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REVIEW ARTICLE

# The Impact of the Covid-19 Pandemic on Child Health

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**ABSTRACT**

A "pandemic" refers to an extensive outbreak of disease affecting a large population across a wide geographic area. Various factors have been linked to pandemics throughout history. Since March 2019, the onset of the COVID-19 pandemic has had detrimental effects on children's development, nutrition, care, vaccination, safety, mental health, and education. Understanding the impact of the COVID-19 pandemic on children's health is crucial for implementing effective measures. It is essential to ensure the continuity of child health services during extraordinary situations such as pandemics to prevent disruptions in child development. This article aims to investigate the effects of the COVID-19 pandemic on children's health and underscore the preventive measures that need to be implemented.

**Keywords:** Child, pandemic, COVID-19

## INTRODUCTION

The term "pandemic" denotes an epidemic affecting a large population across a widespread area, often transcending national boundaries (1,2). Globalization, economic progress, and societal shifts have led to the emergence and global spread of epidemics caused by novel microbial agents. Unlike historical epidemics primarily driven by military factors, contemporary epidemics propagate through national and international trade, as well as tourism. In 2019, the COVID-19 pandemic joined a roster of significant historical epidemics, including the 1918 Spanish flu, the 1957 Asian flu, the 1968 Hong Kong flu, and the 2009 H1N1 influenza, all of which wrought substantial devastation (3).

The World Health Organization (WHO) announced that by March 16, 2023, there were 760 million confirmed cases of COVID-19, resulting in 6.8 million deaths attributed to the pandemic (4). In comparison to adults, children under 18 years old tend to experience COVID-19 with fewer fatalities and generally mild symptoms, accounting for approximately 8.5% of reported cases (5). However, it is crucial to recognize that while children are less severely affected by COVID-19, it still significantly impacts their health (6,7). Children are affected by the pandemic for various reasons, including the virus's high transmission rate, the socioeconomic repercussions of containment measures, and the setbacks in achieving Sustainable Development Goals (SDGs) due to delays (7). The global community recognizes the COVID-19 pandemic as a crisis concerning the rights of children, impacting their development and long-term well-being. Progress made in enhancing the welfare of children and youth over the past two decades, attributable to the SDGs, faces the risk of regression due to increasing disparities among nations (8). The sudden onset of the COVID-19 pandemic has adversely affected all SDGs, particularly SDG 3 (Ensure healthy lives and promote well-being for all at all ages) and its associated goals: SDG 1 (No poverty), SDG 2 (Zero hunger), SDG 4 (Quality education), SDG 5 (Gender equality), SDG 6 (Clean water and sanitation), SDG 13 (Climate action), SDG 14 (Life below water), SDG 15 (Life on land), and SDG 17 (Partnerships for the goals), hindering the progress toward these objectives (9).

A small portion of child mortality worldwide is attributed to COVID-19-related deaths, while a significant portion is anticipated to result from insufficient access to essential resources such as water, sanitation, shelter, vaccines, health services, and food (8). Instances of severe COVID-19-related illnesses have been documented in children. Various risk factors for severe illness and intensive care admissions among children

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have been identified, including chronic respiratory conditions, obesity, diabetes, and cancer (5). Furthermore, the COVID-19 pandemic has adversely impacted children's nutrition, particularly breastfeeding, as well as their care, safety, mental health, vaccination, and education. Given the global scale of the COVID-19 pandemic, understanding its impact on children's health is crucial for implementing necessary precautions. This review aims to underscore the effects of the COVID-19 pandemic on child health and elucidate the requirements for mitigating these effects.

