Indian J. Applied & Pure Bio. Vol. 37(1), 21-28 (2022). **ISSN: 0970-2091**
A web of Science Journal

Influence of Covid-19 in prevalence of malnutrition and mortality among children: An Appraisal

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Abstract

The unprecedented outburst of corona virus globally resulted in social and economic crisis which instigated threat on the status of children in low-income and middle-income countries (LMICs). The global crisis due to sudden lockdown shattered the Indian economy which raised peril among young children due to reduction in income among low- and middle-class families. Changes in the affordability of nutritious food due to decline in income pose menace indirectly among younger generation. Then COV-19 upsurge has depreciated key factors of health and caused chief commotion around the world. The children in the families are affected indirectly due to the restricted import-export activities, loss of pay supportresulted in poor supply of diet, reduced psychological health, social distance as well away from school and health care. The current review paper mainly focuses on the malnutrition among children especially due to the upsurge of corona in the global context. Nonetheless, the paper highlights and provides broad insights to researchers among the potential impacts of COVID-19 on nutritional status of children and to find out the life-long consequences and measures need to be taken inorder to provide optimal nutrition for further development in health among children.

In the end of December 2019 and the beginning of 2020, the whole universe has witnessed the emerge of novel COVID-19 infections called SARS-CoV2, which has turned the globe upside down and interrupted human health state. Among the population, young children were considered to be more under serious risks posed by the novel COVID-19 crisis. These collateral damages include inadequate nutrition due to economic crisis which in turn resulted with a risk of both overweight as well as underweight, lack of

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schooling, psychological health impact, social distancing, increase of child abuse and demur in vaccination rates[21]. The COVID-19 pandemic has shifted dietary and lifestyle habits of many families.

Nevertheless, children who are younger than 5 years in low, middle income countries are attributable to severe wasting because wasted children are at increased threat of deaths due to infectious maladies[2]. In accordance to the World Food Programme [2020], whenever pandemic, endemic outbreak occurs there has to be expected services to increase nutritional health among children. However, in LMICs due to rapid upsurge of COVID-19 transmittance among populace, there arose an acute food insecurity by the end of 2020 decade[15,23]. The emerge of COVID-19 pandemic has restructured lifestyle and dietary habits in several families. However, restriction among states, regions and countries has caused economic chaos &distress in livelihood actions for many millions of people globally, particularly those working in the informal economy.

Although, High-income countriescomprising the richest/wealthiest, have observed scandalouspanorama of thousands of desperate persons waiting for long duration, every week, to obtain free food packets. However, closure of Schools interrupted several service programs offered by government agencies which allows children from poor families to accept free or government supported agencies in provision of school lunches along with healthy snacks to millions of children which led to food insecurity and malnutrition[7,10].

Nonetheless, present situation is unprecedented as well as indefinite to what extent this pandemic will influence the nutritional status of children all-round the globe and also how far the quality and quantity of diet is reconciled?The up-surging threat may lead to many forms of malnutrition such as obesity, under-nutrition along with hidden hunger due to micronutrient deficiencies, particularly amongst susceptible groups[20]. In addition, several latest literature reports were examined on the effect of COVID-19 restriction/quarantine and how it affected on supply chain of food and also the negative impact on production, distribution of food particularly in pandemic state[6,9,13,15,25]. (Shown in Figure-1). Therefore, ourreview particularly aims atthrowing light on the malnutrition and mortality and discuss about preventive measures for management of such maladies from data available relevant to the topic.

Impact of COVID-19 Mortality in children:

The first stage of this deadly disease Coronavirus or SARSCoV-2, was less severe to affect children in comparison to adults[26]. However, less than 10% of children have depicted severity due to nCoV infection. The common symptoms among the young children are pulmonary pathology or immuno-compromising state. Nevertheless, transmission from mother to foetus is considered rare, but if the rigorousness of COVID-19 ailment is high during pregnancy period which might lead to premature birth or intrauterine asphyxia. During COVID-19 ailment, children experience insecurity of food. The potential effect of Corona virus on grandparents, parents particularly disturbed the family security.

