

What works at home?



Improving complementary feeding based on locally available foods -
Learning from caregivers through Trials of Improved Practices in
Kasungu and Mzimba districts of Malawi

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ABBREVIATIONS AND ACRONYMS

AEDO	Agriculture Extension Development Officer
ASF	Animal-Source Food
BMEL	German Ministry of Food and Agriculture
EPA	Extension Planning Area
FAO	Food and Agriculture Organization of the United Nations
FICA	Flanders International Cooperation Agency
HSA	Health Surveillance Assistant
IFSN	Improving Food Security and Nutrition Policies and Programme Outreach
IMCF	Improving the dietary intakes and nutritional status of infants and young children through improved food security and complementary feeding counselling
IYCF	Infant and Young Child Feeding
JLU	Justus-Liebig-University
MDHS	Malawi Demographic Health Survey
MOAFS	Ministry of Agriculture and Food Security
MOH	Ministry of Health
TIPs	Trial of Improved Practices
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

Trials of Improved Practices, or “TIPs” is a consultative research technique which aims to identify the individual, cultural and environmental barriers that prevent and facilitate optimal behaviors, and then to use this information to craft targeted strategies to promote positive behavior change. Using TIPs, program planners can pretest the actual practices that a project will promote. The procedure consists of a series of visits in which an interviewer and participant analyze current practices, discuss problems and what could be improved, and together reach an agreement on one or a few solutions to try over a trial period. The interviewer and participant then assess the experience together at the end of the trial period, with results feeding directly into program design.

Unlike more observational techniques, TIPs’ participatory approach benefits from experimentation by potential users. As such it is a valuable tool for encouraging participation. However, its main purpose is the identification of key practices which are not only effective but also *feasible* for the target population to carry out. This is of particular import in resource-poor settings.

This report presents findings from an FAO-facilitated study which used TIPs to explore infant and young child feeding (IYCF) practices in the Kasungu and Mzimba districts of northern Malawi. The trials’ results fed into the nutrition education component of the FAO integrated agriculture-nutrition program “Improving Food Security and Nutrition Policies and Programme Outreach” (IFSN).

Investigating seasonal variation in local food availability was one of the main objectives of the trials. Seasonality poses a major challenge to food security in rural Malawi. It affects the quantity and types of food available in villages and it also affects food prices and household purchasing power. Taken together, these factors can have a substantial negative impact on the quality, diversity and frequency of household meals at certain times of the year, with implications for complementary feeding of babies and children under 24 months.

As such, two rounds of TIPs were conducted with an initial sample of 100 households to capture the impact of seasonality on IYCF and to explore options for mitigation. Round 1 was conducted immediately prior to and during the rainy season, when household food stocks become progressively lower (October 2011 - January 2012); round 2 was conducted during harvest when food security and purchasing power are relatively high (May 2012 - July 2012).

Each round consisted of a series of group cooking demonstrations and consultative household visits to record feeding practices, provide counselling advice, and negotiate improved IYCF practices and record subsequent behavior changes. During the initial visits for both rounds of TIPs, facilitators collected information regarding household food security and family meals. Findings from these interviews provided important information to IFSN program planners on project context, especially regarding the actions required to address gaps in access to foods crucial for preparing balanced meals.

In addition to interviewing caregivers and other family members regarding household food security and family meals, TIPs facilitators also used their initial home visit during rainy season TIPs to collect information on IYCF practices. Taken together with the family food security and meals data, this information laid the groundwork for the iterative counselling and recommendation process upon which later visits were based. Table 1 provides an overview of the main problems identified during TIPs and the subsequent recommendations.

The majority of TIPs participants were mothers of children aged 0-23 months. However husbands, grandmothers and adult females residing in the same household also participated. This is an important detail, as mothers do not always make “executive decisions” on child feeding. Grandmothers and husbands also influence child care decisions and husbands have strong control over what foods are purchased.

Table 1: Problems identified during TIPs and subsequent recommendations

	Problem	Recommendation
For babies 0-5 months		
1	Sub-optimal breast feeding, including low frequency and premature introduction of water, other liquids and watery porridge	Stop giving water and porridge, breastfeed exclusively on demand, preferably eight or more times per day, until baby is six months old
For babies and children 6-23 months		
2	Offering watery, plain starchy porridge made of refined maize meal with salt and/or sugar	Prepare thick enriched whole maize (<i>mgaiwa</i>) porridge instead of refined maize (<i>ufa woyera</i>) porridge after children turn six months old
3	Delayed introduction of solids: offering only liquid from the relish as opposed to the solid, due to belief that children were not ready for the “adult” relish until they could chew	Mash/pound/chop relish
4	Vegetables not offered daily	Add green leafy and non-leafy vegetables to complementary food
5	Legumes not offered daily	Add legumes to complementary food
6	Animal source food (ASF) not offered daily	Add ASF to complementary food
7	Food does not include sufficient fat	Add oil to complementary food if not using groundnuts or soybeans
8	Over-reliance on maize as main ingredient in complementary food	Diversify complementary food dishes by using roots and tubers
9	Snacks are insufficient or not provided, or foods of minimal nutritional value are offered as snacks	Provide at least one nutritious snack a day for children aged 9-11 months and two nutritious snacks a day to those aged 12-23 month. Reduce provision of sugary and salty commercial snacks in favor of healthier snacks, in particular fruits
10	Insufficient quantities of food offered	Provide age-appropriate quantities of complementary food
11	Use of salt is excessive	Reduce quantity of salt used to a single two-finger pinch

TIPs households reported that household food security was at its best during and shortly after harvest. Post-harvest, food security deteriorated, reaching its lowest level during the rains. The greatest shortfalls occurred with regard to maize, which is the main staple and culturally preferred compared to other foods (e.g. roots and tubers); also legumes were in short supply during this season. Family meal frequency and quality deteriorated concomitant to increased food insecurity.

Positive child feeding practices included: age-appropriate daily meal frequency for children aged 6-8 months; provision of freshly prepared complementary food; offering fruit as snacks; and feeding small children from their own plate. These practices were encouraged further during TIPs.

Harmful child feeding practices included: sub-optimal breastfeeding practices (low frequency and/or water and other preparations given to children under six months); low provision of porridges enriched with vegetables, legumes, animal-source food and fat; low provision of healthy snacks, especially to children aged 9-23 months; excessive salt use in complementary food; low provision of solids to children aged 6-11 months in particular; and inappropriate feeding of sick children.

While not systematically identified as such, many of these negative practices appeared to be influenced by cultural norms. These range from fairly common perceptions with respect to which foods are harmful for children, to the small sample of caregivers who reported giving herbal tonics and thin porridge to their 0-5 month olds due to perceived prophylactic qualities. Other examples include the widespread practice of giving watery porridge, and the belief that solids should only be fed whole to children old enough to chew, as opposed to mashed or otherwise processed.

Based on identification of these and related problems, recommendations were made during the second counselling visit. During the third and fourth visits, follow-up interviews were conducted to explore caregivers' perceptions and experiences regarding the new proposed practices, whether or not they had tried the practice, whether they had modified the recommendation in any way to make it more feasible, and/or whether they abandoned the practice altogether and the reasons for this.

By the end of the trials, all caregivers had expressed willingness to continue improved complementary feeding practices, *subject to accessibility of relevant foods*. Their reasons for continuing were that children (Figure 1):

- grew well according to records on the child health card
- gained weight
- appeared healthier, more alert and active and did not get sick often
- liked the new dishes and ate well

Some caregivers also cited local availability of ingredients and confidence in preparing improved complementary foods as reasons to continue.