**The impact of COVID-19 on children's nutrition**

Following the guidelines of the WHO, exclusive breastfeeding is recommended for the first 6 months, with appropriate complementary feeding starting at 6 months, continued breastfeeding up to at least 2 years of age, and support for breastfeeding during exceptional circumstances such as epidemics (10,11). Concerns arose at the onset of the COVID-19 pandemic regarding the potential transmission of the SARS-CoV-2 virus through breast milk and whether infected mothers could transmit the infection to their infants while breastfeeding (12–14). Reports indicate that lockdowns, confinement measures, and diminished social support in Italy have had adverse effects on breastfeeding, resulting in a decline in exclusive breastfeeding rates (15). In California, the decrease in breastfeeding rates is attributed to the inability to offer in-person breastfeeding counseling due to the pandemic (16). A study conducted in Tekirdağ, Turkey, examined breastfeeding practices among mothers with COVID-19 and those in contact with COVID-19, revealing that 54.5% of contact mothers and 17.6% of ill mothers exclusively breastfed their infants. Additionally, 76.5% of ill mothers considered formula feeding the safest option during the pandemic (17). The importance of breastfeeding and its continuation during the pandemic was underscored in an article by Gökçay and Keskindemirci at the pandemic's onset (13).

There is no evidence to suggest that breast milk transmits COVID-19 to infants (18–20). A study conducted in the USA examined breast milk samples from mothers who tested positive for SARS-CoV-2 via nasopharyngeal swab test before giving birth. Of the 18 mothers tested, only 1 tested positive for SARS-CoV-2 in breast milk, yet the infant who received this milk tested negative for the virus in their nasopharyngeal test, showing no signs of infection (18). Similarly, in a separate study involving 44 breast milk samples from 16 Chinese mothers with confirmed COVID-19, no traces of SARS-CoV-2 were found (19). A comprehensive review of 340 studies also found no evidence of SARS-CoV-2 transmission through breast milk (20).

The WHO advocates for COVID-19-positive mothers to continue breastfeeding, emphasizing the importance of initiating breastfeeding and skin-to-skin contact immediately after birth while adhering to proper mask and hand hygiene protocols (14). Breast milk is well-known for bolstering a newborn's immune system and providing protection against infectious diseases. Therefore, health professionals should continue to promote and support breastfeeding to safeguard the health of both the infant and the mother (18-22).

Poverty, widespread job losses, food insecurity, and the implementation of school closure policies were the primary factors contributing to nutritional inadequacy during the pandemic (23). The global impact of COVID-19 has resulted in the adoption of school closure policies across most nations (24). The United Nations International Children's Emergency Fund (UNICEF) has highlighted that 368.5 million children in 143 countries, who rely on school meals for access to nutritious food, are at risk of malnutrition due to these closures (7). For children living in poverty, schools serve not only as places of learning but also as vital sources of healthy meals. The absence of school meal programs leads to poor nutrition, which in turn affects academic performance and adversely impacts the physical and mental well-being of children (24). To mitigate these effects, it is essential for all countries to implement pandemic protocols such as mask-wearing, hygiene practices, and physical distancing to ensure that schools can remain open.

**The impact of COVID-19 on children's care**

Restrictions imposed during the pandemic resulted in a substantial decline of 70%–80% in applications for pediatric health services and treatments (25). In the USA, while there was no notable change in initial child health checkups during the early stages of the COVID-19 pandemic, a temporary reduction was observed in subsequent followup visits for older children (26). Despite no significant decrease in admissions for 2-year-olds between 2019 and 2020 at the Gazi University Social Pediatrics Department followup outpatient clinic, there was an overall decrease of 28% in child health followups up visits. This indicates that families did not postpone followupup appointments during the first 2 years of a child's life, which typically include breastfeeding, complementary feeding, and vaccinations. However, they avoided other followups due to concerns about potential infection (6).

During the pandemic, the followup monitoring of children with chronic illnesses has faced disruptions (27,28). Information and communication technologies offer the potential to deliver accessible, high-quality, and cost-effective healthcare services across countries. Telemedicine, utilizing these technologies, can surmount geographical barriers, enhance healthcare accessibility, and address logistical challenges (29). Telemedicine proves valuable, particularly in nonemergency situations, routine healthcare, and psychological service provision. By leveraging remote care, healthcare facilities can optimize resource utilization, enhance care accessibility, extend caregivers' access to diverse medical expertise, and minimize direct exposure to infectious agents (30). Telemedicine is increasingly pivotal in the routine followupmonitoring of children with chronic illnesses. Institutions should receive adequate technical support to enable the provision of telemedicine services.

