Complementary Feeding Counselling Promotes Physical Growth of Infant and Young Children in Rural Villages in Leyte, Philippines

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Abstract
Appropriate infant and young child feeding practices are fundamental to the development of the full human potential of each child. In the Philippines, the impact of infant and young child feeding counselling following the recent WHO recommendations has not been evaluated sufficiently. This study was designed to determine the effect of complementary feeding counselling involving families on the dietary intake and physical growth of infants and young children. A longitudinal study involving 22 families with 6-15 months old children with weight-for-age z-scores < -2SD participated in this study. The intervention group received counselling by the barangay health care providers on the WHO recommended complementary feeding messages. Data on anthropometry were collected monthly for weight and quarterly for length. Dietary intakes were obtained through the 24-hour food recall. Socio-demographic characteristics were generated using pretested questionnaire. At the end of the study, food intake of children improved (fish, meat and poultry, 27 grams vs. 11 grams, \( p=0.003 \) and vitamin A-rich fruits and vegetables, 18 grams vs. 3 grams, \( p=0.033 \)). The mean energy and nutrient adequacy ratios were significantly higher in the intervention group than the control group except for ascorbic acid after the intervention. Intervention group was 250 g heavier and 1.2 cm longer than the control group (WMD 0.38, \( p=0.09 \); WMD 0.60 SD, \( p=0.041 \)). This study provides evidence that counselling on appropriate complementary feeding involving families can be used to improve infant and young children growth even under impoverished condition.

Keywords: family-based complementary feeding counselling, 24-hour food recall, dietary intake

Introduction
The World Health Organization defines complementary feeding as the process starting when breastmilk is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods are needed, along with breastmilk. Generally, 6 to 24 months of age is considered as the complementary feeding period for infants and young children.

Bhandari et al. (2004) observed that in developing countries, complementary feeding is characterized by inadequate amount of calories, protein, and micro-nutrients. These inappropriate complementary feeding practices contributed to the high levels of malnutrition, morbidity, and mortality among infants and young children (Huffman et al., 1994). The physical growth of young children is influenced by the dietary intake which in turn is determined by the knowledge and practices on complementary feeding of the mothers/caregivers and the availability of food at the household level.

Research and experiences in the field have shown that implementation of educational intervention such as counselling leads to improvement of physical growth of infant and young children. This fact is evident in the studies of Bhandari et al. (2004), Hotz and Gibson (2005), Santos et al. (2001), Vitolo et al. (2005), Guldan (2000), Roy et al. (2005), and Dewey and Adu-Afarwuah (2008) proving that education about complementary feeding
as the main treatment had a modest effect on weight (mean effect size = .28; range -0.06, 0.96) and linear growth (mean effect size 0.20, range 0.04, 0.64).

As in other countries, complementary feeding is pervasive in the Philippines. In fact, only 39.4% percent of the 6 to 11 months old children and 21.6% of 12 to 23 months old were breastfed and given complementary foods, respectively. Only 17.1% of the children were breastfed up to 12 to 23 months old (FNRI, 2010). These feeding practices is far based on the WHO-PAHO guiding principles for complementary feeding of the breastfed child.

Region 8 (Eastern Visayas) is among the top five nutritionally depressed regions in the Philippines with an underweight (0-5 years old) prevalence of 32.1% based on the latest FNRI (2008) survey. Initial training of health care providers on infant and young children has been started in the region but little is known about the existing complementary feeding practices among mothers/caregivers. Likewise, the potential impact of complementary feeding counselling on the physical growth of infant and young child needs to be assessed.

This paper investigated whether the family-based complementary feeding counselling as an approach has a significant impact on the physical growth of the infant and young children.

Materials and Methods

Participants

Participants in the study included 22 and 21 families with 6 to 15 month-old children with weight-for-age z-scores < -2SD in the intervention and control villages, respectively. The intervention group received counselling by barangay health and/or nutrition workers on the WHO recommended complementary feeding messages. Control group received the routine health and nutrition program of the local government units.

