Determinants of the willingness of medical staff to vaccinate their children with a booster dose of the COVID-19 vaccine in Taizhou, China

Li-Li Huang*, Tao-Hsin Tung†, Yan-Hong Jiang‡, Wei-Wei Hu§, and Yu-Pei Yang

*Department of Emergency, Taizhou First People’s Hospital, Taizhou, Zhejiang, China; †Evidence-Based Medicine Center, Taizhou Hospital of Zhejiang Province, Wenzhou Medical University, Linhai, Zhejiang, China; ‡Department of Outpatient, Taizhou First People’s Hospital, Taizhou, Zhejiang, China; §Department of General Surgery, Taizhou First People’s Hospital, Taizhou, Zhejiang, China; ＃Department of Hematology, Taizhou Hospital of Zhejiang Province, Wenzhou Medical University, Linhai, Zhejiang, China

ABSTRACT
The study aimed to determine the willingness of medical staff to have their children vaccinated with a COVID-19 booster in Taizhou, China. From March 21 to April 19, 2022, an online questionnaire survey was conducted to assess the willingness of medical staff to vaccinate their children with a booster dose of the COVID-19 vaccine. Of the 1,252 medical staff in a tertiary grade hospital in Taizhou who were invited to answer the structured questionnaire, 514 (41.1%) samples had valid information for further data analysis. Four hundred thirty-seven medical staff (85.0%) were willing to have their children receive vaccine boosters. After adjustments for confounding factors, the opinion (‘Do you think your child needs a booster vaccination against COVID-19?’) (yes vs. no, OR = 6.91, 95% CI: 3.29–14.54), the viewpoint (‘What are your thoughts the effectiveness of COVID-19 vaccine boosters for children?’) (≥12 vs. <12, OR = 13.81, 95% CI: 4.03–), and the attitude (‘Your attitude to whether your child is boosting the Covid-19 vaccine?’) (yes vs. no, OR = 4.66, 95% CI: 2.30–9.44) were significantly associated with their willingness to have their children receive a COVID-19 vaccine booster. A moderate percentage of the respondents expressed willingness to have their children receive booster vaccines. The findings implied that factors affecting medical staffs’ willingness to vaccinate their children with a COVID-19 vaccine booster included viewpoint, opinion, and attitudes.

Introduction
The global COVID-19 pandemic has not been completely controlled, and the current prevention and control efforts are facing serious challenges. Given the absence of a specific treatment for COVID-19, promoting vaccination and establishing herd immunity remain the most effective and economical measures to control the spread of the disease. In the pre-delta, delta, and omicron periods, COVID-19 vaccine efficacy was confirmed among children (5–11 years) and adolescents (12–17 years) with complete immunization (two doses). Another study suggested that all eligible children and adolescents should maintain up-to-date COVID-19 vaccination. However, other reports showed that those who received three doses of the vaccine, including at least two doses of the mRNA vaccine, may still suffer from breakthrough infections with the omicron variant.

As of 8 September 2022, more than 3.4 billion doses of COVID-19 vaccines have been runned in mainland China. The coverage rate of the first dose, whole-course vaccination, and booster immunization rates were 92.4%, 90.1%, and 77.0%, respectively. Given the concerns about breakthrough infections even with COVID-19 vaccine boosters and the uncertainty about the safety and side effects of these booster doses, many people fear the COVID-19 booster vaccination, and the willingness to receive booster doses is relatively low. For children, their parents’ willingness directly affects their receipt of vaccinations.

Recent studies have shown that 41.8–52.5% of medical staff in Taizhou, China are hesitant about vaccines and boosters against COVID-19, the main issues surrounding vaccine hesitancy are vaccine efficacy and safety, and the main factors affecting hesitancy are insufficient awareness of vaccines and lack of relevant knowledge. The effectiveness of COVID-19 vaccine boosters for children refers to the percentage of infections that can be reduced by the injection of COVID-19 vaccine boosters in children.

