

## THE IMPACT OF COVID-19 PANDEMIC ON CHILDREN'S NUTRITION AND THEIR SOLUTIONS: A REVIEW

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### ABSTRACT

*Introduction: The novel coronavirus disease 2019 (COVID-19) continues to deteriorate economic and health system globally. Globally including Malaysia, the government strives relentlessly through public health measures to contain the transmission of COVID-19 and prevent a continuous exponential rise of cases. As a pandemic consequence, many families were affected which in need of humanitarian aid in getting access to appropriate nutritious foods. Children became more vulnerable and were at a greater risk of malnutrition because of the disruptions in food system and change in lifestyle habits. Objective: The aim of this article is to review the impact of COVID-19 pandemic on children's nutrition and identify targeted measures primarily for vulnerable children to combat the nutrition crisis. Method: PubMed, Scopus, and ScienceDirect were searched from December 2019 to February 2021. The search terms include "impact" AND "COVID-19" AND "children" AND "nutrition". A narrative review was written based on the articles found. Results: A total of 15 articles were found to be of relevant. Reviewed articles revealed that children's nutrition was disproportionately affected by the pandemic due to food insecurity, affected financial resources, changes in dietary patterns and lack of access to healthcare facilities, increasing their vulnerability to childhood malnutrition. On-going initiatives include food basket and food bank programs, social protection programs and the deployment of community health workers to remote areas. Mass media played an important role as a continuous effort to help spread awareness on the importance of maintaining nutritious food intake during the pandemic. Conclusion: It is crucial to recognize the effects of the pandemic on children's nutrition and the effectiveness of the current initiatives that has been done. This will aid public health authorities in restructuring future nutritional policies in anticipation of future pandemics.*

Keywords: COVID-19, pandemic, children, malnutrition, food insecurity

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### INTRODUCTION

In today's world, approximately one out of every three children globally is suffering from at least one form of malnutrition (UNICEF, 2019). The World Health Organization (WHO) defines malnutrition as a deficiency, excess, or imbalance of energy and/or nutrients intake in a person. Examples of malnutrition include undernutrition (i.e. wasting, stunting, and underweight), vitamin or mineral deficiency, overweight, obesity, and diet-related non-communicable diseases (WHO, 2017). Stunting, wasting, underweight, and overweight are indicators used to assess a child's nutritional status, and such imbalances are interpreted as either undernutrition or overweight (WHO, 2010).

Generally, malnourished children, even those suffering from mild to moderate malnutrition, have a higher risk of death (Rice et al., 2000). If left untreated, children with severe acute malnutrition (SAM) are nine times more likely to die from common childhood infections such as diarrhoea, pneumonia and malaria when compared to healthy children. Wasting, extreme thinness or nutritional oedema are classical features of SAM (WHO, 2019). They can still suffer from physical and mental developmental

deterrent following recovery from SAM, particularly if those who have stunted growth (UNICEF, 2019). Studies have shown that impairment in cognitive development in children as a result of reduced mental development gives rise to lower IQ, social skills deficit and behavioural disorders, all of which leads to poor academic achievement at school (Khor, 2004).

In 2020, it was estimated that 149.2 million children under the age of five were stunted, 45.4 million were wasted, and 38.9 million were overweight around the world (UNICEF et al., 2021). These malnourished children under the age of five mainly concentrated in Africa and Asia with more than half of all stunted children lived in Asia, with two-fifths in Africa; more than two-thirds of all wasted children lived in Asia, with more than a quarter in Africa; and nearly half of all overweight children lived in Asia, with more than a quarter in Africa (UNICEF et al., 2021). However, the report from The Joint Malnutrition Estimates did not exactly consider the COVID-19 pandemic impact on the nutritional status of children due to physical distancing measures that hindered the process of collecting household survey data on child age, height and weight, hence, the estimates for the year 2020 were established almost entirely based on data collected prior to 2020 (UNICEF et al., 2021).