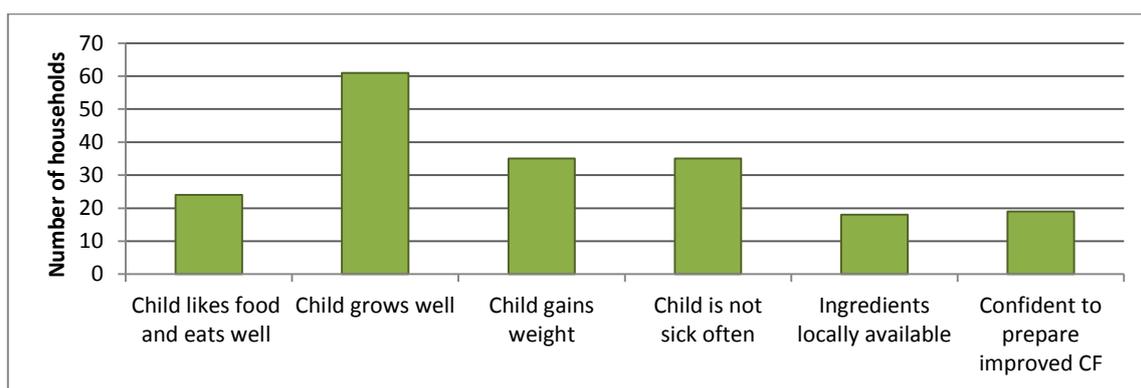


Figure 1: Reasons for willingness to adopt improved IYCF practices, assessed at the end of TIPs

Improvements to complementary feeding observed across the entire TIPs process included the following:

- Almost all households increased their use of the more nutritious whole maize (*mgaiwa*) meal to prepare complementary food for children from the age of six months. This marked a shift from the traditional practice, which consists of preparing porridge made with plain,

refined maize meal (*ufa woyera*) with salt and occasionally sugar for children aged 6-8 months, then starting preparing plain *mgaiwa* porridge, occasionally enriched with groundnuts and soybeans, for children from 8-9 months old.

- The preparation of thick porridges (as opposed to thin, watery porridges) increased.
- Households increased their use of: (i) green leafy vegetables and non-leafy vegetables when in season; (ii) fish and eggs; (iii) milk including goat milk; and (iv) oil when not using groundnuts and soybeans.
- Households increased provision of age-appropriate quantities of cooked complementary food.
- Nearly all households began offering a wider range of healthy snacks (fruits, boiled sweet potato and Irish potato and pumpkin) in between main meals during the harvest season.
- The number of households offering salty commercial snacks daily to children declined
- More households started using fine iodized salt, which is preferable because it is easier to measure than rock salt; and the number of households adding too much salt per meal declined.

Notable improvements were reported in children's dietary diversity during the second, harvest season round of TIPs. During the rainy season, however, minimum dietary diversity was achieved on only 2-4 days a week, suggesting the need to improve households' access to more and a wider variety of foods during this season. Meeting this need is an underlying goal of the IFSN and recommendations were made to the project to diversify agricultural production and ensure the provision of inputs and agricultural advice to families to address: 1) seasonal food availability gaps by stepping up production and productivity and 2) lack of adequate availability of nutrient-dense foods throughout the year by diversifying food production through the provision of inputs to enable families to access more easily diverse nutrient-dense foods, especially animal-source food, vegetables and fruit, and legumes.

Other recommendations address other areas of import for the IFSN (and agriculture-nutrition programming more generally) identified by TIPs, including the need to include grandmothers and husbands in the target audiences for nutrition education activities; the need for health extension officers to actively address breastfeeding issues during wider promotion of complementary feeding practices; the need to ingrain complementary feeding practices in cultural beliefs; and the need to strengthen financial and operational capacity for nutrition at sub-district levels of government, especially for extension.

INTRODUCTION

Preliminary research to probe local customs and belief systems is an essential prerequisite for nutrition projects aiming to improve context-specific practices. One approach for conducting such formative research is to first identify the individual, cultural and environmental barriers that prevent and facilitate optimal behaviors, and then to use this information to craft targeted strategies to promote positive behavior change (Academy for Educational Development/Linkages Project, 2003; Davis, 2004; Hill *et al.*, 2007, in Locks *et al.*, 2013). Trials of Improved Practices or “TIPs”, is a consultative research technique which involves both project participants and project staff in this approach.

TIPs use interactive sessions with household members and other potential project participants to gather information on key cultural and personal concerns. Changes in behavior and practices are proposed, negotiated, evaluated, and re-negotiated within a set time period. The research follows an iterative process of trial and evaluation with the results eventually feeding into project design and implementation.

This report presents results from an agriculture-nutrition project which used TIPs to explore infant and young child feeding (IYCF) practices in the Kasungu and Mzimba districts of northern Malawi. The objective of the study was to identify feasible, culturally acceptable, and effective strategies to improve child feeding practices using locally available foods.

Two rounds of TIPs were conducted to capture the impact of seasonality on IYCF and to explore options for mitigation. The first round corresponded to the rainy season, when household food stocks were low (November 2011 - January 2012), the second was conducted during harvest (May - July 2012).

Results of these TIPs are presented in sections 4, 5 and 6 of this report. However, a number of sections are provided prior to orient the reader with regard to background and methods. A brief overview of Malawi’s nutrition and food security situation is presented immediately below, followed by background information on the broader FAO program context. Additional information on the TIPs technique is also provided. Section 2 contains information on study design, site selection and participant recruitment, and section 3 describes the data collection process. Section 7 and 8 conclude the report with a summary and a discussion of selected results. They offer conclusions and provide an overview of the modified recommendations to improve counselling on child feeding practices and complementary feeding recipes.

1. BACKGROUND

1.1 Nutrition and food security in Malawi

Malawi continues to struggle with high and persistent rates of stunting, which is low-height-for-age and indicative of chronic, prolonged malnutrition. Over much of the past two decades, stunting rates in Malawi have hovered around 53 to 54 percent. Based on the most recent Malawi Demographic and Health Survey (MDHS), the figure is an estimated 47 percent, still well above the “severe” cut-off point as designated by the WHO¹ (NSO and ICF Macro, 2011). Micronutrient deficiencies are also common. For example, country-wide, prevalence of anemia in children aged 6-59 months is estimated to be 63 percent, 29 percent in non-pregnant, non-breastfeeding women, and 38 percent in breastfeeding women (NSO and ICF Macro, 2011).

Although programs in Malawi are in place for addressing malnutrition, most have tended to be small scale and short term instead of providing systematic, permanent support. This is likely due in part to disparities between national and local capacity. Despite the fact that substantial institutional “architecture” for nutrition now exists at national and municipal level, especially in the Ministries of Agriculture and Health, no sector has nutrition capacity below district level, leaving area supervisor, extension workers and villages with little to work with in terms of operationalization.

Persistent food insecurity is a related problem. The vast majority of Malawians are rural, poor net consumers whose limited land holdings (1.2 ha on average for smallholder farmers and less for those with no formal holdings) are inadequate to support year-round production for own consumption. Lack of irrigation, declining soil fertility, highly variable weather patterns, low technology transfer, and weak extension services all contribute to low output among these households (IFAD, 2011). As a result, many families are vulnerable to weather and food price shocks, as well as seasonal food insecurity. The latter is partly due to low production diversity. Over 80 percent of small holder land is planted to subsistence maize and, at country level, the contribution of carbohydrates (predominately maize) to dietary energy supply remains above recommended levels (78 percent in 2002; 73 percent in 2007² [Mtimuni, 2008]).

This over-reliance on maize is a large part of the problem for food and nutrition security, many Malawians experience a “hungry season³” every year prior to and during the rains (October through March), before early green maize is mature enough for consumption or sale.

1.2 The IFSN Project: “Improving Food Security and Nutrition Policies and Programme Outreach”

Against this background, Malawi’s Ministry of Agriculture and Food Security (MOAFS) implemented a two-phase project on “Improving Food Security and Nutrition Policies and Programme Outreach” (IFSN), beginning in 2007. Through provision of policy and program advisory services, the IFSN aims to contribute to improvement of the national food security and nutrition situation in Malawi.

¹ Stunting rates of 40 percent or more are classified as severe by the WHO.

² The WHO recommends between 55 and 75 percent.

³ For the purposes of this report, “hungry season” is defined as the number of months a household lacks food because their own food stores have depleted and they have no resources to buy food (Kuchenbecker *et al.*, 2012).

Delivery mechanisms include capacity development support to government institutions at central and district level, and direct grass-roots interventions at sub-district level. With regard to the latter, the project aims to reach out to 15,000 food insecure households and provide educational and training support to 31,500 households and 10,500 school children in two neighboring districts- Kasungu and Mzimba - by the end of its project cycle in 2015 (FAO, 2010a). IFSN receives technical support from FAO and financial assistance from the Flanders International Cooperation Agency (FICA) and the German Ministry of Food and Agriculture (BMEL).

During the second phase (2011 to 2015), the project's focus is the grass-roots component, which is aimed at increasing the production and consumption of nutrient dense plants and animal-source foods. This includes provision of technical assistance and inputs to increase crop and agricultural diversification, as well as capacity building for nutrition at field level. Outcomes aimed for in this current phase include:

- 1) Kasungu and Mzimba households strengthened to the extent that they can meet their needs in terms of food security and nutrition year-round.
- 2) Local organizations strengthened to continue delivering a district-wide, comprehensive set of services in support of food security and nutrition improvement (Nordin, 2014).

