

# Strengthening Nutrition Knowledge of Pregnant Women Through Nutrition Education During Public Health Emergencies



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## ABSTRACT

Proper maternal nutrition evidently results in good pregnancy outcomes both for the mother and born infant. However, the process leading to good nutrition during pregnancy remains a challenge most especially during public health emergencies, such as the COVID-19 pandemic, which brought limitations on access to a variety of foods as well as nutrition services. Thus, nutrition education through the provision of contextualized information, education and communication (IEC) materials was explored as an alternative delivery strategy. The delivery strategy aims to increase the number of pregnant women in Barangay Palanan, Makati City, Philippines who have adequate nutrition knowledge through IEC materials-based nutrition education that is contextualized during public health emergencies. As an outcome, the delivery strategy intends to increase the number of pregnant women who have

normal nutritional status as determined by weight per month of pregnancy. Results in determining the adequacy of nutrition knowledge through pre- and post-testing show that there is a 10% increase in the passing rate from 59% at baseline to 69% at endline. From the number of pregnant women who have taken the post-test, a remarkable 52% have either post-test scores that are maintained or improved. Meanwhile, for pregnant women who have normal nutritional status, an increase of 5% was seen given by 46% at baseline to 51% at endline. Ultimately, IEC materials-based nutrition education may serve as a supplementary approach in the continuous provision of nutrition services to attain good nutrition of pregnant women amid the COVID-19 pandemic.

**Keywords:** pregnancy; public health emergency; COVID-19 pandemic; nutrition knowledge; nutrition education; Information, Education and Communication (IEC) materials

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## INTRODUCTION

Pregnancy is a critical stage of life wherein adequate nourishment is required to sustain the normal needs of the mother as well as that of the growing and developing fetus and tissues that support the process.

On the other hand, malnutrition during pregnancy may predispose the pregnant woman and growing fetus to complications such as gestational diabetes mellitus, hypertension, pre-eclampsia-eclampsia and outcomes given by stillbirth, preterm delivery, low birth weight (LBW) and maternal and perinatal mortality.

Prior to the COVID-19 pandemic, problems related to malnutrition among pregnant women evidently existed, especially in low-resource settings. In the Philippines, the 2018 Expanded National Nutrition Survey (ENNS) of Food and Nutrition Research Institute of the Department of Science and Technology (DOST-FNRI) reported that there was 36.6% prevalence of nutritionally at-risk pregnant women who are below 20 years old.[1] This is significantly high considering the problem of teenage pregnancy in the Philippines as one of the highest among the countries of the Association of Southeast Asian Nations (ASEAN), with 47 annual births per 1000 adolescent women.[2] Moreover, 2018 ENNS has shown an increase in the prevalence of anemia from 24.6% to 26.1% in 2013 to 2018, respectively. This remains as moderate in public health significance based on World Health Organization (WHO) cut-off points.[3] Pregnant women are highly at risk of iron-deficiency anemia as the developing fetus takes up iron from the stores of the mother to make up its own. In a more recent result from ENNS for the year 2019, it is revealed that prevalence of nutritionally at-risk pregnant women has increased from 20.1% in 2018 to 22.9% in 2019. This upward trend could be worsened as there was also an increase in food insecure households from 53.9% in 2018 to 64.1% in 2019.[4] Food insecurity, as an underlying factor of maternal undernutrition, is expected to be exacerbated by the ongoing pandemic and may result in more pregnant women who are nutritionally at-risk.

The ongoing COVID-19 pandemic placed many countries, especially those in resource-constrained setting, to crisis not only in health but also in humanitarian, socioeconomic and human rights aspects.[5,6] These crises impact maternal and child nutrition as measures in containing the transmission of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) stemmed limitations in the access to nutritious foods and services, such as nutrition education and counseling, and may have resulted in poor dietary and lifestyle habits.[7] For this reason,

an alternative approach for nutrition education using developed contextualized IEC materials, as a possible key delivery strategy to guide pregnant women during the ongoing COVID-19 pandemic, was explored. Nutrition education and counseling are widely used strategies to help improve the nutritional status of pregnant women through the promotion of a healthy diet with increased amounts and diversity relative to the needs of pregnancy. Secondly, both promote adequate weight gain by attaining sufficient and balanced protein and energy intake. And lastly, the strategies support consistent uptake of micronutrient supplements and food supplements or fortified foods to meet the added nutritional needs of pregnancy.[8] The delivery strategy, that is designed and implemented during a public health emergency intends to strengthen the nutrition knowledge of pregnant women through contextualized IEC materials-based nutrition education. It specifically aims to (1) increase the number of pregnant women who have adequate nutrition knowledge as determined by pre- and post-testing, and to (2) increase the number of pregnant women who have normal nutritional status as determined by weight per month of pregnancy.

