RESEARCH ARTICLE

Impact of COVID-19 in the participation of Filipino children 0-12 years old to nutrition-specific programs and their mothers' knowledge based on a Rapid Nutrition Assessment Survey

Imelda Angeles-Agdeppa, Eva A. Goyena*, Maria Stephanie N. Parani, Ma. Lynell V. Maniego

*Corresponding author's email address: evabille2@gmail.com

Food and Nutrition Research Institute, Department of Science and Technology, Taguig, Philippines

ABSTRACT

Background: As the SARS-CoV-2 virus (COVID-19) continues to affect the capacity of the health system to deliver essential nutrition and health services, many countries, especially the low- and middle-income countries, including the Philippines, are beset with addressing undernutrition and micronutrient deficiencies among children.

Objective: The rapid nutrition assessment survey (RNAS) was conducted in selected areas in the Philippines to provide evidence of the effect of the COVID-19 pandemic on children's participation in the nutrition services and their mothers' knowledge level on nutrition.

Methodology: The RNAS was a cross-sectional survey conducted through phone interviews in nine (9) selected areas in the Philippines. A total of 7,092 children aged 0 to 12 years were included in the survey, of which 5,239 mothers and caregivers were interviewed regarding nutrition program participation of their children, and their knowledge on nutrition.

Results: A significant decline in children's participation in the Operation Timbang (OPT) Plus (83.0% vs. 51.1%), Vitamin A supplementation (65.4% vs. 54.9%), supplementary feeding (21.6% vs. 11.9%), and deworming (60.4% vs. 11.9%) was recorded during the COVID-19 pandemic based on RNAS as compared to the pre-pandemic period using the 2019 Expanded National Nutrition Survey (ENNS). The most commonly cited reasons for health service disruptions include: child did not visit health centers due to fear of infection, community health workers did not visit the child at home, and no available health workers in the facility. Stunting among children was more likely to be perceived by food insecure (19.7% vs 14.4%; p <0.001) and poor (22.1% vs 16.6%; p<0.000) mothers or caregivers than their counterpart mothers from food secure and rich households.

Conclusion: With prolonged limited access to health and nutrition services, children, particularly those from poor households, are at risk of hunger, malnutrition, and consequently, of not developing their full potential. Findings can guide efforts to ensure the continuity of essential health and nutrition services towards improving maternal knowledge and promotion of child health and nutrition during the COVID-19 outbreak and crisis recovery period.

Keywords: *disruption of nutrition services during COVID-19 pandemic, delivery of nutrition services, supplementary feeding, Vitamin A supplements, COVID-19 pandemic, community health workers, Philippines*

Introduction

As the SARS-CoV-2 virus (COVID-19) continues to affect the capacity of the health system to deliver essential nutrition and health services and increase economic uncertainty, many countries especially the low- and middle-income countries are beset with addressing undernutrition and micronutrient deficiencies among children. The continuance of social distancing and community lockdowns, with no clear end date in many places, is expected to worsen all forms of

malnutrition [1]. A recent projection study using a reduced maternal and child health intervention and a 10% to 50% increase in wasting prevalence showed that the scenario would result in 253,500 to 1,157,000 additional child deaths and about 12,200 to 56,700 additional maternal deaths globally [2]. In 2018, global estimates indicated that 149 million (21.9%) of children under five were stunted, 49.5 million (7.3%) wasted or had low weight-for-height, and nearly 17 million were severely wasted [3].

In the Philippines, child malnutrition continues to be a major public health concern. Prior to the COVID-19 pandemic, the country ranked fifth among the countries in East Asia and the Pacific region and was one of the 10 countries with the highest number of stunted children in the world [4]. Recent estimates based on the 2019 ENNS showed that almost one-third (28.8%) of children under five were stunted [5]. Further, the prevalence of underweight and wasting among children under five reached 19.0% and 6.0%, respectively [5]. Progress in reducing the country's stunting and wasting prevalence among children under five has remained slow, with only a 1% decrease rate between 2015 and 2018-2019 from 33.4% to 29.6%, respectively, lower than the 2.5% target rate to meet the Sustainable Development Goal targets by 2030 [6]. To address malnutrition problems including micronutrient deficiency and its underlying causes, the Philippine Plan of Action for Nutrition (PPAN) underscores eight (8) nutrition-specific, 10 nutrition-sensitive programs, and three (3) enabling programs which serve as frameworks of action for 2017-2022 [7]. Pre-pandemic estimates showed that of the 76% of children 6-59 months old who received Vitamin A supplementation, 28% were given iron tablets, while 43% had been given deworming medicine [8]. Based on the impact evaluation study, there was an increasing coverage of the Department of Education's (DepEd) school-based feeding program. In SY 2014-2015, for instance, the DepEd targeted all the 672,262 severely wasted children enrolled in kindergarten to Grade 6, or about 3.8% of approximately 14.9 million enrolled children in public school [9].

Aside from the national government agencies, local government units (LGUs) play important roles in delivering nutrition services in the communities. In 2018 and 2019, results of the ENNS showed that 70.6% of children 0-71 months old were covered in the OPT Plus, while 12.4% children 6-59 months old received dietary supplementation program from any sources [6]. These figures may reflect a less desirable coverage of these nutrition programs at the national level even before the COVID-19 pandemic period.

On 17 March 2020, the Philippine government imposed enhanced community quarantines and lockdowns across the entire Luzon islands including the National Capital Region (NCR) [10], that expanded to other areas [11]. Enhanced community quarantines and lockdowns require physical distancing of at least two meters [12], limited social gatherings and interactions [13], and temporary cessation of classes replaced by home-schooling and online learning activities [14]. With mobility restrictions, reduced participation of children in nutrition and health programs is anticipated. An earlier study in the NCR showed a relatively small share of children under five who visited a health facility since the start of the crisis; of those sick children, 62% visited a health center, while parents and guardians appeared to be taking young children to health facilities for serious medical needs only [15].