During both phases, sub-district services have been delivered via rounds of support provided to targeted sections within six agricultural extension planning areas (EPAs). A section is an administrative boundary delineated by the Ministry of Agriculture and Food Security. One EPA includes several sections and one section includes several villages. Phase II sections are Champhira, Mbawa, and Khosolo in Mzimba; and Chulu, Kaluluma, and Mkanakhoti in Kasungu (Figure 2).

Each round of support targets approximately 5,000 households. The project is currently in its third and final round. Villages covered in previous rounds no longer receive direct support, though periodic monitoring does occur (Nordin, 2014).

Specific activities supported in each round are as follows:

- Increased production of vegetables, fruits, legumes, nuts, and small livestock (the latter in "pass-on" programs, the former through improved access to seed and other inputs)
- Soil and water management
- Use of trees for food and fertilizer
- Irrigation
- Water points and management of bore holes
- Sanitation and hygiene
- Nutrition education to promote improved infant and young child feeding (IYCF) practices through utilization of locally available nutrient-rich foods.

This integrated approach, which links technical advice in food security with efforts to improve nutrition knowledge and practices, is supported by a substantial evidence base which had repeatedly demonstrated that projects using stand-alone production strategies work less well than integrated projects whose interventions include nutrition education components *in addition to* activities to increase income and food availability (Webb & Kennedy, 2012, Gillespie *et al.*, 2013).

However, although there is consensus on global nutrition education recommendations for improving nutritional status and growth of young children (Black, 2008; SUN, 2010) published literature on the adaptation of these strategies to local contexts is limited. For example, a meta-analysis of 42 complementary feeding interventions concluded that there is no universal 'best' package of

components of a complementary feeding program (Dewey & Adu-Afarwuah, 2008). This is because socio cultural, economic and environmental factors play a crucial role in how nutrition education messages are received and acted upon. In resource poor settings, food security, especially regarding seasonal food shortages and hunger patterns, are an especially important part of the picture (PAHO/WHO, 2003; Daelmans *et al.*, 2009; UNICEF, 2011, in Wijesinha-Bettoni *et al.*, 2013).

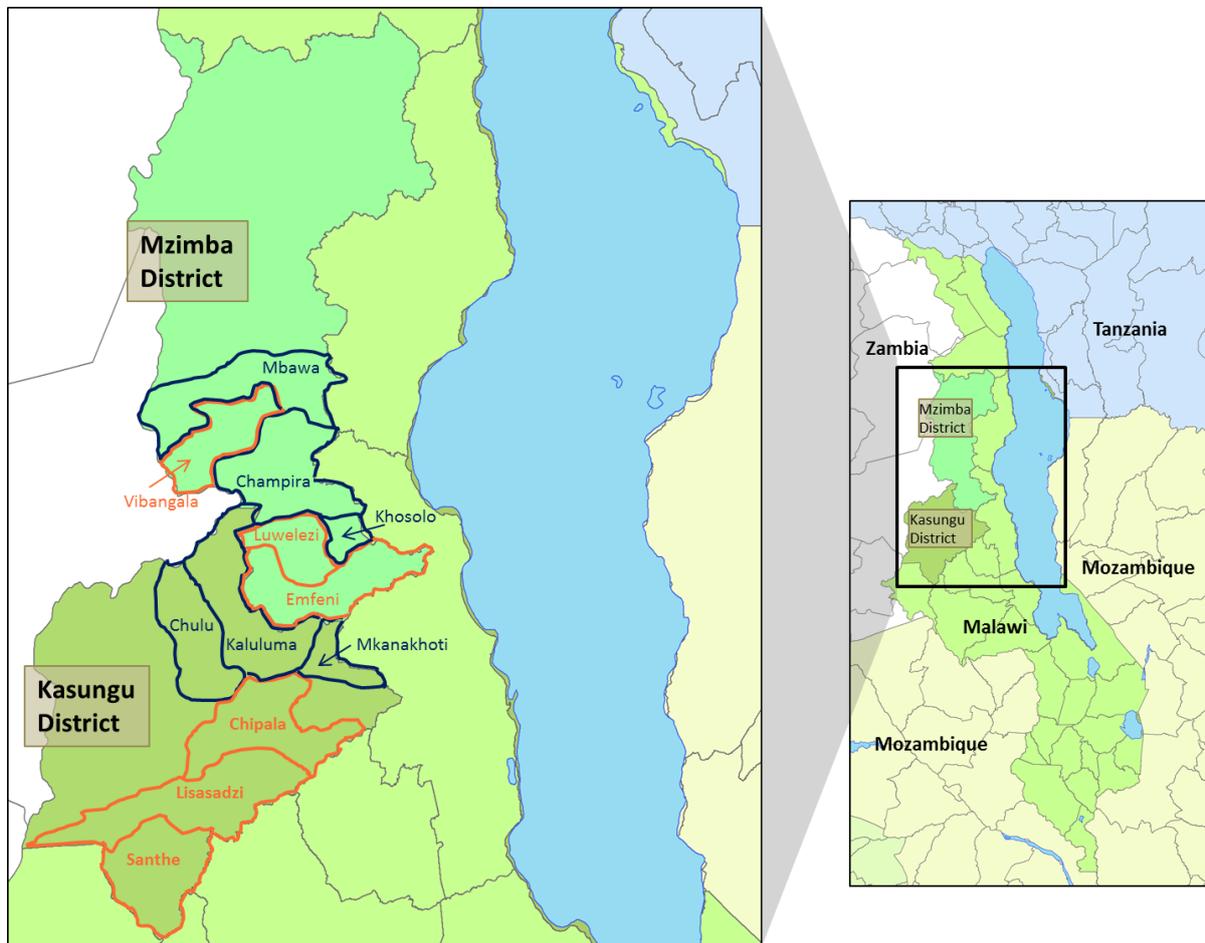


Figure 2: EPAs targeted by Phases I & II of the IFSN, Phase I EPAs: Orange; Phase II EPAs: Blue

As such, in order to maximize the potential of any nutrition education intervention, activities which aim to change behavior must be tailored to the local context. Especially for ambitious, integrated projects like the IFSN, formative research on barriers and facilitators to good IYCF practices is thus an important prerequisite, not only in terms of maximizing efficacy of the nutrition education intervention, but also with regard to informing food security actions aimed at increasing locally available, nutrient dense foods.

1.3 Trials of Improved Practices or “TIPs”

One technique for conducting formative research is “Trials of Improved Practices” or TIPs. Using TIPs, program planners pretest the actual practices that a project will promote. In essence the procedure consists of a series of visits in which an interviewer and participant analyze current practices, discuss problems and what could be improved, and together reach an agreement on one or a few solutions to try over a trial period. The interviewer and participant then assess the experience together at the end of the trial period, with results feeding directly into program design (Manoff Group, undated).

Unlike more observational techniques, TIPs' participatory approach benefits from experimentation by potential users. As such it is a valuable tool for encouraging participation. However, its main purpose is the identification of key practices which are not only effective but also *feasible* for the target population to carry out (Manoff Group, undated). This is of particular import in resource-poor settings like rural Malawi.

FAO used TIPs as a preliminary step in designing and implementing the IFSN- nutrition education intervention using previously trained Malawi government agricultural extension staff and health surveillance assistants to facilitate the household trials with caregivers. Selected households and caregivers of children under two in targeted villages were consulted to gain a better understanding of what could be done with available resources to improve IYCF. Results of the trials informed the design and implementation of the nutrition education intervention and the agricultural diversification component of the project, which has been implemented in selected villages.

Given the challenges posed by Malawi's hungry season, generating feasible and acceptable recommendations sensitive to seasonality was one of the study aims. And for this reason, two waves of TIPs were conducted. The first corresponded to the end of the dry season and ran through the rains, when household food stocks become progressively lower (November 2011 - January 2012). This first round is referred to throughout this report as "rainy season TIPs". The second wave was conducted during harvest, in May - July 2012, and is referred to as "harvest season TIPs".

