Chinese Parental Awareness of Protective Measures for Children During COVID-19 Outbreaks

Niang-Huei Peng
Henan University

ZhenZhen Li
Putian University

Hongyan Meng
Soochow University

Yue-Cune Chang
Tamkang University

JianFu Zhou (zhen202078@gmail.com)
Affiliated Hospital of Putian University

Research

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Abstract

Background

Currently children's COVID-19 case numbers are gradually increased in various countries, and many parents fear for their children' safety after schools reopen. The aim of this research was to investigate Chinese parents’ awareness of pediatric COVID-19 in relation to protecting their children.

Methods

A cross-sectional study was conducted in Fujian and Jiangsu provinces in China using a web-based research questionnaire to investigate parents with children aged 6 to 16 years old.

Results

Research samples included 1222 participants. 99.2% of participants were aware of respiratory transmission of COVID-19, and 75.6% also believed fecal-oral transmission to be possible. Although 98.3% of participants reported knowing how to properly wear and remove masks, most parents were unaware of good handwashing technique and answered incorrectly regarding cough etiquette. Research participants seemed uncertain of children's symptoms. Awareness scores of participants significantly differed across parental role, educational attainment levels, and social-economic levels (P<0.005), with fathers, the better educated, and those of higher income showing higher levels of awareness.

Conclusion

Research results suggest an urgent need for parental education regarding COVID-19 in children, especially regarding handwashing techniques and cough etiquette; educational facilities and outreach to parents and schoolchildren are particularly important.

Background

The recent novel coronavirus outbreak was first detected in Wuhan, China in late December 2019. By July 2020, it has spread to 216 countries and territories, resulting in over 12 million confirmed cases and fifty-five thousand deaths [1–2]. This new pandemic was officially determined by World Health Organization (WHO) to be an novel coronavirus disease (abbreviated as COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [2]. Where infection rate is concerned, young children seem to be less susceptible to COVID-19 infection than adults; additionally, children with COVID-19 became less ill and demonstrated less obvious symptom and classic [3]. Current investigations have confirmed that SARS-CoV-2 enters cells by binding to the angiotensin-converting enzyme 2 (ACE-2) cell receptor and facilitate internalization of the virus into human cells. That may explain this different infection rate between adults and children because of low ACE2 expression in children [3–5].
However, evidence has proved children can get COVID-19 like adults, and pediatric COVID-19 cases are now gradually increasing in different countries [6–9]. The most common clinical manifestations of pediatric cases are fever, cough, or shortness of breath (over 60%) followed by headache (15% in 0–9 year old pediatric patients, 42% in 10–19 year old pediatric patients) [7–8]. According to clinical characteristics of existing pediatric cases, children with COVID-19 can be divided into five clinical types: asymptomatic infection, mild, common, severe, and critically severe [8–10]. In comparison adult patients, most children diagnosed with the disease experience mild symptoms, faster recovery, shorter detoxication time, and good prognosis [8–9]. However, a rare new serious multisystem inflammatory syndrome, related to COVID-19 and apparently caused by overactive immune responses in old children and adolescents, can occur, and the number of these atypical cases in pediatric patients has been increasing since the middle of April 2020 in Europe, Canada, and the United States [11–12].

COVID-19 is highly contagious and transmits mainly from person-to-person contact with respiratory droplets of an infected person and usually through coughing and sneezing [13–16]. Currently, experts believe that SARS-CoV-2 can be transmitted through direct, indirect, or close contact with infected secretions (saliva, respiratory droplets, eye discharge, feces or urine) [17–18]. Infection can occur by multiple routes including contact and droplet transmission, touch contaminated surfaces and objects (Fomite transmission), aerosols transmission, fecal-oral, and waterborne routes [14–17]. WHO has acknowledged that the coronavirus can be spread by tiny particles suspended in the air [16–17]. A South Korea's study found that children, younger than 10, transmit COVID-19 to others much less often than adults do; however, children, between 10–19 years old seemed to transmit the virus as well as adults do [19]. This research, conducted during school closure, also found that the highest COVID-19 rate in school-aged children and the lowest for household contacts of children 0–9 years [19]. In contract, an investigation in Wuhan and Shanghai, China, found that school closures and social distancing significantly reduced COVID-19 rates among school-age children [16].