In an effort to ensure continued access to essential health services, the Department of Health (DOH) in April 2020 issued a memorandum providing guidance to local government units on how to manage COVID-19 patients including the provision of maternal and child health care, organization of healthcare networks, and provision of telemedicine facilities [16]. The Interagency Task Force Technical Working Group (IATF-TWG) created in May 2020 a comprehensive plan dubbed as “We Recover as One” to mitigate the impact of the COVID-19 crisis and allow the economy to transition to the new normal, with a set of priorities vis-à-vis the COVID-19 situation, and which are aligned with the Philippines Development Plan 2017-2022 [17]. However, the DOH primary health care system including other key government sectors may have reduced their efficiency in delivering health and nutrition services within and outside the health system due to the COVID-19 pandemic.

Amidst the COVID-19 pandemic, the Food and Nutrition Research Institute of the Department of Science and Technology (FNRI-DOST) conducted the RNAS in selected areas in the Philippines to assess the food, health, and nutrition situation at the household and individual levels. Specifically, the RNAS was undertaken to determine the level of participation of children 0-12 years old in the different long-running nutrition programs of the various national implementing agencies along with the local government units in the areas with COVID-19 low, medium, and high-risk classifications. In addition, it aimed to determine the knowledge and perception of mothers on their childrens' nutritional status during the pandemic. The results of this study could be used as a basis in crafting and/or modifying effective strategies to minimize the risk of undernutrition and micronutrient deficiencies among children in the wake of the pandemic, and even post-pandemic period.

Methodology

Ethical Considerations

The remote consent of household respondents and individual subjects to participate in the RNAS (through the mother or guardian of children ≤ 7 years old) was obtained by recording the conversation during the process of getting verbal consent. For children 7-12 years old, verbal assent was obtained from the children before proceeding with the interview of their mothers/caregivers. Written in the informed consent form were the background and objectives of the survey, the data collection procedures, expected interview duration, possible risks and benefits of participation, confidentiality of information, and option to withdraw without penalty or consequences from the respondent by the interviewer. All remote consents were filed accordingly in the assigned laptop of each interviewer. All ICFs were collected and filed in a password-protected file.

The RNAS study protocol was approved by the DOST-FNRI Technical Committee (TECCOM) on September 15, 2020. It was ethically approved by the FNRI Institutional Ethics Review Committee (FIERC# 2020-013; October 29, 2020), while the clearance for the survey design as well as the questionnaires was provided by the Philippines Statistics Authority (PSA) on September 30, 2020.

Study Design, Survey Areas, and Participants

This study was a cross-sectional survey conducted through phone interviews of households from nine (9) selected areas in the Philippines from November 3 to December 3, 2020. The survey employed a multi-stage sampling technique. First, the areas were selected based on the list of 39 provinces and highly urbanized cities (HUCs) covered in the 2019 Expanded National Nutrition Survey (ENNS). Second, the ENNS 2019 areas were categorized into low, medium, and high risk of COVID-19 infection. The details of the ENNS 2018-2019 sampling procedure and methodology were described elsewhere [18]. One province or HUC was selected from each island group (Luzon, Visayas, and Mindanao), with a total of three provinces/HUCs per island group to represent high, medium, and low-risk areas on the basis of average daily attack rate (ADAR)>7, ADAR 1-7, and ADAR <1, respectively, according to the IATF COVID-19 categories [19]. However, two areas in the NCR were included for the reason that there were no provinces under the high-risk category in Mindanao. A total of four (4) provinces, four (4) highly urbanized cities, and a special area (Pateros) were covered in the survey. Third, all households in these areas with contact numbers were included in the survey.

Of the 5,943 households with recorded contact numbers, 5,717 (96.2%) were covered due to non-functional mobile numbers. Of these households, a total of 7,092 children 0-12 years old were included in the survey, of which 5,239 mothers and caregivers were interviewed to collect information regarding maternal knowledge and perception of their children's health and nutritional status including participation in micronutrient supplementation, supplementary feeding, OPT Plus, and deworming between the period of March 17 and December 3, 2020. Disaggregating the study participants by age, 792 (11.2%) were under two years old (0-23 mos old), 1,995 (28.1%) were preschool-aged children (2–5.9 years old), and 4,305 (60.7%) were school-aged children.

Prior to the conduct of the survey, coordination letters were sent and Zoom meetings were conducted among the various stakeholders in the study areas. The meetings were conducted in two phases: (1) with the provincial DOST directors and provincial nutrition coordinators, and (2) with the local government executives and the municipal nutrition officers. Coordination activities on the ground were done by the municipal nutrition action officers with the village volunteer health and nutrition workers.