1.4 Improving dietary intakes and nutritional status of infants and young children through improved food security and complementary feeding counselling (IMCF)

Parallel to the IFSN, a five-year research project "Improving dietary intakes and nutritional status of infants and young children through improved food security and complementary feeding counselling (IMCF)" (2011 - 2015), is being implemented by FAO in partnership with Justus-Liebig-University (JLU), Germany and Lilongwe University of Agriculture and Natural Resources, Malawi. IMCF aims to assess the effectiveness of the integrated approach taken by the IFSN on children's dietary intake, micronutrient status and growth. That is, it aims to assess the nutrition impact of combining nutrition education with food security interventions. In so doing, an important function of this parallel project is evaluation of the degree to which TIPs informed the IFSN's nutrition education component.

A baseline survey was conducted by JLU in June - August 2011, prior to the TIPs study, followed by a cross-sectional mid-term survey in August 2013, and a longitudinal study with several assessment rounds are conducted (following a cohort of 100 children in intervention and control areas) across the program's lifecycle, and the final impact assessment is planned for August 2014. IMCF is funded by the BMEL.

Please see Figure 3 for an illustration of how TIPs and the IMCF impact assessment project "nest" within the broader context of the IFSN.

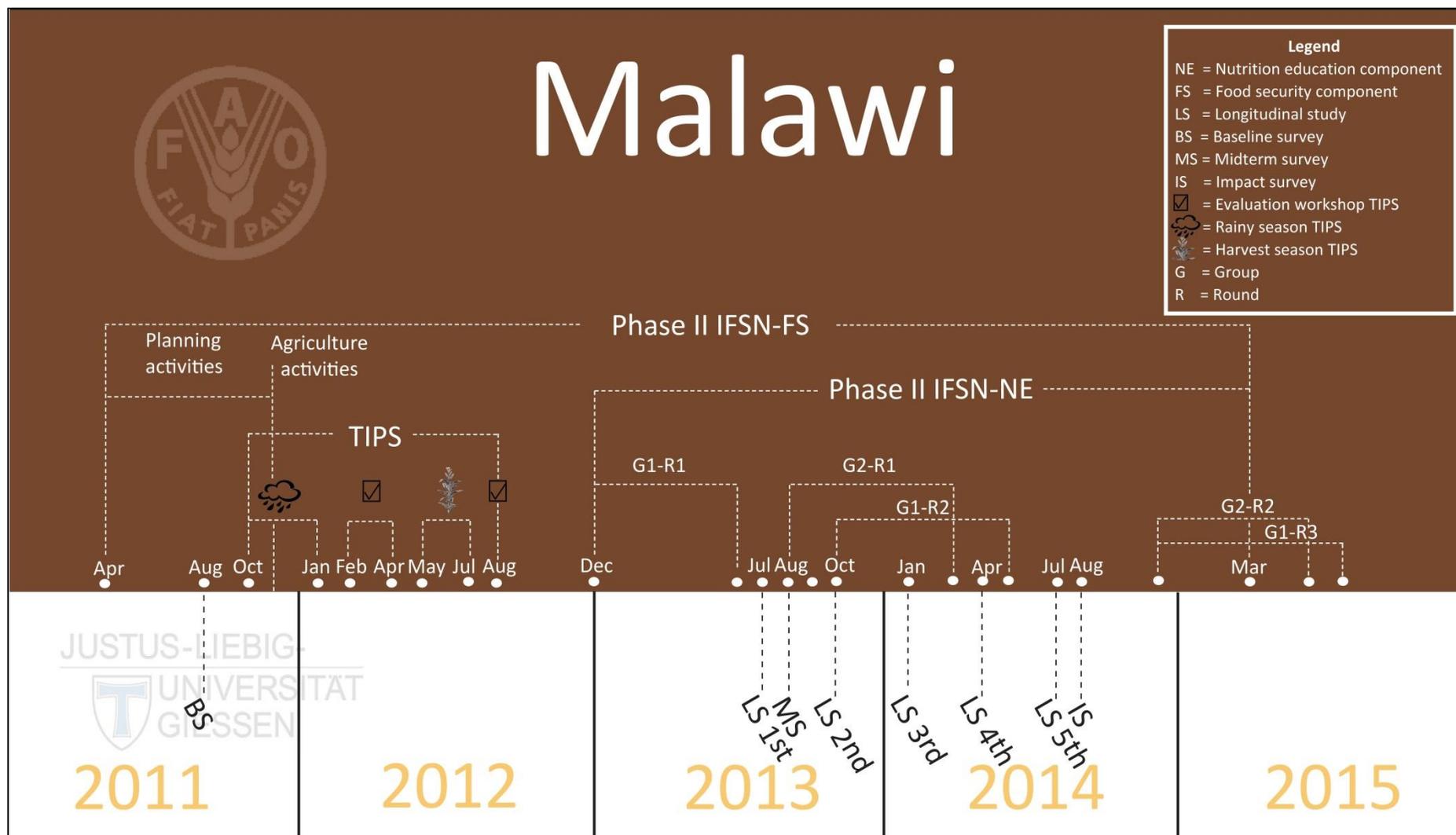


Figure 3: Timeline for IFSN-Food Security, IFSN-Nutrition Education, TIPS, and JLU-IMCF baseline, midterm and endline surveys

2. STUDY DESIGN, SITE SELECTION AND RECRUITMENT

2.1 Study design

As mentioned above, two rounds of TIPs were conducted to determine feasible, acceptable, and effective strategies to improve IYCF practices in districts targeted by the IFSN. Round 1 was conducted immediately prior to and during the rainy season, when household food stocks become progressively lower from November 2011 - January 2012 (Table 2a). Round 2 was conducted during harvest (Table 2b). Each round consisted of a series of consultative household visits to record feeding practices, provide counselling advice, and negotiate improved practices and record subsequent behavior changes. In both rounds, the last visit functioned as a follow up-cum-evaluation visit.

As part of the TIPs process, participatory group cooking demonstrations were also carried out (three per round). Seasonal food availability calendars (see Annex 2) which mapped food variety and availability throughout the year formed the basis for developing season-specific improved complementary feeding recipes tried in these demonstrations. The demonstrations provided an opportunity for developing skills and confidence to use underutilized nutrient-rich local foods. They also created the opportunity to test the acceptability to caregivers and children of enriched dishes, while reinforcing recommended food safety and hygiene practices. Caregivers were then encouraged to try the group-approved recipes in their homes. Some complementary food recipes based on available foods were field-tested during the rains while others were tested during harvest. Individual cooking demonstrations were also conducted in participant's homes, using foods and equipment available in those households.

Table 2a: Chronological Overview of TIPs - Rainy season

Rainy season TIPs				
2011			2012	
Oct	Nov	Dec	Jan	Feb
Training of MTs, TIPs facilitators and supervisors	In-depth training of TIPs facilitators in nutrition counselling	Participatory cooking demonstrations	Orientation of master trainers & FAO nutritionists in data entry	Data entry and analysis and evaluation workshop
		4 home visits per participating household		

Table 2b: Chronological Overview of TIPs - Harvest season

Harvest season TIPs			
2012			
May	Jun	Jul	Aug
Refresher training of TIPs facilitators and supervisors	Participatory cooking demonstrations		Data entry and analysis and evaluation workshop
	3 home visits per participating household		
		Orientation of Master trainers & FAO nutritionists in data entry	

2.2 Training

Both rounds of TIPs were conducted by ten multi-sectoral teams of facilitators (one team per village, see 2.3 for study sites). Each team was comprised of one Agriculture Extension Development Officer (AEDO) and one Health Surveillance Assistant (HSA). The immediate supervisors of these teams were Agriculture Extension Development Coordinators (AEDC) from MOAFS and Assistant Environmental Health Officers (AEHO) from the Ministry of Health (MOH).

Although the extension staff selected to work as TIPs facilitators were familiar with the local culture and health and nutrition practices, they required training on basic nutrition and recommended Infant and Young Child Feeding practices. FAO provided technical support during the training and implementation of both rounds of TIPs. Senior extension officers from MOAFS and MOH were trained by FAO nutritionists to act as master trainers for the project and were responsible for supervising community nutrition trials (Figure 4).

Each session included the following topics:

- Basic nutrition concepts, including foods commonly consumed in Malawi, their nutrient contents and the Malawian six food groups chart
- Preparation of seasonal food availability calendars
- TIPs methodology and data collection/verification methods for seasonal food availability, household food consumption, and IYCF
- Nutrition counselling protocols
- Child feeding practices, challenges and potential for improvement
- Development of improved complementary food recipes
- Conducting participatory group cooking demonstrations of improved complementary feeding recipes
- Evaluating the acceptability of improved complementary feeding recipes
- Mobilization of communities for TIPs, including household selection.

