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PII: S1576-9887(22)00074-7

DOI: <https://doi.org/10.1016/j.vacun.2022.07.004>

Reference: VACUN 256

To appear in:

Received date: 10 June 2022

Accepted date: 22 July 2022

Please cite this article as: H.K. Sabra, M.A. Bakr, O.E.S.M. Rageh, et al., Parents' perception of COVID-19 risk of infection and intention to vaccinate their children, (2022), <https://doi.org/10.1016/j.vacun.2022.07.004>

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Parents' perception of COVID-19 risk of infection and intention to vaccinate their children

Percepción de los padres sobre el riesgo familiar de infección por COVID-19 e intención de vacunar a sus hijos

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Abstract

Background: Parent's perception of the COVID-19 vaccines is very important to protect themselves and their children and achieve maximum effect of vaccination programs.

Objective: evaluate the perception and attitude of parents towards COVID-19 risk of infection and intentions to vaccinate their children.

Method: Cross-sectional study including 1032 participants who have children aged from 5 to 18 years using a structured questionnaire.

Results: Overall, 65.0% of participants or their family members suffered from comorbidities that poses them at risk for COVID-19 infection such as hypertension (25.1%) and diabetes mellitus (16.1%). The prevalence of tobacco smoking in the studied families was 36.9%. Among participants, 40.6% had a family member with history of confirmed COVID-19 infection. Nearly one-half of studied parents (48.2%) reported COVID-19 as a serious infection and the majority were worried about getting a family member infected (86.8%). Among participants 62.0% of male parents and 57.8% of female parents agreed that vaccine information is reliable. Participants reporting safety of COVID-19 vaccination represented 45.3%. If vaccine is available, 40.1% of parents intended to vaccinate their children. The

main factors associated with the willingness to vaccinate children were vaccine is not suitable for children under 18 years (OR=11.508), concern about vaccination safety (OR= 8.678), doubts about reliability of vaccine information (OR= 7.811) and ability of vaccine to prevent infection (OR= 5.766).

Conclusion: Our study provides a brief insight about how parents think about COVID-19 vaccines and acceptance to vaccinate their children.

Resumen

Antecedentes: la percepción de los padres sobre las vacunas contra el COVID-19 es muy importante para protegerse a sí mismos y a sus hijos y lograr el máximo efecto de los programas de vacunación.

Objetivo: evaluar la percepción y actitud de los padres hacia el riesgo de infección por COVID-19 y las intenciones de vacunar a sus hijos.

Método: Estudio transversal que incluyó a 1032 participantes que tenían hijos de 5 a 18 años mediante un cuestionario estructurado.

Resultados: En general, el 65,0 % de los participantes o sus familiares padecieron comorbilidades que los ponen en riesgo de infección por COVID-19, como hipertensión (25,1 %) y diabetes mellitus (16,1 %). La prevalencia de tabaquismo en las familias estudiadas fue del 36,9%. Entre los participantes, el 40,6% tenía un familiar con antecedentes de infección confirmada por COVID-19. Casi la mitad de los padres estudiados (48,2 %) informaron que la COVID-19 era una infección grave y la mayoría estaba preocupada por la posibilidad de que un miembro de la familia se infectara (86,8 %). Entre los participantes, el 62,0 % de los padres varones y el 57,8 % de las mujeres acordaron que la información sobre las vacunas es confiable. Los participantes que informaron sobre la seguridad de la vacunación contra la COVID-19 representaron el 45,3 %. Si la vacuna está disponible, el 40,1% de los padres tenía la intención de vacunar a sus hijos. Los principales factores asociados al deseo de vacunar a los niños fueron la vacuna no apta para menores de 18 años (OR=11.508), preocupación por la seguridad vacunal (OR= 8.678), dudas sobre la confiabilidad de la información vacunal (OR= 7.811) y capacidad de vacuna para prevenir la infección (OR= 5.766).

Conclusión: Nuestro estudio proporciona una breve perspectiva sobre cómo piensan los padres sobre las vacunas contra el COVID-19 y la aceptación de vacunar a sus hijos.