## METHODOLOGY

### Situational Analysis

A short survey was conducted to key persons in the community of Barangay Palanan, Makati City, Philippines to supplement the available information in line with the situation of pregnant women amid the COVID-19 pandemic. The respondents included five pregnant women during the pandemic and three healthcare workers who were all communicated through electronic mail and short message service (SMS). The survey consisted of questions about the services given to pregnant women by the health center and local government unit before and during the pandemic to determine the effects of public health emergency on the provision of health and nutrition services. Information on the problems and difficulties of both pregnant women and health center as well as adjustments and solutions to the situation were also obtained.

Meanwhile, developing information about the COVID-19 pandemic's impact to maternal nutrition were gathered through convenience literature review of reports and guidelines from the WHO, United

Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA), Department of Health – Philippines (DOH), National Nutrition Council (NNC) and other related local agencies. The key research terms used were nutrition education, nutrition counseling, pregnancy, public health emergency, COVID-19 and pandemic. Literature was screened by publication of not more than five years from 2021, however, some earlier references were considered as deemed relevant to maternal nutrition. With information provided by the short survey and review of related literature, a problem tree was constructed (Figure 1), which provided a logical framework foundation to be used in planning, monitoring and evaluation of the delivery strategy.

For the conduct of nutrition education, the participants were selected by convenience sampling such that pregnant women who were available in the health center of Barangay Palanan, Makati City during the implementation from November 2020 until February 2021 were encouraged to participate. The Barangay Palanan health center was selected as the project site as it is the only 24/7 facility out of the 26 health centers in Makati City. Upon its re-establishment in 2014, the Barangay Palanan health center was set to be a model facility where the quality of service delivery of other health centers in the city will be followed.[9] Thus, it is advantageous to integrate the contextualized IEC materials-based nutrition education to supplement the services that are already offered in the health center for pregnant women during the COVID-19 pandemic. Additionally, Barangay Palanan health center is also serving its neighboring communities, therefore, it is also strategic to implement in the facility as there could be more pregnant women who will be reached by the IEC materials-based nutrition education.

Further, a range of 30 to 40 participants was established as the identified average number of consulting pregnant women per month in the health center. Informed consent forms were given and accomplished to signify the voluntary participation of pregnant women. On the other hand, newly arrived pregnant women were no longer included for monitoring and evaluation but were still given IEC materials.

### **Pre- and Post-Testing for Nutrition Knowledge**

The IEC materials consist of three main topics with a corresponding pamphlet each, namely: (1)

*Risks and Malnutrition During Pregnancy* (2) *Good Nutrition During Pregnancy*, and (3) *Nutrition Recommendations During Pregnancy*, which are all contextualized during public health emergencies. Contents of the IEC materials were reviewed by community nutritionists in the field for validity and appropriateness. Meanwhile, in order to validate the ability of the developed 15-item pre- and post-test questionnaires to measure the nutrition knowledge of pregnant women, community nutritionists in the field as well as two Barangay Nutrition Scholars (BNS) answered and reviewed the tool.

The nutrition education through developed IEC materials was done with the aid of BNS assigned in the health center under the supervision of the community nutritionist. The developed and printed pamphlets were distributed to pregnant women in the health center upon a scheduled visit. The nutrition education through IEC materials was intended to be finished within three weeks such that each of the three pamphlets will be read and studied by the participants per week. Subsequently, nutrition knowledge was determined through pre- and post-testing done during the scheduled visit of pregnant women in the health center. The interval of the pre- and post-tests was the time that participants were reading the pamphlets at home in consonance with the next scheduled visit to the health center. Pre-test served as the baseline for nutrition knowledge of the participants while post-test, as the endline, was only given to those who have completed reading the IEC materials.

In the monitoring and evaluation phases of the IEC materials-based nutrition education, the possible changes in test scores from baseline to endline were measured. The established passing score of the pre- and post-test is 9 points or 60% which also served as the basis in determining the adequacy of nutrition knowledge. In order to evaluate the effectiveness of the delivery strategy, 50% of the total participants was targeted to complete and pass the post-test that was intended to measure the adequacy of nutrition knowledge.

