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Recipe Trials to Improve Complementary Feeding: The Philippine Experience

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ABSTRACT

Introduction: An effective participatory community nutrition programme to improve poor food intake and sub-optimal complementary feeding practices in the Philippines is wanting. The use of the recipe trial as an approach was explored. **Methods:** The protocol was conducted nine times in three communities in the provinces of Camarines Sur, Iloilo, and Zamboanga del Sur among 83 caregivers of children 6-8, 9-11, and 12-23 months old. The protocol implemented followed these steps: (1) Preparatory activities; (2) Recipe Trial 1 (RT1); (3) Recipe Trial 2 (RT2); and (4) Follow-up visit. **Results:** The use of the modified RT to improve complementary feeding was evaluated in terms of the quality of the improved recipes and the overall feasibility of the RT technique. The RT1s identified rice porridge as complementary food usually prepared in the three areas across age groups, followed by cooked rice mixed with broth from the family pot. The RT2s facilitated the caregivers' modification of the 12 complementary foods from the three communities. Nutrient content was improved while maintaining acceptability among caregivers and their children. The follow-up visits showed that the adoption of the recipes at the households was limited to a few caregivers. **Conclusions:** The modified RT protocol has good potential to help alleviate poor nutrition among infants and young children in the Philippines. Minor improvements, characterised by an increase in local adoption and provision of enabling mechanisms from the local government units should contribute to the success of its implementation.

Key words: Caregivers, child nutrition, complementary feeding, nutrition programme, recipe trial

INTRODUCTION

Child undernutrition remains a significant public health problem worldwide. It contributes about 35% to deaths of children under 5 years old (CU5) and 11% to the total disease burden (Horton *et al.*, 2010). In the Philippines, 26.2% of infants and young children are underweight and 27.9% are stunted (FNRI, 2010). The causes of these are multifaceted, but the major contributory factors are inadequate food intake of young children and sub-optimal complementary feeding practices of mothers/caregivers. Interventions addressing these two factors are priority thrusts as outlined in the 2010-

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2016 Philippine Plan of Action for Nutrition (NNC, 2012). The country has seen efforts to promote optimal breastfeeding and complementary feeding; however, these need to be intensified. Local studies on the factors of sub-optimal complementary feeding practices have been scant. Identification of simple, adequate and workable method/s to improve the quality of complementary foods also remains a challenge.

According to Dewey & Brown (2003), there is no "magic bullet" for improving complementary feeding but a systematic, participatory and coordinated approach can be highly effective. Community nutrition programmes are said to be more effective in changing child feeding practices and improving nutrition when programme planners "pay close attention to the voices of the families who will participate in the programme" (Dickin, Griffiths & Piwoz, 1997). Such is the context of the research methodology *Trials of Improved Infant Feeding Practices (TIPS)*, which is designed to develop and test locally appropriate recommendations to improve feeding practice through a "series of visits to learn and engage with mothers on different practices" (USAID, 2011; FAO, 2011). Specific to improving the quality of complementary foods, the importance of the participatory approach is encapsulated in the use of the technique known as *Recipe Trial (RT)*, which is conventionally undertaken prior to TIPS (Dickin *et al.*,1997). The RT entails a series of participatory cooking sessions with caregivers where local recipes are proposed, prepared, tasted, and discussed to evaluate the acceptability, feasibility, and affordability of the recipes in young children's diets (Dickin *et al.*, 1997; Ruel *et al.*, 2004). RTs illustrate the potential of modifying existing recipes and of developing new food preparations using locally available ingredients (Dickin *et al.*, 1997). The use of RTs to improve the quality of complementary foods has been noted in a number of countries, with adaptations to individual country context. Our preliminary study in two lowland communities also indicated the potential application for a Philippine setting of the RT technique based on the protocol by Dickin *et al.* (1997). However, it was found necessary to divide the actual RT step into two separate phases which we termed as "Recipe trial 1" (RT1) and "Recipe trial 2" (RT2). RT1 was designed to document food preparation and serving/feeding of common complementary recipes to children, and to identify opportunities to modify/improve existing recipes and practices. RT2, on the other hand, focused on modifying/developing enhanced recipes and/or improving existing food preparation practices. Prior to RTs, preparatory activities were implemented, including coordination with local authorities and home visits to invite/mobilise the caregivers in gathering relevant information on complementary food and feeding practices. Follow-up visits to some households who participated in the RTs were conducted after a month to determine whether the caregivers were adopting the improved recipes and following the proposed feeding guidelines. This study was conducted to determine the value of RT technique based on the modifications done and improve complementary feeding among 6- to 23-month-old children in selected communities in the three major islands of the Philippines. The research specifically aimed to (1) identify complementary food preparation practices and recipes; (2) compare the quality of original and improved complementary foods from RTs; and (3) identify facilitating and hindering factors for the adoption of improved recipes to explore the feasibility of RTs in the community.