Research Design

This study used the experimental research design. A control and intervention group was randomly assigned and measurements of variables under study were measured before, in between and after the intervention.

A longitudinal prospective study was undertaken for a period of ten months from March to December 2011. The pre-post test design was employed using random sampling with inclusion criteria and random allotment of villages to intervention and control group.

From the districts that met the inclusion criteria, two were randomly chosen as study sites and assigned to intervention group (family counselling) and the other to control group (current nutrition activities) by flipping a coin done by the statistician who was not directly involved in the study. All villages in the two districts with families of underweight and severely underweight children 6 to 15 months old meeting the inclusion criteria were enrolled in this study. Thus, this had involved six villages for the intervention and five for the control groups, respectively. Children with severe illnesses or handicap affecting development, feeding or activity were excluded. The children, however, having severe illness were referred to the health center for immediate action.

Ethical Approval

Prior to the selection of the study sites, approval was sought from the Local Chief Executive of the City of Ormoc, City Health Office and Barangay Officials. Since it is culturally not appropriate in the Philippine setting to get the signature of the mothers to participate in the study, oral informed consent was sought instead. The nature and detailed procedures of the study was explained to the families involved.

Intervention

Health care providers who care for women and children after the perinatal period have a key
role to play in promoting appropriate complementary feeding practices. However, many health workers cannot fulfil this role effectively because they have not been trained to do so. Little time is assigned to breastfeeding and complementary feeding counselling and support skills in the curricula of health care providers (WHO, 2004). It is often been difficult for health workers to discuss with families how best to feed their young children due to the confusing, and often conflicting, information available. Health care providers focuses on the regular program of the government on health related activities such as the regular weighing of children, assisting in the immunization program, and the like. Thus, the Rural Health Midwives (RHMs), Barangay Nutrition Scholars (BNSs), and Barangay Health Workers (BHWs) in the intervention group were provided a 24 hours (three days) training on the WHO Infant and Young Child Feeding (IYCF) Counselling (WHO, 2004). The training focused on the following 10 key messages on complementary feeding developed by WHO (2004):

8. A growing child needs increasing amounts of food.
9. A young child needs to learn to eat: encourage and give help with lots of patience.
10. Encourage the child to drink and to eat during illness and provide extra food after illness to help them recover quickly.

The training course was divided into 15 sessions. A variety of teaching methods were used including lectures, demonstrations, role play, workshops, field work and exercises. Theoretical information on complementary feeding was discussed first before the counselling skills was practiced through role playing. After the training, the Barangay Nutrition Scholars and Barangay Health Workers conducted the family counselling. Health workers are village volunteer workers who work with caregivers of young children under the supervision of the rural health units. The health workers in the control group had no training on IYCF Counselling.

The families of the intervention group received family counselling on IYCF for 9 months plus the routine program of the Local Government Unit. Members of the family who were available during the visits were included in the counselling. The messages given to the family members in their home were based on the 10 guidelines on complementary feeding. The following content were included in the counselling:

1. Importance of complementary feeding;
2. Foods to fill the energy gap;
3. Foods to fill the iron and vitamin A gaps;
4. Quantity, variety, and frequency of feeding;
5. Feeding during illness and recovery.

Messages on recommended health practices such as the importance of immunization and proper hygiene and sanitation, and the
importance of consistent and regular monitoring of the growth and development of their children were also included in the counselling. Messages based on those recommendations were translated into the vernacular. The counselling was done at home once every two weeks for the succeeding nine months. The control group received only the routine program of the Local Government Units.

The families with 6-15 months old children at the beginning of intervention were assigned among the number of trained health care workers in each village in the intervention group. Each BHW counselled the mothers/caregivers assigned to her. The minimum number of children for each of the trained BHW was one with two as maximum.