The reluctance of medical staff to be vaccinated may have widespread negative social consequences, which may affect behavioral modeling in the general population. However, little is known about the willingness of this subpopulation (i.e., healthcare workers who are parents) to vaccinate COVID-19 vaccine boosters for their children. Therefore, the current study aimed to explore the willingness of medical staff in Taizhou, China who are parents to receive COVID-19 vaccine boosters for their children. This evidence may support parents’ medical decisions about vaccinating their children with a COVID-19 booster vaccine.
Methods

Study design and data collection

This study conducted an anonymous, population-based, cross-sectional online survey. We used the WeChat questionnaire platform (Changsha Ranxing Information Technology Co., Ltd., Hunan, China), the largest online survey platform in mainland China. The system generated a uniform resource locator (URL) link and a quick response (QR) code (two-dimensional code) for the questionnaire. Our target study population included medical staff with at least one child under the age of 18. The researchers met with the participants and explained the purpose of the study, the risks and benefits of participation, and their right to refuse to participate. The researchers then told participants that the survey was voluntary, the results would be anonymous, and there would be no right or wrong answers. Finally, the researchers shared the medical staff the URL link, and the QR code through the group WeChat platform. For the calculation of the appropriate sample, a sample size of 458 achieves 90% power using an effect size of 0.05 and a ten predictor with a significance level (alpha) of 0.05. The collection period was from March 21 to 19 April 2022. Finally, we included a total of 514 valid samples, with a response rate of 41.1% (514/1,252). This study was approved by the Ethics Committee of Huangyan Hospital, Wenzhou Medical University (approval number: 2022-KY009-01). All procedures were performed strictly in accordance with the investigator’s institution's ethical review guidelines and the principles of the Declaration of Helsinki.

Structured questionnaires and measurement

On the basis of previous studies and relevant background information, we constructed an online structured questionnaire. The contents of the questionnaire are as follows: (1) general population sociology information including age, gender, place of residence, education level, occupation and number of minor children; (2) background information on vaccination including history of vaccine allergy, previous degree of vaccine allergy, number of doses of COVID-19 vaccine accepted; (3) In order to understand the willingness of medical workers to vaccinate their children, they were asked: “Would you like to vaccinate children over the age of 3 with a COVID-19 vaccine booster?” “Very willing,” “willing,” “unwilling,” or “extremely unwilling.” Almost all questions are closed, and checkboxes are provided for answers; (4) medical staffs’ opinion on child vaccination by a question: ‘Do you think your child needs a booster vaccination against COVID-19?’ (Three response options: yes, no, don’t know); (5) medical staffs’ viewpoint on child vaccination by a question: ‘What are your thoughts the effectiveness of COVID-19 vaccine boosters for children?’ (Three items answered this question, as measured using a five-point Likert scale 1 = strongly disagree, 5=strongly agree, the lowest score is 3 points, the highest score is 15 points, the median is 12 points (≥12 scores are considered high, <12 scores was considered low.) (6) Attitudes about boosters are measured by the question: ‘Your attitude to whether your child is boosting the Covid-19 vaccine?’ The options for this question are set as soon as possible, elective, optional, absolutely not Vaccination, wait and see, and further define. In the final analysis, the vaccination attitude of medical staff was recorded, with the first two options as high and the others as low.

Quality control

To avoid missing responses to the questions, we set each item in the questionnaire as mandatory. Results were logically checked prior to data analysis to eliminate outliers. Did not include parents under 18 or over 70. The time required to complete the questionnaire was less than 120 seconds, which was not accounted for in the analysis. The mean time to complete the questionnaire was 322 seconds and the median was 249 seconds (range: 121–2684 seconds).

