

ORIGINAL ARTICLE

Barriers to compliance with the Daily Food Guide for Children among first-grade pupils in a rural area in the Philippine Island of Mindanao

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Background/objective: To identify and address caregivers' perceived barriers to compliance with dietary guidelines for children.

Subjects/methods: Information on family socioeconomic status, child's consumption frequency of nine food items, and caregiver's attitudes and behaviors regarding meal preparation were collected through structured interviews with caregivers (70 mothers, four grandmothers and one father) of first-grade children (39 boys and 36 girls) living in five barangays of New Corella, Mindanao Island, Philippines. If the child's intake did not reach the level recommended in the dietary guidelines, the reasons were investigated from the economic, social, cultural and environmental viewpoints.

Results: Their diet relied heavily on rice and others. The percentages of children who did not consume each of the food items on a daily basis were 77.3% for eggs; 57.3% for milk; 41.3% for fish/meat/poultry/dried beans/nuts (FMPDBN); 42.7% for fruits; 17.4% for green, leafy and yellow (GLY) vegetables; and 38.5% for other vegetables. The most reported reasons for the infrequent consumption of FMPDBN (87.1%), milk (81.4%) and eggs (36.2%) were 'no money to buy,' that of fruits (59.4%) was 'out of season' and that of GLY (61.5%) and other vegetables (55.2%) was 'child's dislike.'

Conclusions: The expansion of homestead food production and the national feeding program contribute to increased animal food consumption. Nutrition education aimed at overcoming food preferences and increasing the awareness of micronutrient intake are perhaps the most effective means to promote vegetable intake.

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Introduction

Child malnutrition remains a major public health issue in many developing countries (de Onis and Blossner, 2003). In the Philippines, an island nation in Southeast Asia, an

estimated 36.5 and 26.7% of children aged between 6 and 10 years were stunted and underweight, respectively (Food and Nutrition Research Institute, 2003a). In particular, in Davao del Norte – where the present study area is located – the prevalence of underweight (35.0%) and wasting children (8.9%) under the age of 5 years was higher than their respective national averages of 32.0 and 6.0% (Food and Nutrition Research Institute, 1998).

To improve the nutritional status, many countries have published dietary guidelines and food guides for the people (Ministry of Health, Labour and Welfare of Japan and Ministry of Agriculture, Forestry and Fisheries of Japan, 2005; US Department of Health and Human Services and US Department of Agriculture, 2005; Food and Nutrition Research Institute, 2000, 2004a). Although dietary reference intakes are developed for professional use, dietary guidelines

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and food guides are designed to be used by the public. The descriptions provided are simple and the expressions used are easy to understand. In developing countries, however, there appear to be some barriers to compliance with these food guides.

There are two clusters of underlying causes that lead to inadequate dietary intake among children: inadequate access to food and inadequate care for children (UNICEF, 1998). Access to food is chiefly regulated by economic, social, cultural and environmental factors (Gittelsohn and Vastine, 2003). Although there are abundant foods available in the market, poor families cannot afford them. Food intake of the people particularly in rural areas depends on access to agricultural resources. The extended UNICEF (1990) model of care also shows that child survival, growth and development depend on the behaviors of caregivers. Care behaviors for children include breastfeeding and the feeding of young children, hygiene and health practices, food preparation and storage, and psychosocial stimulation.

In this study, the food intake of the first-grade pupils was assessed based on the food frequency questionnaire (FFQ) and was compared with the dietary recommendations in the Daily Food Guide for Children (DFGC) (Food and Nutrition Research Institute, 2004a). Although many studies have addressed the nutritional status of children in developing countries, there has been comparatively little research conducted on the dietary patterns of school children relative to national dietary recommendations, as has been performed in this study (Candelaria *et al.*, 2005; Keskin *et al.*, 2005). Based on the comparison with the DFGC, the potential economic, social, cultural and environmental barriers to following the recommended food intake among children were examined through structured interviews with their caregivers. Caregivers' attitudes and behaviors in meal preparation and their interest in nutrition were also evaluated, as care behaviors were found to be one of the important factors related to the dietary intake among children (UNICEF, 1998). As regards social support or community resources, caregivers were requested to evaluate the current feeding program in the area. This study aimed to (1) evaluate the diets of first-grade school children in a rural area in the Philippines relative to the dietary recommendations provided in the DFGC; (2) identify caregivers' perceptions of the barriers to improving children's dietary patterns; (3) provide recommendations on how to address such barriers; and (4) discuss the possible measures to improve children's food intake.