Data Gathering Procedure

Questionnaire

Surveys using structured pre-tested questionnaire were administered before the start of the study and at the end of intervention period to determine the socio-economic and demographic information of the family and the children. Mothers/caregivers of the children were interviewed face to face about their socio-economic status.

Anthropometric Measurement

Weight of infant and young children was measured monthly during the last week of the month for the duration of nine months using a calibrated salter weighing scale (to the nearest 0.1 kg). Length (to the nearest 0.1 cm) was measured during the baseline and every after three months until the end of intervention using length board (World Vision calibrated) locally made to WHO specifications and with a movable foot board.

Dietary Assessment

To determine the food and nutrient intake of the children, food intake was collected using 24-hour food recall. It was administered thrice a month after the intervention started. The designated days were varied so that all seven days were represented. Mothers/caregivers were asked to remember the foods eaten by their children in one day 24-hour food recall. This was conducted for three days (two weekdays and one weekend) once a month until nine months.

Data Analysis

Baseline characteristics were compared between the intervention and control groups with Student’s t-test for normally distributed continuous variables, and the chi-square test for categorical variables. The t-test was used to determine statistical significance of the observed differences between control and intervention group. To evaluate the impact of the intervention, the groups were compared before the intervention and after the intervention, by chi-square test and t-test. General Linear Model (GLM) and repeated-measures analysis of variance (ANOVA) was used to compare the control and intervention groups and age groups through time. The baseline data of the major outcome indicators were used as co-variates in the analysis of variance to adjust every parameter to equal level. To assess the impact of the intervention on the physical growth of infant and young children, weighted mean difference (WMD) or effect size was calculated. Effect size was categorized as small (0.2), medium (0.5), and large (0.8) (Dewey et al., 2008). Statistical significance was accepted at a 5% probability level with 95% confidence interval.

Quality Control

Strict blinding of interviewer regarding the intervention on control status of health care providers, mothers and children were
observed. Pretested standardized interview schedule form and detailed interview guides were used in the study. Research assistants/enumerators were alternately assigned to intervention and control villages and were trained on the WHO child growth standards.

Results and Discussion

Description of the Participants

The intervention group had more male children (54.5%) than the control group (47.6%). However, the ratio between sexes in both groups was almost one is to one. Two-thirds (66.7%) of the children in the control group belonged to the age group between 12 to 15 months old while half of the children in the intervention group belonged to the same category.

At baseline, the mean weight-for-age z-scores, length-for-age z-scores and weight-for-length z-scores of all children based on the WHO-CGS were comparable in the intervention and control group. Mean weight-for-age z-score for the children 6-8 and 9-11 months in the control group was lower compared to the intervention group. The mean weight-for-age z-scores in all groups were not significantly different.

The mean length-for-age z-score among 9-11 months of the intervention group was higher than the control group, while the mean LAZ score among the 6-8 and 12-15 age group in the control group was higher than the intervention group. Mean weight-for-length z-score of the intervention group was higher than the control group.

Food, Energy, and Nutrient Intake from Complementary Foods

The total food intake from complementary foods of ever-breastfed children of both intervention and control groups at baseline did not significantly differ in almost all food groups except for milk intake. The significant difference of milk intake at baseline could be attributed to the high milk intake of one child in the intervention group who was temporarily left to the care of the grandmother. The grandmother reported that she found her grand child pitiful upon knowing the nutritional status, thus, she gave milk to the child aside from the solid and semi-solid foods. She believed that milk will make her grand child grow well.

At baseline, the mean one-day food intake from complementary food of the ever-breastfed 6 to 24-month old children in both the control and intervention groups weighed 220 grams and 272 grams of edible portions, respectively. In the control group, the 220 grams consisted of rice and rice products and the remaining amount came from fish, egg and milk. While in the intervention group, the 272 grams consisted of 226 grams of rice and rice products and 6 grams of fish, meat and poultry products and 22 grams of milk usually of an instant filled milk powder among others. Children in both the control and intervention groups consumed rice that contributed to 85% and 83% of their food intake, respectively. As regards contribution to the total food intake, the mean food intake of fish, meat and poultry products was only 5% for the control group and 3% for the intervention group.