Statistical analysis

Figure 1 Provide a conceptual framework that explain the rational of investigation of opinion on vaccine effectiveness and the attitudes items investigated. Factors in parents’ willingness to vaccinate their children are multidimensional and complex, including sociodemographics, environmental determinants, vaccine safety and efficacy, and the individual’s perceived susceptibility to COVID-19, such as parental knowledge, perceptions, and attitudes.

The categorical variables for essential characteristics were expressed as percentages and counts. Chi-square tests were used to initially assess the differences in the demographic and personal background variables of the parents who were willing and unwilling to receive COVID-19 vaccine boosters for their children. Variables that were significant at the p < .05 level in the univariate analyses were included in the model. From this, odds ratios (ORs) and 95% confidence interval (CI) were calculated. All data were analyzed using IBM SPSS version 26.0 (IBM Corporation, Armonk, USA). For differences between test groups, a two-tailed p < .05 was considered statistically significant.

Results

Univariate analysis of the factors related to willingness of parents to receive COVID-19 vaccine boosters for their children

A total of 514 participants completed the questionnaire in this study. The mean (±SD) age was 37.4 ± 6.8 years, and 73.9% of the participants were female. In addition, 86.2% of the respondents (n = 443) had received a booster dose of the COVID-19 vaccine.

Table 1 summarizes the characteristics and willingness of parents to receive COVID-19 vaccine boosters for their children. Sex, age, residence, allergic reactions to food/drugs and vaccines, and educational attainment did not differ significantly between parents’ willingness or unwillingness to vaccinate their children (p > .05). For the number of children in the family (one-child families vs. families with ≥2 children), the difference was statistically significant (χ² = 5.17, p = .02). We also found that parents’ viewpoints about the need to receive
Demographic information of parents/guardians.
- Sex
- Age
- Education level
- Perceived economic status
- Occupation

Family characteristics
- Number of children
- Older children

Parent/Guardian Perceptions and Attitudes
- Vaccine knowledge
- Receive vaccination awareness
- Risk perception
- Concerns of efficiency/safety

**Figure 1.** Framework for studying the outcome of variables.

**Table 1.** Characteristics of respondents and willingness to receive COVID-19 vaccine booster for their children (n = 514).