Keywords

COVID-19 vaccines, children vaccination, parents' perception

Introduction

In December 2019, a cluster of people with pneumonia of unknown origin was traced to a seafood wholesale market in Wuhan, China. A previously unknown beta coronavirus was discovered using unbiased sequencing in samples from pneumonia patients. [1] Human airway epithelial cells were used to identify 2019-nCoV, a novel coronavirus that established a clade within the subgenus Sarbecovirus, Orthocoronavirinae subfamily [1]

In Egypt, from 3rd January 2020 to , to 4th February 2022, there have been 430,480 confirmed cases of COVID-19 with 22,735 deaths, reported to WHO. As of 29th January 2022, a total of 65,052,928 vaccine doses were administered. The actual number of SARS-CoV-2 infections is undoubtedly much higher than the officially reported number of cases, due to a variety of factors such as asymptomatic infections, varying levels of healthcare seeking for clinically mild cases, different testing strategies across countries, false-negative virological tests, and incomplete case reporting [2]

In Egypt, the reported COVID-19 cases based on clinical identification with virological confirmation represent only a small proportion of the overall population, with many asymptomatic and mild infections in the general population that may only be detected through analogy to common cold coronaviruses. Immunity after SARS-CoV-2 infection is thought to be incomplete and temporary, lasting only several months to a few years. [3] To accomplish the COVID-19 herd immunity threshold wide coverage of vaccination is required. [4]

In a systematic review, it was concluded that SARS-CoV2 is much milder and shows better prognosis in children than in adults. [5] COVID-19 vaccine for children is still questionable as they are at low risk of infection with SARS-CoV2. Children, especially secondary school students, carry the risk of transmitting SARS CoV2 between school-aged students and into

the wider community. [6] Vaccinating young and low risk individuals may help to accomplish the COVID-19 herd immunity, protect high risk groups, and reduce societal burden. [4]

Six vaccines were approved for use on the WHO Emergency Use List as of 11th June, 2021. Compared to adults, the course of COVID-19 disease is often milder in children and adolescents. The factors impacting parents' attitudes regarding child vaccination were diverse, reflecting country-specific factors while also exhibiting some common trends across nations, such as parental education. The most important factor in deciding to vaccinate children was to protect them, their families, and others. The most important factor in deciding not to vaccinate children was the fear of adverse effects and safety. [7]

Objectives:

We aim to evaluate the perception the parents towards the COVID – 19 vaccines their intentions to vaccinate their children and relationship between their perception of risk of infection and intention to vaccinate children. This study should guide the stakeholders and organizations to take actions to encourage parents to have more trust in the COVID–19 vaccines to vaccinate their children.

Methodology:

Study design and settings:

A cross-sectional study was conducted in Egypt through a self-administered questionnaire distributed through social media groups during the period from December 2021 to February 2022. Our target population was parents. The inclusion criteria included being mother or father, having one or more child aging 5-18 years and living in Egypt during the epidemic. Exclusion criteria included parents having children less than five years or older than 18 and families with no children.

Method of data collection

Authors collected data through an online survey (Google form survey). The authors designed the questionnaire that started with a message to participant explaining the objectives and the benefits of the study. The message confirmed confidentiality and voluntarily participation and asked for consent to complete the survey.

We used a predesigned structured questionnaire formulated from data collected from literature review about the topic of the study. The questionnaire was in Arabic language. Seven professors in Community Medicine and Public Health Department tested the questionnaire for content and face validity. Authors organized a pilot study on 50 participants (not included in the study) to test questionnaire reliability and calculated Cronbach's alpha that was 0.725. Our survey is divided into six sections:

Section I: This section included 6 questions about sociodemographic characteristics which were age, sex, residency, level of education and occupation, and income. **Section II:** This section included family members and their medical history. **Section III;** measured COVID-19 related history and contained of three questions answered with yes or no. **Section IV;** about attitudes toward COVID 19. All questions included three choices; disagree, not sure and agree except the first question included additional choice; "It depends on who gets COVID-19". **Section V,** This section measured attitudes toward COVID-19 vaccines. This section contained four questions answered by disagree not sure and agree. **Section VI;** This section measured acceptance of COVID-19 vaccination for their children and their answers were disagree, not sure and agree.

Statistical analysis

We used Excel sheet to collect required data from our survey and IBM SPSS Statistical software version 26 to conduct statistical analysis. Qualitative variables were presented as

frequency and percentage. Quantitative variables were presented as mean and standard deviation. Data were compared using Chi-square. We calculated the odd ratio to test for factors affecting intention to vaccinate children in relation to items of attitude towards COVID-19 infection and vaccination. Statistical significance was considered when a two-sided P value was less than 0.05.