At the end of the intervention, the overall mean food intake of ever-breastfed children in the intervention group was higher compared to control group. For the ever-breastfed children, the intervention group had significantly higher mean intake than the control group in fish, meat, and poultry (27g vs. 11g, \( p=0.003 \)) and vitamin A-rich fruits and vegetables (18g vs. 3g, \( p=0.033 \)). The increased consumption of these food groups could be attributed to the continuous counselling on the importance of animal foods to help the child grow strong and healthy and the promotion of the consumption of locally available dark green leafy vegetables and orange-colored fruits and vegetables. A similar
Table 1: Distribution of participants by sex, age and nutritional status based on z-scores.

<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>CONTROL GROUP (n=21)</th>
<th>INTERVENTION GROUP (n=22)</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>10</td>
<td>12</td>
<td>0.65</td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Age, months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-8</td>
<td>5</td>
<td>6</td>
<td>0.415</td>
</tr>
<tr>
<td>9-11</td>
<td>2</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>12-15</td>
<td>14</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Weight/age Z-score¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All children</td>
<td>-2.97 ± 0.61</td>
<td>-2.71 ± 0.40</td>
<td>0.108</td>
</tr>
<tr>
<td>6-8</td>
<td>-3.36 ± 0.61</td>
<td>-2.78 ± 0.55</td>
<td></td>
</tr>
<tr>
<td>9-11</td>
<td>-3.36 ± 0.13</td>
<td>-2.64 ± 0.34</td>
<td></td>
</tr>
<tr>
<td>≥12</td>
<td>-2.78 ± 0.57</td>
<td>-2.71 ± 0.35</td>
<td></td>
</tr>
<tr>
<td>Height/age Z-score¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All children</td>
<td>-2.73 ± 0.97</td>
<td>-2.70 ± 0.94</td>
<td>0.912</td>
</tr>
<tr>
<td>6-8</td>
<td>-2.65 ± 1.20</td>
<td>-2.77 ± 1.33</td>
<td></td>
</tr>
<tr>
<td>9-11</td>
<td>-2.89 ± 0.08</td>
<td>-2.07 ± 0.29</td>
<td></td>
</tr>
<tr>
<td>≥12</td>
<td>-2.74 ± 0.99</td>
<td>-2.94 ± 0.81</td>
<td></td>
</tr>
<tr>
<td>Weight/height Z-score¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All children</td>
<td>-1.87 ± 0.78</td>
<td>-1.64 ± 0.35</td>
<td>0.311</td>
</tr>
<tr>
<td>6-8</td>
<td>-1.82 ± 0.96</td>
<td>-1.26 ± 1.20</td>
<td></td>
</tr>
<tr>
<td>9-11</td>
<td>-2.91 ± 0.55</td>
<td>-2.08 ± 0.47</td>
<td></td>
</tr>
<tr>
<td>≥12</td>
<td>-1.75 ± 0.68</td>
<td>-1.64 ± 0.73</td>
<td></td>
</tr>
</tbody>
</table>

¹ Values are means ± SD.

找到的研究发现，在中国的研究中（Shi et al., 2009），在补充喂养实践的有效性中，干预组的儿童显著比例更高，他们消耗了肉类、鸡蛋、深绿色叶菜、水果和豆类，与对照组在6、9和12个月的数据相比。Dewey et al. (2004) 在其系统综述中，评估了补充喂养实践在发展中国家的效用和有效性，发现关于孩子的喂养教育（其中包括对喂养营养丰富的动物源性食物的强烈重视）是一种有效的方法。