| Variables                        | Categories                      | Respondents (n = 514) | Unwillingness (n = 77) n(%) or mean±SD | Willingness (n = 437) n(%) or mean±SD | P-value for t-test or χ²-test |
|----------------------------------|---------------------------------|-----------------------|----------------------------------------|----------------------------------------|-----------------------------|
| Sex                              | Female                          | 380 (73.9)            | 57 (74.0)                              | 323 (73.9)                             | 0.983                       |
|                                  | Male                            | 134 (26.1)            | 20 (26.0)                              | 114 (26.1)                             |                             |
| Age, mean±SD                     | 37.4 ± 6.8                      | 36.3 ± 5.7            | 37.6 ± 6.9                             |                                        | 0.063                       |
| Residence                        | Urban                           | 131 (64.4)            | 46 (59.7)                              | 285 (65.2)                             | 0.355                       |
|                                  | Rural/Town                      | 183 (35.6)            | 31 (40.3)                              | 152 (34.8)                             |                             |
| Education level                  | College and below               | 120 (23.3)            | 13 (16.9)                              | 107 (24.5)                             | 0.146                       |
|                                  | University and above            | 394 (76.7)            | 64 (83.1)                              | 330 (75.5)                             |                             |
| type of jobs                      | Doctor                          | 129 (25.1)            | 20 (26.0)                              | 109 (24.9)                             | 0.572                       |
|                                  | Nurse                           | 275 (53.5)            | 44 (57.1)                              | 231 (52.9)                             |                             |
|                                  | Others                          | 110 (21.4)            | 13 (16.9)                              | 97 (22.2)                              |                             |
| food/drug allergic reaction      | No                              | 447 (87.0)            | 69 (89.6)                              | 378 (86.5)                             | 0.307                       |
|                                  | Slight                          | 54 (10.5)             | 8 (10.4)                               | 46 (10.5)                              |                             |
|                                  | Serious                         | 13 (2.5)              | 0 (0)                                  | 13 (3.0)                               |                             |
| allergic reaction to vaccine     | No                              | 488 (94.9)            | 73 (94.8)                              | 415 (95.0)                             | 0.728                       |
|                                  | Slight                          | 23 (4.5)              | 4 (5.2)                                | 19 (4.3)                               |                             |
|                                  | Serious                         | 3 (0.6)               | 0 (0)                                  | 3 (0.7)                                |                             |
| COVID-19 vaccine booster         | No                              | 71 (13.8)             | 11 (14.3)                              | 60 (13.7)                              | 0.896                       |
|                                  | Yes                             | 443 (86.2)            | 66 (85.7)                              | 377 (86.3)                             |                             |
| How long do you think the protective effect after strengthening the needle will last? | 6 months and under | 311 (60.5) | 52 (67.5) | 259 (59.3) | 0.171 |
|                                  | more than six months           | 203 (39.5)            | 25 (32.5)                              | 178 (40.7)                             |                             |
| Number of underage children      | One child family                | 363 (70.6)            | 46 (59.7)                              | 317 (72.5)                             | 0.023                       |
|                                  | ≥ 2 children family            | 151 (29.4)            | 31 (40.3)                              | 120 (27.5)                             |                             |
| Opinion of your child needs a booster vaccine | No | 71 (13.8) | 11 (14.3) | 60 (13.7) | <0.001 |
|                                  | Yes                             | 443 (86.2)            | 66 (85.7)                              | 377 (86.3)                             |                             |
| Viewpoint of the effectiveness of booster vaccine for children | <12 points | 227 (44.2) | 74 (96.1) | 153 (35.0) | <0.001 |
|                                  | ≥12 points                      | 287 (55.8)            | 3 (3.9)                                | 284 (65.0)                             |                             |
| Attitudes about booster vaccine  | NO                              | 159 (30.9)            | 73 (94.8)                              | 86 (19.7)                              | <0.001                       |
|                                  | YES                             | 355 (69.1)            | 4 (5.2)                                | 351 (80.3)                             |                             |
COVID-19 vaccine boosters for their children ($\chi^2 = 128.57$, $p < .01$), their opinion on the effectiveness of vaccine boosters in their children’s health ($\chi^2 = 181.48$, $p < .01$), and their attitudes toward vaccinating their children with vaccine boosters ($2 = 172.94$, $p < .01$) had a significant impact on their willingness to get their children to accept vaccine boosters.

**Logistic regression to determine the willingness of parents to receive COVID-19 vaccine boosters for their children**

In binary logistic regression models, we further calculated the degree of association between these factors and parents’ willingness to receive booster vaccinations for their children. As shown in Table 2, we found that parents’ viewpoints about their children’s need for a COVID-19 vaccine booster (yes vs. no, OR = 6.91, 95% CI: 3.29–14.54, $p < .01$), their opinion about vaccine effectiveness ($\geq 12$ points vs. $< 12$ points, OR = 13.81, 95% CI: 4.03–47.36, $p < .01$), and their attitude about whether to receive COVID-19 vaccine boosters for their children (yes vs. no, OR = 4.66, 95% CI: 2.30–9.44, $p < .01$) were significantly associated with their willingness to have their children receive COVID-19 vaccine boosters. Parents’ different perceptions of the importance, effectiveness, and protection offered by children’s booster vaccinations strongly influenced their willingness to vaccinate their children.