Childhood obesity has increased in Southeast Asia over the last 10 to 15 years, with Malaysia and Brunei recorded the highest obesity rates among children aged 5 to 19 (Koo et al., 2020). In 2016, Brunei (14.1%) ranked first among ASEAN countries in terms of the obesity prevalence among children aged 5 to 19, followed by Malaysia (12.7%) (Malaysian Healthcare Performance Unit, 2018). Obesity rates among Malaysian children have increased dramatically, from 11.9% in 2015 to 14.8% in 2019 (Institute for Public Health et al., 2019). Several studies have reported that low physical activity was among all lifestyle factors which exhibited remarkable association with overweight and obesity among children (Al-hazzaa et al., 2014; Mahaletchumy et al., 2019). Besides, rapid socioeconomic progress in Malaysia has caused dietary transition in which nutrient-dense foods have been replaced by energy-dense foods, and this has led to rise in childhood obesity (Koo et al., 2020).

Although obesity does not affect morbidity and mortality directly, it increases the risk of developing variety of medical conditions including early onset of type 2 diabetes mellitus, cardiovascular diseases, asthma and other respiratory diseases, musculoskeletal disorders, as well as malignancies (WHO, 2010, 2019). In addition, obese children were found to have lower immunity, thus predisposing them to infections (Alwarawrah et al., 2018). Worryingly, Zhang et al. discovered that obesity increases the risk of COVID-19-related death in patients as young as 14 years old (Zhang et al., 2020). In New York, obesity was the most common comorbidity among children and adolescents reported to be hospitalized with COVID-19 (Nogueira-de-Almeida et al., 2020).

The global COVID-19 pandemic has turned the world upside down and continues to cause significant economic crises and further worsen food and nutrition insecurity, thus making the global efforts in combating childhood malnutrition becomes more challenging. This includes challenges in making sure nutritious foods are made available and affordable, as well as access to healthcare such as nutrition services and social protection services (Akseer et al., 2020). Children's deaths from COVID-19 were reported to be low, with 0.7 per 100,000 population, accounting for 0.48% of all-cause deaths in a typical year in the United States, the United Kingdom, Italy, Germany, Spain, France, and South Korea (Bhopal et al., 2021). Nevertheless, it is not the COVID-19 disease itself that is concerning to the children, but its collateral damages such as financial instability, food insecurity and disconnection from community-based support that can potentially aggravate their nutritional status with a risk of both underweight and overweight (Omoni et al., 2020; Roberton et al., 2020). Due to the COVID-19 pandemic, it is anticipated that there will be an increase of both undernutrition in children under the age of 5 as well as overweight and/or obese children due to school closures and lockdowns (Ntambara and Chu, 2021). Considering the COVID-19 pandemic and the pre-existing issues of children's nutrition, this review aims to discuss the impact of COVID-19 pandemic on children's nutrition and to identify targeted measures primarily for vulnerable children to combat the nutrition crisis.

## **METHODOLOGY**

This article is based on literature review of published articles and journals which have been accessed via following online databases: PubMed, Scopus and ScienceDirect. The reviewed articles were published in English from December 2019 to February 2021. Search terms included: (impacts OR consequences OR implications OR effects) AND (COVID-19 OR coronavirus disease 2019 OR COVID-19 pandemic OR COVID-19 outbreak OR COVID-19 lockdown) AND (children OR adolescents OR toddlers OR infants OR paediatric OR teenagers OR schoolchildren) AND (nutrition OR nutritional status OR nutrition insecurity OR malnutrition OR malnourishment). Other sources included the reference lists of the selected articles and national reports to obtain more information related to the study.

## **RESULTS**

A total of 376 articles were found in the search. After removing duplicates and screening titles and abstracts, 39 articles were chosen for full-text review. There were 15 articles which were deemed eligible and included in this literature review. The summary of findings of these 15 articles were described in Table 1. Based on the analysis of the 15 papers, four main factors were found to have an influence on children nutrition during COVID-19 pandemic and four main on-going solutions as examples were identified that could lessen the impact (Figure 1). The included articles examined factors of malnutrition among children such as food insecurity, low household income, unhealthy eating and lifestyle habits (e.g. increased snacking and screen time, reduced physical activity) and limited access to essential healthcare services were associated with the risk of malnourishment among children as a result of COVID-19 pandemic. Food basket and food bank programs, social protection programs, the deployment of community health workers, and the use of mass media to raise public awareness about childhood malnutrition were among the approaches discovered.