Data Collection

A phone interview using the existing ENNS electronic Data Collection System (eDCS) developed by DOST-FNRI was conducted by trained interviewers to collect information regarding the participation of children 0-12 years old on the various age-specific nutrition programs during the COVID-19 pandemic. Questionnaires with English and Tagalog versions were pre-tested to ensure clarity and understandability, and were programmed into the eDCS for easier data collection. The questionnaires were patterned from the ENNS 2019 and divided into three forms. Form 1 contained the household membership including age, sex, civil status, education, physiological status, and occupation of members. Form 2 contained questions regarding household food security using the Food Insecurity Experience Scale (FIES) with a recall period of "since the start of the community quarantine in March" (or 8 months from the time of declaration of a strict community quarantine to the actual conduct of the phone survey). Form 3 was used in the survey to capture chronic food insecurity, including the household coping strategies during the pandemic. Form 4 as the core questionnaire included questions related to the participation of children 1-12 years old in the following programs: (1) OPT Plus is the annual weighing and height measurement of all children under-six years old in a community by the health workers to identify and locate the malnourished children [20], (2) Supplementary Feeding

Program (SFP) is the provision of food in addition to the regular meals to target children 3-4 years old and 2-4 years old children under the Department of Social Welfare and Development's Early Childhood Care and Development program, while children 5-12 years old who are malnourished are under the School-based Feeding Program [21,22]; (3) Vitamin A capsule and micronutrient powder under the micronutrient supplementation program of the DOH are targeted among children 6-71 months old, and 6-23 mos old, and can be extended among children under five years old during emergency response [23]; and (4) Deworming program among children 1-12 years old to reduce the burden of soil-transmitted helminth infections [24]. Pre-coded reasons for non-availment of the specific nutrition programs were also obtained from the mothers/caregivers. To capture the critical knowledge and perception of mothers/caregivers towards their children's nutrition and health during the current pandemic, a semi-structured questionnaire was included in Form 4. Mothers were asked about their knowledge and perception of their child's health and nutritional status. The questions with pre-coded responses are as follows: (1) Did you observe any changes in your child's weight in the past months since the start of the COVID-19 pandemic? (1=yes, lost weight; 2=yes, gained weight; 3=no, weight did not change; 4=do not know; 5=others); (2) Do you think your child (name of the child) is healthy? (1=yes; 2=No); (3) Do you think your child (name of the child) is strong? (1=yes; 2=No); 4) Do you think your child (name of the child) is stunted? (1=yes; 2=No). Whether the response was yes or no in questions 2 to 4, probing was done to explore the attributed characteristics of the child's perceived status. Knowledge of mothers/caregivers on stunting and the physical characteristics associated with stunting (e.g. child not tall, inherited from parents, child is malnourished, among others) were also asked among the respondents.

Data Analysis

Survey results such as descriptive statistics (means, proportions, standard deviation) were computed using the STATA 15 [25]. To determine the impact of the COVID-19 pandemic on the level of participation of children 0-12 years old on the age-specific nutrition programs, the data of the 2019 ENNS were matched with the RNAS provinces and HUCs. The 2019 ENNS data on OPT Plus, SFP, Vitamin A supplementation, and deworming, respectively, included 3,467 children aged 0-71 mos old, 5,974 children 6 mos-12 years old, 3,141 children 6-59 mos old, and 8,180 children 1-12 years old. On the other hand, 2,787 children were asked on OPT Plus, 6,878 on SFP, 2,577 on Vitamin A supplementation, and 6,700 on deworming in RNAS. T-test was used to determine whether the differences between the percentage of participation in the different nutrition interventions from the RNAS (during COVID-19 pandemic) and that of the estimates from the ENNS 2019 (before pandemic) were statistically significant. Estimates of the survey in low, medium, and high-risk areas were also compared using the ANOVA test. Test of association between maternal perception and socio-economic status was also done using Chi-square test. A 5% significance level was assumed for all the tests performed.

Results

General Characteristics of Study Participants

The descriptive statistics of the study participants across areas are presented in Table 1. A total of 7,092 children aged 0-12 years old were covered in the survey, of whom 1,677, 3,118, and 2,297 were covered in the high, medium, and low-risk areas, respectively (Table 1). The mean age of the children was 7.1±3.6 years old, with a similar mean age across high, medium, and low-risk areas. Meanwhile, a total of 5,239 mothers or caregivers completed the interview, of which 1,180 were from high, 2,386 from medium, and 1,673 from low-risk areas. The mean age of the respondents was 38.1±11.6 years old. Mother respondents were primarily married (62.1%), have at least a high school education (57.5%), not working (59.5%), and from urban areas (60.8%). However, in medium-risk areas, the majority of the respondents were from rural areas. Households have predominantly 5 or more members, a little above one-fourth (25.6%) were food secure, while 43.1% were moderately food insecure.