与国家营养调查（2008）的结果相比，两岁儿童在干预期间的每日食物消费量更高（574克，可食用部分）比全国的平均水平（493克，生的购买）更高。这些发现支持了教育母亲/照顾者采取适当的补充喂养实践的必要性，这可以提高她们对特定关键信息的了解，从而提高儿童的食物摄入量。

A study on nutrition knowledge and attitude on Omani children’s dietary intake (Al-Shookri et al., 2011) found a positive relationship between children’s dietary food intake scores with the knowledge and attitude of mothers. Results of this study imply that despite the impoverished condition of the families with average monthly income of less than Php 5,000.00 which was below the poverty threshold (annual per capita) of Php 15,910.00 (NEDA-Region 8, 2009), it is still possible to improve food intake of children. When families recognize the importance of the role of appropriate food for the welfare of
the children, they will likely sacrifice other family needs and make food as their priority.

**Energy and Nutrient Intake**

The energy and protein intake from complementary foods of the 6-24 months children were compared to the RENI for Filipino children (FNRI, 2000) to determine percent adequacy ratio. After adjusting for the baseline energy adequacy ratio, results showed that the least square mean for energy adequacy ratios of the ever-breastfed children in the intervention group were significantly higher ($p<0.05$) starting month five (89.7%), six (74.4%), seven (78.3%), eight (84.2%) to month 9 (93.8%) compared to the control group (49.6%, 52.3%, 55.7%, 49.4% and 57.1% for months 5 to 9, respectively). The increasing intake of rice and rice products from month five to month nine among the ever-breastfed 12 to 24 month old children in the intervention group contributed to the increased energy intake. Mean rice consumption of 233 grams contain at least 300 kcal and provide 28% of the total recommended energy intake for the 12 to 24 months old children while the 398 grams could provide almost half (48%) of the...

Figure 1: *Comparison of the mean one-day food intake in grams edible portion from complementary foods of the ever-breastfed 6 to 24 months old children by intervention status.*
Table 2: Comparison of mean energy and nutrient adequacy ratio from complementary foods of ever-breastfed 6-24 months old children at baseline and endline by intervention status.

<table>
<thead>
<tr>
<th>NUTRIENT</th>
<th>CONTROL BASELINE</th>
<th>CONTROL ENDLINE</th>
<th>INTERVENTION BASELINE</th>
<th>INTERVENTION ENDLINE</th>
<th>P-VALUE</th>
<th>P-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kcal)</td>
<td>47.83±28.24</td>
<td>55.34±23.65</td>
<td>0.367</td>
<td>58.56±41.87</td>
<td>.002**</td>
<td></td>
</tr>
<tr>
<td>Protein (g)</td>
<td>40.05±33.86</td>
<td>52.22±23.28</td>
<td>0.148</td>
<td>54.54±52.65</td>
<td>0.746</td>
<td></td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>20.17±16.93</td>
<td>23.05±16.50</td>
<td>0.635</td>
<td>50.57±31.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>30.63±27.94</td>
<td>58.02±95.25</td>
<td>0.255</td>
<td>107.15±93.96</td>
<td>.018*</td>
<td></td>
</tr>
<tr>
<td>Vitamin A (µg RE)</td>
<td>15.62±17.64</td>
<td>13.81±20.77</td>
<td>0.798</td>
<td>43.94±36.36</td>
<td>0.803</td>
<td></td>
</tr>
<tr>
<td>Ascorbic acid (mg)</td>
<td>11.40±13.94</td>
<td>13.83±18.89</td>
<td>0.649</td>
<td>48.45±52.72</td>
<td>0.56</td>
<td></td>
</tr>
<tr>
<td>Thiamin (mg)</td>
<td>41.14±39.44</td>
<td>45.58±33.91</td>
<td>0.721</td>
<td>103.19±70.58</td>
<td>0.288</td>
<td></td>
</tr>
<tr>
<td>Riboflavin (mg)</td>
<td>41.78±37.17</td>
<td>45.58±33.91</td>
<td>0.731</td>
<td>105.14±63.15</td>
<td>0.498</td>
<td></td>
</tr>
<tr>
<td>Niacin (mg)</td>
<td>28.64±40.84</td>
<td>55.83±24.64</td>
<td>.009**</td>
<td>101.67±51.89</td>
<td>.009**</td>
<td></td>
</tr>
</tbody>
</table>