**Table 1: Summary of findings**

No.	Author (Year) Country	Title	Population	Exposure	Outcome	Key Findings
1	Arianna Dondi (Jan 2021) Italy	Parents' Perception of Food Insecurity and of Its Effects on Their Children in Italy Six Months after the COVID-19 Pandemic Outbreak	Parents of children <18 years old and living in Italy	COVID-19 pandemic outbreak	Food insecurity	Risk factors for food insecurity: Low income, households with children, higher size households, single parents, immigrants
2	Boutaina Zemrani (Jan 2021) Switzerland	A hidden side of the COVID-19 pandemic in children: the double burden of undernutrition and overnutrition	Parents of stable patients in University Hospital in Lausanne Switzerland	COVID-19 pandemic outbreak	Children's nutrition and lifestyle habits	Pandemic has led to increase in eating and snacking, time spent on screens and reduction in physical activity
3	Bindu Panthi (Jun 2020) Nepal	An urgent call to address the nutritional status of women and children in Nepal during COVID-19 crises	Not applicable	COVID-19 pandemic outbreak	Nutritional status of women and children in Nepal	Lockdown has resulted in a decrease in household incomes leading to less availability and reduced access to food, and restriction in receiving essential health care services.
4	Nadia Akseer (Jun 2020) Canada	COVID-19 pandemic and mitigation strategies: implications for maternal and child health and nutrition	Not applicable	COVID-19 pandemic outbreak	Maternal and child health and nutrition	- Risk factors for undernutrition in the context of COVID-19: Food insecurity and poor-quality diets, reduced income and limited financial resources, limited care and restricted health services, interrupted education for children and adults, unhealthy household environment - Approaches to prevent undernutrition: Food insecurity interventions, social protection programs, access to health care, educational programs, safe and healthy household environments
5	Derek Headey (Jul 2020) USA	Impacts of COVID-19 on childhood malnutrition and nutrition-related mortality	Not applicable	COVID-19 pandemic outbreak	Childhood malnutrition and nutrition-related mortality	Decreases in gross national income (GNI) per capita due to severe mobility and food systems disruptions are associated with increases in child wasting and deaths in children younger than 5 years

No.	Author (Year) Country	Title	Population	Exposure	Outcome	Key Findings
6	Henrietta H Fore (Jul 2020) USA	Child malnutrition and COVID-19: the time to act is now	Not applicable	COVID-19 pandemic outbreak	Child malnutrition	- More children are becoming malnourished due to the deteriorating quality of their diets, interruptions in nutrition and other essential services - An estimated additional 6-7 million children with wasting during the first 12 months of the pandemic
7	Angello Pietrobelli (Sep 2020) Italy	Effects of COVID-19 Lockdown on Lifestyle Behaviors in Children with Obesity Living in Verona, Italy: A Longitudinal Study	Children and adolescents with obesity	COVID-19 pandemic outbreak	Lifestyle behaviours in children with obesity living in Verona, Italy	- No changes in reported vegetable intake - Increased fruit, potato chip, red meat, and sugary drinks intake - Decreased in time spent in sports activities - Increased in sleep time and screen time
8	Maximilian Andreas Storz (Nov 2020) Germany	The COVID-19 pandemic: an unprecedented tragedy in the battle against childhood obesity	Not applicable	COVID-19 pandemic outbreak	Childhood obesity epidemic	The COVID-19 pandemic will aggravate the epidemic of childhood obesity and lead to significant weight gain in school children by creating an unprecedented obesogenic environment.
9	Rafael Perez-Escamilla (Jun 2020) USA	COVID-19 and maternal and child food and nutrition insecurity: a complex syndemic	Not applicable	COVID-19 pandemic outbreak	Maternal and child food and nutrition insecurity	The COVID-19 pandemic has led to increases in unemployment, poverty and food and nutrition insecurity of vulnerable groups including young children, pregnant and lactating women
10	Maartje P. Poelman (Oct 2020) Netherlands	Eating behavior and food purchases during the COVID-19 lockdown: A cross-sectional study among adults in the Netherlands	Adults in Netherlands	COVID-19 pandemic outbreak	Eating behaviour and food purchases	Most participants did not change their eating behaviour or food purchases during lockdown. However, profound socio-demographic differences were observed for those that did report changes, especially for individuals with overweight and obesity.