### **Pre- and Post-Weighing for Gestational Weight**

On the other hand, in order to determine the nutritional status of participants, weight was recorded before and after the conduct of IEC materials-based nutrition education. Obtained data were compared to reference weights per month of pregnancy to

determine the normalcy of gestational weight. The reference that was used in monitoring the gestational weight of the participants is the *Weight-for-Height by Month of Pregnancy Table* developed for field-use by DOST-FNRI, which is a recalibration of the initial works of Magbitang and colleagues.[10] For the nutritional status as determined by gestational weight, 50% of the total participants were targeted to have weight that was within the reference range per month of pregnancy. The indicator set was patterned in the global target for anemia among women of reproductive age.[11]

Furthermore, health protocols (ie, proper use of personal protective equipment and social distancing) were observed in all activities of the delivery strategy, especially in the distribution of IEC materials as well as in the collection of necessary data for monitoring and evaluation. The results for adequacy of nutrition knowledge were then associated to the nutritional status of pregnant women as determined by gestational weight.

**RESULTS**

Nutrition knowledge, as the realization of the integral role of good maternal nutrition during pregnancy as well as to the development of fetus until birth and infancy, was measured through validated pre-test and post-test questionnaires. A total of 44 participants were initially enrolled and 37 of which were able to take the pre-test. The other seven were identified as dropouts or with no follow up which could possibly be due to giving birth already, decision to transfer to another healthcare facility or inability to attend the next scheduled check-up due to constraints brought by the COVID-19 pandemic. As part of the collected information of participants, according to obstetric history (Table 1), 10 were identified as gravida 1 and parity 0 (G1P0), nine were G2P1 and G3P2, three were G4P3, two were G2P0, and one each for G3P0, G3P1, G5P4 and G6P5. This indicates that more than a quarter of participants were in their first pregnancy, therefore, guidance in nutrition knowledge is utmost warranted for them to attain proper nutrition and good pregnancy outcomes.

**Adequacy of Nutrition Knowledge**

In the obtained results for nutrition knowledge (Table 2), from the 37 participants who had taken the pre-test, 22 (59%) passed while 15 (41%) failed.

**Table 1:** Pregnant women participants classified according to their obstetric history

| Obstetric History | Participant (n=37) | Percentage (%) |
|-------------------|--------------------|----------------|
| G1P0              | 10                 | 27             |
| G3P2              | 9                  | 24             |
| G2P1              | 9                  | 24             |
| G4P3              | 3                  | 8              |
| G2P0              | 2                  | 5              |
| G5P4              | 1                  | 3              |
| G6P5              | 1                  | 3              |
| G3P0              | 1                  | 3              |
| G3P1              | 1                  | 3              |

G – gravidity; P – parity

Post-test was given to the participants who were able to completely read the distributed IEC materials. From the 37 participants, 23 were able to take the post-test within the time of implementation. As could be seen in Table 2, a total of 16 or 69% were able to pass the post-test with 12 (52%) of which who have either maintained or improved scores. Whereas, the remaining four (17%) obtained a lower score, yet still passed the post-test. On the other hand, seven participants or 31% of those who were able to take the post-test have failed.

**Nutritional Status as Determined by Gestational Weight**

Meanwhile, the nutritional status of 37 participants, as a possible outcome of adequate nutrition knowledge was monitored through gestational weight. Gestational weight gain serves as an indicator of nutritional status of both the pregnant woman and the fetus. Therefore, a range of normal weight gain should be attained to prevent risk of unfavorable pregnancy outcomes and complications.[12] The baseline results for nutritional status in Table 2 shows that eight or 22% of the 37 participants are nutritionally at-risk (NAR) due to having weight that falls below the recommended weight range. On the other hand, overweight or obese participants are 12 (32%) at baseline. Meanwhile, nutritionally at-risk participants declined by six percentage points after endline results accounted only six (16%) who are underweight for the month of pregnancy whereas, 12 participants (33%) were classified as overweight or obese at baseline. Comparing baseline and endline results for the participants with normal

**Table 2:** Passing rate and nutritional status of pregnant women at baseline and endline

|                 | Passing Rate |          | Nutritional Status |          |          |
|-----------------|--------------|----------|--------------------|----------|----------|
|                 | Failed       | Passed   | NAR                | Normal   | OW/Obese |
| <b>Baseline</b> | 41% (15)     | 59% (22) | 22% (8)            | 46% (17) | 32% (12) |
| <b>Endline</b>  | 31% (7)      | 69% (16) | 16% (6)            | 51% (19) | 33% (12) |

NAR – nutritionally at-risk; OW – overweight; \*values in parentheses are actual number of participants

nutritional status, an increase of five percentage points (5%) could be inferred from 17 (46%) to 19 (51%), respectively.