METHODS

Study sites

This study was conducted in three communities in the provinces of Camarines

Sur, Iloilo, and Zamboanga del Sur located in the Philippines' major island groups of Luzon, Visayas, and Mindanao, respectively. The provinces were the project sites for the Joint Programme (JP) of UN agencies and government partners which aimed at contributing to the achievement of the Millennium Development Goals (MDG) specifically on eliminating hunger and reducing child mortality rate. The criteria used to select the specific study sites for this study included presence of a health station, a relatively high level of peace and order, accessible transportation, representation of both urban and rural areas, and a high prevalence of undernutrition. The selected community in Camarines Sur represented a rural community; Iloilo a rural, coastal community; Zamboanga del Sur an urban community (NSCB, 2014).

Subjects

In this study, the participants were mothers/ caregivers with children aged 6-23 months old. They were identified from the lists maintained by the local health and nutrition workers in the study sites who were then invited to join the RTs. A total of 83 participants signified willingness and gave signed informed consent to participate. The participants were divided according to three age groups of their children (i.e., 6-8 months, 9-11 months, 12-23 months) with specific complementary guidelines. Of the 83 participants, 26 had children belonging to the 6-8 months age group, 30 with children 9-11 months old and 29 with children 12-23 months old.

Conduct of recipe trials

The study used the RT protocol shown in Figure 1. The RT was facilitated by a 3-member research team. The RT was conducted by age group in each study area for a total of 9 RTs.

Preparatory activities were mainly done through home visits. Caregivers were interviewed about local complementary foods and common recipes prepared for children, feeding practices, household menu, and food sources. One-day food recall was used to assess children's actual food intake. The use of facilities such as health centres, community centres and chapels, as well as the activities for RT1 and RT2, were coordinated with local activities.

During RT1, the participants were gathered to discuss the most common complementary foods prepared for their children at home. The participants were assigned to groups with four to six members and were asked to decide the food they will demonstrate to prepare and cook as a group. A cook and an assistant cook were assigned

