5. Conclusions

Vaccinating children can reduce the transmission of COVID-19 at school and thus reduce school closures. Indeed, keeping schools open is very important for the education and development of children. The vaccination of children can also prevent children from transmitting COVID-19 to people at risk of serious illness, such as the elderly and people with underlying chronic diseases who live in different households.

In this study, nearly a third of all survey respondents were willing to have their children vaccinated. Factors influencing willingness to vaccinate children were parental age below 40, fear that the parent or a member of their family will contract COVID-19, thinking that the parent and his/her children are vulnerable to COVID-19, thinking that the family or the parent could contract COVID-19, and having been vaccinated against COVID-19. The findings of this study are useful for future policy decisions regarding the vaccination of children against COVID-19.

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