However, this pandemic situation disrupted the lifestyle of people in the age group of 25-40, who suffer being jobless due to the tremendous economic crisis[24].

Nutritional Impact of COVID-19 infection:

The potential effect of COVID-19 malady has influenced the world's food security. Sustaining the food insecurity is through provision of balanced amount of food to children. In accordance to the United States, Department of Agriculture, there are 4 types of food security (Table-1). Hence, evidences from the literature studies/surveys brought distinct comprehension on the impact of Corona virus on nutritional behaviour and food security globally.

Correspondingly, there is no confirmation that transmission of COVID-19 happened through foods[18]. While, several literature reports have distinctively emphasized that the COVID-19 virus was supposed to be communicated to humans from bats.However, Centre for Disease Control and Prevention (CDC) has acknowledged that the menace of COVID-19 spread from animals to humans is deliberately low[5]. Due to drastic spread of virus globally, sudden lockdown measures have been followed to mitigate the transmission of virus among human population. Food insecurity during pandemic caused malnutrition in children and changed their food consumption pattern[8].

Risk of increased pediatric obesity in middle- and high-income countries :

The influence of the COVID-19 pandemic onchildren has yet to be completely evaluated from the primary availabledata. Moreover, guesstimate from intercontinental organizations confersus certain clues as to how this crisis could impact the nutritionand lifestyle of children. Above all, there are apprehensions on augmentedthreatof pediatric obesityparticularly in middle-and high-income countries along with transferal towards an "obesity pandemic". However,under nutrition isaccepted to intensify in poor income countries intimidating worldwide progress to end preventable child deaths in serious hassle[11]. Actually, in poor-income countrieswhere underweight or overweight coexist, under nutritiondeliberatelyrose further amongseven millionchildren in 2020 particularly in regions already pretentious by humanitarian crisis. In addition to thatfurtherapproximatelyforty-seven million childrenbelow 5 are previously suffering from

Table-1. United States, Department of Agriculturedepicts types of food security

High Food security : Means no problems reported on access of food items or limitations
Marginal Food Security: Few reports have specified stress over food insufficiency or in turn scarcity of food in home. No or little change in food intake or diet
Low Food security: Reduced intake of food, reduced quality of food
Very Low Food security: Disturbances in eating patterns

Table-2. COVID-19 Pandemic crisis attributes affecting Gross National Income (GNI) and Nutritional Intervention Coverage in LMIC#

Year	2020			2021			2022		
Pandemic crisis	Negative Impact/Pessi-mistic state	Modest/ Sensible State	Positive/ Optimistic State	Negative Impact/Pessi-mistic state	Modest/ Sensible State	Positive/ Optimistic State	Negative Impact/Pessi-mistic state	Modest/ Sensible State	Positive/ Optimistic State
Alteration in Gross National Income per capita (mean)	↓ 6.1%	↓ 6.1%	↓ 6.1%	↓ 5.4%	↓ 3.4%	↓ 0.47%	↓ 2.9%	↓ 0.73%	↓ 0.45%
Nutritional Intervention	Coverage based on each country-specific baseline								
Breast feeding Campaign	↓ 42.3%	↓ 22.8%	↓ 14.3%	↓ 21.2%	↓ 11.4%	↓ 7.2%	↓ 10.6%	↓ 0%	↑ 5.0%
Manifold Micro-nutrients during Pregnancy	-	-	-	-	-	-	-	-	↑ 5.0% ##
Supplementation Vitamin A	↓ 42.3%	↓ 22.8%	↓ 14.3%	↓ 21.2%	↓ 11.4%	↓ 7.2%	↓ 10.6%	0%	↑ 5.0%
Balancedprotein-energysupplemen-tationin pregnancy	-	-	-	-	-	-	-	-	↑ 10%
Treatment ofmod-erate acutemalnu-trition ###									↑ 10%
Treatment of severe acutemalnutrition	↓ 50%	↓ 25%	↓ 15%	↓ 25%	↓ 12.5%	↓ 7.5%	↓ 12.5%	↓ 0%	↑ 5.0%

Significant Notes

Explanation for the magnitude of the reduction is provided in the used approaches

In 2022 small scenario IFA is replaced by Multiple Micronutrient Supplementation and coverage increased relative to IFA baseline.