Methods

Study sites

Davao del Norte is located in the southern part of Mindanao Island in the Philippines. It is subdivided into eight municipalities and three cities. The study area, New Corella, is one of the eight municipalities. It has a total area of

321.48 km², and there are 20 barangays in this municipality (Provincial Government of Davao del Norte, 2002). The average temperature ranges between 27.5 and 28.8°C, and the monsoons last from November through February. The population size of New Corella was 44 590 in 2000, with an average annual population growth rate of 1.49%.

The field study was conducted in five barangays in New Corella, namely, Poblacion (central), Santo Nino (west), Mesaoy (south), New Bohol (east) and Maming (north). Each barangay has an elementary school. Their main source of income is agricultural production and processing. They are also engaged in handicrafts such as mat weaving. This study was conducted with the support of the Institute of Primary Health Care Davao Medical School Foundation (IPHC), and the five barangays were selected by the IPHC, with due consideration given to the security problems.

Subjects

We conducted structured interviews with 70 mothers, four grandmothers and one father who lived in the five barangays and who were the main caregivers of their first-grade children, aged between 5 and 8 years. From the list of households having a child studying in the first grade, 75 caregivers (15 from each barangay) were selected by the local interviewers based on the accessibility to their houses, as there is a danger of terrorist bombing and abduction in the study area. We did not use a random sampling method because of the possibility that we would be unable to visit some of the selected households as a result of the security problems.

They were informed about the objectives of the study and explained the fact that participation in the interview was completely voluntary. All the caregivers agreed to participate in the study.

Permission to conduct this survey was obtained from the Department of Education of the Philippines and the municipal government of New Corella. The ethical guidelines for epidemiological research prepared by the National Institute of Public Health were also fulfilled.

Data collection

Home-visiting interviews were conducted during a 10-day period in August 2005. Using a structured questionnaire, the caregivers were interviewed by a team comprising a native interviewer and a Japanese researcher (EF) or by a native interviewer alone. The two native interviewers were recruited from the IPHC. Anthropometric data of the children were obtained from their school teachers.

Anthropometric measurements. In June 2005, the standing height and body weight of the first-grade pupils in all elementary schools in New Corella were measured by two school nurses who are registered as school nurses of Davao del Norte by the Department of Education. The height and

weight were recorded to the nearest 1 mm and 0.1 kg, respectively. Z-scores were used in the evaluation of child nutritional status. Height-for-age, weight-for-age and weight-for-height were compared with the international reference data of the National Center for Health Statistics (NCHS)/WHO. In cases when they were mean -2 s.d., the children were classified into stunting, underweight and wasting, respectively, and they were regarded as malnourished.

Structured interviews

Socio-demographic information. Information regarding caregivers' academic qualifications, parental occupation and the number of children in the family was obtained. House income was estimated based on the parental occupation. The occupations of the fathers were classified into three groups – low-, middle- and high-income jobs – based on the information obtained from the IPHC staff. The mothers' occupations were classified into two groups: homemakers and wage earners.

Food frequency questionnaire. Seven of nine food items in the newly developed FFQ were extracted from the DFGC (Food and Nutrition Research Institute, 2004a). They were (1) green, leafy and yellow vegetables (hereafter, GLY vegetables), (2) other vegetables, (3) fruits (vitamin C-rich and others were combined), (4) rice and others, (5) fish/meat/poultry/dried beans/nuts, (6) egg, and (7) whole milk (Supplementary Table). The DFGC constitutes child-specific nutritional guidelines that have been developed differently from the Nutritional Guidelines for Filipinos (Food and Nutrition Research Institute, 2000); however, most of the study subjects were not familiar with it. Although the recommended amounts are provided in the DFGC, we asked the caregivers to provide information with regard to their children's average consumption frequency of each food item, as the caregivers seemed to find it difficult to recall the amounts of intake. An item on fortified foods and sweets was added to the FFQ. There were eight possible degrees of responses ranging from 'almost never' to 'three times or more per day.'