Based on above research, personal protective measures, personal hygiene, and appropriate social distance remain the most viable options for prevention among children [6, 19, 21–26]. In recent months schools around the world have gradually begun to reopen, including in most provinces in China, causing many parents to fear for their children's safety in the midst of a pandemic. To keep students safe, self-protection measures, educational facilities and outreach are particularly important; therefore, parental awareness regarding COVID-19 must first be evaluated. As schools reopen in China and around the world, such studies will be essential to a safe reopening process. The aim of this research was to investigate the awareness of parents regarding pediatric COVID-19 in relation to protecting their children.

**Methods**

A cross-sectional research was conducted in Fujian province and Suzhou provinces from 25th. May through 25th. June. 2020, as most schools in China reopened after COVID-19 outbreak. The study was reviewed and approved by the Institutional Review Board of Putain University (approval number: 2020-33). Participants were recruited via the snowball sampling techniques and data were collected via online
questionnaire. All participants had to answer a yes or no question to voluntarily confirm their willingness to participate before data were collected.

Criteria of Participants

Because literature found that children over 10 may transmit the COVID-19 virus more easily than younger children or adults [19–20], the criteria of inclusive sampling for this study were parents of children aged 6 to 16 years old who could read Chinese. The criteria of exclusive sampling were the parents of younger (< 6 y/o) or older (> 16 y/o), or parents unable to read Chinese.

Research Instrument

The questionnaire was constructed and developed based on literature [8–9, 18–21]. It comprised 8 demographic questions and 25 questions assess parental awareness regarding COVID-19 in children, with Sect. 1 (7 questions) covering transmission routes, Sect. 2 (4 questions) covering preventive measures, and Sect. 3 (14 questions) covering symptoms of COVID-19 in children. For each question of Sect. 1 and 2, the response options were on a 5-point Likert-type scale (1 = strong disagreement, 2 = disagreement, 3 = unsure, 4 = agreement, 5 = strong agreement). For each question of in Sect. 3, the response options were no (1) and 2 (yes). Two questions in Sect. 2 were negatively worded (Question 9 and Question 11). In Sect. 3, the correct answer to five questions was false (yes) (S9, S11-S14).

Reliability and Validity

The content validity Index (CVI) of research questionnaire was 0.85 to evaluate by a panel of five experts including three clinical experts (two doctors and one nursing manager) and two pediatric scholars. Internal consistency reliability evaluated with overall Cronbach's alpha coefficient was 0.8, 0.858 for questions of transmission routes (Sect. 1), 0.794 for questions on preventive measurements (Sect. 2), and 0.746 for questions on symptoms of COVID-19 (Sect. 3).

Statistical Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) software version 26. The research data were described by number and frequency for categorical data and mean, standard deviations and range were used for continuous variables. Multiple linear regression models were used to explore the possible factors affecting participants’ awareness regarding children COVID-19. A p value of less than 0.05 was considered as statistically significant.

Results

A total of 1360 participants completed the online questionnaire. After detailed review of the responses 138 questionnaires were excluded to missing data or duplications, for the final total of 1222 responses, with 1149 participants from Fujian province and 73 participants from Jiangsu province. The average age of participants was 39.3 y/o (range: 23–58, standard deviation: 5.161). The educational attainment of
the majority of participants was junior high school (55.6%) and 53.3% were farmers. Most reported middle-class household social-economic status. Table 1 summarizes the demographic profile of participants in this study.
Table 1
Characteristics of Participants (N = 1222)

