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Article

Determinants of Parents' Motive to Vaccinate their 12–17 Years Old Children against COVID-19 in North Kivu (DRC)

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Abstract: Background: children immunization against COVID-19 is an indispensable public health strategy to reach herd immunity and prevent children and adult's illness. Parents are dealing with tremendous stress due to the COVID-19 pandemic and the efficacy of the COVID-19 children immunization program. This study aimed to investigate parents' will to make their children vaccinated against COVID-19 in North Kivu province (DRC). **Methods:** we conducted a cross-sectional survey from December 01, 2021 to January 20, 2022 in 6 health zones (Goma, Karisimbi, Butembo, Beni, Kamango and Katwa) in the province of North Kivu. In each health zone, we selected 5 clusters (Health area) using the method of probabilistic selection proportional to population size. In total, 522 parents participated in our study. **Results:** among parents, 32.8% of parents deliberated to vaccinate their children. In the multivariate analysis, younger age of parents (aOR : 2.40, CI : [1.50-3.83]), higher level of fear that "a member of my family" could suffer from COVID-19 with OR =2.35 and CI : [1.38-4.02], higher level of vulnerability perception to COVID-19 within the family (aOR : 1.70, CI : [1.005-2.2881]), higher level of susceptibility perception to COVID-19 within the family (aOR : 3.07, CI : [1.80-5.23]), and history of vaccination against COVID-19 among parents (aOR : 16.47, CI : [8.39-32.33]), were significantly associated with the motive to have their children or adolescents vaccinated. **Conclusion:** parents will to vaccinate their children against COVID-19 was low in North Kivu. There is undeniably in this region a need to reinsure the populations about vaccine safety for both children and adults. Public health stakeholders should also address widespread disinformation about vaccines punctually.

Keywords: parents' motive to vaccinate; coronavirus disease; children

1. Introduction

The World Health Organization (WHO) declared on 11 March 2020 that coronavirus disease (COVID-19) is a worldwide pandemic. About one year and half since its emergence in Wuhan, China, more than 194 million cases and 4 million deaths have been reported in not less than 177 countries worldwide (WHO, 2022). The pandemic of coronavirus disease 2019(COVID-19) is continuing. For example, on June 16, 2022; 82,306 COVID-19 cases were confirmed in DRC including 1,225 deaths globally (ref).

At first, only people aged 18 and over were recommended to be vaccinated against COVID-19. As a lot of countries adopt for a new stage of management in the slowdown sands of the COVID-19-pandemic, the importance of the disease spread and its prevention is advancing to the new generations (Fazel et al., 2021). This emphasis consider the slowdown in middle age of those becoming infected with the virus, with it being described as becoming a young disease (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. the Chinese National Health Commission accepted In June 2021, the urgent use of its national inactivated COVID-19 vaccines youngers aged 3 to 17 (Rudan et al., 2021). The adolescents vaccination role is now taking notoriety in many higher resource countries, especially as older and more

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vulnerable populations have been vaccinated and severe illness is mostly vaccine-preventable outcome (Fazel et al., 2021). A multitude of countries started to vaccinate their adolescent populations in the first half of 2021; Israel, the USA and recently the UK were countries where those over the age of 16, and younger adolescents with certain co-morbidities, have been vaccinated (Kostoff et al., 2021).

A lot of population-based SARS-CoV-2 seroprevalence and viral shedding studies have looked over 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 measures (Gaythorpe et al., 2021). A seroprevalence survey conducted after the second wave (Delta variant) in India from June to July 2021 showed similar seropositivity between children aged 6-18 years and older age groups excepting those older than 60 years whose immunization rate was high (Murhekar et al., 2021). Generally, it looked that whether schools were opened or closed, there were similar infection rates among children and adults. Thus, it appears that all children can become infected and spread the virus to others.

Despite the fact that the major part of COVID-19 vaccines are only authorized for use in adults aged 18 years and above, a great deal of number of them are now also being authorized for use in children. Some countries authorized in emergency the use of mRNA vaccines in the adolescent age group (12-17 years) such as BNT162b2 and mRNA 1273 developed respectively by Pfizer and Moderna. given that COVID-19 vaccines for children aged 12 and under are available, it is time to assess parents' attitude on COVID-19 vaccination for their children. Parents compliance with COVID-19 vaccination is critical to help public health systems hold out the recommended threshold for performing herd immunity to stop the spread of the epidemic.