*values are means±SD  **significant at p=0.01  *significant at p=0.05

Recommended amount for energy intake. Other sources of energy among children in the intervention come from other cereal products mostly coming from the bread and biscuits eaten by children as snacks. These foods were commonly present in many small sari-sari or retail store even in interior villages at an affordable price. The commercial powdered milk mostly filled and instant milk given during breakfast and snack time also contributed to energy intake. Powdered milk intake of the 12 to 24 months old children in the intervention group ranged from 16 to 25 grams. The 25 grams of instant filled milk powder contains 127 kcal and contributed at least 12% of the energy intake.

In months 8 and 9, consumption of fish and poultry (25 g and 31 g), eggs (19 g and 40 g) and dried beans (mungbeans) (27 g and 40 g) were high in the intervention group. These had contributed to the increase protein intake in addition to the contribution of protein from rice which was 2.1 gram per 100 gram boiled rice (FCT). Mothers were counselled on the importance of including animal sources in the diet of children. This influenced the practice of mothers/caregivers to include fish and eggs and other animal products in the diet of their children.

The counselling of mothers/caregivers by the health and nutrition workers on the addition of one to two cups of milk per day for the not ever-breastfed children had motivated the mothers to give milk to their children. It can be noted that despite the limited income of the families they were able to squeeze their budget to be able to buy milk and other nutritious food for the child.

This implies that families recognized the importance of providing nutritious food to their child because they were provided with the appropriate information as basis for decision making as to what food to give to the child.

Comparison of mean energy and nutrient adequacy ratio from complementary food of the ever-breastfed children at baseline and endline showed that energy, iron and niacin were significantly higher in intervention group \( (p=0.002; \ p=0.018 \ and \ p=0.009, \ respectively) \) at the end of the intervention. While in the control group, only the niacin adequacy ratio was significantly higher \( (p=0.009) \) at the end of intervention (Table 2). A study in Bangladesh (Brown et al., 1992) on the impact of weaning food messages on infant feeding practices and child growth showed that children in the intervention group consumed a significantly greater percent of their energy and protein requirement from complementary foods than did control group.

Overall mean energy and nutrient adequacy was consistently higher among children in the
intervention group than the control group except for ascorbic acid (Figure 2). The nutrient with highest adequacy of intake was thiamin, providing more than 100% of the recommended intake for children in the intervention group. Thiamin intake mostly came from the commercial milk intake of the children given during snack time. Energy, protein and iron intake (77%, 74.4% and 78%, respectively) of children in the intervention group provided more or less three-fourths of the recommended amount. While the control group intake of the same nutrient provided only more than half of the recommended amount.

Effect on Weight Gain

Weight gain (kg) of children was computed every month for nine consecutive months. To determine the effect of the intervention on the weight gain of children, GLM and repeated measures ANOVA were used. The baseline weight of children was used as covariate since baseline weight of children has a significant effect on weight gain in months 7-9 ($p=0.025$, $p=0.002$, and $p=0.018$, respectively). Children who started heavier at baseline gained more weight at months 7-9 compared with those who weighed lighter. For every one kilogram heavier baseline child weight there is a decrease of 0.18 kg. After adjusting for baseline weight, results showed that children in the intervention group gained more weight than those in the control group at the end of the intervention. The mean cumulative weight gain was 1.45 kg in the intervention group compared to 1.19 kg in the control group ($p=0.09$). During the third month, children in the intervention group gained more weight than the control group ($p=0.04$). However, during the fourth month, large difference in weight gain occurred where the intervention group lost much weight compared to the control group ($p=0.008$) (Figure 3). The significant decrease in weight gain among children in the intervention group was due to illness. Twenty seven percent of the children in the intervention group had diarrhea during the fourth month and few had fever. Probable cause of diarrhea maybe attributed to the unsafe source of drinking water of almost three-fourths of families who got drinking water from artesian/dug well. During the fourth month of the study, the area experienced heavy rains which resulted to unsafe water source.