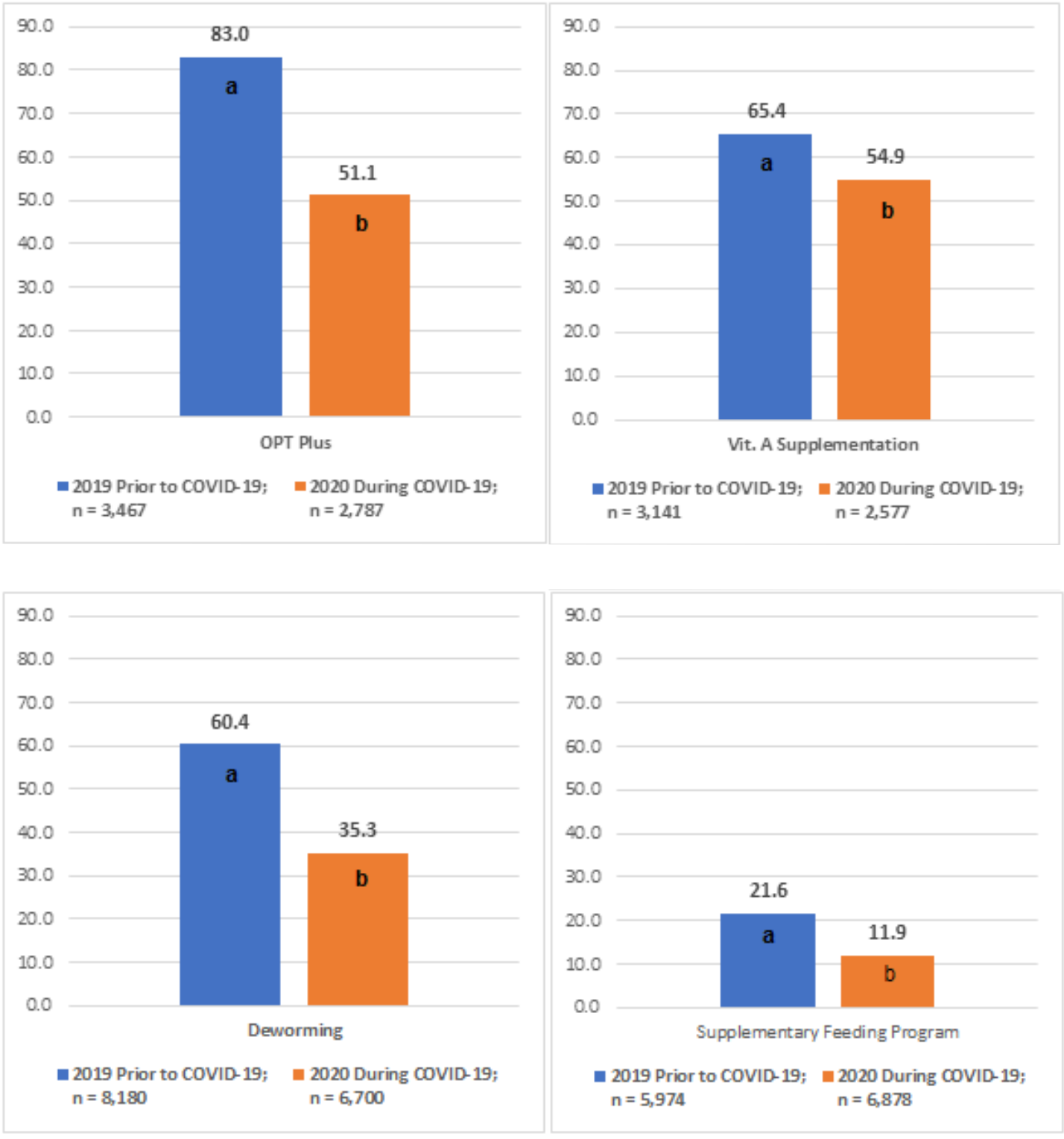
Participation in Nutrition-specific Programs During the COVID-19 Pandemic

A summary of the participation of children in the nutrition-specific programs in the community during the COVID-19 pandemic and the reasons for non-availment by area category is presented in Table 2. A comparison of the percentage of participation before the pandemic based on the ENNS 2019 and during the pandemic using RNAS results is shown in Figure 1. Slightly more than half (51.1%) of children under 6 years old were either weighed and measured with height under the OPT Plus program, with a significantly higher proportion of children covered in the medium (57.1%) and low risk (57.0%) than in high-risk areas (33.4%). Only 11.8% of the surveyed children aged 6 months to 12 years were reported to have received supplementary feeding during the pandemic, with approximately 12 days duration of supplementary feeding on average, as shown in Table 2.

Table 1. *General Profile of Study Participants in RNAS, Philippines: 2020*

Variables	All Areas	Area Classification		
		High Risk	Medium Risk	Low Risk
Child Characteristics				
n	**7,092**	**1,677**	**3,118**	**2,297**
Mean age (SD)	7.1 (3.6)	6.9 (3.6)	7.2 (3.6)	7.0 (3.6)
Age (years)				
0-<2	11.2	11.9	10.4	11.8
2-<5	20.0	21.2	19.6	19.6
5-<9	33.4	33.5	34.1	32.5
9-<13	35.4	33.4	36.0	36.0
Sex				
Boys	52.2	51.0	53.4	51.6
Girls	47.8	49.0	46.6	48.4
Maternal Characteristics				
n	**5, 239**	**1, 180**	**2, 386**	**1, 673**
Mean age (SD)	38.1 (11.3)	37.8 (11.4)	38.5 (11.2)	37.8 (11.3)
Education				
No grade completed, Elementary, Others	20.4	13.2	25.4	18.1
High school	57.5	66.3	51.6	59.8
College and above	22.1	20.5	23.0	22.1
Working status				
Working	40.5	41.8	39.0	41.5
Not working	59.5	58.2	61.0	58.5
Marital status				
Single	5.9	6.5	5.2	6.6
Married	62.1	53.0	67.5	60.9
Widowed	5.0	4.7	4.7	5.7
Separated	2.7	2.3	2.3	3.3
Common-Law/Live-in	24.3	33.6	20.4	23.4
Place of residence				
Rural	39.2	3.2	60.6	35.1
Urban	60.8	96.8	39.4	64.9
Household Characteristics				
n	**7,035**	**1,674**	**3,103**	**2,258**
Members				
<5	14.0	15.3	15.9	22.9
5 and more	86.0	84.7	84.1	77.1
Food security status				
Food Secure	25.6	24.9	21.0	26.6
Mildly food insecure	9.9	8.4	9.7	10.8
Moderately food insecure	43.1	48.9	43.9	41.5
Severely food insecure	21.5	17.9	25.3	21.1

In terms of micronutrient supplementation, 10.6% of surveyed children 6 months to less than 5 years old received multiple micronutrient powder (MNP), with no significant difference in the proportion of children who received MNP across areas ($p>0.05$). More than half (54.7%) of the surveyed children aged 6 months to 6 years had received Vitamin A capsules. There were significantly more children who received Vitamin A in the medium risk (69.2%) and low risk (60.2%) than those in the high-risk areas (22%: $p<0.05$). Meanwhile, anti-helminthic or deworming tablets were received by more than one-third (35.2%) of children 1-12 years old. Medium-risk areas had a significantly higher proportion of children (50.5%) who received the deworming tablet than those in the high (10.5%) and low (32.2%) risk areas. Reasons cited by the mothers for the non-availment of the programs were: (1) mothers were not aware of the program (38.6%); (2) community health workers did not visit the child at home (28.3%); (3) child and the mother were not able to visit the health center due to lockdown (20.0%); (4) child was given supplements prior to COVID-19 pandemic (10.8%); and (5) no available health workers in the facility (2.4%).