No.	Author (Year) Country	Title	Population	Exposure	Outcome	Key Findings
11	J. Tester L. Rosas (2020) USA	Food Insecurity and Paediatric Obesity: A Double Whammy in the Era of COVID- 19	Not applicable	COVID-19	Food insecurity and pediatric obesity	Food insecurity and obesity coexist in low- income children and adolescents in the USA. The COVID-19 pandemic exerts disproportionate burden on low-income children and families, magnifying their vulnerability to both food insecurity and pediatric obesity
12	Joint Malnutrition Estimates, UNICEF/WHO / World Bank (2020)	COVID-19 and the Risks to the Nutritional outcomes of Children and Women in Eastern and Southern Africa	Children and women in Eastern and Southern Africa	COVID-19	Nutritional outcomes	At global level, scenarios developed by UNICEF indicate that the impact of COVID-19 on nutrition could lead to an increase in wasting by about 15% (7 million children) over the first 12 months of the pandemic, with higher increases in Africa (20- 25%) over the remainder of 2020 and into 2021.  Possible ways: -Reduced access to health and nutrition services -Increased food insecurity -Risk to child feeding practices
13	Carrasco-mar, Fernanda (2020)	COVID-19 Confinement and Changes of Adolescent's Dietary Trends in Italy, Spain, Chile, Colombia and Brazil	Adolescents in Italy, Spain, Chile, Colombia, and Brazil	COVID-19 confinement	Dietary trends	Modified consumption of fried food, sweet food, legumes, vegetables, and fruits.
14	Liubiana Arantes de Araujo (2020)	The Potential Impact of the COVID-19 Pandemic on Child Growth and Development	Not applicable	COVID-19	Child growth and development	Increase in parental stress, the suspension of class- room activities, social isolation measures, nutritional risks, children's exposure to toxic stress, especially in previously unstructured homes, and a lack of physical activities

No.	Author (Year) Country	Title	Population	Exposure	Outcome	Key Findings
15	Nogueira-de-Almeida (2020)	COVID-19 and obesity in childhood and adolescence: a clinical review	Children and adolescents	COVID-19	Obesity	<p>-Obesity has peculiarities that may impair immune response, because diet often has characteristics that can lead to “hidden hunger”</p> <p>-Living with stress during COVID-19 pandemic may have consequences for pediatric health, in particular for nutritional and emotional areas.</p>