| Characteristic          | Numbers of Participants | Percentage |
|-------------------------|-------------------------|------------|
| **Gender**              |                         |            |
| Male                    | 419                     | 34.3%      |
| Female                  | 803                     | 65.7%      |
| **Parental Role**       |                         |            |
| Father                  | 419                     | 34.3%      |
| Mother                  | 803                     | 65.7%      |
| **Marital status**      |                         |            |
| Single                  | 54                      | 4.4%       |
| Married                 | 1168                    | 95.6%      |
| **Numbers of Children** |                         |            |
| One                     | 142                     | 11.6%      |
| Two                     | 683                     | 55.9%      |
| Three or more           | 397                     | 32.5%      |
| **Occupation**          |                         |            |
| Civil Servant, Teacher  | 48                      | 3.9%       |
| Farmer                  | 651                     | 53.3%      |
| Labor                   | 259                     | 21.2%      |
| Businessman             | 124                     | 10.1%      |
| Clinician               | 72                      | 5.9%       |
| Other                   | 68                      | 5.6%       |
| **Educational Attainment** |                       |            |
| Primary School or Under | 245                     | 20%        |
| Junior High School      | 679                     | 55.6%      |
| High School             | 140                     | 11.5%      |
| Undergraduate           | 139                     | 11.4%      |
| Postgraduate            | 19                      | 1.6%       |
| **Residential Status**  |                         |            |
| Characteristic     | Numbers of Participants | Percentage |
|------------------|-------------------------|------------|
| Houseowner       | 1081                    | 87.3%      |
| Renter           | 155                     | 12.7%      |
| **Socio-Economic Status** |                     |            |
| Poor             | 85                      | 7%         |
| Middle-class     | 908                     | 74.3%      |
| Well-off         | 227                     | 18.6%      |
| Rich             | 2                       | 0.2%       |

Results of Participants’ Awareness Scores

In Sect. 1, Transmission Routes, the majority of participants believed that “COVID-19 virus transmits via respiratory droplets of infected patients” (99.2%) and most (94.3%) believed that uncovered sneezing or cough could spread COVID-19 virus. 75.6% believed that virus may be transmitted by patients’ feces, urine and excrements. Additionally, only 853 participants (69.8%) believed that COVID-19 virus may spread by eating contaminated food.

In Sect. 2, regarding the personal preventive measures, the majority of participants (95.7%) strongly agreed or agreed with the statement “a good handwashing should last for at least 10 seconds”. Additionally, most (92.2%) strongly agreed or agreed with the statement “people should cover their moth while sneezing and coughing by hands”. Unfortunately, based on the WHO and CDC recommendations to people for the prevention of COIVD-19, these responses were incorrect (Table 2).
Table 2
Distributions of Participants’ Awareness (number/ percentage, N = 1222)