Globally, the COVID-19 pandemic has triggered socioeconomic challenges, including reductions in parental income, food scarcity, housing issues, and heightened levels of anxiety and stress, contributing to instances of child neglect and abuse. The closure of kindergartens and schools has increased the vulnerability of children to neglect and abuse (6). A study involving 140 American

parents investigating food and physical activity patterns during the pandemic revealed the presence of adaptive positive parenting behaviors, albeit hindered by perceived stress (31). UNICEF has underscored the significance of providing information and support to parents and caregivers regarding safeguarding their own and their children's mental well-being and addressing the topic of the epidemic with children. Accordingly, guidelines have been developed to aid in this aspect (7,24).

**The impact of COVID-19 on children's immunization**

In just 1 year since the onset of the COVID-19 pandemic, significant efforts have been made to develop vaccines offering protection against the SARS-CoV-2 virus. The WHO has recommended that nations ensure at least 70% of their population is vaccinated, with priority given to fully vaccinating healthcare workers, individuals over 60 years of age, and those who are immunocompromised or have chronic illnesses (32). By July 30, 2023, a total of 13.49 billion doses of COVID-19 vaccine had been administered globally (33). As of April 5, 2023, 89% of healthcare workers, 82% of elderly individuals, and 66% of the general population had completed their primary COVID-19 vaccination series. However, booster dose coverage remains notably low worldwide (34). Although most COVID-19 vaccines have been authorized for individuals aged 18 years and older, mRNA vaccines such as Pfizer-BioNTech BNT162b2 and Moderna mRNA-1273 have received emergency use approval in some countries for children aged 6 months and above. As of March 5, 2023, approximately 2.2 million (13%) children aged 6 months to 4 years, 11.2 million (39%) children aged 5–11 years, and 17.9 million (68%) children and adolescents aged 12–17 years had received their initial dose of COVID-19 vaccine in the USA (35).

Due to efforts to combat the COVID-19 pandemic, routine vaccination services for children have been negatively impacted worldwide, leading to decreased vaccination rates (36–38). Chandir et al. (39) discovered that half of the children in the Pakistani Sindh province were not vaccinated during the COVID-19 pandemic quarantine period. In Lebanon, a study revealed the most significant decline in oral polio and measles vaccination (40). The substantial disruption of routine immunization programs in at least 68 countries has raised concerns about the potential impact on approximately 80 million infants, leaving them vulnerable to infectious diseases such as polio, measles, and diphtheria (37–38). The American Centers for Disease Control and Prevention (CDC) reported that over 61 million measles vaccinations were missed during the COVID-19 pandemic, contributing to measles outbreaks worldwide (41). It is crucial during pandemic situations to ensure that childhood vaccinations are administered promptly and in full (6,36).

**The impact of COVID-19 on children's visual and musculoskeletal systems**

Amidst the COVID-19 pandemic restrictions and lockdowns, children experienced reduced outdoor activities and increased use of technological devices like tablets and smartphones, leading to constrained daily movements (42,43). A study in Iran involving 585 school-age children during lockdown revealed a smartphone addiction rate of 53.3%, with usage exceeding 6 hours per day. There was a positive correlation between smartphone addiction and discomfort in areas such as shoulders, wrists, back, neck, and eyes (42). Similarly, research in China involving 1,728 students before and 1,733 students after the pandemic indicated a 10.4% increase in myopia rates. It was concluded that decreased outdoor activity and increased digital screen exposure contribute to myopia progression in children and adolescents (43).