Based on identified needs, refresher training on counselling skills, basic nutrition concepts, data collection, data verification and data entry were conducted.

An evaluation workshop was conducted at the end of each round of TIPs. The purpose of these workshops was to: (i) present and discuss preliminary findings; (ii) share experiences, observations and lessons learned; (iii) review TIPs tools, procedures and feeding recommendations, including recipes; (iv) identify areas for improvement; and (v) brainstorm on strategies for wider promotion of the complementary feeding recommendations and recipes developed during the trials⁴.

Workshops were attended by TIPs facilitators and their supervisors from MOAFS and MOH, officials from the Department of Agriculture Extension Services at national level, IFSN project managers, researchers from JLU and nutritionists from FAO headquarters.

⁴ Most immediately regarding the IFSN target population.

Training dates	Type of training	Training duration and participants	
03–06 Oct 2011	Training of master trainers	5-day TIPs training with 12 participants: <ul style="list-style-type: none"> • 6 ADD & district nutritionists (MOAFS) • 4 district nutritionists (MOH) • 2 NGO nutritionists 	Rainy Season TIPs
10–14 Oct 2011	Training of TIPs facilitators	5-day TIPs training with 20 participants: <ul style="list-style-type: none"> • 10 AEDOs • 10 HSAs 	
18–19 Oct 2011	Training of supervisors	2-days TIPs orientation with 16 participants: <ul style="list-style-type: none"> • 6 AEDCs (3 per district) • 6 AEHOs (3 per district) • 2 CAEOs • 2 FAO Project managers 	
28–29 and 29–30 Nov 2011	Training of TIPs facilitators	2-days training in counselling with 20 participants: <ul style="list-style-type: none"> • 10 AEDOs • 10 HSAs 	
23–24 Jan 2012	Orientation of master trainers & FAO nutritionists	2-days orientation in data entry with 5 participants: <ul style="list-style-type: none"> • 3 Master trainers • 2 FAO nutritionists 	
2–4 May and 7–9 May 2012	Training of TIPs facilitators and supervisors	3-days training for harvest season TIPs with 32 participants: <ul style="list-style-type: none"> • 10 AEDOs • 10 HSAs • 6 AEDCs • 6 AEHOs 	Harvest Season TIPs
16 July 2012	Orientation of master trainers & FAO nutritionists	Half-day orientation on data entry with 6 participants: <ul style="list-style-type: none"> • 5 master trainers • 1 FAO nutritionist 	

Figure 4: Summary of trainings for TIPs implementation. ADD = Agricultural Development Division; AEDC = Agriculture Extension Development Coordinator; AEDO = Agriculture Extension Development Officer; AEHO = Assistant Environmental Health Officer; CAEO = Chief Agriculture Extension Officer; HSA = Health Surveillance Assistant; NGO = non-governmental organization

2.3 Study sites

The TIPs study site selection process was based on the JLU baseline survey (see section 1.4). JLU survey sections were randomly assigned as nutrition intervention (n =12) or control (n =12) sections for the pending impact assessment study; ten TIPs sections were subsequently selected from the pool of JLU intervention⁵ sections (Table 5, Table 3). As previously mentioned, a section is an

⁵ The JLU study design is a restricted randomized control trial with intervention and control areas. As such TIPs were only conducted in the intervention area to avoid bias in the control area.

administrative boundary delineated by the MOAFS. One EPA includes several sections and one section includes several villages.

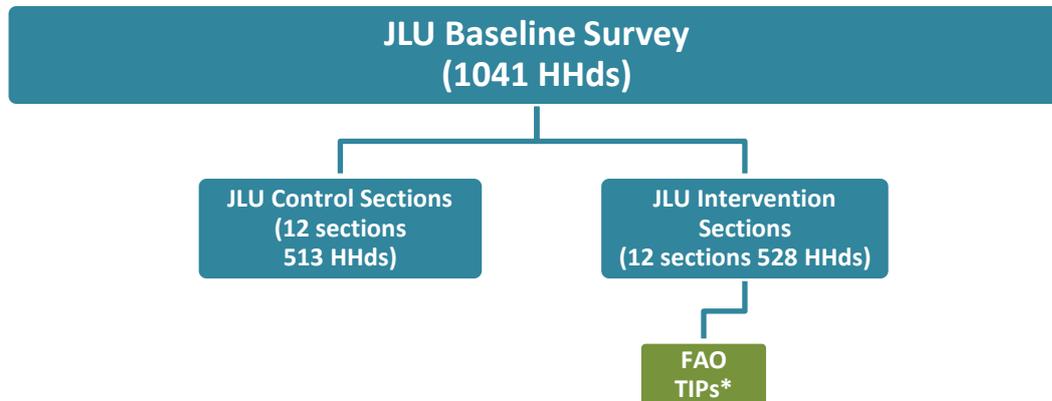


Figure 5: TIPs Study Site Selection. *100 households recruited at project initiation. Please see sections 4-6 for details regarding sample size during different stages of the intervention.

TIPs sections were selected to reflect actual variation with regard to economic background, agro-ecology and resource availability. Selection criteria included rainfall patterns, access to irrigable land, soil type, food production levels, livestock ownership and diversity, and quality of housing. Selection was done by District Project Managers in close consultation with Agricultural Extension Development Coordinators. Box 1 provides additional descriptive statistics for the study sites. (These data were collected from JLU survey participants but are also applicable to TIPs participants, as the latter were drawn from the larger JLU survey pool). The final selection of sections is listed in Table 4.

Once sections were selected, the next step was to identify households within the survey area who were eligible for TIPs. Participants were recruited through a community-based process which included a group cooking demonstration by TIPs facilitators. Final selections were made subsequently, in consultation with the village head. Efforts were made to ensure inclusion of lower income households (see Annex 1 for documentation of the recruitment process.) One hundred households were selected during this initial recruitment process.

- ✓ Average household size was 5.72 with a minimum of 2 and a maximum of 17 members per household.
- ✓ The majority of households were Christians (99.5 percent) and either of Tumbuka (71.3 percent) or Chewa (19.9 percent) ethnicity.
- ✓ Households were predominantly male-headed (93 percent) and most household heads had at least a primary level education (61.6 percent).
- ✓ The main occupation of the household heads was farming crops (80 percent) and farming was as well the main source of income throughout the year for 75.4 percent of households.
- ✓ In almost all cases, the child's mother was the survey respondent (97.5 percent).
- ✓ Most respondents had one or more years of education (89.5 percent), however more than half (55.3 percent) had not completed primary school.

Box 1: Study site details (from JLU baseline survey; applicable to TIPs). Source: Kuchenbecker et al., 2012.

Table 4: Final selection of sections for TIPs study based on JLU intervention and control areas

District	EPA	Section	JLU IA (Control)	JLU IA (Intervention)	TIPs	
Kasungu	Chulu	Lisitu	√			
		Mphomwa		√		
		Kamtuwale		√	√	
		Chulu North		√	√	
		Kaluluma	Kaluluma Central		√	√
			Kaluluma West	√		
			Kamwelembo	√		
			Milenje	√		
			Chatoloma	√		
		Mkanakhoti	Kapopo		√	√
			Ofesi West	√		
			Simulemba West		√	√
	Mzimba	Champhira	Levi Jere	√		
Jenda			√			
Kazingilira			√			
Champhira				√	√	
Luviri				√	√	
		Mbawa	Mbawa	√		
			Kakoma		√	√
			Katungubiri		√	
			Thoza		√	
			Mchilapundu		√	√
		Khosolo	Khosolo A	√		
			Msese A	√		
			Unyolo		√	√

2.4 Study participants and sample size

The majority of TIPs participants were mothers of children aged 0-23 months. However husbands, grandmothers and adult females residing in the same household also participated. As discussed below, this is an important detail, as mothers do not always make “executive decisions” on child feeding. Grandmothers and husbands also influence child care decisions and husbands have strong control over what foods are purchased.

One hundred households were signed up to participate in the first round of TIPs. The plan had been for the largest sub-samples to be 6 to 8 and 9 to 11 months old children (n=30 for each), with less representation of babies 0-5 months (n=20) and children over 12 months (n=20). However, minor adjustments were made to take into account availability of children in the different groups in the selected communities (Figure 6).

In the selected group of children, four of the 100 households had a set of twins (see Table 5) and a total of 104 children (57 males and 47 females) participated at the outset.