| Questions                                                                 | Strongly/agree | Unsure | Strongly/Disagree |
|---------------------------------------------------------------------------|----------------|--------|-------------------|
| **Section 1: How is COVID-19 transmitted?**                                |                |        |                   |
| Q1. Respiratory Droplets of Patients                                      | 1212/99.2%    | 10/0.8%| 0/0               |
| Mean: 4.78, SD:0.435                                                      |                |        |                   |
| Q2. Feces, Urine and Excrement                                            | 924/75.6%     | 231/18.9%| 67/5.5%           |
| Mean:4.13, SD: 0.954                                                     |                |        |                   |
| Q3. Eye Discharge of Patients                                             | 930/76.3%     | 206/16.9%| 83/6.8%           |
| Mean:4.13, SD: 0.959                                                     |                |        |                   |
| Q4. Uncovered Sneeze, or Cough                                            | 1153/94.3%    | 42/3.4%| 27/2.2%           |
| Mean:4.55, SD:0.71                                                       |                |        |                   |
| Q5. Direct Hand Contact with an Infected Person's Respiratory Droplets    | 1005/82.3%    | 137/11.2%| 80/6.5%           |
| Mean:4.24, SD:0.925                                                      |                |        |                   |
| Q6. Eating Contaminated Food                                              | 853/69.8%     | 254/20.8%| 115/9.4%          |
| Mean: 3.98, SD:1.028                                                     |                |        |                   |
| Q7. Touching Other’s Clothes and Shoes; Mean: 4.02, SD:1.00               | 880/72%       | 234/19.1%| 108/8.8%          |
| **Section 2: Knowledge of COVID-19 Preventive Measures**                  |                |        |                   |
| Q8. I understand how to properly wear and remove masks. Mean: 4.64, SD:0.528 | 1201/98.3%    | 18/1.5%| 3/0.3%            |
| Q9. A good handwashing should last for at least 10 seconds; Mean: 4.58, SD:0.683 (Reverse question) | 1190/95.7% | 25/2% | 27/2.2% |
| Q10. I separate outdoor clothes and indoor clothes. Mean: 4.59, SD: 0.564 | 1185/96.9%    | 34/2.8%| 3/0.3%            |
| Q11. In order to prevent spreading the virus, we should cover our mouth with our hands when coughing or sneezing. Mean: 4.47, SD:0814 (Reverse question) | 1126/92.2% | 33/2.7% | 63/5.1% |
| **Q12, Sect. 3: What are the symptoms of COVID-19 in children? (Number/Percentage of “Yes”)** | | | |
| S1. Fever: 1196/ 97.9%; S2. Stuffy Nose & Cough: 746/ 61%; S3. Sneezing: 594/ 48.6% | | | |
| S4. Nausea & Vomiting : 611/ 50%; S5. Diarrhea: 426/ 34.9%; S6. Myalgia: 323/ 26.4% | | | |
In Sect. 3, Symptoms of COVID-19 In Children, the majority of participants (97.9%) responded that fever was one of the symptoms of COVID-19 in children, and 61% believed that stuffy nose and coughing were also symptoms. Few participants believed that the symptoms of “nausea & vomit” (50%) and “diarrhea” (34%) were related to pediatric COVID-19. Literature did not suggest that swollen joints, flushed face, sweaty, chapped lips may not relate to COVID-19, and indeed few participants considered those symptoms related to COVID-19. Table 2 displays distribution and comparison of participants’ awareness levels.

Awareness scores significantly differed by parental relationship (mother or father), educational attainment, and social-economic Status ($p<0.05$; Table 3), after adjusting for the age effect. More specially, the results of multiple liner regression analysis exhibited that mothers had, on average, 0.779 units significantly lower score of awareness regarding pediatric COVID-19 than did fathers (estimate = -0.779; $p = 0.026$; Table 3), after adjusting for other factors. Participants with higher academic attainment had higher awareness scores. After adjusting of other factors’ effects, those participants with a high school diploma (estimate: 1.588, $p = 0.007$; Table 3), an undergraduate degree (estimate: 2.224, $p < 0.001$; Table 3), or a graduated degree (estimate: 2.554, $p = 0.046$; Table 3) had higher awareness score than those with the lowest educational attainment (primary school or less). Participants in the highest socio-economic class had higher awareness scores than those in the lowest class (estimate: 1.504, $p = 0.031$).
Table 3
Multiple Logistic Regression Analysis of Significant Impact Factors on Awareness (N = 1222)