Ethical considerations

The Ethical Committee of Scientific Research in Tanta Faculty of Medicine approved our application before the beginning of the study (approval code: 35085/12/21). Authors guaranteed confidentiality and privacy of the participants during the research. Consent was taken from each participant before completing the questionnaire.

Results:

The study included 1032 fathers or mothers who have children aged between 5-18 years old. Sociodemographic characteristics were presented in Table (1). Females represented 54.7%. The mean age of participants was 40.15 ± 9.51 years. Educational level below university level was reported by 52.4%. Employees represented 40.9% while housewives represented 13.1%. The monthly income was reported as enough by 57.4%. Among participants, families with five members or more represented 45.3% and families with a lonely child represented 24.8%. Having two or more children at school was reported by 50.9%. Among studied families, 22.5% reported having a health care worker family member and 7.8% of participants had a family member aged 65 years or above. Single parent families represented 7%. Participants who had a family member with a history of confirmed COVID-19 infection represented 40.6% while 47.5% had a test for suspected infection. Prevalence of tobacco smoking among family members was 36.9%.

Table (2) shows co-morbidities among family members as reported by the participants. Those with no family member with comorbidities represented 35.0%. Hypertension and diabetes mellitus were the most common reported comorbidities (25.1% and 16.1%, respectively).

Table (3) shows the perception of the risk of COVID-19 infection and the importance of the vaccine in relation to gender. Participants who agreed that COVID-19 is a serious disease represented 46.7% with no statistically significant difference between males (44.2%) and females (48.8%). Most of participants were worried about themselves or a family member acquiring infected with COVID-19 (86.8%). Almost 60% of participants agreed that vaccine information were reliable. Trust in vaccine to prevent infection was agreed by 44.7% and 45.3% agreed that the vaccine is safe. Parents who thought that the vaccine is suitable of under 18 children represented 35.1% while 40.1% were willing to vaccinate their children if the vaccine is available. Concerning COVID-19 vaccination among family members, 56% reported that the participant in this study was the only vaccinated which was significantly higher among males (37.2%) compared to females (27.0%) ($p < 0.001$). The spouse being vaccinated was reported by 50.6% of males and 60.5% of females which was significantly different ($p=0.002$). One child was vaccinated was reported by 15.5% of participants and most of children were vaccinated was reported by only 6.6% of participants.

Table (4) shows perception of the risk of COVID-19 and the importance of COVID-19 vaccine in relation to educational level. Among university educated, those who were worried about infection among their family members were 89.8% which was significantly higher than 84.1% among those with below university education ($p=0.007$). Trust in reliability of vaccine information was found among 60.8% of those with below university compared to 58.5% among those with university education. The percentage of participants with university education who disagreed with reliability of vaccine information was higher than those of below university education (22.6% and 16.3%, respectively). These differences were

statistically significant ($p=0.023$). Intention to vaccinate children was higher among participants with university education compared to among those with below university education (42.2% 38.3%, respectively). Those who were not sure represented 24.2% among parents having below university education that was higher than 16.5% of university-educated parents. These difference were statistically significant ($p= 0.009$)

Table (5) shows the main factors associated with refusal of children's vaccination. Among those who disagreed that COVID-19 is suitable for children below 18 years, 79.0% did not have intention to vaccinate their children (OR = 11.508). The second main barrier for vaccination of children was the issue of vaccine safety where those who disagreed or were not sure of vaccine safety (81.1%) were not willing to vaccinate their children (OR = 8.678). Reliability of information about vaccine safety was an important determinant of intention of vaccination of children where 85.3% will not vaccinate their siblings due to lack of trust of vaccine related information (OR= 7.811). Those who did not believe that the vaccine will prevent infection had no interest to vaccinate their children (77.8%, OR = 5.766)

Discussion:

Vaccines provide some of the most significant public health benefits. It may be the most practical strategy to cease the epidemic and achieve herd immunity in the event of COVID-19. [8] It is critical to overcome obstacles of vaccine acceptance and increase vaccine uptake, especially during a pandemic and among children. [9] This study presented the perception of Egyptian parents about SARS-Cov-2 infection, their trust in available COVID-19 vaccines and their intention to vaccinate their children.