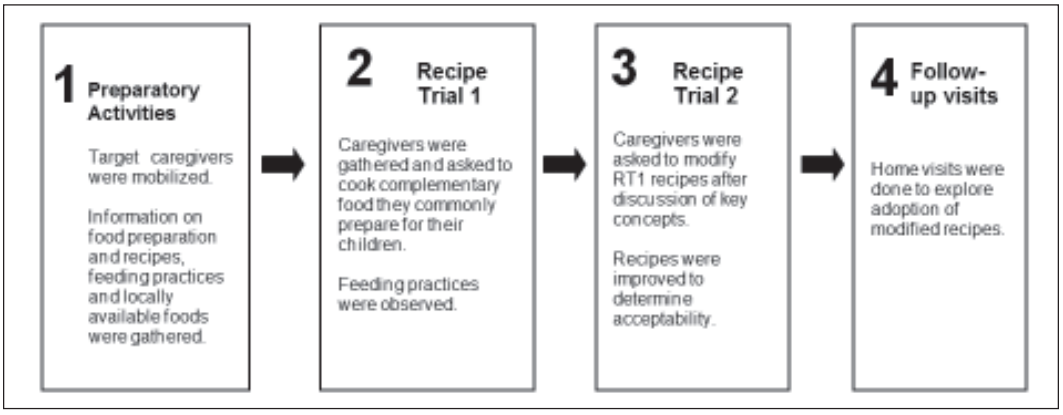

Figure 1. Modified recipe trial protocol

for each group while the rest of the members served as observers. The most common and locally available ingredients used in the households based on interviews were prepared and cooking stations were set up by the research team. After the cooking demonstrations, the food was served to the children. Observations on food preparation, serving portions, and child feeding were noted by the research team.

The RT2, conducted a day after RT1, started with the research team's facilitation of discussion on optimal complementary feeding practices, techniques in food preparation, nutrient conservation, and food hygiene. Messages with intent to correct sub-optimal practices/ problematic areas noted during RT1 were given. The use of ingredients that will produce nutritious, affordable, doable, and acceptable complementary food recipes were emphasised during the sessions. The caregivers then discussed modifications based on appropriate complementary guidelines to their RT1 recipes to be prepared by the cook and assistant cook. Cooking stations were set-up while caregivers were asked to bring ingredients from their backyards. The improved recipes were served to the children and discussions on the acceptability (with reference to taste, odour, preparation, affordability) followed.

One to three months after the conduct of the RTs, follow-up home visits were conducted to gauge whether whether RT participants were adopting the improved recipes. One-on-one interviews and observations were held to determine the extent of adoption of the modified recipes and to identify facilitating and hindering factors for adoption.

Assessment of recipe trials

The RT was mainly evaluated in terms of the improvement in the quality of the modified complementary food recipes and their adoption among caregivers with 6- to 23-month-old children. Specifically, the quality of the improved recipes from RT2 was compared to the original recipes from RT1 based on nutrient content, acceptability to children (i.e., food was not rejected by the children) and acceptability to caregivers (i.e., recipe cost and preparation time). The nutrient content of the original and improved recipes were computed based on the Philippine Food Composition Table (FNRI, 1997). The extent of adoption of modified recipes was qualitatively assessed using the caregivers' feedback during RT2 focus group discussions and their insights during follow-up home visits. Meanwhile, the feasibility of RT as an approach to improve complementary feeding was explored through interviews of ten midwives (5 each from Iloilo and Zamboanga) who observed the RTs.

RESULTS

Profile of respondents

The participants were mostly mothers and grandmothers who were taking care of 6- to 23-month-old children at the time of the study. The youngest mother was 18 years old while the oldest was a 60-year-old grandmother (mean age=30.0± 8.5years). Most of the participants finished high school education and were full-time housewives, while others worked as laundrywomen, seamstresses, vendors, net weavers, and village health workers. The caregivers and their children belonged to households with a mean size of 6 members. Family income came primarily from the fathers who worked as farm labourers, carpenters, drivers, or factory workers. Households in Zamboanga del Sur had the highest average monthly income of 3,901 pesos (~$87.78), followed by Camarines Sur (2,874 pesos or ~$64.67), and finally by Iloilo (2,702 pesos or ~$60.80). The budget for household expenses, including food, was found to be less than 150 pesos (~$3.38) per day in all areas.

Complementary foods/ recipes and food preparation practices

Complementary foods given to children 6-23 months old included single food items and mixed dishes. Common single food items were biscuits, wafers, mashed vegetables and fruits (e.g., banana, taro, potatoes, and squash), noodles, and commercially prepared and sold complementary food. Biscuits and wafers were often given as snacks. Mixed dishes were commonly given during the main meals.