| Variables               | Estimate | SE  | 95% CI           | P       |
|-------------------------|----------|-----|------------------|---------|
| Intercept               | 62.962   | 1.589 | 59.846,66.077    | < 0.001*|
| **Parental Role**       |          |     |                  |         |
| Mother versus Father a  | -0.779   | 0.349 | -1.465,-0.093    | 0.026*  |
| **Educational Attainment** |       |     |                  |         |
| Postgraduate            | 2.554    | 1.282 | 0.04, 5.068      | 0.046*  |
| Undergraduate           | 2.224    | 0.584 | 1.079, 3.37      | < 0.001*|
| High School b           | 1.588    | 0.589 | 0.432, 2.743     | 0.007*  |
| Junior High School      | 0.721    | 0.424 | -0.11, 1.552     | 0.089   |
| Primary school or Under | 0 a      |     |                  |         |
| **Socio-Economic Status** |       |     |                  |         |
| Rich                    | 1.885    | 3.843 | -5.648,9.417     | 0.624   |
| Well-off                | 1.504    | 0.696 | 0.139,2.869      | 0.031*  |
| Middle-class            | 0.905    | 0.612 | -0.296, 2.106    | 0.140   |
| Poor                    | 0 a      |     |                  |         |
| Age                     | -0.059   | 0.032 | -0.123, 0.006    | 0.074   |

Note: Dependent variable: Total Score of Awareness; Model: (Intercept), Parental Role, Educational Attainment, Socio-Economic Status. a. Set to zero because this parameter is redundant. * p < 0.05

**Discussion**

To our Knowledge, this is the first investigation of Chinese parents’ awareness regarding pediatric COVID-19. Research was conducted as most schools reopened after the COVID-19 outbreak, while China was no longer at the epidemic stage but still a dangerously affected area, especially with many imported confirmed cases. In contrast to a previous study in Wuhan city [10], most participants in this study were farmers with low educational attainment (55% junior high school). The majority participants were recruited from Fujian province, with few (n = 73) from Jiangsu province. In Fujian province, almost 50% residents are farmers. To this point, Fujian has recorded 367 COVID-19 patients including 71 patients recently came from abroad or from other provinces, and no confirmed infections in children. Therefore, this research data may be considered and accurate picture of the Fujian population.
In our research, although most participating parents knew that respiratory transmission (patients’ droplets) was the main transmitted route of COVID-19; few recognized contact transmission as another transmitted route for the virus (Question 4, 5, & 7; Table 2). In this study, 69.8% of participants believed that contaminated food may be a transmission route, but 20.8% participants doubted this theory. Although one hypothesis proposes that the COVID-19 virus may be transmitted via respiratory droplets on the surface of food or food package, currently no evidence proves this hypothesis. Good handwashing, personal hygiene practices, and choice of grocery stores are more important [18].

Personal preventive measures towards COVID-19, including proper handwashing, appropriate facemask use, and respiratory hygiene practices (cough etiquette), are particularly important [18–19]. Clinical experts recommend that proper handwashing technique involve 7 steps and last at 20 seconds [23–25], and it is recommended to cover nose and mouth with tissue or and an elbow rather than hands when coughing or sneezing [17, 21–26]. However, our research revealed that the majority of participants had incorrect information on handwashing technique and respiratory hygiene practice (Table 2, q11 and q12). These parents urgently need accurate and appropriate information to correct these misunderstandings.

Additionally, evidence has found differences between the COVID-19 symptoms of children and those of adults [8–9]. In this research, most participants knew that fever and cough are symptoms of COVID-19 in children, but few knew that sneezing is also a symptom. Unlike adult patients, children with COVID-19 have digestive symptoms (nausea, vomiting, diarrhea) [6–8, 20]. Our research found that participants lack knowledge regarding the symptoms of COVID-19 in children (Table 2).

Parental role, educational attainment and socio-economic condition were significant factors affecting COVID-19 awareness scores. Research participants who were fathers, more highly educated, and of a higher socio-economic status showed better awareness than did others. We assure that more educated, and prosperous parents may possess more resources and access to information on COVID-19, and accordingly better hygiene practices, than parents of lower education and income. These results are likely consisted with a previous study [10, 16]. Investigations in other countries have also revealed that educational attainment, poverty level on awareness regarding COVID-19 [19, 27].

One important limitation of this study was that it may not representativeness of the Chinese population as a whole due to use of a snowball sampling method to recruited participants. Additionally, since research setting was limited to two provinces in China, data may not represent the conditions in other provinces which suffered many COVID-19 cases during the outbreak.