*Different letter denotes significant difference at p<0.05

- Prior to COVID-19 based on the results of the ENNS 2019
- During COVID-19 based on the results of RNAS 2020

Figure 1. *Comparison of participation on the different age-specific nutrition- programs among Filipino children before and during the COVID-19 pandemic.*

Children aged 1-12 years significantly experienced decline participation in all the different nutrition-sensitive programs (Figure 1). The most dramatic decline was observed in the OPT Plus program, with an almost 32% point reduction from the 83.0% participation before the COVID-19 pandemic. This was followed by deworming, with a 25.1% point decrease from its 60.4% participation before the COVID-19 outbreak. A significant decline was reported in the availment of Vitamin A capsule (65.4% to 54.9%) and supplementary feeding (21.6% to 11.9%) before and during the COVID-19 outbreak, respectively.

Maternal Knowledge and Perceptions

In terms of observed changes in the child's weight, 21.0% of the mothers reported to have observed weight loss and 37.9% weight gain, while 35.2% reported to have seen no weight changes in their children during the COVID-19 pandemic (Table 3). Meanwhile, for stunting, almost one-fifth (18.4%) of the mothers perceived that their children were stunted. There were significantly more mothers in medium-risk areas (20.9%) who perceived that their children were stunted than those in the high and low-risk areas. Among those with stunting perception, majority (79.9%) stated that their children were stunted due to the slow growth or the child is too short, 6.3% of the mothers stated that they just felt and knew that their child was stunted, 5.9% reported that their child was malnourished, and 4.0% cited that stunting was inherited by the child (Table 3).

The association analysis between maternal perception and socio-economic status revealed that mothers or caregivers from food-insecure households (19.7% vs 14.4%; p <0.001), and poor households (22.1% vs 16.6%; p<0.000) were more likely to perceive their children to be stunted than their counterpart mothers from food secure and rich households. Similarly, children who were perceived to be stunted (23.6%) were significantly higher among those whose mothers had no educational attainment or other informal education than those with higher educational attainment (Table 4). Meanwhile, mothers from food-insecure households were more likely to perceive their children to be not healthy (12.4% vs 5.1%; p<0.001) and not strong (6.6% vs 2.4%; p<0.001) as compared to their counterparts from food-secure households. Further, more mothers from the poor households perceived that their children were unhealthy (14.0% vs 9.1%; p<0.000) and not strong (7.0% vs 4.9%; p<0.000). Similarly, children who were perceived as not healthy (13.7%) and not strong (6.8%) were significantly higher among mothers with no educational attainment or formal education than those with higher educational attainment.

Discussion

The aim of this study was to provide evidence on how the COVID-19 pandemic affected the participation of children in the nutrition-specific programs including their mother's perception of nutrition during the COVID-19 outbreak through a phone-interview survey. This study was the first to confirm the assumptions that the pandemic-related restrictions have led to limited access to specific nutrition programs such as OPT Plus, Vitamin A supplementation, supplementary feeding, and deworming among the Filipino children 1-12 years of age which highlights the urgency of

Table 2. *Participation of Children 1-12 years old in the Nutrition-specific Programs by Area Classification.*

Variables	All Areas		Area Classification						p-value*
			High Risk		Medium Risk		Low Risk		
Nutrition-specific Programs	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
1. *Operation Timbang* Plus *(0-<6 yrs)*	2,787	51.1	697	33.4	1,184	57.1	906	57.0	0.000
2. Supplementary Feeding *(6 m-12 yrs)*	6,891	11.8	1,613	8.4	3,043	14.6	2,235	10.6	0.000
3. Use of Micronutrient Powder *(6 m-<5 yrs)*	2,011	10.6	491	9.8	859	10.9	661	10.7	0.777
4. Vitamin A Supplementation *(6 m-<6 yrs)*	2,586	54.7	633	22.0	1,109	69.2	844	60.2	0.000
5. Deworming *(1-12 yrs)*	6,719	35.2	1,579	10.5	2,970	50.5	2,170	32.2	0.000
Reasons for Non-availment	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
Not aware or no idea about program	5,298	38.6	1,509	25.1	2,002	46.9	1,787	40.6	0.000
Community health workers did not visit the child at home	5,298	28.3	1,509	36.1	2,002	22.3	1,787	28.4	0.000
Did not visit the health center due to lockdown	5,298	20.0	1,509	26.2	2,002	16.2	1,787	18.9	0.000
Child was given supplements before COVID-19 pandemic	5,298	10.8	1,509	10.7	2,002	11.2	1,787	10.4	0.000
No available community health worker in the health facility	5,298	2.4	1,509	1.9	2,002	3.3	1,787	1.8	0.000

*Significantly different across categorical variables at p < 0.05 using ANOVA (test of proportion).