The complementary food commonly prepared in the three areas across age groups was porridge (locally called *lugao*). The porridge was either made from rice or corn but rice-based porridge was more popular (Table 1). It varied according to cooking preparation, ingredients, and proportions and was usually prepared in thin consistency in Camarines Sur and Iloilo. It was also common to give children cooked rice mixed with broth such as boiled mixed vegetables, fish cooked in vinegar, and other fish dishes prepared with soup. Small amounts of fish and other vegetables were also added to the rice-soup mixture. These preparations were not only common in the study sites, but also repetitively reported in each child's meals the entire day, as revealed by the 24-hour food recall during preparatory activities.

Area-specific complementary foods and ingredients reflected the usual cooking ingredients and methods in the locality. In Camarines Sur, cooking with little oil (sautéed) and coconut milk was common. In Zamboanga del Sur, corn meal was used in the preparation of porridge, wherein corn grits were boiled like rice and served with viands.

The characteristics of complementary foods also reflected the meal preparation in the caregivers' households. Family meals were normally cooked at home with a few ingredients, minimal time and effort in food preparation, and less fuel requirement. Their ingredients were usually limited to what could be purchased and whatever could be grown in the garden or surroundings, and this excluded most fruits, dairy products, fish/meat/poultry, as well as the household's own produce. Food prepared in the morning was eaten the entire day or for a few more days. Recipes that did not spoil easily were also part of the family meals.

Cooking with too much water was the most common method of food preparation, as shown in the range of dishes prepared during RT1. Adding artificial/instant flavoring to complementary foods was a common practice. Other improper food preparation practices included overcooking (eggs, liver, and vegetables); undercooking (noodles); and not observing nutrient conservation (washing rice three to four times, use of too much water in cooking, washing of vegetables after cutting into pieces). These practices affected the texture, consistency, and palatability of complementary foods and recipes. Other problems noted were the non-observance of food hygiene like the absence of hand washing prior to food preparation and the use of the same utensils for cutting fish/meats and fruits/vegetables. Positive food preparation practices, on the other hand, included thorough washing of pots and cooking utensils and using clean water for washing utensils/ingredients and cooking.

Modification of complementary food recipes and practices during RT2

Twelve commonly prepared recipes and their regional variants were documented during the RT1s in the three provinces. These recipes were modified by the caregivers during RT2 based on the discussion of key concepts on complementary food and proper complementary feeding. The mothers introduced a single modification or a combination of many after the group deliberated over the limitations of the recipes they prepared in RT1.

The modifications done to different recipes in the three study sites are given in

Table 1. Common complementary food recipes from the three study sites, their ingredients, and the modification made during RT2.

Recipes from the RT1	*Area*	*Target age group*	*Base ingredient*	*Changes made during RT2*
Rice porridge (locally called *lugao*)	Camarines Sur		Rice grain + water	Addition of egg, fish, chicken, liver, and/or mungbean
	Iloilo		Rice grain + salt +water	Addition of *Moringa* leaves and/or carrots
	Zamboanga		Rice grain + squash + water	Sautéing porridge (addition of oil)
	Iloilo		Ground rice + powdered whole milk + water	Reduction of water (except for rice porridge from Zamboanga which was initially thick)
Corn porridge (locally called *lugao tictic*)	Zamboanga		Cornmeal + water +squash (for 6-8 months)+ chocolate energy powder, sugar (for 9-11 months)	Addition of egg, fish, and/or mungbean Addition of *Moringa* leaves Sautéing porridge (addition of oil) Removal of sugar for 9-11 months
Instant noodle soup	Camarines Sur		Instant Noodle + water	Addition of *Moringa* leaves, eggs and oil
Rice noodles with shrimp and vegetables (locally called *Pancit Guisado*)	Iloilo		Rice noodles + small shrimps, cabbage, carrots, garlic, onion, seasoning (soy sauce, instant seasoning granules), water	Addition of oil Substitution of ingredients with available/cheaper alternatives e.g., cabbage/ carrots to string beans, shrimp to fish Cutting vegetables into smaller pieces Removal of instant seasoning granules
Mashed boiled sweet potato	Camarines Sur		Sweet potato + water	Addition of margarine
Mashed boiled mungbean	Iloilo		Mungbean + water	Addition of powdered milk and sugar
Cooked squash	Iloilo		Squash + oil	Addition of shrimp, fish and/or mungbean Addition of vegetables like *Moringa* leaves, sweet potato tops, Malabar nightshade, papaya
	Camarines Sur		Squash +coconut milk	Addition of fish and string beans