## DISCUSSION

### Health and Nutrition Situation

In the reports of WHO and UNICEF, various impacts of COVID-19 pandemic leading to increased risk of malnutrition, morbidity and mortality among pregnant women were elaborated.[13,14] As shown in the constructed framework (Figure 1) as the synthesis of related reports and results of the conducted short survey, due to the pandemic measures being implemented in most parts of the world, vulnerable groups such as pregnant women had limitations in accessing a variety of foods for their nutritional needs. This was observed in the restrictions to movement of people and transport of goods brought by community quarantine and lockdowns that negatively affected food systems and eventually worsened food insecurity. Moreover, socioeconomic regression of households caused by loss of livelihood and jobs entailed inability to purchase nutritious foods, which eventually led to replacement with those that are processed, with longer shelf life and of lesser nutritional value. Another is the limitation in the provision of essential nutrition services for pregnant women (eg, nutrition counseling and nutrition education) as healthcare facilities put more attention to pandemic response and the need for compliance to health protocols such as social distancing. This scenario was also coupled with the induced fear among pregnant women to contract COVID-19. Recent literature regarding the outcomes of COVID-19 infection to pregnancy show that pregnant women with COVID-19 are less likely to have symptoms than infected non-pregnant women; however, those who have severe conditions are in need of intensive care.[15] In the analyzed responses of the short survey, most pregnant women preferred to not attend scheduled check-up, especially during

the onset of the pandemic to prevent exposure of the virus. This was added with the inability to go to healthcare facilities due to limitation and cost of safe transportation which contributed to the reduced uptake of services and decreased health- and care-seeking behaviors of pregnant women.[7] Moreover, the long stay in homes brought by the community quarantine also limited the ability of pregnant women to engage in physical activity which may eventually lead to sedentary lifestyle and excessive weight gain during pregnancy. Hence, IEC materials-based nutrition education that is contextualized during the COVID-19 pandemic, as a public health emergency, may help in increasing the ability of pregnant women for self-care by providing knowledge which will serve as guidance in attaining proper nutrition and health. This approach will drive empowerment of pregnant women during the current COVID-19-related health and economic crises that extremely worsened vulnerabilities.

In the published brief of UNICEF together with involved organizations in nutrition (World Food Program [WFP], Global Nutrition Cluster and Global Technical Assistance Mechanism for Nutrition [GTAM]), key principles focusing on human rights, equity and context-specificity were stated as recommendations in designing maternal nutrition programs.[14] As an example, in Syria where the ongoing armed conflict was exacerbated by the COVID-19 pandemic, the distributed IEC materials developed by UNICEF and UNFPA (eg, pamphlets) for COVID-19 prevention are contextualized in order for the aforementioned key principles to intersect with the complexities and limitation of resources during the worsened humanitarian situation.[16] The necessity for varied ways of effective communication was also highlighted in the published *Public Health Emergency Preparedness and Response Capabilities* of the Centers for Disease Control and Prevention (CDC) to address access and functional needs of vulnerable groups such as pregnant women during public health emergencies.[17] As minimum public



implemented policies and programs at the local and national levels.

In the Philippines, the *National Safe Motherhood Program* of the DOH is integrated in several policies and laws that are already rolled out to ensure provision of essential services for pregnant women. For instance, the *Behavior Change Interventions in Collaboration with Health Promotion and Communication Service* and the *Development and Dissemination of IEC Materials* of the program enforced the inclusion of nutrition education in the delivery of maternal-newborn service package.[19] Furthermore, the Republic Act 11148 or commonly known as the *First 1000 Days Law (Kalusugan at Nutrisyon ng Magnanay Act)* underpins the importance of good nutrition starting from conception until the first two years of life.[20,21] In the context of the COVID-19 pandemic, DOH has released its Department Memorandum Number 2020-0319 or the *Interim Guidelines on COVID-19 Management of Pregnant Women, Women About to Give Birth, and Newborns*. Under these guidelines, the provision of maternal nutrition counseling and education is emphasized together with other essential health and nutrition care for pregnant women regardless of COVID-19 status during the pandemic.[22]

### Nutrition Knowledge

In the obtained results, a 10% increase in the passing rate from baseline to endline shows that the IEC materials as supplementary material has the ability to improve nutrition knowledge of pregnant women participants. Despite the limitation on face-to-face nutrition education session due to COVID-19 pandemic minimum public health standards, the IEC materials that could be taken home by participants to read provide the necessary information about their health and nutrition. Moreover, the target of 50% passing rate was met at 69% for endline and was suggestive of the effectiveness of delivery strategy as a supplementary approach for nutrition education during the COVID-19 pandemic.