North Kivu, one of the country's 26 provinces, has over 10 million inhabitants. It shares borders with Rwanda and Uganda, and has nine official points of entry. Prior to the pandemic, an average of 95,000 people used these points to cross the border between Rwanda and DR Congo each day. 9980 cases were notified in the province of North Kivu, including 5852 men and 4118 women with 8822 cured and 567 deaths, hence a lethality of 5.7%. The rollout of COVID-19 vaccination in North Kivu started in May 2021 and targeted health-care workers and people aged 18 and over. The region has a history of conflict and continues to suffer from insecurity; it is officially designated by the government of DRC as under a “State of Siege”. In May 2021, 450,000 people were displaced by the eruption of Mount Nyiragongo, with an estimated 4,000 households losing their homes permanently. It also has been affected by other recent epidemics, notably the 2018-2020 Ebola epidemic, which was the second largest known Ebola outbreak in history. The underlying insecurity, combined with community distrust and resentment of outside authorities has put health workers at risk during epidemic response efforts. During the 2018-2020 Ebola outbreak, at least 25 health workers were killed during violent attacks, and in total, over 450 acts of violence or threats were reported against responders. These factors make North Kivu a particularly challenging environment to implement COVID-19 vaccination efforts.

It should be noted that in DRC in general and in the province of North Kivu in particular, children and adolescents play a major 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 parents COVID-19 vaccination acceptability for their children and the factors affecting this acceptability.

2. Methods

2.1. Recruitment and participants

It was a cross-sectional survey conducted from December 01, 2021 to January 20, 2022 in 6 health zones (Goma, Karisimbi, Butembo, Beni, Kamango and Katwa) of the province of North Kivu. In each health zone, we selected 5 clusters (Health area) using the method

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of probabilistic selection corresponding to population size. The investigation teams selected 4 random starting points in every one of the selected clusters. commencing from a random starting point, investigation teams visited successive ménages and listed all relatives aged 18 and over who were permanent residents of the area. qualified persons present in the ménage were invited to participate in the survey. Thus, a minimal of 15 individuals from each health area and 75 individuals from each health zone were registed.

2.2. Measures

We used a structured questionnaire to collected data which comprised 19 items divided into 3 parts. the first part contained socio-demographic and other general information investigated thanks to the following characteristics: 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; presence or absence of a chronic disease in the child.

The second part looked over perceptions of both COVID-19 and COVID-19 vaccination, which can be viewed as important predictors of parents' motive 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 part investigated parents will to vaccinate their children against COVID-19), through a question about the parents' motive to vaccinate their children when vaccines would be at hand in DRC. Then, parents who declared that they would vaccinate their children or whose children were already vaccinated were asked to provide one or several explanations of their choice among the followings : "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 followings: "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 was collected in the household by structured face-to-face interview with the respondents using a questionnaire previously pre-tested and configured on the ODK tool. About 15 min were required to fill in the questionnaire.

2.4. Data Analysis and Statistics

We described Variables as absolute frequencies and percentages. The determinants of the motive to vaccinate the child or adolescent were evaluated by either univariate or multivariate analyses. The multivariate analyzes results were presented as odds ratio (OR)

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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 incorporated in the final multiple logistic regression model, in agreement with the results of the univariate models. Statistical significance was set at $p < 0.05$. we used Microsoft Excel (Microsoft Corporation) to collect data. The entire analyzes were performed using SPSS version 25 software.

2.5. Ethics

The study was performed after obtaining the permission from 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. We used Anonymous data for analysis, reporting and interpretation.

3. Results

Table 1. respondent's distribution according to their socio-demographic characteristics.

Sociodemographic characteristics of the interviewee	Effective	Percentage
Age		
40 and over	235	45.0
Under 40	287	55.0
Sex		
Femal	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

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 Protestants.

Table 2. respondent's distribution 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 and I could be infected by 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 they could get COVID-19, 67.6% were afraid that they or a family member could get COVID-19, and 18.8% think they and children are vulnerable to COVID-19.

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Table 3. Distribution of perception on vaccination and intention to want to have the teenager vaccinated.