supporting children and their families during the pandemic, including the need to increase access to the different nutrition programs for children. As shown in the results, a lower level of participation in the different nutrition services was noted in the high-risk areas, which were mostly cities, as compared to the low and medium risk areas. The findings suggest that the COVID-19 pandemic has imposed challenges for children in receiving essential nutrition services at the community level. The community quarantines and lockdowns have led most public and private sector institutions to close down to avoid face-to-face interactions, except for health care facilities and a limited number of essential services [26] to limit the spread of virus, flatten the curve of incidence rate, and contain the disease. However, these measures have severe repercussions on the delivery and/or availment of essential nutrition services in most communities in the Philippines. Identifying and treating early signs of malnutrition and other health conditions through undergoing routine health services like the OPT Plus contribute to the child's overall development. However, the results of this study showed that the OPT Plus had the largest decline in the reported child's participation during the COVID-19 lockdown followed by deworming, Vitamin A supplementation, and supplementary feeding. Despite efforts to promote the conduct of growth and development monitoring activities for young children through the DOH-Department Memorandum 2020-0237 "Interim Guidelines for the Delivery of Nutrition Services in the Context of COVID-19 Pandemic under Growth and Development Monitoring and Promotion", the closure of services/facilities, interruptions of community engagement activities, reduced demand due to fear of infection, and personnel gaps such as inadequate health workers were the top reasons for the disruptions of child health and nutrition services between 2020 to 2021 according to the UNICEF dashboard. These cited reasons across different countries were consistent with the RNAS results where the top-cited reasons for health service disruptions include: the parents and the child did not visit health centers due to fear of infection, community health workers did not visit the child at home, fewer/no available health workers in the facility, and parents were not aware of the program including other difficulties. The UNICEF further reported that almost 68% of the countries reported disruptions in the delivery of health care to children including immunization services [27]. The findings were consistent with the recent survey of WHO [28] involving 105 countries showing that half of the reported health disruptions were in the essential health services for sick children and for children with moderate and severe malnutrition.

Access to supplementary feeding declined significantly based on the RNAS data. For reference, the Philippine school-based feeding program (SBFP) which is a vital component of the social safety net of the DepEd provides free meals containing one-third of the recommended energy and nutrient requirements aimed at improving the nutritional status of severely wasted and wasted preschool to grade 6 pupils after 120 feeding days [29]. According to the report, about 73% of the undernourished student beneficiaries were

Table 3. *Percent Distribution of Maternal Responses Regarding their Child's Health and Nutritional Status by Area Classification.*

Responses	All	Area Classification			p-value*
		High Risk	Med Risk	Low Risk	
Observed changes in the child's weight (n)	**2,787**	**697**	**1,184**	**906**	
Yes, lost weight	21.0	18.9	23.9	18.7	0.0045
Yes, gained weight	37.9	37.2	37.4	39.0	0.7184
No changes	35.2	36.4	33.5	36.3	0.2983
Do not Know	4.5	6.7	3.2	4.5	0.0007
Others	1.5	0.7	1.9	1.5	0.1067
Is your child stunted? (n)	**7,093**	**1,678**	**3,118**	**2,297**	
Yes	18.4	14.3	20.9	17.9	0.0000
No	81.6	85.7	79.1	82.1	
Why is your child stunted? (n)	**1,305**	**240**	**653**	**412**	
Child is not tall	79.9	77.1	81.6	78.9	0.2649
Inherited from parents/relatives	4.0	2.1	4.9	3.6	0.1478
Child is malnourished	5.9	7.9	4.9	6.3	0.2171
Mothers' opinion	6.3	8.8	4.7	7.3	0.0552
Do not know	0.2	0.4	0.0	0.5	0.2188
Others	3.7	3.8	3.8	3.4	0.9342

*Significantly different across categorical variables at $p < 0.05$ using ANOVA (test of proportion).

Table 4. *Factors Affecting Maternal Perception on Child's Nutrition and Health Status During the COVID-19 Pandemic.*

Factors	Maternal Perception					
	Perceived their children to be stunted		Perceived their children to be not healthy		Perceived their children to be not strong	
Food Security	**%**	**ρ-value**	**%**	**ρ-value**	**%**	**ρ-value**
Food Insecure **Food Secure**	19.7 14.4	<0.001	12.4 5.1	<0.001	6.6 2.4	<0.001
Wealth Status						
Poor **Non-poor**	22.1 16.6	<0.001	14.0 9.1	<0.001	7.0 4.9	<0.001
Maternal Education						
No grade completed, elementary, & others ***High School*** ***College and above***	23.6 17.8 14.7	<0.001	13.7 10.7 7.9	<0.001	6.8 5.7 4.2	0.027

rehabilitated to normal nutritional status based on the recent impact assessment of the SBFP [30]. The current pandemic disrupted the access to this food assistance due to the closure of schools and shift to remote learning methods. To adapt to the blended learning approach, the SBFP program has recently been continued in the form of food ration for at least 60 feeding days and fresh or sterilized milk for 50 feeding days [31]. However, based on the result of the rapid survey, only 11.9% of the school-aged children participants received supplementary feeding. The possible reason for the low percentage result was the start of School Year 2020-2021 on October 5, 2020 ahead of the RNAS that was conducted on November 4, 2020. The feeding program may not be fully rolled-out since the blended classes just started during the conduct of this study.

The RNAS findings emphasize the need for a coordinated response to ensure that Filipino children receive important nutrition services as part of the COVID-19 response at the local and national levels. Since the outbreak of the COVID-19 in 2020, much of the focus on the healthcare system has recently been on the COVID-19 response. However, the regular delivery of basic nutrition services among children should not take a back seat while the country fights the pandemic. Significant planning, coordination, and urgent actions are needed at the national to the local level in formulating policies to support the delivery of and access to the different nutrition and health services in the rural and urban areas regardless of the current level of risk to the COVID-19 infection. Barangay nutrition scholars (BNS), barangay health workers (BHWs), and rural midwives as frontliners should be mobilized to deliver nutrition services for children amidst the pandemic, with appropriate incentives and/or allowance to compensate for the cost of load and the increased effort. This is to address the significant decline in the proportion of children receiving the OPT Plus, Vitamin A capsules, supplementary feeding, and deworming tablets. Face-to-face in combination with phone-based counseling by the community health workers in areas with high COVID-19 cases can help fill the gap in terms of nutrition service delivery. Community health workers should now receive additional remote training on how to deliver health and nutrition services online via telehealth. With the competing time of the community health workers, there is a need to optimize their time of delivering food packs among priority households by integrating other basic nutrition services like the conduct of OPT among under five years old children, inclusion of vitamin A capsule including micronutrient powder, deworming tablets in the food packs along with basic nutrition counseling.