To mitigate visual and musculoskeletal issues during the pandemic, parents should recognize the adverse effects of excessive digital screen exposure, assist children in cultivating a healthy relationship with digital devices by setting limits on daily screen time, reduce their own digital device usage as role models, engage in outdoor activities with their children, and involve them in indoor activities such as household chores, music, and art (44).

**The impact of COVID-19 on children's mental health**

The effects on children's mental well-being vary depending on various vulnerability factors, such as their developmental stage, educational status, presence of special needs, pre-existing mental health conditions, socioeconomic status, and whether they or their parents have been quarantined due to infection or fear of infection.

Social isolation during the pandemic has adversely affected the mental health of children (45–48). Children and adolescents may struggle to cope with the changes brought about by the pandemic and may experience stress. Concerns about infection and the subsequent need for quarantine or social distancing measures further exacerbate these challenges (6). A study conducted in China revealed that out of 1,036 quarantined children aged 6–15 years, 196 experienced anxiety, 112 suffered from depression, and 68 had both conditions (45). A meta-analysis of 23 studies involving 57,927 children and adolescents from China and Turkey indicated that depression affected 29%, anxiety 26%, sleep disorders 44%, and post-traumatic stress symptoms 48%, of the participants. Additionally, depression and anxiety were more prevalent among adolescents and girls compared to children and boys (46). In a study conducted in France, it was revealed that 81% of 1,376 children with physical disabilities experienced adverse effects due to closures, with behavioral problems being notably prevalent, leading to increased parental stress (47). Similarly, findings from research involving 369 children and adolescents in Spain highlighted the detrimental impact of 6 months of closure and school absences on their mental health. This included issues such as sleep disturbances, excessive screen time, and emotional and behavioral difficulties. Children's anxiety regarding their own and their families' health emerged as a risk factor for psychological issues, whereas a supportive family environment served as a protective factor (48). Enhancing children's emotional and behavioral well-being involves engaging in activities together with parents. Parents are advised to limit their children's solitary screen, encourage home-based activities, enjoy recreational activities and reading with their children, listen to their thoughts, discuss upcoming

activities, and inquire about their feelings. A parent-child relationship characterized by harmony and flexibility fosters children's emotional and behavioral development (49).

On a global scale, approximately 10.5 million children have experienced the loss of a parent or caregiver due to COVID-19 (50,51). Children may harbor fears of losing family members or confront the reality of losing loved ones to the pandemic. Addressing grief and loss, especially with children, poses significant challenges. UNICEF advises honesty and the provision of clear, straightforward explanations when communicating with children of all ages. For instance, using phrases like "I have sad news to share with you. Your grandparents have passed away. Their body has stopped working, and we won't see them again" underscores the importance of honest and transparent communication (52).

It is anticipated that the pandemic's long-term repercussions will lead to increased instances of substance abuse, suicide attempts, and psychiatric disorders. Therefore, during visits related to child and adolescent health, it is crucial to consider the multifaceted impacts of the pandemic. To mitigate these effects, parents and children should receive support and counseling on effective coping strategies. Parents can alleviate their children's fears, anxiety, and stress by enhancing communication, engage in recreational activities, participating in physical exercise, and singing together (53).

**The impact of COVID-19 on children's education**

The adverse effects of school closures encompass several challenges, including parents being compelled to work from home, economic hardships, the shift from work life to childcare responsibilities, potential virus transmission from children to adults, educational setbacks, nutritional deficiencies, and psychological issues (54). UNICEF reported that school closures affected over 1.5 billion children across 188 countries (7). Among the repercussions of school closures is the difficulty faced by economically disadvantaged students in accessing nutritious meals outside of school. Additionally, there has been a surge in negative educational indicators. The transition to digital leaning environments has exacerbated educational disparities (24). While distance education platforms have been adopted in more than two-thirds of countries globally, the adoption rate is merely 30% in low-income countries (7). Peer learning is particularly beneficial for children aged 2–10, as it plays a crucial role in their personality development. However, the disruption caused by isolation and quarantine may lead to the loss of social relationships, adversely impacting children's mental health (24).