FFQ is often used for dietary assessment in developing countries in order to avoid the influences of day-to-day variations in the consumption of expensive foods, which prevail to great extents in these areas (Willett, 1998; Sudo et al., 2004, 2006; Keskin et al., 2005). Our FFQ survey, which targeted a smaller number of food items as compared to many other studies, was particularly suitable for this population with a dietary pattern that seldom varied on a day-to-day basis or differed from household to household, primarily because the interview was completed in an average of only 3 min per subject.

The DFGC recommends that the food listed be consumed on a daily basis, at least once a day. When the consumption frequency was observed to be less than once a day, the caregivers were asked the reason for the observed frequency.

Multiple responses were allowed for this question and the eight alternative reasons were (1) not domestically produced, (2) domestically produced but poorly yielded, (3) no money to buy, (4) difficult access to the markets, (5) out of season, (6) child's dislike, (7) lack of culinary skills, and (8) religious reasons. Other reasons were recorded as open-ended comments.

In addition, the children's consumption frequency of breakfast, lunch and dinner was investigated based on the question 'how often does your first-grade child eat breakfast, lunch and dinner?' Their caregivers were requested to choose the answer from five alternatives: 'never,' 'once a week,' '2–4 times a week,' '5–6 times a week' and 'once a day.'

Caregivers' attitudes and behaviors in meal preparation. The caregivers' attitudes and behaviors in meal preparation were assessed by requesting them to answer the following questions with a 'yes' or 'no':

1. 'Do you prepare meals with whatever food is available without any nutritional consideration?'
2. 'Do you try to serve a variety of foods every day?'
3. 'Do you give nutritional consideration to the meal?'
4. 'Do you maintain child's normal growth through proper diet and monitor his/her growth regularly?'
5. 'Do you use iodized salt but avoid excessive intake of salty foods?' and
6. 'Do you prepare clean and safe foods?'

All of the above mentioned questions apart from questions (1) and (3) were extracted from the Nutritional Guidelines for Filipinos (Food and Nutrition Research Institute, 2000), which most of the study subjects were not familiar with. Any other comments mentioned by the caregivers were recorded in the category 'Others.'

Caregivers' interest in nutrition. The caregivers' interest in nutrition was assessed based on the question 'Would you like to learn more about nutrition?'

Feeding program evaluation. In the Philippines, the School Health and Nutrition Center in the Department of Education introduced the breakfast feeding program in 1996. This program aimed at improving the nutritional status and the active learning capabilities of pupils. However, this has been implemented only in select schools; no school in New Corella has been included in this program (Department of Education, 1996). New Corella conducts its own feeding program in every elementary school by encouraging the contribution of parents. In this program, caregivers visit elementary schools each week and take turns to cook vegetable soup or *vinignit* – a dish made from rice, banana and coconut milk – and distribute it among pupils as a snack. The frequency of implementation and the target age of pupils vary depending on the school. In the school at Poblacion, food is provided on a weekly basis to pupils from the first to the fourth grade. In the Mesaoy elementary

school, food is provided once a week to all pupils who are classified as underweight. In the Santo Nino and Mambing elementary schools, food is provided to all the pupils once

and twice a week, respectively. In the New Bohol elementary school, food is provided twice a week to all the pupils who are judged to be malnourished.

First, the caregivers were asked whether they were aware of the feeding program that was being conducted in the school. If the answer was 'yes,' then they were asked to evaluate the frequency of the program activity by choosing from seven categories ranging from (1) 'few' to (7) 'many.' The contents of the food were evaluated by seven ratings ranging from (1) 'disapprove' to (7) 'approve.' For both frequency and contents, when the answer was other than (7), they were asked for a request or suggestion to the feeding program.

Table 1 Socio-demographic characteristics of the subjects (N = 75)