Despite the pandemic, more mothers reported that their children have gained weight than lost weight, while more than one-third reported no change observed in their child's weight. Comparing areas, there were significantly more mothers in the medium-risk areas who perceived their children to have lost weight than their counterpart mothers in low and high-risk areas. Moreover, there was a significantly higher proportion of mothers who perceived their children to be healthy in high-risk areas than those in the medium and low-risk areas. On the other hand, there were significantly more mothers who perceived their children to be stunted in the medium than those in the high and low-risk areas. These findings are consistent with the prevalence of food insecurity, in which low-risk areas had the highest increase of 24.0 percentage points while the high-risk areas had only 16.3 percentage points during the COVID-19 based on the

same survey. This is probably because high-risk areas are mostly located in highly urbanized cities which have greater food availability and accessibility either through LGU-, national government-, or private-induced donations. In contrast, the low-risk areas are mostly rural areas where access to many services including livelihood, health, and food is usually difficult. While cities may be the center of economic development that drives national development, the plight of rural and peri-urban areas during the pandemic should also be prioritized through a systematic approach that is specific for the rural areas rather than focusing only on urban areas [32].

These findings were also triangulated with maternal perception of the child's nutrition. Household food security, wealth status, and maternal educational level were identified to influence maternal perception of a child's nutritional status. Mothers from food insecure households were more likely to perceive that their children were stunted; similar to previous studies, food insecurity had negative effects on the nutritional status of children [33, 34]. Maternal education also affects the perception of the child's nutrition. The findings of this study were consistent with the previous studies by Wolde et al. [35] which showed that low maternal education, household food insecurity, and poor health were strong predictors of undernutrition in school-age children. Similarly, a previous study [36] as cited by Alcantara *et al.* [37] also found a higher probability of having stunted children for mothers who never attended formal education. On the other hand, the impact of mothers' having a higher level of education may attribute to greater knowledge in childcare, feeding practices, environment, and household hygiene [36,38]. Thus, enhancing nutrition education among mothers is the strategy that can address misinformation about child health and nutrition specifically child stunting.

Strengths and Limitations

Given that the evidence on the effect of the COVID-19 outbreak on children's participation in various nutrition-specific programs is scarce, this study has strengths. First, the survey covered 7,092 children aged 0-12 years old from 7,035 households in selected nine areas across Luzon, Visayas, and Mindanao. Second, the results may help in reassessing, monitoring, and restrategizing current programs or protocols to ensure continuity of services. Third, the perception of mothers or caregivers about their child's nutritional status, as well as their knowledge on stunting, was also included as important findings of the study. However, weight change, whether the child had lost, gained, or had no change in weight during the time of pandemic, was merely based on the perception of mothers. No guidelines nor any clinical features were used to describe the changes in the nutrition and health status of children given the rapid nature of the assessment. The self-reported children's participation by the respondent-mothers and the likelihood of social desirability and/or recall bias may affect the study findings. Lastly, households with no mobile phones were not included in the survey, thus, findings may not fully represent the effect of COVID-19 on the participation of children in the various nutrition programs across the country. Given the challenges of data collection during the pandemic, the RNAS provides a snapshot picture of the changes in the participation of children in the nutrition programs in the selected areas during the pandemic.

Conclusion

This study provides a snapshot of the immediate consequences of the COVID-19 outbreak, indicating a significant drop in the children's participation in the OPT Plus, supplementary feeding, Vitamin A supplementation, and deworming programs as compared with the pre-pandemic estimates. Poor nutrition and health status of children were more likely to be perceived by food insecure and poor mothers or caregivers than their counterpart mothers from food secure and rich households. With prolonged limited access to health and nutrition services, children, particularly those from poor households are at risk of hunger, malnutrition, and consequently, of not developing their full potential. These findings can guide efforts to ensure the continuity of essential health and nutrition services towards promotion of child health and nutrition during the COVID-19 outbreak and crisis recovery period, and inform strategies to mitigate potential harm during future pandemics.