By the end of the first round, the number of households had dropped to 95 as three households moved out of the study area and two households were excluded from the analysis because their data were incomplete leaving a total number of available 99 child records.

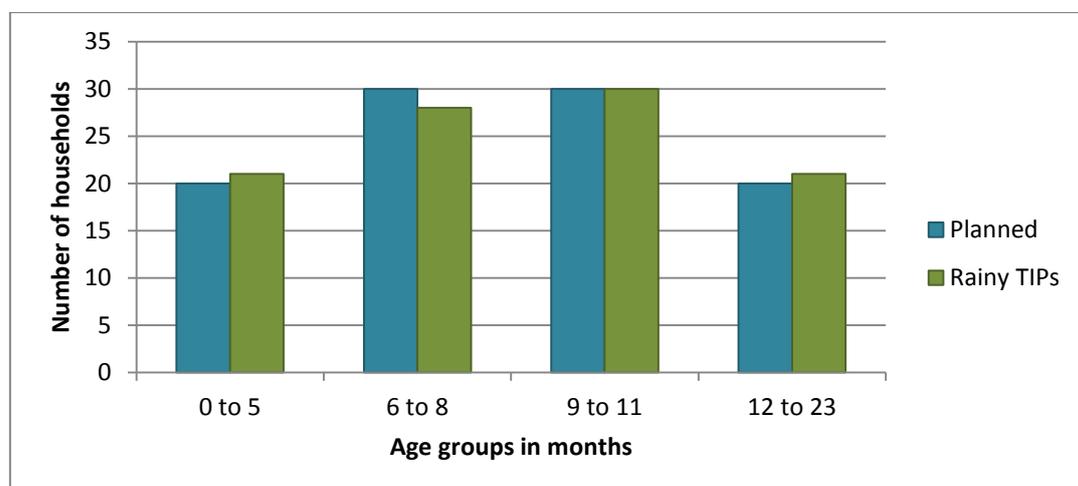


Figure 6: Planned and actual households per age group for the first round of TIPs

The entire TIPs study stretched over a period 10 months. At the beginning of the second wave of TIPs, the participating sample had further reduced to 91 children. By then, all the children were above 6 months. Six were aged 6-8 months, 15 were aged 9-11 months and the vast majority (n=70) were between 12 and 23 months (see Table 5).

Table 5: Number of households selected and age groups of children

Section	Village	Rainy season TIPs					Harvest season TIPs				
		TOTAL HHs	HHs by children's age group in mo.				TOTAL HHs	HHs by children's age group in mo.			
			0-5	6-8	9-11	12-23		0-5	6-8	9-11	12-23
Kasungu											
Kamtuwale	Kalomo plus 4 small villages	10	2	3	3	2	7	0	2	0	5
Chulu North	8 small villages	10	3	2	3	2	10	0	1	1	8
Kaluluma Central	6 small villages	10	2	3	3	2	10	0	1	1	8
Kapopo	Kapopo	10	2*	3	2	3*	8	0	2	0	6
Simulemba West	Kamchocho	10	2	3	3	2	10	0	0	2	8
Mzimba											
Champhira	Kaigunde	10	2	2	4*	2	7	0	0	1	6
Luviri	Jam village	10	2	3	3	2	10	0	0	4	6
Kakoma	Mbekwa Shaba	10	2	3	3	2	10	0	0	3	7
Mchilapundu	Kachingwe	10	2	3	3	2	10	0	0	2	8
Unyolo	8 small villages	10	2	3	3*	2	9	0	0	1	8
Total		100	21	28	30	21	91	0	6	15	70

* One of the HHs had a set of twins

3. DATA COLLECTION

3.1 Data collection tools and analysis

Data collection tools and guides were adapted to the Malawian situation and tailored to the educational level of the TIPs facilitators. Seven instruments were used during the TIPs process including six tools for rainy season TIPs and an additional tool for harvest season TIPs.

For rainy season TIPs, tool 1 was used for the first home visit, during which data on the household food availability, family feeding practices and IYCF including feeding the sick children were collected. Additionally, data was collected on hygiene and sanitation, as well as on food preparation and processing equipment available to the household. Tool 2 was used to facilitate data processing after this initial home visit. Tool 3 was used in preparation for and during the second home visit, which focused on counselling caregivers on improved IYCF practices. Tool 4 was an evaluation form used to facilitate data processing after the counselling visit, after the follow-up visit, and after the follow-up cum evaluation visit. Tool 5 was used for recording issues requiring the advice of facilitator's supervisor and for recording the supervisor's advice.

One instrument was used during harvest season TIPs. This tool repeated the same data collection procedures as during rainy season TIPs, as well as capturing information on any dietary changes observed by the caregiver and willingness to continue the improved IYCF practices year-round. To obtain additional information on the specific types and amounts of foods children were consuming, a 24-hour dietary recall was used to ask mothers in detail about what they had fed their children in the previous 24 hours (Black Phiri *et al.*, 2012).

Table 6 provides more detail on these instruments and the following section describes each of the home visits in detail.

EpiData and Excel software were used for data entry and analysis. Prior to data entry, information recorded on evaluation forms was verified via random cross-checks conducted by a team of field evaluators comprised of three FAO nutritionists and selected master trainers. Incomplete answers were left out of the analysis, resulting in differences in the numbers of respondents per question. These differences are flagged in findings under Sections 4, 5 and 6.

Table 6: Data collection tools used during rainy season and harvest season TIPs

Season	Study tool	Purpose of the tool	When tool was
Rainy season	Tool 1: Initial assessment tool	Collecting data on foods available and accessible to the household (HH), family feeding practices, breastfeeding and complementary feeding practices, when specific foods were introduced in child's diet and child-care and feeding information sources	First home visit
	Tool 2.A: Child feeding and care classification form	Recording and classifying helpful and harmful child feeding practices using data collected on Tool 1, as well as recording child feeding practices which TIPs facilitator does not know how to classify and therefore requires advice from the supervisor	Shortly after the first home visit
	Tool 2.B: Tool for identifying possible complementary feeding improvements	Listing foods available in the HH and ingredients used in preparing complementary food, using data collected on Tool 1. On space provided, TIPs facilitator records possible areas of complementary feeding improvement, for discussion with caregiver during the next home or counselling visit	Before the counselling visit (second home visit)
	Tool 3: Counselling guide	Provides brief reference notes on nutrition and hygiene topics covered during the training of TIPs facilitators. It also suggests improved complementary feeding and child-care practices to address common child feeding problems, including improved complementary feeding recipes	In preparation for and during counselling visit. Recipes also used in group cooking demonstrations (GCD)
	Tool 4: Counselling and follow-up visit outcome form	1) Listing observed child feeding and care problems on Tool 2, recording recommendations suggested to the caregiver, reaction of the caregiver, action that the caregiver agrees to try; 2) whether the caregiver tried agreed option(s) after an agreed period and whether caregiver made modification and the reason for the modification; and (3) willingness of caregiver to continue improved complementary feeding, giving reasons for the response	Shortly after these visits: counselling; first follow-up; and follow-up-cum-evaluation
	Tool 5: Tool for recording issues requiring supervisor's advice	First column is for TIPs facilitator to record issues requiring the supervisor's advice and the second is for the supervisor to record advice given on each issue	As and when appropriate
	Tool 6: Summary of data on completed Tool 4 forms	Tool forms the basis for developing the Excel templates used for data entry and analysis for rainy season TIPs. Modifications must be made for harvest-season data entry, depending on the information to be collected using Tool 7. NB: This is too complex for the TIPs facilitators to use but is used by project nutritionist.	Excel sheets used during data entry and analysis
Harvest season	Tool 7: Harvest season recording form	Consists of three parts for: 1) re-assessing foods available at harvest, breastfeeding practice, current complementary feeding practices (24-hour qualitative dietary recall, frequency of adding different ingredients in complementary food, etc.), feeding problems, new recommendations offered 2) recommendations tried, opinion of caregiver, modifications to recommendation(s) and reasons why 3) dietary changes observed and willingness to continue preparing improved complementary feeding recipes year round, giving reasons	During first harvest-season re-assessment-cum-counselling home visit; First follow-up visit; and Second follow-up visit

3.2 Household visits for rainy season TIPs

During the rainy season trials, participating households were visited four times between the second week of November 2011 and the first week of January 2012. Information was provided by caregivers, often with input from husbands and grandmothers living in the same household. Individual home-based cooking demonstrations were often included as part of the visits. These encouraged mothers to adopt improved IYCF practices and recipes that they had learnt during group cooking demonstrations held in TIPs communities.