**Conclusion**

Because the COVID-19 is a new disease which infected only few children in China during outbreak, and due to the prevalence of myths and misinformation about this virus, parents lacked clear protective information on protecting children during the critical outbreak in China. However, evidence has found that children of all age can be infected and develop COVID-19. Our research results suggest an urgent need to improve parental knowledge regarding the transmission routes, symptoms in children, and preventive
measures for children, especially handwashing techniques, cough etiquette and recognition of children's COVID-19 symptoms. Moreover, we also suggest an urgent push to develop educational outreaches to parents and schoolchildren to promote personal hygiene knowledge and practice to protect both children and their families. Further studies are needed to develop and evaluate the effectiveness of these programs.

**Abbreviations**

WHO: World Health Organization;  
COVID-19: Novel Coronavirus Disease;  
SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2  
ACE-2 : Angiotensin-Converting Enzyme 2

**Declarations**

**Ethics approval and consent to participate**

The study was reviewed and approved by the Institutional Review Board of Putain University (approval number: 2020-33). Informed consent: Written informed consent was posted on web-based questionnaire and all participants had to log into web-based questionnaire and answer a yes or no question to voluntarily confirm their willingness to participate before data were collected.

**Consent for publication:**

This research only report aggregated statistics. No details, images, or videos relating to individual persons are published with this study

**Availability of data and material:**

The dataset analyzed in the current study is available from the corresponding author on application and approval for appropriate Statistical Package for Social Sciences software version 26. Details on application may be obtained from the corresponding author.

**Competing interests:**

The authors declare no competing interests and no disclosures.

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**Authors' Contributions:**
N-H Peng, JF Zhou conceived and designed the study. H Meng, ZZ Li contributed research data collection, Y-C Chang was responsible for data analysis. All authors have read and approved the manuscript.

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**References**

1. World Health Organization (WHO), The Coronavirus disease (COVID-19) pandemic. 2019, https://www.who.int/emergencies/diseases/novel-coronavirus-2019?
gclid=EAIaIQobChMI24jsrsHE6glV06mWCh1oTgIuEAAYASAAEgIQQfD_BwE

2. World Health Organization (WHO). Naming the coronavirus disease (COVID-19) and the virus that causes it. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it

3. Patel, A.B., & Verma, A. Nasal ACE2 Levels and COVID-19 in Children. JAMA, 2010; 323 (23): 2386-2387.

4. Zhou P, Yang X-L, Wang X-G, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. Nature. 2020; 579(7798):270- 273. doi:10.1038/s41586-020-2012-7

5. Bunyavanich S, Do A, Vicencio A. Nasal gene expression of angiotensin-converting enzyme 2 in children and adults. JAMA. 2020; Published online May 20, 2020. doi:10.1001/jama.2020.8707

6. She J., Liu L., &Wenjun Liu COVID-19 epidemic: Disease characteristics in children. J Med Virol. 2020; 92: 747–754. (2020)

7. Liguoro I., Pilotto C., Bonanni M., et al. SARS-COV-2 infection in children and newborns: a systematic review. European Journal of Pediatrics. 2020; 179:1029.

8. Deville, J.G., Song, E., & Ouellette C.P. Coronavirus disease 2019 (COVID-19): Clinical manifestations and diagnosis in children. UpToDate: Jun 26, 2020. https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-clinical-features

9. Jiatong She, Lanqin Liu, &Wenjun Liu COVID-19 epidemic: Disease characteristics in children. J Med Virol. 2020; 92: 747–754.

10. Zhong B-L, Luo, W., Li, H-M, Zhang, Q-Q, Liu, X-G, Li, W-T., & Li Y. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. J. Biol. Sci., 2020; 16, 1745-1752.