Continued next page

Table 1. From previous page

			Substitution of squash with pigeon peas and dried fish
Boiled mixed vegetables	Iloilo (locally called *Laswa*)	Sponge gourd + string beans + okra + squash+ jute+ salt +MSG+ shrimp+ water	Addition of vegetables (i.e., eggplant,bottle gourd, onion,garlic, *Moringa* leaves) Addition of oil
	Zamboanga del Sur (locally called *Utan*)	Squash + string beans + bell pepper +hot chili leaves + eggplant + tomato + okra + *Moringa* leaves +Malabar nightshade +taro/swamp cabbage leaves + salt + instant seasoning granules+water	Removal of instant seasoning granules Served with fried fish or fish-based stew together with boiled rice or corn grits

Table 1. The addition of ingredients to improve nutritional quality was a commonly suggested change. Rice porridge, which was usually just plain rice boiled with water, was improved by adding different types of protein-rich foods (e.g., eggs, meat, and liver) and vegetables (e.g., *Moringa* leaves, mungbean, carrots). Other improvements included the substitution of ingredients with cheaper and locally available ones, change in cooking method (from boiled to sautéed, with oil as additional energy source), and adjustment of consistency (from thin to thick porridge). Also, commercial instant flavorings were removed from the recipes.

Several improper food preparation practices of caregivers such as overcooking, undercooking, and non-observation of nutrient conservation were corrected during the modification of recipes. However, the practices of not washing of hands prior to food preparation and using the same utensils for cutting fish/meats and fruits/vegetables did not change.

Nutrient content of original and improved recipes

Complementary foods given to children 6-23 months old in the three study areas were low in energy and nutrient content. After RT2, most of these recipes improved in terms of nutritional quality. Energy content increased from 50% to more than 100%. Protein contents also increased significantly, while vitamin A and fat values rose remarkably because of added eggs, meat/fish/poultry, *Moringa* leaves and (sautéing in) oil. Table 2 illustrates these findings using four recipes that have undergone from minor to major modifications.

Acceptability of improved recipes

The modified recipes were acceptable to children of all age groups and their caregivers. Children ate and did not reject any of the food cooked using the modified recipes. Caregivers expressed approval of all the modified recipes further describing them as tastier and more nutritious. Based on Table

Table 2. Changes in nutrient contents of selected modified complementary foods.

	Age group recipe was given	*Nutrient content based on recommended serving size/ age group*		*% Increase in nutrient content*
		Recipes from RT1	*Modified recipes from RT2*	
Addition of ingredients				
Ground rice porridge (locally called *Suam*)	6-8 months	Ground rice + milk + water	+ Mungbean reduce water	
Energy, kcal		111.0	208.0	87.0
Carbohydrate, g		15.6	19.8	27.0
Protein, g		4.3	10.3	140.0
Fat, g		3.5	9.7	177.0
Vitamin A, mcg		94.9	259.1	173.0
Iron, mg		0.0	0.5	
Instant noodles	9-11 months	Instant noodles + water	+ Moringa leaves + eggs + oil	
Energy, kcal		47.0	217.0	362.0
Carbohydrate, g		6.1	16.1	164.0
Protein, g		1.1	5.5	400.0
Fat, g		1.9	14.5	663.0
Vitamin A, mcg		0.2	39.9	19850.0
Iron, mg		0.0	0.7	
Addition and substitution of ingredients				
Rice noodles with shrimp and vegetables	12-23 months	Rice noodles + small shrimps + cabbage + carrots + garlic + onion seasonings + water	+ oil Change cabbage and carrots to string beans Supplement shrimp with fish	
Energy, kcal		134.0	206.0	54.0
Carbohydrate, g		27.3	33.5	23.0
Protein, g		4.8	6.1	27.0
Fat, g		0.7	5.2	643.0
Vitamin A, mcg		257.1	279.4	9.0
Iron, mg		0.8	0.9	13.0
Addition of ingredients and change of cooking method				
Boiled mixed vegetables (*Laswa*)	12-23 Months	Sponge gourd + string beans + okra + squash + jute+ shrimp + seasonings + water	+ Eggplant + bottle gourd, *Moringa* leaves + garlic + onion Sautéing with oil	
Energy, kcal		77.0	160.0	108.0
Carbohydrate, g		12.8	15.9	24.0
Protein, g		5.5	8.8	60.0
Fat, g		0.6	6.9	1050.0
Vitamin A, mcg		159.3	219.4	38.0
Iron, mg		1.0	1.6	60.0