**Discussion**

**Clinical implications**

This study revealed that parents’ willingness to receive COVID-19 vaccine boosters for their children depends on their viewpoint, opinion, and attitude toward these booster doses. We summarized the different estimates of parents’ acceptance or willingness to vaccinate their children against COVID-19 in different study populations, indicating that the estimated range of willingness is from 4.9% to 70.4%.\(^{16–22}\) This difference may be due to different study populations and their different beliefs regarding the details of COVID-19 vaccination. Parents with a strong belief in COVID-19 vaccination among children were more likely to have their children vaccinated with booster doses. Parents’ willingness to receive COVID-19 vaccine boosters for their children may be improved by positively influencing parental cognition and attitudes. These findings reflect the current willingness of Chinese parents to receive COVID-19 vaccine boosters for their children.

In this study, the parents who believed that boosters would make their children less likely to contract COVID-19 were more likely to give their children boosters. Parents’ reluctance to vaccinate their children with boosters may be attributed to their belief that the local outbreak was under control and the chances of their children being infected were relatively small. What they failed to recognize was that, similar to other respiratory diseases, children play an important role in the spread of COVID-19.\(^{16}\) Even if the pandemic slowly declines or local transmission stops, the disease can start spreading again without proper immunization. Hence, vaccinating children could ensure effective herd immunity.\(^{23–25}\) A previous study found that parents who were medical staffs were more likely than non-medical staffs to want their children to be vaccinated, possibly because those parents had witnessed first-hand the severity of the pandemic.\(^{16}\) This evidence suggests that research into the vaccination willingness of medical staffs who are parents is of great value.

Previous findings have shown that most children with COVID-19 experience mild symptoms or are asymptomatic.\(^{26}\) Such mild or asymptomatic cases may make parents less anxious, leading to a lower willingness to vaccinate.\(^{16}\) However, it is worth noting that it may be due to the characteristics of the virus transmission. Children are often referred to as asymptomatic carriers of the virus and are important in the virus transmission chain. Therefore, it is necessary to be able to provide children with high-coverage COVID-19 vaccines and vaccine boosters.

This study also indicated that parents’ attitudes have a significant impact on their willingness to vaccinate their children with a booster dose of the COVID-19 vaccine. Therefore, to increase parents’ willingness to vaccinate their children, their positive attitudes toward COVID-19 vaccine boosters for children should be enhanced. According to previous research findings, the attitudes that affect parents’ willingness to vaccinate their children with a booster dose of the COVID-19 vaccine may be related to their concerns about the safety of the new vaccine, the verification of vaccine efficacy, and other novelty concerns.\(^{24,27}\)

Parents’ attitudes toward giving their children a COVID-19 vaccine booster largely depend on their perceptions of the outcomes of vaccination behaviors and their estimates of their value.\(^{28}\) There are many factors affecting the cognition and value estimation of behavioral outcomes. We believe that

| Variables                                      | Categories                        | OR (95% CI)          | P value  | β value | SE  |
|------------------------------------------------|-----------------------------------|----------------------|----------|---------|-----|
| Number of underage children                   | One child family vs. ≥2 Children family | 0.870 (0.460–1.648)  | 0.669    | −0.139  | 0.326 |
| Opinion of your child needs a booster vaccine | Yes vs. No                         | 6.912 (3.286–14.537) | <0.001   | 1.933   | 0.379 |
| Viewpoint of the effectiveness of booster vaccine for children | ≥12 points vs. <12 points | 13.812 (4.028–47.362) | <0.001   | 2.626   | 0.629 |
| Attitude about booster vaccine                | Yes vs. No                         | 4.656 (2.296–9.439)  | <0.001   | 1.538   | 0.361 |

*P-value for Hosmer-Lemeshow test = 0.185.*
the scientific nature and timeliness of obtaining information are very important in forming a positive evaluation of vaccine boosters. It is widely known that misinformation, conspiracy theories, and blatant antivaccine propaganda became rampant during the COVID-19 pandemic.29 Individuals are more likely to absorb negative information instead of positive information during an outbreak.30 In recent years, the proliferation and influence of social media on information has made it difficult to distinguish between true and false information.