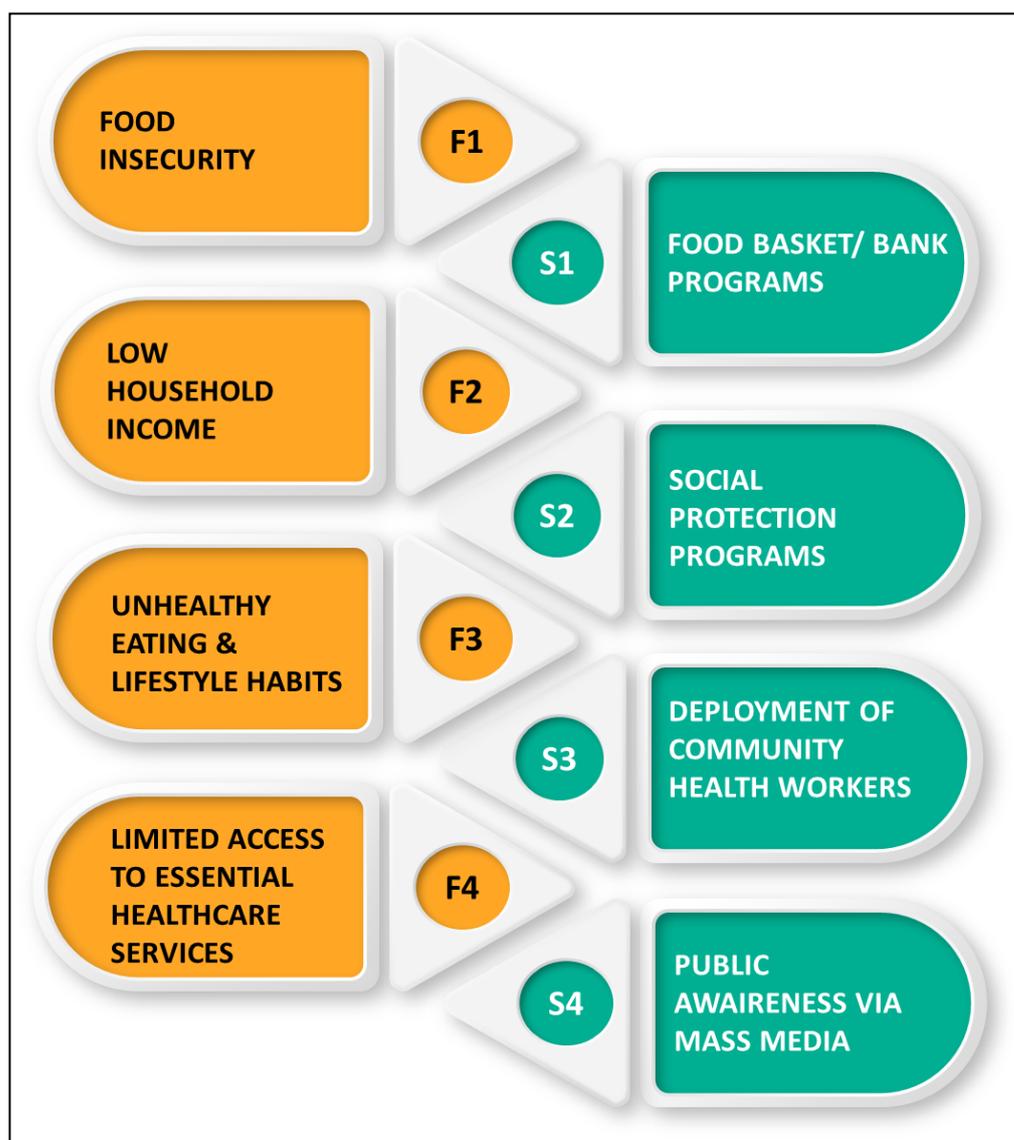


Figure 1: Factors (F1-F4) that influence children nutrition during COVID-19 pandemic and solutions (S1-S4) that are on-going to lessen the impact.

## 1. Impact of the COVID-19 pandemic on children and their nutritional status

Children's energy and nutrient needs differ depending on their age, gender, and level of activity (Duryea, 2020). The number of meals and snacks consumed throughout the day, as well as the energy content of the foods consumed, all influence energy consumption (Duryea, 2020). It is an obligation for parents to provide a well-balanced diet for their children by providing a variety of nutrient-dense foods to ensure their well-being and protect them against malnourishment.

### *Food insecurity*

Food insecurity refers to a situation where people having lack of access to nutritionally adequate and safe foods, as well as lack of ability to obtain foods in socially acceptable ways (Ahmad et al., 2020). Several recent studies highlighted how the pandemic has posed a serious threat to global food security, disrupting agricultural production, and placing household food security at risk (Food and Agriculture Organization, 2020; Kim et al., 2020). Before the emergence of COVID-19 pandemic, the prevalence of food insecurity had risen in several European countries, for instance in Italy, there was an increment of 10% from 2009 (7%) to 2012 (17%) (Dondi et al., 2020). Based on Malaysian Adult Nutrition Survey (MANS) in 2014, about 25% of adults in Malaysia had been recognized to be food insecure due to financial constraint. Children were also identified to be food insecure, whom about 23.7% of them were food insecure, relying on a small number of low-cost foods, and 20.8% of households claimed they could not feed their children a variety of foods due to financial constraints (Institute for Public Health et al., 2014). Unless immediate action is taken, the World Food Programme predicted that the COVID-19 pandemic could double the number of people facing food shortages. Food insecurity is expected to affect 30% of Malaysian population as a result of the COVID-19 pandemic, given the current food insecurity rate (UNICEF, 2020a).