11. Centers for Disease Control and Prevention (CDC). For parents: Multisystem inflammatory syndrome in children (MIS-C) associated with COVID-19. May 20, 2020. https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/children/mis-c.html
12. Beth, M., Friedman, K. Coronavirus disease 2019 (COVID-19): Multisystem inflammatory syndrome in children. UpToDate (Jun 24, 2020)

https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-multisystem-inflammatory-syndrome-in-children

13. Kumar J, Katto M, Siddiqui A A, et al. Knowledge, attitude, and practices of healthcare workers regarding the use of face mask to limit the spread of the new coronavirus disease (COVID19). Cureus 2020; 12(4): e7737.

DOI 10.7759/cureus.7737

14. Zhang, R., Lib, Y. Zhang, A.L., Wang, Y., & Molina, M.J. Identifying airborne transmission as the dominant route for the spread of COVID-19. PNAS, 2020; 117 (26) 14857-14863.

15. Amirian, E.S. Potential fecal transmission of SARS-CoV-2: Current evidence and implications for public health. International Journal of Infectious Diseases. 2020; 95, 363–370.

16. Zhang J, Litvinova M, Liang Y, Wang Y, Wang W, Zhao S, et al. Changes in contact patterns shape the dynamics of the COVID-19 outbreak in China. Science. 2020; 368:1481–6.

17. World Health Organization. Transmission of SARS-CoV-2: implications for infection prevention precautions. (9. July. 2020) file:///C:/Users/user/Downloads/WHO-2019-nCoV-Food_Safety-2020.1-eng.pdf

18. World Health Organization. COVID-19 and food safety: guidance for food businesses. Published at 7th. (April.2020)

file:///C:/Users/user/Downloads/WHO-2019-nCoV-Food_Safety-2020.1-eng.pdf

19. Park, Y-J, Choe, Y-J., Park, O., Park, S-Y., Kim, Y-M, et al. Contact Tracing during Coronavirus Disease Outbreak, South Korea, 2020. Emerging Infectious Diseases, 2020; 26(10). https://wwwnc.cdc.gov/eid/article/26/10/20-1315_article

20. Davies, N.G., Klepac, P., Liu,Y., Prem,K. et al. Age-dependent effects in the transmission and control of COVID-19 epidemics. Nature Medicine, Published online (2020). https://www.nature.com/articles/s41591-020-0962-9.pdf

21. Bender, L. UNICEF Key Messages and Actions for COVID-19 Prevention and Control in Schools. March. 2020. file:///C:/Users/user/Desktop/new%20research%202020/key-messages-and-actions-for-covid-19-prevention-and-control-in-schools-march-2020.pdf

22. UNICEF Coronavirus disease (COVID-19): What parents should know how to protect yourself and your children. http://www.e-lactancia.org/media/papers/Coronavirus_disease_COVID-19_What_parents_shoud_know_UNICEF.pdf
23. Florian G., Begoña, S-G, Antoni N-J, et al. COVID-19 in children and adolescents in Europe: a multinational, multicentre cohort study. The Lancet Child & Adolescent Health. (2020).
file:///C:/Users/user/Desktop/new%20research%202020/PIIS2352464220301772.pdf

24. Vivas, A., Gelayea,B., Aboset, N., Kumie, A., Berhane, Y., & Williams M.A. Knowledge, attitudes, and practices (KAP) of hygiene among school children in Angolela, Ethiopia. J Prev Med Hyg. 2010; 51(2): 73–79.

25. Centers for Disease Control and Prevention, When and how to wash your hands.
https://www.cdc.gov/handwashing/when-how-handwashing.html

26. Pradhan,D., Biswasroy, P, Naik,PK., Ghosh,G., & Rath, G. A Review of current interventions for COVID-19 prevention. Archives of Medical Research. 2020; 51, 363-374.

27. Wolf, M.S., Serper, M., Opsasnick, L., O’Conor, RM. et al. Awareness, attitudes, and actions related to COVID-19 among adults with chronic conditions at the onset of the U.S. outbreak a cross-sectional survey. Annals of Internal Medicine, 9 April 2020.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7151355/pdf/aim-olf-M201239.pdf