Nutrition education through IEC materials as a delivery strategy drives maintenance of good nutrition in the course of pregnancy in order to avert complications to both the pregnant woman and unborn child. For instance, in the study of Sunuwar and colleagues, the role of nutrition education on the adequacy of iron in the diet to prevent anemia

has shown that those pregnant women who received nutrition education and iron-rich food-based diet plan were seen to have a significant increase in hemoglobin level than those without in the control group. This was attributed to the resulting adequate consumption of iron-rich foods of the intervention group of the study. In terms of nutrition knowledge, those who have been provided with nutrition education have favorable scores compared with those who have not received.[23]

### Nutritional Status

As an outcome of adequate nutrition knowledge, the nutritional status determined by the weight per month of pregnancy of the participants is an important factor to sustain the health of the mother and unborn child. The decrease in percentage of participants who are nutritionally at-risk, from 22% at baseline to 16% at endline, and the increase of five percentage points (46% to 51%) for those with normal status suggests that the knowledge they have acquired through the IEC materials-based nutrition education was translated to actions to improve weight. This could be attributed to adequate protein and energy intake which are both essential to support the growth and development of the fetus. Diet could have also increased in amount and diversity corresponding to the needs of pregnancy. Furthermore, the target of 50% of participants having normal nutritional status was attained by 51% at endline and was suggestive of the positive effect of knowledge obtained from IEC-based nutrition education to gestational weight.

In the analysis of results aforementioned, it is worthy to take note that out of the 16 participants who passed the post-test, 10 (62%) of them were able to have weight that was within the recommended range per month of pregnancy. Furthermore, looking to the 19 participants with normal endline nutritional status, 10 (53%) of them are included to those who have passed the post-test. These two representations provide a positive relationship between adequate nutrition knowledge through IEC materials-based nutrition education and good nutritional status among pregnant women as exposure and outcome aspects of the delivery strategy, respectively. Lastly, despite the greater number of participants who were monitored for gestational weight relative to those who have completed the post-test, the increase of five percentage points from baseline to endline

data for those with normal nutritional status could be attributed to the guidance on proper nutrition during pregnancy that the IEC materials have already provided regardless of completion of post-test. It was identified that 50% or seven of the pregnant women who were not able to take the post-test have maintained normal nutritional status according to the recommended weight for month of pregnancy.

As the delivery strategy aimed to increase the number of participating pregnant women who have normal nutritional status, only the weight at baseline and endline were taken. The need for other nutritional assessment methods to completely determine the nutritional status of participants in the monitoring and evaluation phases was suggested. This may include dietary assessment, specifically in terms of energy and macronutrient intakes through estimated food record or 24-hour food recall. Nevertheless, depending on the nature of public health emergency, the most feasible assessment method, especially in terms of available resources, should be employed. Additionally, other factors that may affect nutrition knowledge (ie, obstetric history and educational attainment) and the weight (ie, multiple gestation, presence of edema, etc.) of participants were not considered in terms of analysis of results due to the programmatic delivery strategy approach nature of the project. Despite, based on health center records, there were no identified multiple pregnancies among the participants during the implementation.

## CONCLUSION

In the results for adequacy of nutrition knowledge of pregnant women, there was a 10% increase from 59% at baseline to 69% at endline. From the number of participants who have taken the post-test,

a remarkable 52% have either post-test scores that are maintained or improved. Meanwhile, for the nutritional status of pregnant women, an increase of five percentage points was seen given by 46% at baseline to 51% at endline. It could also be inferred from cross analyses of results that maintenance of normal nutritional status could be observed from pregnant women who were provided with the IEC materials-based nutrition education alone.

Moreover, it is evident that the role of BNS in the provision of services in community health centers is very vital during the ongoing pandemic. Their participation in crafting innovative and alternative interventions should be fostered to build capacity for continuous delivery of basic nutrition services at the community level even during public health emergencies. Ultimately, with the provision of contextualized IEC materials-based nutrition education during public health emergencies, good nutritional status of pregnant women could be continuously promoted and attained albeit constraints brought by the COVID-19 pandemic.

Nutrition education helps in alleviating the unfavorable impacts of the pandemic that could reverse long-time and hard-won developments in maternal and child nutrition.[24] It enforces actions toward proper nutrition and good health that consequently will mitigate, if not fully prevent, the impacts and consequences of malnutrition during pregnancy, most especially during public health emergencies.

## Disclosure and Conflict of Interest

All authors (Fidel Mar G. Sebastian, RND, MPH; Wilhelmina A. Mercado, MD, MHA; Maria Victoria A. Rondaris, MD, MPH; Mary Agnes S. Regal, MD, MPH, MSc; and Ermengard C. Gemira, RND) declare that the paper was written in the absence of any commercial or financial support from any entity that could be construed to be a potential conflict of interest.

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