Note: Nutrient content was computed using the Philippine Food Composition Tables (FNRI, 1997).

3, recipes such as instant noodle soup and rice noodles cooked with shrimp and vegetables had better food quality rating. This is probably because these were also well-liked adult foods.

Most recipes increased in cost when modified due to the cost of the added ingredient/s. Of the modified recipes, boiled-and-mashed sweet potato with milk and sugar was the cheapest (~$0.25), and boiled mixed vegetables and rice porridge were the most expensive (~$2.05). The caregivers claimed that these were still affordable as the additional ingredients were cheap and locally available.

Preparation and cooking time for the modified recipes ranged from 10 to 76 minutes. This time was, on average, longer by 10 to 15 minutes than the time spent preparing and cooking the original recipe during RT1. It took longer to prepare the modified recipes because of the additional steps like paring/cutting additional ingredients and sautéing. Despite this longer time, caregivers still rated the modified recipes as easy and quick to prepare.

Adoption of modified recipes and improved food preparation

During the follow-up home visits, some caregivers claimed to have cooked the improved recipes (e.g., thick rice porridge and sautéed noodles) in their homes. Some caregivers made further modifications to the improved recipe. One of these is the addition of one protein food (liver or egg or meat or fish) instead of two or three, which is more expensive and, therefore, not affordable to many. A few caregivers practised substituting foods/ingredients. One of the caregivers, being unfamiliar with porridge before the RTs, was able to prepare the recipe at home and has shared the recipe with her neighbours and friends because it is easy to prepare. Some caregivers did not try the improved recipes due to the ingredients being unavailable or expensive or due to the belief that children would not like the dish (e.g., porridge with mongo). Apparently, ingredients like chicken, meat, liver, and eggs are not easy to obtain. In addition, they believe these foods can cause indigestion, rashes and other health problems.

Table 3. Food quality rating, cost and preparation, and cooking time of selected modified recipes

Modified RT2 recipes	*Caregivers' food quality rating*[1]	*Mean cost, US Dollars*	*Mean preparation and cooking time, minutes*
Ground rice porridge (locally called *Suam*)	Very good	1.42 (0.54)	10 (15)
Rice grain porridge variants[2]	Good to excellent	1.89 (0.45)	78 (65)
Cornmeal porridge variants[2]	Very good	0.74 (0.49)	33 (22)
Instant noodle soup	Excellent	0.85 (0.20)	15 (15)
Rice noodles with shrimp and vegetables (locally called *Pancit Guisado*)	Excellent	2.62 (2.53)	60 (98)
Mashed boiled sweet potato with milk and margarine	Good	0.25 (0.22)	55 (40)
Mashed boiled mungbean	Very good	1.51 (0.27)	70 (60)
Cooked squash variants[2]	Very good	1.37 (0.97)	65 (55)
Boiled mixed vegetables[2]	Good	2.05 (1.10)	76 (76)

[1] Determined from the discussion during the RT2
[2] Values for time and cost are averages taken from several variants from the different study sites
( ) Values for original (RT1) recipes

Some mentioned they applied the concepts in the RTs rather than prepare the recipes exactly as how they were prepared in RT2. This gave them more flexibility in preparing better complementary food. For instance, one mother substituted ground mung bean with cooked whole mongo from another dish. Another mother used flaked fish from another dish in making porridge. Preferences in flavour were also considered in the modifications (e.g., addition of fermented fish/shrimp and sugar for salty and sweet taste, respectively).