Perception of COVID-19 by parents	Effective	Percentage
Currently, children under 18 are not concerned with vaccination against COVID-19 in the DRC. Did you know?		
Yes	369	70.7
No	153	29.3
Are COVID-19 vaccines essential 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

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

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

If yes, what are the reasons for wanting to vaccinate your children?	Effective	Percentage
The vaccine can prevent my child to be Infected by COVID-19	162	94.7
The vaccine is safe for my child	98	57.3
My child presents a higher risk of COVID-19 infection	45	26.3
My child presents a higher risk of COVID-19 infection, vaccines will protect my child and those around him to be infected by 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 my child's EPI advice to have my child vaccinated	22	12.9
I would follow Public Health Ministry recommendations to have children vaccinated	16	9.4
If the vaccine is free	22	12.9
If the vaccine is available during my son's visits to his doctor/pediatrician and a a regular follow-up is done	19	11.1
If my child's vaccination against COVID-19 him to travel	22	12.9

It appears from this table 4 that 94.7% of parents agreed to vaccinate their children or adolescents 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 should follow Public Health Ministry recommendations to vaccinate their children.

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Table 5. respondent's distribution conforming to reasons for not wanting to have children vaccinated.

If not, what are your Reasons for not wanting your child be vaccinated against COVID-19?	Effective	Percentage
COVID-19 is not a severe illness	53	15.1
The vaccine may not be efficient and may cause COVID-19 disease to my child	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
COVID-19 vaccine side effects are possible	40	11.4
I don't believe in vaccines in general	33	10.0
I prefer my child to resist COVID-19 naturally, without being vaccinated	101	28.8
I choose my child to be at home to minimize the risk of contracting COVID-19	23	6.6
I don't think it will be correctly tested in children before use to the public	18	5.1
I prefer myself to be vaccinated and protect my child against infection	13	3.7
My child is immature to be vaccinated	14	4.0

In relation to the motivation for not wanting his child to be vaccinated against COVID-19, 60.4% of parents thought that the vaccine may not be efficient and may cause COVID-19 disease to their children; 41.6% thought the vaccine can give their children an illness other than COVID-19;28.8% had preferred that their children fight COVID-19 naturally, without using any vaccine;15.1% said that the COVID-19 is not a serious disease and 3.7% think it would be better to for one to get vaccinated and protect their child from infection.

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

Associated factors	motive to have the 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 & university	145(35.5)	263(64.5)	1.87 [1.15-3.02]	0.010
No level &Primary	26(22.8)	88(77.2)		
I think COVID-19 is a severe disease				
Yes	140(34.2)	269(65.8)	1.34 [0.85-2.13]	0.21
No	31(27.9)	80(72.1)		
All of us in the family 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 recommended to 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 adolescents				
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 relevant association of the motive to have the adolescent vaccinated with the following leading 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 schooling (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]), believing that she/he and her/his children are vulnerable to COVID-19 (OR=1.47 95% CI: [1.01-2.15]), the fact of thinking that the vaccine is necessary for the child and adolescent (OR=94.01, 95% CI: [47.5-186.42]), the fact that the parent is already

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vaccinated (OR=14.79, 95% CI: [7.83-27.93]) and the existence of a chronic disease in adolescents (OR=1.84, 95% CI: [1.21-2.79]).

Table 7. Logistic regression of the different explanatory variables of the parents' motive 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	.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	.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
All the family 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	.000	.033		

Age of parent < 40 years (aOR : 2.40, CI : [1.50-3.83]) fearing that the parent or a member of his/her family does not 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]), the family or the parent could contract COVID-19 (aOR : 3.07, CI : [1.80-5.23]), and having been immunized against COVID-19 (aOR : 16.47, CI : [8.39-32.33]), were crucially associated with the intention to have the children or adolescents vaccinated. Thus, the model for predicting the motive to have the child or adolescent vaccinated can be written as follows:

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

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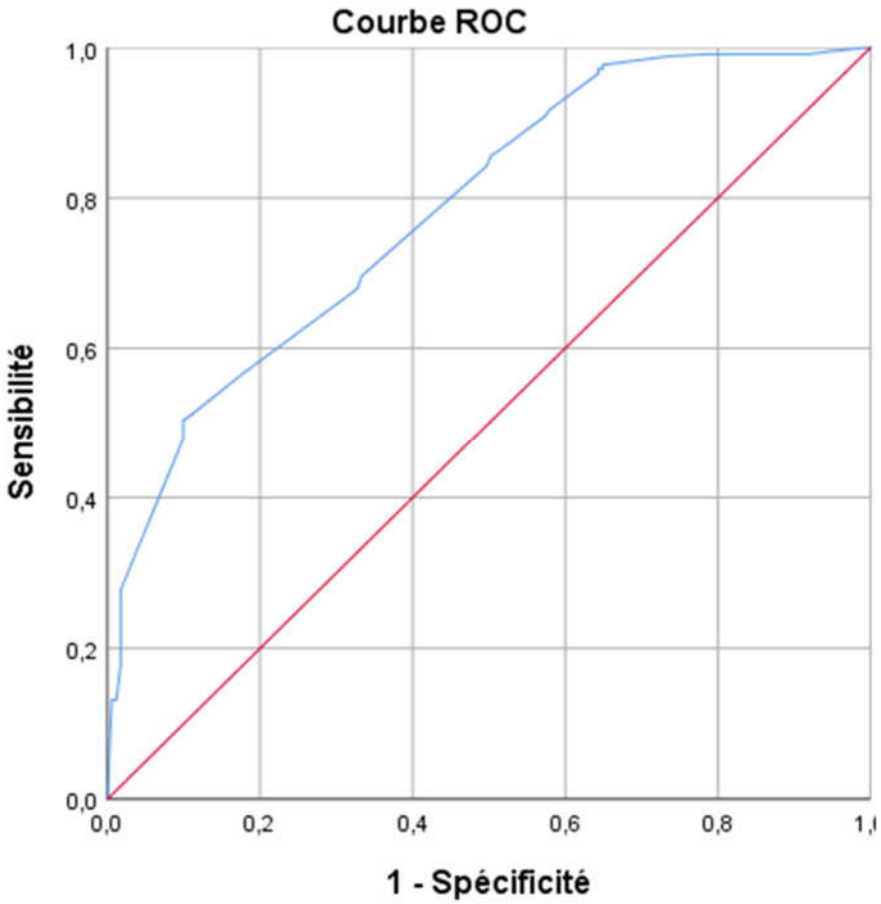

Figure 1. factors ROC curve explaining parents' motive to have the child or adolescent vaccinated.

The values of the area beneath the curve (AUC) in figure 1 show an ability to predict the parents' motive to have the child or adolescent vaccinated in the order of 74.4% (AUC between 0.74 and 0.82).

4. Discussion

Children and young people Vaccination against COVID-19 remains highly controversial, with plentiful policy differences globally. younger age groups Vaccination was not an initial plan when the original SARS-CoV-2 variant virus emerged. Given that children and young people (CYPs) appeared to be moderately affected by COVID-19. However, new mutations have resulted in increasing SARS-CoV-2 virulence. This led to an increase in the population vaccination threshold coverage required for the prevention of viral spread, eventually to levels more than 80% vaccination coverage in the general population. Additionally, due to the successful vaccination implementation to older and risky populations, the virus has begun to spread in greater numbers among youngers, which has become a new concern.(Mkony et al., 2014; Snape & Viner, 2020).

This study investigated parental COVID-19 vaccination acceptability in the Democratic Republic of the Congo. It is one of the first studies conducted in an African region providing preliminary data to inform policy-making and service planning. The proportion of parents will in DRC is considerably lower (32.8%) in comparison to other countries such as studies published in England (89%)(Bell et al., 2020); New Zealand (80%)(Jeffs et al., 2021); China (73%) (Zhang et al., 2020); USA (65%) (Goldman et al., 2020); Canada (63%) (Humble et al., 2021); Japan (42.9%) (Yoda & Katsuyama, 2021) and Turkey (42%) (Akarsu et al., 2021).

Several reasons may explain these different discrepancies in the prevalence of motive to accept COVID-19 vaccination in adolescents. With the different settings of the health

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system and the structure of studies in different countries. there is diverseness among will rates, which makes difficult straight comparisons. discrepancies between responders across regions thought about different policies and cultural contexts regarding COVID-19 (Al-Jayyousi et al., 2021). For instance, 92% of Zambian parents were disposed to have their children vaccinated (Carcelen et al., 2021), a cross-sectional study conducted in Turkey showed a vaccination rate from ages 20 to 85 of only 10.4% (İkiışık et al., 2021). generally, we suggested that various interventions be undertaken to boost parents' will to vaccinate their children in various countries and regions given varying willingness rates and backgrounds of COVID-19.