Clinical practices

This study found that 15.0% of the participating parents were reluctant to give eligible children a COVID-19 vaccine booster, indicating that they did not believe in the effectiveness of booster vaccinations against COVID-19. Parents who had a higher opinion, viewpoint, and attitude about the value of vaccination were more willing to vaccinate their children against COVID-19. The findings may guide the assessment of the feasibility of future booster vaccinations. Active training and education could increase parents’ awareness of the increased efficacy of vaccine boosters against COVID-19. A meta-analysis showed that the efficacy of the COVID-19 vaccine against infection and symptomatic disease declined by about 20–30% after six months. Evaluating the effectiveness of vaccines with a six-month cutoff is critical for updating COVID-19 vaccine policy.31 Therefore, we set six months as the dividing line in the questionnaire to investigate the protective effect of intensive acupuncture. These data are shown in Table 1.

To increase the willingness of parents to receive COVID-19 vaccine boosters for their children, this study suggests the following interventions. First, through social media and the official websites of health agencies, positive information about new vaccines should be made available to parents to help establish an understanding of the related guidelines. Second, to strengthen parental support for COVID-19 vaccine boosters, parents should be made aware that vaccine boosters can protect their children from COVID-19 infection. Third, during a disease outbreak, parents are more likely to absorb negative information and may experience severe anxiety. Hence, government departments need to boost parents’ confidence in a timely manner to ease their anxiety. Fourth, parents should be encouraged to actively participate in publicity campaigns promoting COVID-19 vaccines and to form rational behavior intentions in practice to generate rational behaviors.

Methodological considerations

The survey conducted in the study exhibited several methodological strengths. Firstly, the structure and content of the questionnaire were attributable to a well-established questionnaire design and thus increased the potential to gain respondents’ opinions on the effectiveness and benefits of interventions. Secondly, with relatively large sample sizes, population-based studies are more likely to reduce selection bias. Thirdly, the survey was conducted during the peak of the omicron variant in China, and the results more truly reflected parents’ willingness to receive vaccine boosters for their children. Fourthly, logistic regression analysis to control for other correlated factors reduced possible bias in estimates of childhood vaccine boosters.

The limitations of this study are reflected in the following points. First, the selection of respondents involved convenience sampling and was voluntary; hence, the study could suffer from selection bias, such as volunteer bias. Second, the population size was small in this study, which might make it difficult to fully draw accurate inferences into the parental willingness to vaccinate a booster dose of COVID-19 vaccine for their children among the medical staff in Taizhou, China.

Since the questionnaire was distributed in the city of Taizhou, the generalizability of the results to other regions could not be guaranteed. Third, due to the limited time of the survey, we were unable to determine whether the parents’ vaccination willingness was dynamic. Fourth, the conceptual framework that explained the relationships between the various study variables only used the results obtained for this study. Hence, more in-depth epidemiological and longitudinal investigations should be conducted.

Conclusion

A moderate percentage of medical staffs as parents in this study expressed reluctance to vaccinate a booster dose of the COVID-19 vaccine for their children. The study found that parents’ clear perceptions and positive attitudes toward giving their children COVID-19 vaccine boosters were factors that increased their willingness. This suggests that in-depth assessments and health education programs are necessary to increase the willingness of parents to vaccinate boosters for their children and thereby reduce the risk of repeated widespread outbreaks.

Acknowledgments

The authors gratefully acknowledge the supervisors and all employees who participated in this study for their assistance as well as all the experts and members of our group for their help and advice.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

The author(s) reported there is no funding associated with the work featured in this article.