According to 5Cs model which study the difference between people health behavior towards vaccination, there are five factors that affect the perception of people about vaccines; confidence (trust in vaccine efficacy and safety), complacency (perception about the risk of

the disease), calculation (weighing risk and benefit of vaccines), constrain (accessibility of information about the vaccine), and collective responsibility towards their community. [10]

In the present study, most parents were worried about risk of themselves or their family members get infected with SARS-CoV-2 and perceived it as a serious disease. However, many of them were still reluctant to vaccinate their children. Another factor that should simulate them accept vaccination against COVID-19 was that most participants or their family member suffered from other risk factors such as smoking, hypertension and diabetes mellitus. There is variation of COVID-19 acceptance as shown by different studies. [9, 10, 11] A study in China among young children 3-6 years reported that 86.75% of participants intended to vaccinate their children if the vaccine is available as 78.57% were worried about their children get infected with SARS-CoV-2. [11] The Chinese people being the first to suffer from this epidemic may be more sensitive to accept vaccination than other nations. [1]

Many factors are operating to influence vaccine hesitancy. Regarding information about SARS CoV-2, we found that only one-half of parents trusted information about COVID-19. Reliability of information about COVID-19 vaccines is an important factor that encourage parents to vaccinate their children. A study conducted in Saudi Arabia suggested that 6.8% and 21.3% of participants refused to vaccinate their children because of lack of trust of healthcare workers and lack of information about COVID-19 vaccines, respectively. Saudi Arabian Ministry of Health made scientifically grounded health information available on its official website, and there have been local regulations preventing the spread of fake materials on social media that may spread misconceptions about vaccination. However, no studies as yet evaluated the effect of this procedure to promote vaccine acceptance in Saudi Arabia. [12]

In the present study, less than one half of participants trusted safety and efficacy of COVID-19 vaccines to prevent infection. In parallel to our findings, a study conducted in China found

that vaccine with high levels of safety and effectiveness would be acceptable to the majority of respondents. [13] Another study supporting our findings found that 70% of parents had concerns about vaccine safety. [4] A study conducted in China found that 68.97% of participants believed in the safety and effectiveness of COVID-19 vaccines. [11]

The present study showed that only one third of participants thought COVID-19 vaccines are suitable for children below 18 years. This finding was similar to other studies conducted in Korea, China and Saudi Arabia [4, 12, 14, 15]. Parents of children in primary or secondary schools (ages 7 to 17) may be more concerned about COVID-19 transmission in schools and hence have a greater desire to vaccinate their children against COVID-19. [15] Educational level in our study increased the acceptance of parents to vaccinate their children which was supported by results of a similar study conducted in Germany [16]

The present study found that male participants were more likely to get vaccinated with COVID-19 vaccines than females. Females were more likely to be a housewife where there is no obligation to get vaccinated. Vaccination for COVID-19 is mandatory for working men in Egypt and many other countries. In our study, there was no significant difference between male and female participants as both had the same percentage of agreement on vaccinating their children. A study performed among parents in Florida to assess their intentions to vaccinate their children found that 48% of female parents over age of 34 who agreed were 48% compared to 71% for the male parents over age of 34 years. [17, 18]

A systematic review concluded that all vaccines granted by emergency use authorization are effective and safe. However, further surveillance from larger sample size and long-term follow-up must be guaranteed, especially for vulnerable groups (elderly, people with comorbidities, pregnant or lactating females, children) to ensure long-term safety. Continuous monitoring of the safety and efficacy of COVID-19 vaccines and disseminating reliable

information through social media will limit mistrust of COVID-19 vaccines and increase public acceptance of vaccinations. [19]

Three COVID-19 vaccines have been granted Emergency Use Authorizations by the Food and Drug Administration (FDA) in the United States. Each vaccination was demonstrated to be safe and effective in preventing symptomatic, laboratory-confirmed COVID-19 infection. [20] FDA authorized Pfizer-BioNTech COVID-19 Vaccine for Emergency Use in Children 5-11 years of Age. The vaccine was effective to prevent SARS-Cov2 infection in 90.7% of children from 5-11 years old with no serious adverse effects [21] Frenk et al., 2021 in their study on safety of vaccination of children found that BNT 162b2 has 100% efficacy to protect against SARS-Cov-2 in children from 12 through 15 years old with satisfactory safety profile. [22]

European Center for Disease Prevention and Control recommended that children and adolescent with high risk factors must get the priority for vaccination. It also recommended that vaccination of children must be in the context of the strategy of vaccination of the whole population. Children who have higher risk of infection or co-morbidities must be vaccinated first. [23]

Limitations of the study.