	N	%
<i>Age of the subject children (years)</i>		
5	2	2.7
6	46	61.3
7	23	30.7
8	4	5.3
<i>Sex of the subject children</i>		
Male	39	52.0
Female	36	48.0
<i>Type of caregivers</i>		
Mother	70	93.3
Grandmother	4	5.4
Father	1	1.3
<i>Age of caregivers (years)</i>		
< 25	3	4.0
25–34	37	49.3
≥ 35	35	46.7
<i>Academic background of caregivers^a</i>		
Mothers		
No education	1	1.4
Elementary school (for less than 3 years)	1	1.4
Elementary school (for more than 3 years)	38	54.3
High school	26	37.1
College	4	5.7
<i>Grandmothers</i>		
Elementary school (for less than 3 years)	1	25.0
Elementary school (for more than 3 years)	1	25.0
High school	2	50.0
<i>Occupation of fathers</i>		
Low-income job ^b	59	78.7
Middle-income job ^c	13	17.3
High-income job ^d	3	4.0
<i>Occupation of mothers</i>		
Homemaker ^e	61	81.3
Job with cash income ^f	14	18.7
<i>Number of children in the family</i>		
≤ 3	45	60.0
> 4	30	40.0

^aAcademic background of the father who was the main caregiver of his child was elementary school (more than 3 years).

^bFarmer, chicken delivery driver, knife maker, gold miner, construction worker, mat weaver, fish seller, utility worker, storekeeper, baker, chainsaw operator and carpenter. Deceased fathers were also included in this category because no cash income is gained in such a case.

^cBarangay counselor, motorcycle driver, security guard, tricycle driver, welder, manager of bakery shop, company worker and jeepney driver.

^dLaborer in a banana plantation.

^eDeceased mother was included in the 'homemaker' category as a result of yielding no cash income.

^fIncluded domestic helper, daycare center teacher, storekeeper and mat weaver.

Results

Socioeconomic status

The socio-demographic characteristics of the children and their caregivers are described in Table 1. More than 60% of the children were 6 years old – the official enrollment age in the Philippines. The number of boys and girls in the sample was nearly equal. With regard to the mothers' academic background, 57.1% of them discontinued their studies at the elementary school level, and only 5.7% of them received college or higher education.

Food intake of children and associated factors

The prevalence of stunting or underweight children was 30.7% (Table 2). Approximately 99% of the children consumed three meals per day. Table 3 lists the consumption frequency of the seven food items and the proportion of

Table 2 Nutritional status of children (N = 75)

Nutritional status ^a	N	%
<i>Height-for-age</i>		
Stunting	23	30.7
Normal	52	69.3
Tall	0	
<i>Weight-for-age</i>		
Underweight	23	30.7
Normal	51	68.0
Overweight	1	1.3
<i>Weight-for-height</i>		
Wasting	19	25.3
Normal	55	73.3
Overweight	1	1.3

Stunting, underweight and wasting < -2 s.d.

-2 s.d. < normal < +2 s.d.

Tall or overweight > +2 s.d.

^aZ-scores were based on growth reference data from the National Center for Health Statistics (NCHS)/WHO international reference population.

Table 3 Consumption frequencies of nine food items among first-grade children

Food items	Three times or more a day	Twice a day	Once a day	5–6 times a week	2–4 times a week	Once a week	1–3 times a month	Almost never	Percentage of children who did not consume the food item on a daily basis
Green, leafy and yellow vegetables	8.0	42.7	32.0	2.7	10.7	1.3		2.7	17.4
Other vegetables	4.0	13.3	44.0	1.3	29.3	5.3	1.3	1.3	38.5
Fruits	6.7	6.7	44.0	8.0	28.0	6.7			42.7
Rice and others	94.7	2.7	1.3		1.3				1.3
Fish/meat/poultry/dried beans/nuts	1.3	6.7	50.7	2.7	29.3	6.7	1.3	1.3	41.3
Egg			22.7		56.0	16.0	2.7	2.7	77.3
Whole milk		4.0	38.7	1.3	36.0	8.0	6.7	5.3	57.3
Fortified foods			13.3	8.0	58.7	9.3	4.0	6.7	
Sweets		10.7	61.3	1.3	21.3	2.7		2.7	

N=75.

For the items extracted from the Daily Food Guide for Children, the consumption frequencies less than once a day are highlighted.