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References

1. Akseer N, Kandru G, Keats EC, *et al.* (2020) COVID-19 pandemic and mitigation strategies: implications for maternal and child health and nutrition. The American Journal of Clinical Nutrition 2020; 112(2): 251-256.
2. Roberton T, Carter ED, Chou VB, *et al.* (2020) Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: a modeling study. The Lancet Global Health 8(7):e901-e908. doi: https://doi.org/10/1016/S2214-109X(20)30229-1
3. United Nations Children's Fund. (2019) World Health Organization, International Bank for Reconstruction and Development/The World Bank Group. Levels and trends in child malnutrition: Key findings of the 2019 edition of the Joint Child Malnutrition Estimates. Geneva. World Health Organization.
4. United Nations Children's Fund - Philippines. (2020) Addressing stunting and malnutrition should go beyond Nutrition Month celebration.
5. Department of Science and Technology – Food and Nutrition Research Institute. (2019) 2019_ENNS Results Dissemination_Preschool and School Age Children.
6. Department of Science and Technology – Food and Nutrition Research Institute. (2021). 2018-2019 ENNS Results Dissemination_Preschool School-agemChildren_ENNS. http://enutrition.fnri.dost.gov.ph/site/uploads/2018-2019%20ENNS%20Results%20%20Dissemination_Preschool%20School-age%20Children.pdf
7. National Nutrition Council. (2017) Philippine Plan of Action for Nutrition 2017-2022. A call to urgent action for Filipinos and its Leadership, Executive Summary.
8. Philippine Statistics Authority (PSA) and ICF. (2018) Philippines National Demographic and Health Survey 2017. Quezon City, Philippines, and Rockville, Maryland, USA: PSA and ICF.
9. Tabunda A, Albert J, Agdeppa I. (2016) Results of an Impact Evaluation Study on DepEd's School-Based feeding Program. Discussion Paper Series No. 2016-05. https://dirp3.pids.gov.ph/websitecms/CDN/PUBLICATIONS/pidsdps1605.pdf.
10. Office of the President of the Philippines. (2020) Community quarantine over the entire Luzon and further guidelines for the management of the Coronavirus Disease 2019 (COVID-19) situation.
11. Office of the President of the Philippines (2020) Executive Order No. 112. Imposing an enhanced community quarantine in high-risks geographic areas of the Philippines and a General Community Quarantine in the rest of the country from 01 to 15 May 2020, adopting the Omnibus Guidelines on the Implementation thereof, and for other purposes.
12. Department of Health. (2020) Department Memorandum No. 2020-0056, Interim Guidelines for 2019 Novel Coronavirus Acute Respiratory Disease (2019-nCoV ARD) Response in the Workplace General Preventive Measure No.2.
13. Inter-agency Task Force for the Management of Emerging Infectious Diseases. (2020) Omnibus Guidelines on the Implementation of Community Quarantine in the Philippines.
14. Department of Education. (2020) The Basic Education Learning Continuity Plan in the Time of COVID-19.
15. United Nations Development Programme (UNDP) and United Nations Children's Fund (UNICEF). (2020) The Impact of the COVID-19 Crisis on Households in the National Capital Region of the Philippines.
16. Department of Health. (2020) Interim Guidelines on Health Care Provider Networks During the COVID-19 Pandemic.
17. National Economic and Development Authority (NEDA). (2020) "NEDA We Recover As One". https://neda.gov.ph/we-recover-as-one/
18. Department of Science and Technology - Food and Nutrition Research Institute (DOST-FNRI). (2019) 2019_ENNS Results Dissemination_Methodology and SES.
19. Ranada P. (2020) Rappler. EXPLAINER: How the government decides your area's quarantine Classifications.
20. National Nutrition Council. (2014) Operation Timbang Plus.
21. Department of Social Welfare and Development. (2020) Guidelines in the implementation of the Supplementary Feeding during the Community Quarantine Period or other similar emergencies.
22. Congress of the Philippines. (2018) Republic Act No. 11037; Masustansyang Pagkain para sa Batang Pilipino Act.
23. Department of Health. Micronutrient Supplementation Program.
24. World Health Organization. (2014) Deworming in children.
25. StataCorp. (2017) Stata Statistical Software:

Release 15. College Station, TX: STATACorp LLC.
26. Naja F, Hamadeh R. (2020) Nutrition amid the COVID-19 pandemic: a multi-level framework for action. European Journal of Clinical Nutrition 74(8): 1117-1121.
27. United Nations Children's Fund. (2020) At least 80 million children under one at risk of diseases such as diphtheria, measles and polio as COVID-19 disrupts routine vaccination efforts, warn Gavi, WHO and UNICEF.
28. World Health Organization (WHO). (2020) Pulse survey on continuity of essential health services during the COVID-19 pandemic. Interim report.
29. Department of Education. (2017) Operational Guidelines on the Implementation of School-based Feeding Program for School Years 2017-2022. 2017.
30. Llego M. (2019) School-based Feeding Program (SBFP).
31. Department of Education. (2020) Operational Guidelines on the Implementation of the School-based Feeding Program for School Year 2020-2021.
32. Ranscombe, P. (2020) Rural areas at risk during COVID-19 pandemic. An expert in rural health advises governments to take a systematic approach to tackling the coronavirus crisis rather than focusing solely on urban areas. The Lancet Infectious Diseases 20(5):545. doi: 10.1016/S1473-3099(20)30301-7.
33. McQuade ET, Clark S, Bayo E, *et al.* (2019) Seasonal Food Insecurity in Haydom, Tanzania, Is Associated with Low Birthweight and Acute Malnutrition: Results from the MAL-ED Study. American Journal of Tropical Medicine and Hygiene 100(3):681-687. doi: https://doi.org/10.4269/ajtmh.18-0547.
34. Agho K, Mukabutera C, Mukazi M, *et al.* (2018) Moderate and severe household food insecurity predicts stunting and severe stunting among Rwanda children aged 6-59 months residing in Gicumbi district. Maternal and Child Nutrition 15(3) e12767. doi: 10.1111/mcn.12767.
35. Wolde M. Berhan Y, Chala A. (2015) Determinants of underweight, stunting and wasting among schoolchildren. BMC Public Health. 2015; 15:8.
36. De Silva I, Sumarto S. (2018) Child Malnutrition in Indonesia: Can Education, Sanitation and Healthcare Augment the Role of Income?. J Int Dev. 2018; 30(5).
37. Alcantara J, Mirabueno C, Narranjos T. Understunting the Child Nutrition Problem in the Philippines: Determining the Nutritional Status and Severity of Undernutrition among Children Aged 1-5 years old using Binary Logistic Regression, and Adjacent-Categories Logit Models.
38. Nguyen N, Sin K. (2008) Nutritional status and the characteristics related to malnutrition in children under five years of age in Nghean, Vietnam. J Prev Med Public Health. 2008; 41(4): 232-40.