Food supply chains, particularly in urban areas, were disrupted in the first week after the movement control order (MCO) was implemented due to traffic restraints and market operating hours (Chin, 2020). This situation has led to 'hoarding', in which those who can afford more food may hoard more than they require, posing a serious threat to vulnerable populations. It is critical to raise public awareness about the impact of 'panic-buying' as it can result in unnecessary severe market shortages and price spikes (Naja & Hamadeh, 2020). In rural areas, the direct impact of restaurant shutdowns and vendor restrictions were much greater than in urban areas, and people in LMICs also have been hit hard by indirect impacts such as unemployment and reduced earnings among labourers and industry workers (Akseer et al., 2020). Increase in food insecurity will be a major public health concern as household food insecurity can negatively affect mental health of caretakers leading to adverse effects on early childhood development outcome. In addition, it also exposes the children to the risk of chronic undernutrition and infectious diseases (Pérez-Escamilla et al., 2020).

Due to the MCO, many families had limited access to fresh and unprocessed food, such as meats, seafood, vegetables, fruits, and eggs, thus they turned to cheaper and easily accessible processed food instead. These highly processed foods, on the other hand, are high in saturated fat, sugar, and salt, and less nutritious (Storz, 2020). It was suggested that many homes would be stocked with ultra-processed food to ensure food security during the lockdown. According to a recent study conducted among adolescents in Italy, Columbia, Spain, Brazil and Chile, there was an increase in frequency of fried and sweet food and beverages intakes during home confinement (Ruiz-Roso et al., 2020). Similarly, an Italian survey conducted during home confinement showed the consumption of chips, red meat and sweet beverages increased significantly, which posed a risk to childhood obesity (Pietrobelli et al., 2020).

Furthermore, school closures because of the COVID-19 outbreak have caused cessation of programs that provided free or subsidised school lunches and healthy meals to children from low-income families, hence putting these children at risk of food insecurity (Zemrani et al., 2021). As stated by the World Food Programme (WFP) and UNICEF, 370 million children of whom living in low income countries and LMICs, are facing nutrition crisis because of loss of access to school meals, leading to reduction of their usual diets by 40% (Khorsandi, 2021). As an effort to overcome this crisis in Malaysia, the MyKasih Foundation, a private Malaysian charity organization, have taken the initiative to raise RM3 million to provide food aid to the poor, with about 2,500 poor families from different states receiving assistance since the MCO (Malaysiakini, 2020).

### *Scarcity of financial resources*

The COVID-19 pandemic has also impacted on global labour markets, leading to increased unemployment across the board, including in LMICs (International Labour Organization, 2021) and causing many people to be dragged into poverty (Zemrani et al., 2021). In 2020, global unemployment rose significantly by 33 million people to 220 million, with the unemployment rate rising from 1.1% to 6.5% (International Labour Organization, 2021). Based on Department of Statistics Malaysia report, the unemployment rate in Malaysia was 4.8% in the first three months of 2021, with an increasing trend of 11.2 thousand people, bringing the total number of unemployed people to 771.8 thousand, as compared to a total of 760.7 thousand in fourth quarter 2020 (Department of Statistics Malaysia, 2021). In Nepal, as a result of reduced workforce, agricultural production and distribution were disrupted due to shortage of seeds and fertilizers, hence further exacerbating malnutrition and increasing poverty in the population (Panthi et al., 2020). According to Oxfam, around 50 million people may be pushed into poverty (Oxfam, 2020), while another 49 million people may face extreme poverty which was predicted by the World Bank (Mahler et al., 2020).