Table 4 Reasons why the children did not consume the food items on a daily basis as per the recommendation of the Daily Food Guide for Children (Food and Nutrition Research Institute, 2004a)

Reasons ^a	Green, leafy and yellow vegetables (N=13) ^b		Other vegetables (N=29)		Fruit (N=32)		Fish/meat/poultry/dried beans/nuts (N=31)		Egg (N=58)		Whole milk (N=43)	
	N	%	N	%	N	%	N	%	N	%	N	%
Not domestically produced	0	0.0	3	10.3	0	0.0	0	0.0	1	1.7	1	2.3
Domestically produced but poorly yielded	1	7.7	1	3.4	5	15.6	3	9.7	13	22.4	0	0.0
No money to buy	2	15.4	4	13.8	11	34.4	27	87.1	21	36.2	35	81.4
Difficult access to the markets	1	7.7	2	6.9	4	12.5	2	6.5	3	5.2	0	0.0
Out of season	0	0.0	0	0.0	19	59.4	0	0.0	0	0.0	0	0.0
Child's dislike	8	61.5	16	55.2	0	0.0	2	6.5	19	32.8	6	14.0
Lack of culinary skills	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Religious reasons	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Others (open-ended comments)	0	0.0	2	6.9	1	3.1	1	3.2	5	8.6	1	2.3
Prepare as alternative menu	—	—	1	3.4	0	0.0	0	0.0	1	1.7	1	2.3
Belief that the food is bad for health	—	—	1	3.4	0	0.0	0	0.0	0	0.0	0	0.0
Child has a health problem	—	—	0	0.0	1	3.1	0	0.0	4	6.9	0	0.0
Want to use money for other purposes	—	—	0	0.0	0	0.0	1	3.2	0	0.0	0	0.0

^aMultiple choices.

^bThe number of children who did not consume the food on a daily basis.

children who did not consume them on a daily basis. A high percentage of children were found to have an intake of less than once a day in the case of eggs (77.3%) and whole milk (57.3%). The main reason for low consumption frequencies of egg and whole milk was cited as 'no money to buy' (Table 4). In addition, the caregivers explained the reason for the low consumption of egg by answering that their children disliked them.

As regards vegetables, 17.4 and 38.5% of the children did not consume GLY and other vegetables, respectively, on a daily basis (Table 4). Dislike for vegetables was the main reason why they did not eat vegetables everyday. More than 40% of the children consumed fruits less than once a day (Table 3). More than 25% of caregivers reported 'out of season' as the main reason for the low consumption of fruits (Table 4).

Caregivers' attitudes and behaviors in meal preparation

Of the six indicators listed in Table 5, preparing clean and safe foods was the most practiced by the caregivers (64.0%). On the other hand, 57.3% of the caregivers prepared meals with whatever was available.

Evaluation of the feeding program

The study caregivers highly appreciated the feeding program that was temporarily practiced in each elementary school. All caregivers were aware of the feeding program and participated in the cooking. Nearly 60% of them wanted to increase the frequency of feeding, and 44% of them wanted to change the contents of food supplied. They mentioned that they wanted to prepare more nutritious foods such as chicken and fish for the children, provided the budget of the program permitted it.

Table 5 Caregivers' attitudes and behaviors in meal preparation and their interest in nutrition

	N	%
<i>Caregivers' attitudes and behaviors in meal preparation^a</i>		
(1) Prepared meals with whatever food is available	43	57.3
(2) Served a variety of foods every day	16	21.3
(3) Gave nutritional consideration to the meal	25	33.3
(4) Maintained child's normal growth through proper diet and monitored his/her growth regularly	34	45.3
(5) Used iodized salt, but avoided excessive intake of salty foods	44	58.7
(6) Prepared clean and safe foods	48	64.0
<i>Others (open-ended comments)</i>		
Saved money for food	8	10.7
Ate rice as a snack	1	1.3
Prepared whatever the child likes	1	1.3
Prepared whatever the child likes	4	5.3
Provided a sufficient amount of food	1	1.3
Purchased food when affordable	1	1.3
<i>Caregivers' interest in nutrition</i>		
Had an interest in learning about nutrition	72	96.0

N = 75

^aThe caregivers' attitudes and behaviors in meal preparation were assessed by requesting them to answer 'yes' or 'no' to the following questions:

- (1) 'Do you prepare the meal with whatever food is available without giving any nutritional consideration?'
- (2) 'Do you try to serve a variety of foods every day?'
- (3) 'Do you give nutritional consideration to the meal?'
- (4) 'Do you maintain your child's normal growth through proper diet and monitor his/her growth regularly?'
- (5) 'Do you use iodized salt but avoid excessive intake of salty foods?'
- (6) 'Do you prepare clean and safe foods?'