Facilitating/hindering factors for the adoption of improved recipes

The facilitating factors for the adoption of the improved recipes developed from the RTs include selection of recipes that are easy to prepare at home; use of simple and familiar cooking methods such as boiling and sautéing; and use of easy-to-add foods/ ingredients such as egg.

On the other hand, the hindering factors were unavailability of additional food/ ingredients; addition of foods/ingredients that caregivers do not like, such as *Moringa* leaves (believed to be difficult to digest) and oil (believed to spoil the dish faster); addition of expensive foods/ingredients such as meat or liver; use of foods/ingredients believed to cause indigestion and lack nutrition; use of unfamiliar foods/ingredients, such as margarine; use of long and complicated cooking methods like soaking noodles (*bihon*) before cooking and constant stirring; adherence to food beliefs especially in feeding children; caregivers' preoccupation with work; insufficient knowledge and skills of food preparation, food hygiene, and nutrient conservation; and lack of actual or perceived lack of time to do the recommended cooking practices.

RT as a tool to promote improved complementary feeding among health and nutrition workers

Key informant interviews among midwives who observed RT in their respective areas indicated that health workers recognised the RT's potential to promote optimal complementary feeding and help solve malnutrition. They said the steps can be followed. The observed participation and cooperation among caregivers suggested that the methodology was doable. Several midwives liked the activity; they were particularly surprised that a simple recipe can be made more delicious and nutritious given a limited budget.

A number of midwives expressed that the RTs will be a venue for them to learn complementary food and recipes and complementary feeding practices. Informants also mentioned that they were willing to be involved as trainers, facilitators, resource persons, or supervisors in future similar activities. However, some suggestions to ensure adoption of RT included the following: (1) identification of the personnel from the barangay and local health office who will be involved; (2) provision of utensils and ingredients; and 3) constant follow-up of caregivers for greater participation. In addition, support from the local government units (LGUs) at all levels (municipal, provincial, national, and barangay) in the provision of funds and adherence to the team approach when conducting RTs were cited to be particularly needed. Midwives further noted that unity and coordination are highly important for health and nutrition workers who would comprise the RT team/facilitators.

DISCUSSION

This study shows that Filipino caregivers have sub-optimal complementary feeding practices that can be detrimental to the nutritional status of infants and young children. Consistent with the findings of Perlas, Gibson & Adair (2004), the common complementary foods given to Filipino children in the three study areas were of low nutritional quality. Several food preparation malpractices such as the use of artificial/ instant flavoring granules (usually high in

sodium content), overcooking or undercooking of ingredients, and not observing nutrient conservation and food hygiene may undermine health and nutrition of young children. The amount of food given to young children was also observed to be less than the recommended amounts (WHO, 2009).

The RT technique, as shown in the study, has generated vital and basic information about current common complementary foods and recipes, food preparation, and complementary feeding practices that are usually collected by conventional, but often costly, methods like surveys, key informants, and focus group discussions. Dividing the actual RT step into RT1 and RT2 was proven appropriate for the Philippine setting. The authors were able to probe deeper into the problem using data from the preparatory activities and RT1. This is important since absence of baseline community data is a major challenge in the country.