Families experiencing falling income and financial struggles will tend to modify their spending on food by choosing cheaper and non-perishable food rather than fresh and unprocessed food in order to spare some money to pay for other necessities (Storz, 2020). Due to their limited financial resources, they will be forced to feed their children with less nutritious foods, which are often cheaper (Storz, 2020). These types of foods also usually contain with high density-energy. As a consequence, their diet quality may be

jeopardized, exposing these vulnerable children to the risk of various forms of malnutrition, such as obesity, undernutrition, and hidden hunger caused by micronutrient deficiencies (Zemrani et al., 2021).

### ***Lifestyle and dietary habit changes***

It was thought that school environments could help children to develop more structure in their lives by following daily routines around mealtimes, exercise, and bedtimes, the three main lifestyle factors linked to obesity risk (Pietrobelli et al., 2020). It has also been mentioned that having a healthy eating behaviour was attributed to spending more time outside (Dondi et al., 2020). Therefore, with current school closures as well as prohibition on going to parks and recreational areas for outdoor activities during the COVID-19 pandemic, there have been concerns that more children will gain excess weight while staying at home (Pietrobelli et al., 2020).

Naja et al. anticipated that home quarantine encouraged sedentary lifestyle characterized by low energy expenditure, which could negatively influence one's eating habits, physical activity patterns and sleep cycles (Naja & Hamadeh, 2020). According to an Italian survey carried out on obese children, Pietrobelli et al. found that there was an increasing trend of junk food consumption, sleep duration and screen time, but decrease in time spent on exercise during three weeks of lockdown (Pietrobelli et al., 2020), making it difficult to maintain good health.

Furthermore, as governments had taken the initiative to implement online classes as an alternative to prevent children from missing out, children were exposed to prolonged screen time and sleep deprivation, resulting in weight gain and loss of cardio-respiratory fitness (Storz, 2020). Previous study has proved that, when compared to children who had less than two hours of screen time per day, the children who had more than two hours of screen time per day had a higher risk of being overweight or obese (Fang et al., 2019). Also, it was suggested that frequent snacking associated with prolonged screen exposure could possibly lead to obesity in children (Storz, 2020).

Moreover, mental health issues can also hinder healthy dietary habits whereby the decision on what and how much a person eats depend on his/her psychological state (Dondi et al., 2020). In the context of COVID-19 pandemic, children who are isolated may be at risk of developing mental health issues as a result of their parents' separation. Sadness, anxiety, fear of death, fear of losing their parents, and fear of being isolated in the hospital may develop in the children, which can have a negative impact on their psychological development (Singh et al., 2020). According to a study conducted in China with 2,230 elementary students who were quarantined for 3 to 4 months, 22.6% of them had depressive symptoms, 18.9% had anxiety symptoms, and 37.3% were concerned about contracting the virus (Ramadhan et al., 2020). Delgado Floody et al. previously discovered that there was a correlation between feelings of sadness or loneliness and childhood obesity (Floody & Jerez-mayorga, 2020).

For the children living in low-cost flats, it was reported that home confinement with all family members in a cramped living condition for two months had put them under significant pressure (UNICEF, 2020c). Dealing with such stressful event in a long period can promote stress-related eating, contributing to obesity and other health issues (Storz, 2020). However, after the schools reopened during the recovery movement control order (RMCO) phase, there were also children who had lost weight, as reported by UNICEF (UNICEF, 2020c). This was in line with one study which stated that anxiety and sadness caused someone to have poor appetite and lack of motivation to eat (Naja & Hamadeh, 2020).

### ***Limited access to healthcare services***

Access to healthcare and nutrition services specifically for children has deteriorated dramatically as a result of overwhelmed health systems in response to increasing daily COVID-19 cases (Akseer et al., 2020). Other factors could be due to sudden fear of seeking medical care, lack of access to transportation, and limited healthcare service provision due to priority shift of health services towards the pandemic (Pérez-Escamilla et al., 2020).

In the early months of the COVID-19 pandemic, a 30% drop in the coverage of nutrition interventions in LMICs was reported by UNICEF, with appalling declines 75 to 100% in lockdown situation (UNICEF, 2020b). Consequently, children's health and the risk of malnutrition may worsen substantially, notably if current situations persist for an extended period of time (Akseer et al., 2020).