Effect on Length Gain

Rate of change in length/height (length/height velocity) is a more sensitive measure of growth than time-specific
length/height measures (Merck Manual, n.d.). In this study, height velocities were obtained every three months by calculating the difference between measurements obtained at the beginning and end of each quarter. In the analysis by GLM and repeated measures ANOVA, the baseline length and age of children were used as covariates. Baseline length of children has a significant effect on length during the first and second quarter ($p=0.03$; $p=0.004$, respectively). Children who were longer at baseline had lower length gain at quarter one and quarter two. For every 1 cm longer baseline length there is a lower length gain by 0.11 cm and 0.12 cm at quarter 1 and quarter 2, respectively. Baseline age of children had a significant effect only in quarter 3 ($p=0.004$). Children who were older at baseline had lower length gain compared to younger children. For every one month older baseline age, there is a lower length gain by 0.16 cm at quarter 3.

After adjusting for baseline length and age of children, results showed that mean length gain among intervention group was higher compared to control group except during the third quarter. After three months, the length gain (3.77 cm, 3.72 cm, adjusted for baseline length and age, respectively) for intervention group was significantly higher ($p=0.006$) than the control group (2.54 cm; 2.59 cm) (Figure 4, Figure 5). In a similar study in India (Bhandari et al., 2001) where length was a major outcome indicator, greater length gain was observed at 6-12 months, but not at 12-18 months of age. This observation is expected because during the first quarter, 27.3% and 23.0% of the children in the intervention and control groups, respectively were less than one year of age. The rate of change in length during the first year of life (1.3 cm/month) is higher than those between 12 months and 10-year old (7.5 cm/year or 0.63 cm/month) (Merck Manual, n.d.). The observed mean increase in length gain during the first quarter after the intervention, however, still fell short from the expected increase which was 3.9 cm for three month period. As a consequence, 50.0% and 60.0% of 6 to 11 months old category in the intervention and control groups, respectively were stunted based on CGS-WHO standard. The cumulative length gain during the succeeding quarters were on decreasing trend for both groups, but the difference was not statistically significant. Although it was expected that the rate of change in length was slower among children more than 12
months old compared to less than 1 year old, the observed cumulative length gain for the second and third quarters were lower than the normal standard length-for-age. Thus, 63.6% and 71.4% among the children in the intervention and control groups, respectively were stunted during the second quarter. The proportion of stunted children increased during the third quarter, higher in the intervention (81.8%) group compared to control group 76.2%. However, the difference was not significant ($p=0.650$). Overall mean cumulative length gain over the study period using general linear model (GLM) and repeated measures analysis of variance ANOVA adjusted for baseline length by analysis of covariance showed that mean cumulative length gain of the intervention group (8.08cm) was higher ($p=0.041$) than the control group (6.91cm), a difference of
Although there was an observed increase in the length of children among all groups, the rate was too slow that these were not translated to the improvement of length-for-age or weight-for-length nutritional status.

Findings of this study showed that family-based complementary feeding counselling had a significant positive impact on length gain (effect size 0.60 and \(p = 0.034\)). Similar observation was found in Peru (Penny et al., 2005), where at 18 months (duration of the study, however, was longer compared to this study), children in the intervention group were 1 cm taller and three times less likely to be stunted and found to have an effect size = 0.49 for length-for-age.