First home visit (assessment)

Using a structured open-ended questionnaire, information was collected on:

- ownership of means of food production (land and gardens), food crops, vegetables and fruit trees, livestock type and ownership, food from the forest, foods available and accessible to the household and its seasonality;
- family feeding practices and frequency of consuming vegetables, fruits, legumes, animal-source foods and refined vegetable oil;
- use of iodized salt in family meals;
- IYCF, with focus on breastfeeding and ingredients commonly used to prepare complementary foods;
- snack types and frequency of their consumption by each child;
- age at which specific foods are introduced into the child's diet, including rationale;
- feeding a sick child or child with no appetite;
- feeding practices in pregnancy and lactation; and
- sources of information on feeding infants and young children and the family in general.

Tool 2 was used to categorize and analyze this information to determine household capacities and identify good practices, weaknesses and gaps.

Second home visit (counselling)

TIPs facilitators presented the caregiver with a summary of positive and negative child feeding practices based on information gathered during the first visit. Facilitators then recommended options for improvement using foods available to the household (also based on information gathered during the first visit). Through discussion, the caregiver selected recommendations she was willing to try and an appointment made to return and discuss her experience and feelings.

Post-visit, the first section of tool 4 was used to summarize the outcome of the counselling and recommendations.

Third home visit (first follow-up visit)

TIPs facilitators assessed caregivers' progress in adopting improved child feeding practices. Were the recommendations that had been agreed upon now being practiced? Had they been modified? If so, how, and why? Was the caregiver willing to continue these practices? During this visit, facilitators also negotiated with household to set new IYCF targets, and, where necessary, helped the household to re-set old ones. Suggestions were also made for additional actions to improve household food security.

Post-visit, the middle section of tool 4 was used to record outcomes of what the caregivers tried, how they felt and what further negotiations or re-setting of targets had occurred. Outcomes of this visit were recorded on the last section of tool 4.

3.3 Household visits for harvest season TIPs

TIPs facilitators visited households three times during the harvest season, starting in the third week of May 2012 and ending in the last week of June 2012. As during the rainy season, information was provided by caregivers, often with input from husbands and grandmothers living in the same household. In-home cooking demonstrations were often included as part of the visits.

First home visit (reassessment and counselling)

Using the first part of tool 7, information was collected on:

- foods available and accessible to the household during harvest;
- breastfeeding practices;
- complementary foods consumed by the child during the previous day (assessed via 24-hour qualitative dietary recall);
- frequency with which different ingredients were added to complementary foods;
- quantity of complementary food given and eaten by the child at each meal;
- frequency with which sweet-potato- or Irish-potato-based complementary food was prepared; and
- frequency with which different types of snacks were given.

During the visit, on the basis of the information collected, TIPs facilitators identified persisting child feeding problems, negotiated new recommendations with the caregiver and recorded what the caregiver agreed to try.

Second home visit (first follow-up visit)

TIPs facilitators followed up on the adoption of agreed child feeding practices by re-assessing the same information regarding complementary feeding that had been collected during the first visit:

- complementary foods consumed by the child during the previous day (assessed via 24-hour qualitative dietary recall);
- frequency with which different ingredients were added to complementary foods;
- quantity of complementary food given and eaten by the child at each meal;
- frequency with which sweet-potato- or Irish-potato-based complementary food was prepared; and
- frequency with which different types of snacks were given.

In addition, facilitators determined whether agreed recommendations were tried, the opinion of the caregiver regarding those recommendations, and any modifications that had been made and why. During this visit, facilitators also negotiated with household to set new IYCF targets, and, where necessary, helped the household to re-set old ones. Facilitators summarized outcomes of this visit using the second section of tool 7.

Third home visit (second follow-up-cum-evaluation visit)

TIPs facilitators used the last section of Tool 7 to record:

- additional information on complementary foods given to the child the previous day;
- frequency with which different ingredients were added to complementary food;
- the quantity of complementary food eaten per meal;
- frequency with which tuber-based complementary food was given;
- snack consumption; and
- whether agreed recommendations were tried.

TIPs facilitators recorded dietary changes observed and willingness to continue preparing improved recipes for complementary food.

4. FINDINGS: HOUSEHOLD FOOD SECURITY AND FAMILY MEALS

As described above, during the initial visits for rainy season TIPs in October and November, facilitators collected information regarding household food security and family meals. These preliminary interviews were conducted at a time when many households begin to experience food shortages. From May - July they were repeated, during a period of relative food security. As such, findings from these interviews provide important information on the setting to inform IFSN food security interventions aimed at stabilizing meal frequency year round and closing seasonal gaps to improve availability and access to different nutritious foods.

In addition to informing the design of food security programming, collection of family meal data also provides a start-point for evaluating the quality of diets of children aged 9-23 months, as children gradually start consuming family meals during this period.

4.1 Summary of family meal practices

When breakfast was consumed, it typically consisted of porridge made from whole maize (*mgaiwa*) meal. Approximately one-third of households reported adding groundnuts or soybeans to their porridge, when available. When in season, sweet potatoes, Irish potatoes, cassava and pumpkins were also consumed for breakfast.

Lunch and supper consisted primarily of a stiff maize-based porridge (*nsima*) consumed with various types of relish. The majority of households preferred *nsima* made from white-refined maize meal known as *ufa woyera*. However, as maize stocks dwindled from October - March, most households switched to unrefined *mgaiwa* flour.

Relishes play a critical role in improving the quality of Malawian meals and include beans, meat or vegetables (Mtimuni, 2008). Beans (other than soya) were available to most TIPs households for only half the year. Around half of TIPs households reported running out of soybean in September/October and around one-third indicated no access to soybeans at any time of year. Meat consumption was very low; most households reported consuming poultry only once a year, at Christmas. Fish (especially dried small fish called *usipa*) consumption was higher than meat though declined precipitously during the rainy season. (This was primarily due to decreased purchasing power. Unlike other areas of Malawi, fishing opportunities in the project area are limited.)

In contrast, green leafy vegetables were reported as readily available during the rains between January and March, when purchasing power as well as direct access to staples and legumes is usually at its lowest. Green leafy vegetables were reportedly consumed as relish twice a day during the rains. They may also have comprised an additional meal for around 50 percent of TIPs households during this period, but were not reported as such. Given the heavy emphasis on maize-based meals in Malawian culture, it is possible that these meals were not reported because they were not considered to “count”.

Cooking oil was mostly used in relish preparation between April and November because most households could not afford it during the rains. On average, households bought approximately 20-40 ml per household per week (FAO, 2011). (Though presumably this average masks variation due to seasonable fluctuations in purchasing power.)

4.2 Staple food (n_{household}=99⁶)

All participating households grew maize - Malawi's main staple - for own consumption. Non-maize staples were also cultivated by some households, namely cassava, Irish potatoes and white-fleshed sweet potatoes.

As mentioned above, most rural Malawian households are net consumers whose limited land holdings are inadequate to support year-round production for own consumption. Lack of irrigation, declining soil fertility, highly variable weather patterns, low technology transfer, and weak extension services also reduce output. As such, the vast majority of TIPs families did not have the capacity to produce enough staple food to meet their needs year round. Out of 99 households, only four reported producing enough maize to last through the rainy or "hungry" season, 19 reported producing enough maize to last up to December/January, and 72 reported running out of home-grown maize before December.

Households reported various coping mechanisms for dealing with maize shortfalls. These included buying maize using proceeds from selling legumes (75 households), food-for-work (34) and gathering food from the forest (16).