All of the abovementioned questions except question (1) and (3) were created using the Nutritional Guidelines for Filipinos (Food and Nutrition Research Institute, 2000) as a reference. Any other comments mentioned by the caregivers were recorded in the category 'Others.'

Discussion

Food intake of children and associated factors

The most reported reason for the infrequent consumption of animal foods was 'no money to buy.' In order to increase the consumption of animal food, it was recommended that they be produced domestically by undertaking small-scale animal husbandry and/or maintaining fish ponds in home gardens (Helen Keller International/Asia-Pacific, 2001). However, in the context of the study area, it is crucial that caregivers begin to understand the value of animal food intake and consume the products instead of selling them. Since 1998, the Participatory Livestock Development Project (PLDP) has operated to increase poultry production and household income in the northwest and north-central regions of Bangladesh. Nielsen *et al.* (2003) investigated the impact of the PLDP on food and the nutrient intake of females. They reported that the intake of chicken and eggs were similar between the PLDP-adopting and non-adopting households, whereas the median monthly household income was higher in the PLDP-adopting households than in the latter. It might be concluded that without any nutrition education, improved accessibility to food did not increase the consumption of animal food.

Most of the subjects' families could gain eggs from the domestic poultries; however, they preferred to sell eggs for monetary gains rather than consume them. It appeared that they wanted money for purchasing electronic

appliances such as TVs and CD players. Almost all the families in the study areas owned TV sets despite the caregivers claiming that they did not have money to buy food. They appeared to prioritize equipping their houses with electronic appliances over ensuring that their children fulfilled the recommended intake of eggs. This behavior might be associated with their lack of knowledge regarding the importance of animal protein intake, particularly in children. In addition, the caregivers explained the reason for the low consumption of eggs by answering that their children disliked them (Table 4). This problem can be solved by changing the method of cooking to suit the child's preferences. In the study area, eggs are eaten as a preparation that is fried or stewed with vegetables or as a soup. As 72% of the children ate sweets everyday (Table 3), their intake can be increased by including eggs in sweets, such as egg puddings or pancakes. The sweets that are usually eaten are *bananaque* (a banana on a stick and glazed with crisp sugar), ice candy and biscuits, which are usually available at school canteens. Snacks play an important role in supplementing children's diet; therefore, nutritional consideration should be given to snacks. Caregivers are encouraged to supplement their children's diet with nutritious snacks in order to increase their dietary animal food intake. If the sale of the domestically produced eggs is discontinued, the sustainable accessibility to eggs would be guaranteed, facilitating the use of eggs in the preparation of sweets.

Milk consumption appeared to decrease in children with their advancing years. Although it was the highest among 6- to 11-month-old children, it decreased to nearly half this level from the age of 1 year and was less than one-tenth of this level among 5-year olds (Food and Nutrition Research Institute, 2003b). Milk is recommended to drink every day; however, only 42.7% of the children in the study followed the recommendation (Table 3). In Ethiopia, the Dairy Goat Development Programme that primarily aimed to improve family welfare through increasing milk consumption was launched in 1988 (Ayele and Peacock, 2003). The program provided local female goats to the poorest women in the community. It led to an increase in milk consumption in their families and improved community nutrition. As people in the study area customarily include milk in their diet, owning goats or cattle would improve their accessibility to milk and thereby increase milk consumption as observed in Ethiopia.

In the study area, vegetables are easily available, as they are usually produced in the home garden. Therefore, the proportion of children who did not consume everyday was lower in the case of vegetables as compared with animal food. However, 17.4 and 38.5% of the children did not consume GLY and other vegetables, respectively, on a daily basis (Table 3). In order to increase their vegetable consumption, imparting nutrition education by making both caregivers and children aware of the nutritional value of vegetables was strongly recommended. They should be made to understand the necessity of including vegetables in their diet regardless of preference for the prevention of micronutrient deficiencies. For instance, vitamin A deficiency is one of the most prevalent nutritional problems in the Philippines. Its prevalence rate among the school children was 36.0%, and the rate among pre-school children continuously increased from 35.8% in 1993 to 40.1% in 2003 (Food and Nutrition Research Institute, 2003c). Vitamin A plays a key role in vision and eye health as well as in the immune system (Department of Health, 1998). It is important to make the caregivers understand that the health problems that their children suffered from were partly due to low vitamin A intake. Another effective approach would be to conduct cooking classes for caregivers in order to teach cooking methods to suit children's preferences and motivate them to eat. For example, cutting vegetables into small pieces or fancy shapes would stimulate children's appetite. Heating cruciferous vegetables significantly alter their volatile flavors, enabling the children to eat them (Fenwick *et al.*, 1983). Sweet vegetable dishes are easily accepted by children. Conducting cooking classes for caregivers to teach them various cooking methods has already been practiced in some Asian and African countries, and these classes have successfully increased the consumption frequency of vegetables (Japan International Cooperation Agency, 2003a). Caregivers were also recommended to be role models in practicing vegetable intake and encouraging happy talk to promote a good appetite among children (Food and Nutrition Research