References

1. Wang YH, Wu CC, Bai CH, Lu, S-C, Yang, Y-P, Lin, Y-Y, Lai, W-Y, Lin, T-W, Jheng, Y-C, Lee, M-C, et al. Evaluation of the diagnostic accuracy of COVID-19 antigen tests: a systematic review and meta-analysis. J Chin Med Assoc. 2021;84:1028–37. doi:10.1097/JCMA.0000000000000626.
2. Meng H, Mao J, Ye Q. Booster vaccination strategy: necessity, immunization objectives, immunization strategy, and safety. J Med Virol. 2022;94:2369–75. doi:10.1002/jmv.27590.
3. Hassan W, Kazmi SK, Tahir, MJ, Ullah, I, Royan, HA, Fahiani, M, Nainu, F, Rosa, SG. Global acceptance and hesitancy of COVID-19
Appendix A. The questionnaire

Questionnaire on parents’ knowledge, attitudes and willingness to vaccinate their children with COVID-19 vaccine boosters

Dear parents:
With the active promotion of the new crown vaccine vaccination by our government, nearly 3 billion doses have been vaccinated nationwide. In July 2021, our country approved the vaccination of children and adolescents aged 3 to 17 years with the new crown virus inactivated vaccine, and actively guides children of school age “inoculate as soon as possible” with teens. Based on this, we have designed the following parental questionnaire on the knowledge, attitude and willingness to strengthen the vaccination of the new crown vaccine. Please answer according to the actual situation. This will take a few minutes of your time. This questionnaire is anonymous, and the information you fill in will be kept strictly confidential. Thank you for your support and participation!

A Basic information for parents

1. Your Gender [Single-choice] *
   - father
   - mother

2. Your age (one full year old) [Fill in the blanks].

3. Long-term residence type [Single choice] *.
   - rural
   - towns
   - urban

4. Your educational level: [Single choice] *.
   - Illiteracy/Elementary School
   - Junior high school
   - High school/vocational high school/secondary school
   - college
   - undergraduate
   - Master degree and above

5. Your career category in a medical institution [Single choice] *
   - doctor
   - nurse
   - pharmacist
   - medical technicians
   - other

6. Do you have a previous history of food or drug allergies [Single choice] *
   - no (please skip to Question 8)
   - yes (please skip to Question 7)

7. The severity of your last food or drug allergic reaction [Single choice] *
   - mild allergic reaction
   - Severe allergic reactions (acute anaphylaxis, angioedema, dyspnea, etc.)

8. Have you ever had an allergic reaction to a vaccine (any vaccine) in the past [Single choice] *
9. The severity of your last anaphylactic reaction to a vaccination [Single choice] *

- mild allergic reaction
- Severe allergic reactions (acute anaphylaxis, angioedema, dyspnea, etc.)

10. Have you received the COVID-19 vaccine [Single choice] *

- no
- yes, one shot
- Yes, two stitches have been completed
- yes, three stitches have been completed
- Yes, it has been strengthened

B Basic information for children

11. How many minor children do you have? [single choice] *

- one
- two
- three and more

12. Your child’s current grade [Single choice] *

- before kindergarten
- kindergarten
- elementary school
- junior high school
- high school

13. Your child’s previous allergies [Matrix Single choice] *

| Have any food or drug allergies in the past | no | mild allergic reaction | Severe allergic reactions (acute anaphylaxis, angioedema, dyspnea, etc.) |
|-------------------------------------------|----|------------------------|-------------------------------------------------|
| History of allergies to previous vaccinations (regardless of what vaccines) | no | * | *

14. Has your child been vaccinated against COVID-19 [Single choice] *

- no
- yes, one shot
- Yes, two stitches have been completed
- yes, three stitches have been completed
- Yes, it has been strengthened

15. Your first child’s current grade [Single choice] *

- before kindergarten
- kindergarten
- elementary school
- junior high school
- high school

16. Your first child’s previous allergies [Matrix single choice] *
17. Has your first child been vaccinated against COVID-19 cc [Single choice] *

* no
* yes, one shot
* Yes, two stitches have been completed
* yes, three stitches have been completed
* Yes, it has been strengthened

18. Your second child’s current grade cc [Single choice] *.

* before kindergarten
* kindergarten
* elementary school
* junior high school
* high school