The study was also able to show how RT can improve the quality of complementary food. The two sets of interventions incorporated in the RT2 protocol namely, teaching key concepts on proper food preparation and complementary feeding and improving the quality and quality of foods/ingredients, facilitated the improvement of the recipes. These improvements include an increase in nutrient content (energy, protein, vitamin A, fats and iron) and acceptability of the modified recipes to both children and caregivers. In a study by Ruel *et al.* (2004), RTs were found instrumental in improving the nutritional quality of complementary foods using locally available ingredients and fortified cereal blends. But while improvement in nutrient content, such as vitamin A, was obtained, requirements for zinc and iron were not met even with a combination of fortified corn-soya blend and other locally available, acceptable, and affordable foods. The present study showed that nutrients such as vitamin A and iron increased in the improved recipes. The appreciation for the improvements noted in the actual RTs, however, did not translate to complete adoption. Familiar recipes, methods, and ingredients remained the most prepared at home. This conservatism is similar to what has been observed by Wrieden *et al.* (2007) among households with a lower socio-economic status and who tend not to improvise. This is most likely caused by fear of the price they have to pay for any mistakes they could make. Adoption is further hindered by food beliefs/knowledge, and lack of actual or perceived lack of time to do the recommended cooking practices. The few caregivers who adopted the principles learned in the RT2s (e.g., substitution of recipes with cheaper protein ingredients) may be considered the early adopters of improved complementary feeding practices. It should be noted that most caregivers learned their food preparation and child feeding practices from deeply rooted beliefs of older women in the community and may thus be resistant to change. These results emphasise the importance of the process of improving recipes more than the product itself. The modified RT protocol espouses this through lending flexibility to caregivers by learning the nutritional contributions of the ingredients and proper cooking techniques in local recipes and the possibilities to transform recipes into new ones. This is valuable in improving recipes of a food culture that prepares predominantly mixed dishes from scratch. Likewise, the existing protocol can greatly benefit from further improvements, particularly to simplify food preparation and complementary feeding practices. Key messages on proper infant and young child feeding, food preparation and complementary feeding practices cannot be imparted nor understood in a one-time lecture but should be done repeatedly. The modified protocol thus has to have a system of continuous assessment and recipe

improvement following the first follow-up visit. This presents the whole protocol as a cycle that starts all over at the preparatory activities after the follow-up visits. The process may be supplemented by shorter interval follow-up visits by local and nutrition health workers (i.e., two to three weeks after RTs) to observe actual food preparation among those who need the monitoring and improvement most. In effect, the RT2 recipes are just the starting point for improving complementary feeding practices.

The feasibility of the RT as a tool to improve complementary feeding practices was recognised in the current study. The caregivers were cooperative and expressed their gratitude for learning a lot from the activity. The fast-paced, action-packed, and participatory nature of the cooking sessions was attractive to the target participants and sustained their interest. The high turn-out of caregivers who completed all four steps of the modified RT indicated the doability of the protocol.

The RT entails change agents to effectively facilitate and guide the process individually and collectively. Health and nutrition community workers can be trained on how to conduct RTs in their catchment areas. Given the limited number of health and community workers and their high workloads, caregivers who show potential during the RTs can be tapped to teach other caregivers within the community. For ease and efficiency in facilitating, groups should be homogenous in terms of education and exposure, among other characteristics.

The success of RT as an intervention, however, relies on enabling mechanisms from the LGUs. Aside from the need for personnel and other resources, the protocol would benefit from using existing facilities in the community that can be re-arranged or modified whenever RT sessions will be conducted. This will institutionalise proper food preparation and complementary feeding and may strengthen the support and compliance of the community. The RTs would also be better implemented with the integration of capacity building of local nutrition workers on the use of RTs in promoting nutrition. Overall, the modified RT used in this study was found to have high potential in improving nutrition of infant and young children through the provision of more nutrient-dense and acceptable complementary foods given the necessary provisions for long-term adoption of the recipes and suggestions for the effective rollout. It is recommended to strengthen the capacity of local workers in imparting nutrition education to correct misconceptions and strengthen skills to encourage mothers to practise appropriate infant and young child feeding practices during RT sessions.

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Conflict of Interest

None of the authors have a personal conflict of interest.

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