Institute, 2004b). Caregivers are encouraged to praise the children when the latter eat the foods that they dislike and thereby help them overcome their food preference.

As most fruits are obtained from the home garden, the availability of food mainly depends on the season. If they are prepared as dried fruits or preserves with sugar during harvest time, fruits can be eaten at any time of the year regardless of the season. As compared with fresh fruits, dried fruits are rich in vitamin D and the nutrient content per gram is also higher. Therefore, more nutrients can be assimilated by consuming dried fruits. In South African countries and Haiti, since the introduction of dried mango, the locals acquire vitamin A from dried mango throughout the year (Japan International Cooperation Agency, 2003b). Mango pickles are another option, and they are well accepted among both children and adults in other Asian countries like Bangladesh. These food processing can be useful in the Philippines as well.

Caregivers' attitudes and behaviors in meal preparation

It is assumed that hygienic practice such as preparing clean and safe food has been established among caregivers with seminars or classes organized for food hygiene education by barangay health workers and barangay nutrition scholars (Table 5). On the other hand, the proportion of caregivers who were concerned about aspects of the meal, such as food variety (21.3%) and nutrition values (33.3%) was low. They should have a greater concern with respect to nutrition in order to improve the food intake of their children. Adequate food intake among children can be realized when the accessibility to various kinds of food is secured and the importance of a nutrient-balanced diet is established among caregivers. Therefore, nutrition education combined with a homestead food production program would be the most effective strategy for improving food intake (Ruel and Levin, 2000). For instance, in South Africa, the mean serum retinol concentration was improved by teaching the caregivers the importance of vitamin A, and encouraging the intake of vitamin A-rich foods through a home gardening program (Faber *et al.*, 2002). As 96% of the subject caregivers answered that they were interested in learning about nutrition (Table 5), nutrition education would be welcomed and easily accepted in these cases. It could complement the measures of the food production program such as home gardening to improve their nutrient intake.

Feeding program evaluation

The feeding program was initiated to reduce the number of malnourished children in the study area; however, the food served in the program was the same as that consumed at home. As their intake was insufficient in animal food, these programs should focus on providing such food items. In Kenya, the study was conducted to evaluate the growth of school children after 23 months of food supplementation

with meat, milk or energy (fat) by comparing them to a control group without supplementation (Grillenberger *et al.*, 2003). The result showed that the food supplementation had a positive impact on weight gain in the treated group and that the addition of meat to the food increased the mid-upper arm muscle area of the children. As the supplementation of animal food is more effective in the physical development of children, there should be some effort to include them in the food provided. In addition, when the program is conducted once or twice a week, it appears to be rather infrequent to improve the nutrient intake among children. Moreover, as the program operation solely relies on parents' contribution and voluntary work, it is not sustainable. The local authorities should strongly appeal to the central government to expand the national feeding program into New Corella.

Conclusions and implications for future developments in the program

Financial difficulties and lack of motivation to eat were the main barriers to animal food intake. The expansion of homestead food production and the implementation of national feeding programs contribute to an increase in animal food consumption. Nutrition education aimed at overcoming food preferences and increasing the awareness of micronutrient intake are perhaps most effective in promoting vegetable intake. Strategies aimed at increasing support toward caregivers in meal preparation and food processing, such as cooking classes in order to teach them fruit preservation in harvest time, are also recommended.

As a sampling method was not used in this study, the usefulness and significance of the data was limited. Further, comparative studies and analyses are needed in order to better understand and develop an effective nutrition improvement strategy, which will efficiently promote behavioral change among children as well as caregivers.

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