In Nepal, the provision of nutrition services to children like supplementation of vitamin A, deworming tablets and multiple micronutrient powder (MNP), and nutrition counselling have all been impacted (Panthi et al., 2020). Similarly, as has been indicated by UNICEF, interruption of nutrition services for children (i.e. school feeding, nutrition assessment of target child, nutrition education, etc.) in Malaysia are expected to lead to an increase of acute malnutrition and child mortality (UNICEF, 2020a).

## **2. Strategic solutions to prevent exacerbating childhood malnutrition amidst COVID-19 pandemic**

The COVID-19 pandemic is expected to aggravate all forms of malnutrition in children; thus a combination of different interventions is necessary to ensure proper nutrition among children are met. Governments, donors, and private sectors across the world must all take part in an effort to prevent exacerbating childhood malnutrition. Failure of these authorities to respond immediately will have long-term implications for children, as well as economic system.

### **Food Basket Program**

First, a food basket program which provides nutritious and safe supplementary food to eligible children can be done to meet population health's need and help in improving household security of those most affected by the crisis (Naja & Hamadeh, 2020). Recently, the Malaysian government channelled the Food Basket Program, worth RM80 million to the affected groups, and a total of 438,376 food baskets had been successfully distributed as of July 7, 2021 (Bernama, 2021). Besides, similar program in Ethiopia called the Productive Safety Net Program was carried out to provide emergency food aid to food-insecure households and regarded as important in reducing stunting among children in that country (Akseer et al., 2020).

### **Social Protection Programs**

Second, social protection programs are essential to avoid financial collapse among people who are affected by poverty, by securing their access to nutritious and affordable food and healthcare services, and such schemes should include households with children, pregnant and breastfeeding women (Henrietta et al., 2020). As an example, in Peru, a conditional cash transfer program called Juntos gave families a fixed monthly cash transfer to help them fulfil their children's basic educational, health, and nutrition needs (Akseer et al., 2020). Similarly in Malaysia, the government introduced the Bantuan Prihatin Nasional, a one-off cash transfer program as financial assistance mainly for low and middle-income families, single parents, and people with disabilities (UNICEF, 2020c). In Malaysia, moratorium up to 6 months were also offered by bankers to ease financial constraint caused by the COVID-19 pandemic.

### **Public Awareness**

Third, governments must be able to utilize various platforms available such as television and radio interviews, news bulletins and social media to increase public awareness on the importance of adequate nutritious food intake (Naja & Hamadeh, 2020). Equally important is ensuring psychological support and counselling provided to parents or caretakers to promote better health and nutrition in children (Panthi et al., 2020). As has been done in Malaysia, the Talian Kasih hotline was established as part of the government's effort to provide psychological support to those who have been affected by the MCO, which has been extended to prevent the spread of the COVID-19 outbreak (Karim, 2020).

### **Community Outreach**

Lastly, mobilization of community health workers for instance, should be encouraged mainly in remote areas, where they need to play an important role in continuously promoting health and nutrition education (Akseer et al., 2020). It was proven by some exemplar countries (e.g. Nepal, Ethiopia) that this mechanism had impacted on stunting reduction through an efficient community health extension program (Akseer et al., 2020).

## **CONCLUSION**

In conclusion, the COVID-19 pandemic has posed high risk of malnutrition among children through its direct or indirect impacts. Although it is still unknown to what extent the COVID-19 pandemic has influenced the children's nutritional status around the world and this is part of the limitation of this review when it was conducted, but it is crucial to ensure continuity of healthcare and nutrition services for children to avoid potential intergenerational consequences. This review has highlighted examples of several initiatives taken to aid in reducing the impact on children's nutrition. Concentrating solely on COVID-19 could result in other health implications, jeopardizing not only health system capacity, but also socioeconomic potential of a country. Therefore, this alarming crisis must be addressed immediately in pandemic planning and prompt multisectoral actions should be taken to avoid life-long impact of the COVID-19 pandemic on childhood malnutrition.

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