The most important reasons parents accepted the vaccine were the conviction that the vaccine could protect against COVID-19 ; the vaccine can protect their child from getting COVID-19, "vaccine is safe for my child", and "my child was at higher risk for COVID-1 infection", which is in accordance with studies conducted in the USA and Turkey (Akarsu et al., 2021; Goldman et al., 2020; Yılmaz & Sahin, 2021). On the other side, the most critical reasons for parents' resistance to vaccinate their children were parents' thought that the vaccine is not efficient and may cause COVID-19 disease to their children; the vaccine can give their children an illness other than COVID-19 and that their children should fight COVID-19 naturally. thus, believing that they Don't want the vaccine, which is consistent with the American study and the UK study.

For Soukaina Ennaceur, the main reasons for COVID-19 vaccine hesitancy in children were the fear of side effects and the vaccine effectiveness. Concerns about the efficacy and safety of the vaccine were linked to the quick vaccine development process and exposure to wrong information about the vaccine via social media (Ennaceur, 2022). Actually, within the COVID-19 pandemic, a wide spread of disinformation and inexact data was disseminated in the media (COVELLO, 2010), leading to a decrease in parental trust and taking of the COVID-19 vaccine. This situation could be managed via clear communication on the development of the vaccine, its innocuity and its effectiveness with children. Identifying this disinformation in a short time is the responsibility of public health authorities to preserve populations from being influenced by such false rumors.

Our multivariable logistic regression findings indicate that Aged below 40 years old concerned 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, the family or the relative could contract COVID -19 and being vaccinated against COVID-19, were significantly associated with the motive to have the child or adolescent vaccinated. Concern about being contaminated with COVID-19 was also significantly associated with vaccine acceptance among children and adolescents. This corroborates with o findings of other researchers elsewhere. One study found that 92% of caregivers feared contracting COVID-19 or their family becoming infected, and among them, 93% would have their children vaccinated (Zhang et al., 2020). In accordance to the health beliefs model, parents who were more worried/feared about COVID-19 might be more likely to look for relief for their adverse emotional state through acceptance of the vaccine for their children (Wong et al., 2020).

Positive vaccine perceptions predict parents' willingness to immunize their children against COVID-19. Aligned with research on adults' will to take COVID-19 vaccines (Kaplan & Milstein, 2021; Schwarzinger et al., 2021), confidence in vaccines, and more specifically COVID-19 vaccines confidence in the efficacy and safety as well as parental vaccination against COVID-19 positively predict parental motive to vaccinate.

Parents' willingness to be vaccinated was one of the predictors in our study. The more the parents were willing to be vaccinated, the more they were likely to vaccinate their children. Generally, vaccination acceptance may reflect to a large extent their trust in COVID-19 vaccines. Lots of studies have also concluded that participants were more hesitant to have their children vaccinated than to vaccinate themselves (Aldakhil et al., 2021; Brandstetter et al., 2021; Chen & He, 2022). Parents are the decision makers in childhood vaccination. In an effort to improve COVID-19 vaccination uptake, strategies may need to be implemented at reducing their parents' vaccine refusal and improving children uptake

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by first place. But it should be noted that Humble's study showed that parents' motives regarding COVID-19 vaccination are better prognosticated by past decisions about influenza vaccination than habit childhood vaccination (Hetherington et al., 2021). This may be attributable to parental concerns about the efficacy or necessity of the influenza vaccine versus habit childhood vaccines, seing the historical low rates of influenza 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). A possible explanation could be the parents' COVID-19 low risk perception.

5. Conclusion

Nearly a third of respondents wanted to have their children vaccinated. Factors influencing children vaccination willingness were Age below 40, fear that the parent or a member of the family does not 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 COCID-19. The findings of this study are practical for policy decisions regarding children COVID-19 vaccination.

Immunizing children can reduce COVID-19 transmission at school and thus avoid school closedown. Indeed, keeping schools unlocked is very important for children education and development. A more reason to vaccinate children is that it can prevent them from infecting people at risk of serious illness like elderly and people with previous chronic diseases living in different households.

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