Our study has some limitations. Our study suffered from sampling bias as we depended on convenient sampling. However, we collected a large sample size of 1032 surveys to reduce sampling bias. Other studies should be done in a larger scale with considering different regions all over the country.

Conclusion

The present study provides a brief insight about how parents think about SARS-Cov-2, COVID-19 vaccines, and acceptance to vaccinate their children. Our findings can help

stakeholders to take decisions as regard to children vaccination with COVID-19 vaccines and tailor education and communication strategies with parents.

Declaration Statements

Data availability

The data is available on request form the corresponding author

Conflicts of interests

All authors declared that they have No conflicts of interest to declare

Funding

The research did not received funding

Ethical issues

1. The authors got approval from Internal Review Board of Tanta Faculty of Medicine for Research Ethics. (Approval code: 35085/12/21).

Participants' consent

2. Consent was obtained from each participants after clarification of the study objectives and activities.
3. Confidentiality was guaranteed and data were collected anonymously.

Authors' contribution

Hamdy Khaled Sabra: concept of the research, data collection, writing the manuscript

Mostafa Abdulraheem Bakr: Data collection

Omar El Sayed Mohmed Rageh: Data collection

Asmaa Khaled: Data collection

Omnia Mohamed Elbakliesh: data collection, writing the manuscript

Ibrahim Ali Kabbash: supervisor of the whole process of the research, statistical analysis, revision of the manuscript

Table (1): Characteristics of studied population

Variables	Number (n=1032)	%
Age in years:		
20-	156	15.3
30-	315	30.5
40-	372	36.0
50-70	187	18.1
Range	22-70	
Mean±SD	40.15±9.51	
Gender:		
Males	468	45.3
Females	564	54.7
Residence:		
Urban	575	55.7
Rural	457	44.3
Educational level:		
Below university	541	52.4
University education	491	47.6
Job:		
Not working	117	11.3
Manual workers	125	12.1
Employees	422	40.9
Professionals	233	22.6
Housewife	135	13.1
Monthly income:		
Not enough	308	29.8
Enough	592	57.4
Enough and saving	132	12.8
Number of family members:		
3	256	24.8
4	309	29.9
5	321	31.1
6+	146	14.2
Number of school children:		
1	507	49.1
2	335	32.5
3	150	14.5
4-6	40	3.9
A family member is a health care worker	232	22.5
Having a family member above 65 years	81	7.8
A single parent family	72	7.0
A family member had confirmed infection	419	40.6

A family member tested for infection	490	47.5
A family member smoke tobacco	381	36.9

Table (2): Distribution of studied participants by family members with chronic illness and

Chronic illness	Number (n=1302)	%
Hypertension	259	25.1
Diabetes	166	16.1
Cardiovascular disease	58	5.6
Neurologic disorder	52	5.0
Respiratory disease	50	4.8
Morbid obesity	49	4.7
Stroke	26	2.5
Renal disease	26	2.5
Hepatic disease	14	1.4
Genetic disorders	11	1.1
Cancer	6	0.6
Bone marrow transplantation	5	0.5
Pregnancy	22	2.1
None of the above	351	35.0

Table (3): Perception of the risk of COVID-19 in relation to gender

Variables	Males (468)		Female (564)		Total (n=1302)		X ² p
	n	%	n	%	n	%	
COVID-19 is a serious disease:							4.230
It depends who gets infection in family	201	43.0	237	42.0	438	42.4	0.121
Disagree	60	12.8	52	9.2	112	10.9	
Agree	207	44.2	275	48.8	482	46.7	
Worried about getting a family member infected							3.643
Disagree	72	15.4	64	11.3	136	13.2	0.056
Agree	396	84.6	500	88.7	896	86.8	
COVID vaccine information are reliable							2.159
Disagree	88	18.8	111	19.7	199	19.3	0.340
Not sure	90	19.2	127	22.5	217	21.0	
Agree	290	62.0	326	57.8	616	59.7	
COVID-19 vaccines prevent infections							1.298
Disagree	118	25.2	154	27.3	272	26.4	0.522
Not sure	132	28.2	167	29.6	299	29.0	
Agree	218	46.6	243	43.1	461	44.7	
COVID-19 vaccines are safe							0.556
Disagree	83	17.7	110	19.5	193	18.8	0.757