19. Your second child’s previous allergies cc [Matrix Single choice] *

| Have any food or drug allergies in the past | no | mild allergic reaction | Severe allergic reactions (acute anaphylaxis, angioedema, dyspnea, etc.) |
|---------------------------------------------|----|------------------------|------------------------------------------------------------------------|
| History of allergies to previous vaccinations (regardless of what vaccines) |    |                        |                                                                        |

20. Has your second child been vaccinated against COVID-19 cc [Single choice] *

* no
* yes, one shot
* Yes, two stitches have been completed
* yes, three stitches have been completed
* Yes, it has been strengthened

21. Your first child’s current grade cc [Single choice] *.

* before kindergarten
* kindergarten
* elementary school
* junior high school
* high school

22. Your first child’s previous allergies cc [Matrix Single choice] *

| Have any food or drug allergies in the past | no | mild allergic reaction | Severe allergic reactions (acute anaphylaxis, angioedema, dyspnea, etc.) |
|---------------------------------------------|----|------------------------|------------------------------------------------------------------------|
| History of allergies to previous vaccinations (regardless of what vaccines) |    |                        |                                                                        |

23. Has first your child been vaccinated against COVID-19 cc [Single choice] *
24. Your second child’s current grade ccc [Single choice] *.

- before kindergarten
- kindergarten
- elementary school
- junior high school
- high school

25. Your second child’s previous allergies ccc [Matrix Single choice] *

| Have any food or drug allergies in the past | no | mild allergic reaction | Severe allergic reactions (acute anaphylaxis, angioedema, dyspnea, etc.) |
|-------------------------------------------|----|------------------------|------------------------------------------------------------------------|
| History of allergies to previous vaccinations (regardless of what vaccines) | *  | *                      | *                                                                       |

26. Has your second child been vaccinated against COVID-19 ccc [Single choice] *

- no
- yes, one shot
- Yes, two stitches have been completed
- yes, three stitches have been completed
- Yes, it has been strengthened

27. Your third child’s current grade ccc [Single choice] *.

- before kindergarten
- kindergarten
- elementary school
- junior high school
- high school

28. Your third child’s previous allergies c [Matrix Single choice] *

| Have any food or drug allergies in the past | no | mild allergic reaction | Severe allergic reactions (acute anaphylaxis, angioedema, dyspnea, etc.) |
|-------------------------------------------|----|------------------------|------------------------------------------------------------------------|
| History of allergies to previous vaccinations (regardless of what vaccines) | *  | *                      | *                                                                       |

29. Has your third child been vaccinated against COVID-19 ccc [Single choice] *

- no
- yes, one shot
- Yes, two stitches have been completed
- yes, three stitches have been completed
- Yes, it has been strengthened
C Opinions, viewpoints and attitudes of medical staff about boosting Covid-19 vaccination

30. Do you think your child needs a booster vaccination against COVID-19? [Single choice] *

- yes
- no
- do not know

31. Do you think your child needs a booster vaccination against COVID-19? [Matrix Scale Topic] *

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|-------------------|----------|---------|-------|---------------|
| 1. Boosting the Covid-19 vaccine is very important for my child's health |
| 2. Boosting the new crown vaccine is very effective for further prevention of new coronary pneumonia |
| 3. Boosting the Covid-19 vaccine can protects my child from infection |

32. How long do you think the protective effect will last after the booster shot of the new crown vaccine?[single choice]*

- 3 months
- 6 months
- 12 months
- Other __________________ *

D Your willingness for your child to strengthen the COVID-19 vaccination program

33. If the country has a policy to recommend that children over 3 years old be vaccinated against the new crown, are you willing to vaccinate your child? [single choice]*

- strongly willingness
- willing
- unwilling
- strong unwilling

34. Your attitude to whether your child is boosting the Covid-19 vaccine? [Single choice] *

- inoculate as soon as possible
- elective vaccination
- can not be inoculated
- absolutely do not inoculate
- wait and see, talk later