School closures and social isolation have had notable repercussions on children's health and lifestyles. Research conducted in Australia, Spain, and China indicates that children often experience depressive symptoms and a diminished sense of life satisfaction. Similarly, studies in Croatia and Italy reveal that children exhibit reduced levels of physical activity and an increased consumption of unhealthy foods (55). Adolescent students in Chicago also report negative impacts of the pandemic on their learning effectiveness and ability to maintain balance in their lives and social interactions (56).

According to the WHO, the extent of children's involvement in transmitting COVID-19 is not yet fully elucidated, and only a few outbreaks linked to children or schools have been reported thus far. Consequently, it is speculated that the spread of COVID-19 within educational settings may be limited (5). In both home and school settings, children are rarely the primary source of secondary transmission, with a higher likelihood of contracting the virus from an adult household member (57). The CDC advocate for the benefits of in-person learning for students and stress the importance of implementing strategies to ensure its continuity (58,59). Vaccination stands out as one such strategy. Encouraging both COVID-19 vaccination and routine vaccinations against other infectious diseases is crucial for preventing illnesses stemming from various infections. Another strategy involves staying at home when feeling unwell. Students and staff exhibiting symptoms such as sore throats, coughs, vomiting, diarrhea, or fever are advised to remain at home. To mitigate the risk of airborne transmission, schools should prioritize ventilation and improve indoor air quality. Additionally, proper hand hygiene practices should be taught and encouraged among students. Those who have been exposed to COVID-19, regardless of vaccination status or prior infection history, should wear a suitable mask when in the presence of others for 10 days following exposure (59).

While the COVID-19 pandemic and associated measures have adverse effects on children and young individuals, their perspectives are often overlooked, and their voices seldom considered. Drawing from the insights of children and young people, the International Society for Social Pediatrics conducted a review examining the impact of COVID-19 and underscored the significance of their involvement in responding to this crisis. Children and young individuals in low-income nations are reporting substantial disruptions to their fundamental needs, including school attendance, access to food, and basic healthcare services. Conversely, those in high-income countries express concerns regarding their inability to attend school and interact with peers and reliance on technology. Policymakers at the local, national, and international levels should engage children and young individuals in the formulation of intervention strategies, with the Committee on the Rights of the Child responsible for reporting on and overseeing their participation (60).

**Preventive measures for mitigating COVID-19 effects on children's health**

Outlined below are essential steps to minimize the impact of the COVID-19 pandemic on children's health:

- Immediate initiation of breastfeeding and skin-to-skin contact following birth is recommended, while adhering to appropriate mask usage and hand hygiene protocols.

- Healthcare providers should actively promote and offer assistance for breastfeeding, ensuring comprehensive support for both mother and infant.

- Parents should receive guidance on nutrition and care tailored to their child's age during each followup visit.

- Timely and complete administration of all vaccinations is crucial for children's health.

- Parents ought to restrict their children's daily screen time and set an example by decreasing their own usage of digital devices.

- Parents should actively engage in outdoor activities with their children and encourage indoor pursuits like painting, music, games, and household chores.

- It is imperative for every nation to prioritize the continued operation of schools.

- Governments must safeguard the rights of children and adolescents by adopting a child-centered approach.

- Policymakers should involve children and adolescents in the formulation of intervention strategies.

- Countries should bolster local food production and guarantee access to essential resources such as food, clean water, sanitation, shelter, and healthcare services.

## CONCLUSION

It is crucial to maintain the provision of child health services even in exceptional circumstances like pandemics. Encouraging the mother–infant bond should for breastfeeding, providing parents with guidance on age-appropriate nutrition and care during followup visit, ensuring timely vaccinations for children, and taking necessary measures to sustain their education are paramount. Additionally, parents and children should receive support and counseling on navigating through the challenges posed by the pandemic. Despite disruptions in various aspects of life during pandemics, it is vital to recognize that child development persists unabated.

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