↓ % decrease

↑ % Increase

wasting, and nearlyone hundred and forty-five million children have shown stunting especially in Asia and Africa. Greater than ten thousand child mortality permonth is expected during this pandemic situation. Nonetheless, social along with incomeinequalities are regarded as chief menace factors for poor outcomes in poor as well as rich countries, these are significant facts that havebeen shockingly highlighted by the present health crisis.

Potential Impact of COVID-19 on Child Nutrition and Pregnant Women :

The COVID-19 disruption indirectly has shown its impact on pregnant women and children leading to malnutrition along with increase in mortality rates. Table-2 shows the attributes on three hypotheses 1) Negative/ Pessimistic, 2) Modest/Moderate, 3) Positive/ Optimistic and also calculated the alterations in gross national income (GNI) per capita and poverty among population affected due to COVID-19 in 3 consecutive years *i.e.* 2020, 2021 and 2022 in 118 LMICs, using three diverse economic recovery scenarios. The GNI per capita is considered based on country-specific changes in the prevalence of diverse stages of child wasting and pregnant women BMI status. We have calculated the poverty as well as wasting based on three assumptions/ hypothesis impacts which led to disturbances in health and nutritive services using LiST (Lives Saved Tools), which support in finding the changes occurred such as stunting, mortality and maternal anemia. Above all we have employed Optima-Nutrition model to investigate thepotentialapproaches to reduce the anticipated rise in malnutrition and deaths in children. The techniques and inputs for each of this following process are described in detail below. In the first step process, we have employed MIRAGRODEP, it is unique worldwide computable general equilibrium model associated with country-specific household survey data, which supports to foresee the impact of COVID-19 disruptions on GNI per capita, household incomes along with poverty rates[12,14], between 2020-2022.

Nutritional Approaches for Coronavirus Regimen :

The functional foods,nutraceuticals/ designer foods are the intense food products to boost immunity during COVID-19 pandemic which helps to decrease the morbidity or mortality particularly when currently no vaccines are in existence for treatment. Herbal plantshave displayed several pharmacological actions in recovering from several infectious diseases. Plant based products possess bioactive compounds which have shown positive impact in improving the health of individuals and thereby suppressing the Corona virus symptoms[1,3,4,19,27]. The paperscrutinized carefully on several literature reports and found that nutritional intervention as best approach in mitigation of any deficiencies rising due to pandemic. Several bioactive agents such as lycorine, curcumin, artemisinin, traditional Chinese medicines, flavonoids, terpenes, resveratrol, micro and macro-nutrients, ketogenic diets have revealed to improve the health of individualsaffected with COVID-19.(Shown in figure-2), In addition to that fresh fruits, vegetables, garlic, and other designer foods too depicted improved efficacy.

Figure-1: The Coronavirus pushes children into malnutrition

Figure-2: Nutritional Intervention for management of COVID-19

The current upsurge in COVID-19 anticipated to augment the threat for various forms of malnutrition. Nevertheless, duration of the chaos is indefinite and revealed its complete effect on food, health, and social economy of the country. Several social service programs have been conducted by the government to help the population but due to sudden upsurge of cases, lockdown implementation disturbed health services which in turn affected indirectly on children's health and increased the mortality rates. The sudden shutdown of schools, colleges, and businesses has shattered our Indian economy and deepened food system crises such as malnutrition, involving child stunting, micronutrient malnutrition, and pregnant women nutrition. However, without proper nutrition, thelifelong consequences result in stunted growth and development.Although, various specific programs have been instigated in many countries to augment availability of food and safety, thealterations in food availability depends upon the affluence/economy of the country. Thus, the paper highlights the nutritional intervention approaches to decrease the mortality and morbidity across the globe.

Associate Prof. N. Rajani and Dr. K.R. Padma solely drafted the paper. All the authors are thankful to the Department of Home Science, Biotechnology, Communication & Journalism Sri Padmavati Mahila Visva Vidyalayam (Women's) University, Tiruapti-India.

Competing interests :

The authors declare that they have no competing interests.

Consent for publication

Not applicable.

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