**Association of Nutrient Intake of Children with Physical Growth of Young Children**

Nutrient intake is a major determinant of physical growth. Results in this study showed that energy and nutrient intake of children was higher among the intervention group but still fell short of the recommended amount. Intake of children of energy \((p = 0.014)\), protein \((p = 0.004)\), ascorbic acid \((p = 0.041)\) and thiamin \((p = 0.028)\) were positively associated with weight gain [Table 3]. This implies that the increase in weight among children was attributable to the increase in the intake of these nutrients specifically energy and protein as these nutrients had major role in promoting growth.

**Conclusion**

Complementary feeding counselling promotes physical growth of infant and young children. Family-based counselling on complementary feeding was significantly associated with increased length velocity among children in the intervention group. This implies that emphasis on appropriate feeding and care behaviour can be used to prevent and address early childhood malnutrition in poor households. Children in the intervention group was 250g heavier and 1.2 cm longer than the control group.

Food and nutrient intake from complementary food were significantly higher in the intervention group although the amount still fell short of the recommended amount for energy and nutrient intake. The energy and nutrient intake however, did not account for the contribution of breastmilk due to the relative difficulty in determining actual amount of breastmilk intake.

**Recommendation**

From the lessons gleaned from this study, it is evident that despite the non-provision of food supplements by the government, dietary intake and eventually physical growth of young children can be improved through family-based complementary feeding counselling. The following recommendations are hereby proposed:

1. Realizing the importance of appropriate complementary feeding practices, promotion on the global guidelines for complementary feeding for the breastfed child must be intensified by health care providers in the villages. In order to ensure that health service providers can deliver the service to the target families, they should be equipped with the necessary skills not just the technical content of breastfeeding and complementary feeding but also their capability to counsel the nutritionally at-risk families. The above recommended practices must be complemented with cooking demonstrations utilizing locally available foods but increasing their energy and nutrient density (e.g. porridge with sauteed squash and eggs, porridge with chicken liver, etc.). Moreover, regular monitoring and feedbacking of child growth must be intensified to encourage mothers to look after the health and nutritional status of the child.
Table 3: Summary of correlation results of nutrient intake of young children (6-24 months) with their physical growth.

<table>
<thead>
<tr>
<th>INDICATORS</th>
<th>WEIGHT GAIN</th>
<th>LENGTH GAIN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r-value</td>
<td>p-value</td>
</tr>
<tr>
<td>Energy</td>
<td>0.516</td>
<td>0.014*</td>
</tr>
<tr>
<td>Protein</td>
<td>0.583</td>
<td>0.004**</td>
</tr>
<tr>
<td>Calcium</td>
<td>0.353</td>
<td>0.107</td>
</tr>
<tr>
<td>Iron</td>
<td>0.326</td>
<td>0.139</td>
</tr>
<tr>
<td>Ascorbic acid (Vitamin C)</td>
<td>0.439</td>
<td>0.041*</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>0.401</td>
<td>0.065</td>
</tr>
<tr>
<td>Thiamin</td>
<td>0.468</td>
<td>0.028*</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>0.412</td>
<td>0.057</td>
</tr>
<tr>
<td>Niacin</td>
<td>0.362</td>
<td>0.098</td>
</tr>
</tbody>
</table>

** significant at p=0.01  
* significant at p=0.05

2. Follow-up home visits can also be conducted to reinforce behavior of mother towards proper complementary feeding practices.

3. Promotion on the establishment of home food production despite limited space to provide sources of food for the family must be intensified.

4. The provision of a more sustainable livelihood projects be intensified to augment family income and thereby increasing household food accessibility or the ability to purchase food for the family. This will be complemented by educational activities promoting the consumption of a variety of foods by the family, most especially the children.

5. Safe water and sanitation should be integrated in the counselling as these are major threats to the nutritional status and development of infant and young children.

6. Responsible parenthood should also be a component of the infant and young child feeding program since about one-fourth of the mothers in this study had more than one 6 to 24-month-old children which indicated that child spacing was too short resulting in the early termination of breastfeeding.

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