Not sure	169	36.1	202	35.8	371	35.9	
Agree	216	46.2	252	44.7	468	45.3	
COVID-19 vaccines suitable for under 18 years							2.748 0.253
Disagree	124	26.5	152	27.0	276	26.7	
Not sure	168	35.9	226	40.1	394	38.2	
Agree	176	37.6	186	33.0	362	35.1	
If available I will vaccinate my children							3.911 0.142
Disagree	173	37.0	233	41.3	406	39.3	
Not sure	108	23.0	104	18.4	212	20.5	
Agree	187	40.0	227	40.2	414	40.1	
Family members receiving COVID-19 vaccines							
Only me	174	37.2	152	27.0	326	56.0	12.384 <0.001
Wife/husband	237	50.6	241	60.5	578	56.0	10.010 0.002
One of children	77	16.5	83	14.7	160	15.5	0.589 0.443
Most of children	26	5.5	42	7.4	68	6.6	1.486 0.223

Table (4): Perception of the risk of COVID-19 in relation to educational level

Variables	Below university (541)		University (491)		X ² p
	n	%	n	%	
COVID-19 is a serious disease:					2.837
It depends who gets infection in family	237	43.8	201	40.9	0.242
Disagree	64	11.8	48	9.8	
Agree	240	44.4	242	49.3	
Worried about getting a family member infected					7.343 0.007
Disagree	86	15.9	50	10.2	
Agree	455	84.1	441	89.8	
COVID vaccine information are reliable					7.546 0.023
Disagree	88	16.3	111	22.6	
Not sure	124	22.9	93	18.9	
Agree	329	60.8	287	58.5	
COVID-19 vaccines prevent infections					0.688 0.709
Disagree	141	26.1	131	26.7	
Not sure	152	28.1	147	29.9	
Agree	248	45.8	213	43.4	
COVID-19 vaccines are safe					4.796 0.091
Disagree	88	16.3	105	24.4	
Not sure	196	36.2	175	35.6	
Agree	257	47.5	211	43.0	
COVID-19 vaccines suitable for under 18 years					0.894 0.640
Disagree	142	26.2	134	27.3	
Not sure	202	37.3	192	39.1	

Agree	197	36.4	165	33.6	
If available I will vaccinate my children					9.392
Disagree	203	37.5	203	41.3	0.009
Not sure	131	24.2	81	16.5	
Agree	207	38.3	207	42.2	
Family members receiving COVID-19 vaccines					
Only me	182	33.6	144	29.3	2.216 0.137
Wife/husband	276	51.0	302	61.5	11.497 0.001
One of children	94	17.4	66	13.4	3.040 0.081
Most of children	43	7.9	25	5.1	3.412 0.065

Table (5): Perception of the risk of COVID-19 in relation to intention to vaccinate children

Variables	Intention to vaccinate children				OR	95% CI
	Disagree		Agree			
	n	%	n	%		
COVID-19 is a serious disease:					1.592	1.239- 2.046
Disagree	358	65.1	192	34.9		
Agree	260	53.9	222	46.1		
Worried about getting a family member infected					1.182	1.079- 2.340
Disagree	94	69.1	42	30.9		
Agree	524	58.5	372	41.5		
A family member is at risk:					1.096	0.845- 1.422
Yes	407	60.7	264	39.3		
no	211	58.4	150	41.6		
COVID vaccine information are reliable					7.811	5.700- 10.704
Disagree /not sure	355	85.3	61	14.7		
Agree	263	42.7	353	57.3		
COVID-19 vaccines prevent infections					5.766	4.390- 7.574
Disagree /not sure	444	77.8	127	22.2		
Agree	174	37.7	287	62.3		
COVID-19 vaccines are safe					8.678	6.517- 11.555
Disagree /not sure	460	81.6	104	18.4		
Agree	158	33.8	310	66.2		
COVID-19 vaccines suitable for under 18 years					11.508	8.501- 15.579
Disagree /not sure	529	79.0	141	21.0		
Agree	89	24.6	273	75.4		

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