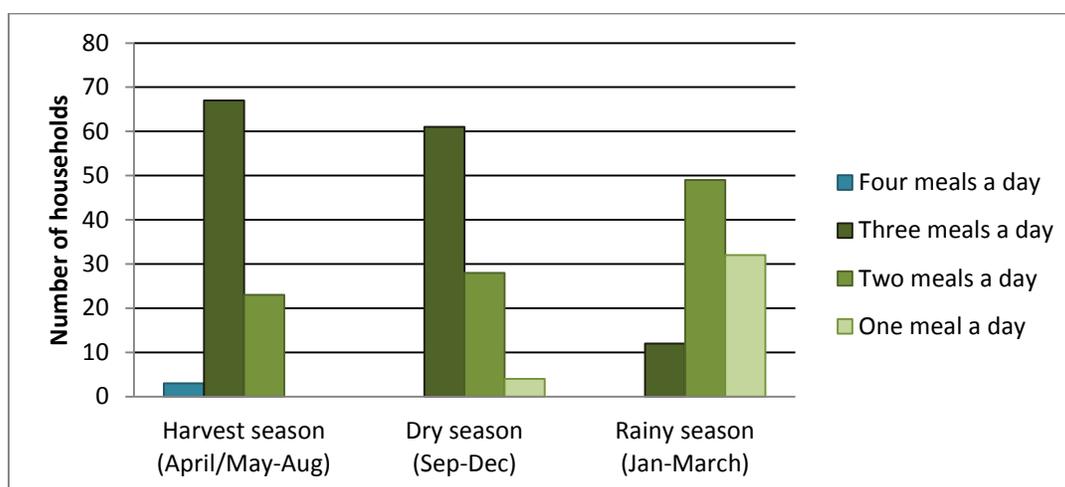


Figure 7: Number of meals per day by season reported by a subsample of n_{household}=93 during rainy season TIPs

Despite these measures, seasonal staple shortages clearly take a toll. Out of a sub-sample of 93 TIPs households, a majority reported reduced meal frequency due to seasonality. Per Figure 7, while 67 households were eating three meals a day during harvest season, only 12 were doing so during the rains, moreover, the number of households who reported eating only one meal a day rose substantially, from zero during harvest to 32 during the rains. However, it is important to note that these families may actually have been consuming additional, non-maize-based meals (see section 4.4).

⁶ Per Section 3.1, not all interviews were complete. Incomplete answers were left out of the analysis. As a result, there is some variability in sample size for specific food groups. Sample sizes are indicated at the beginning of each sub-section.

As mentioned above, food shortages affect not only household meal frequency but also the quality of meals and quantities consumed, with subsequent negative implications for IYCF.

4.3 Legumes (n_{household}=95)

Legumes and nuts were the main source of dietary protein in the project area. As with staple carbohydrates, they were overall, reported as readily available from April to September, with stocks declining in October and into the rainy season. Common groundnuts, beans (including sugar beans, kidney beans and haricot beans), and soybeans were the most common legumes grown. Only 1 household reported not accessing legumes at any time of the year.

- *Common groundnuts:* Out of 95 households, 10 reported access to groundnuts from own production for eight to nine months (April/May through December/January), 5 had access for seven months (April through November) and 67 had access for five to six months (April/May to September/October). Thirteen households indicated that they did not have access to groundnuts at any time of year.
- *Beans:* Out of 95 households, 10 reported access to beans for eight to nine months. The majority (83) experienced bean shortages for nearly six months, from September/October through March. Two households reported having no access to beans at any time of year.
- *Soybeans:* Out of 95 households, 13 reported access to soybeans for seven months, from April/May through November. Fifty-four reported running out of soybean in September/October and 28 indicated no access to soybeans at any time of year.

Regarding frequency of intake (see Figure 8), 85 households reported consuming legumes at least once a day during harvest (April - August). Out of these 85, 24 reported consuming them twice a day.

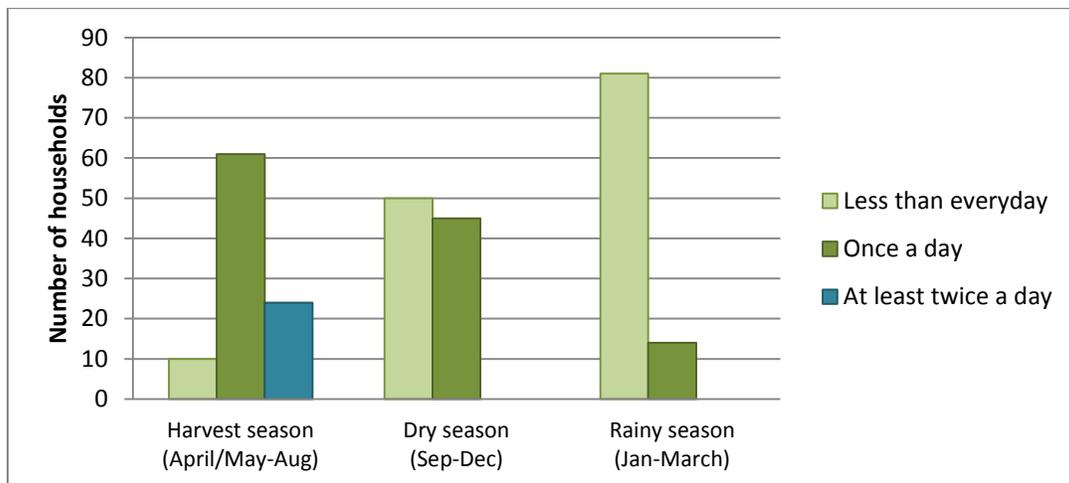


Figure 8: Frequency of legume consumption by season reported by n=95 during rainy season TIPs

Only 10 households did not consume legumes on a daily basis. As stocks declined in September - December, just under half of households reported consuming legumes daily, while the remainder

reported consuming them once or twice a week. During the rains, only 14 households reported consuming legumes daily; 22 reported consuming legumes between twice a month and thrice a week; 59 reported consumption once a month.

Despite production being too low to meet household food needs year-round, households reported selling some of the legumes they produced, particularly soybeans, to buy other foods, namely maize, and essential non-food items.

4.4 Vegetables (n_{household}=99)

Green leafy vegetables (e.g. pumpkin leaves, rape, mustard leaves, bean leaves) were reported as readily available during the rainy season between January and March, when access to staples and legumes is at its lowest. Ninety households reported producing vegetables in the rainy season. Indeed, more households reported consuming vegetables twice a day (51) than reported consuming one main family meal a day (32) during the rains. This reported consumption pattern strongly suggests that some of the “one meal per day” households were, in addition to a single staple-based meal, also consuming an additional portion of vegetable but did not perceive this as a meal because it lacked the staple. This is in keeping with the very strong emphasis placed on “maize as food” in Malawian culture.

Although households preserved vegetables by sun drying when they were in abundance, virtually all households reported a shortage of vegetables starting in October and reaching critical levels during November/December. Of the 90 households that produced vegetables, 18 were able to grow vegetables only during the rainy season and experienced vegetable shortages as early as May/June. These households were unable to maintain even the bare minimum of vegetable production during the dry season. Reasons for this were not reported, reasonable hypotheses include lack of water for irrigation and/or seeds.

In addition to leafy greens, vegetables grown in home gardens included amaranth, black jack (*Bidens pilosa* L.), cowpea, Chinese cabbage and ordinary cabbage. However, these vegetables were reported to be grown by only a small number of households (7). Twelve households also reported growing onions and tomatoes during the dry season.

4.5 Animal-source foods (n_{household}=95)

Eighty-two households reported owning livestock. The majority reported owning chickens (76), and slightly less than a third reported owning goats⁷. However, meat consumption was very low, with most households reportedly consuming poultry only during Christmas. This pattern may be due in part to the desire to maintain poultry and small livestock as an asset base, as opposed to an immediate source of food.

A quarter of the households reported consuming fish twice a week during harvest; another 13 households reported consuming fish once a week during harvest. The frequency of fish consumption declined as income-generating opportunities decreased in the late dry season and during the rainy

⁷ Data on cattle were inconclusive and hence not reported here.

season. Only 16 households reported consuming fish twice a week in October and November (late dry season), and only 11 households reported consuming fish twice a week during the rains. Fifteen households reported consuming fish once a week during the rains, while the majority of households reported consuming fish once or twice a month.

4.6 Fruits and snack food ($n_{\text{household}}=99$)

Apart from bananas, which were available all year round, most fruits and snacks were seasonal. Overall snack availability was poorest in October and November, when vegetables were also in short supply. Seventy six households owned fruit trees, most commonly mango trees (60 households), the fruits of which were abundant from December to February. A third (32 households) owned banana trees but the number of trees per household was low which contributed to poor access to bananas. Twenty households owned pawpaw trees whose fruits were abundant from June to September. Another 22 households reported owning guava trees, and 16 households reported owning orange trees. Several wild fruits (e.g. *masuku* [*Uapaca kirkiana*]) were also reported as available, but as with domestic varieties, accessibility was predominantly seasonal.

Other fruit and vegetables eaten as snack food included pumpkins, sweet potatoes, cassava and Irish potatoes. All are seasonal in their availability (see Annex 2).

4.7 Implications

With the exception of green leafy vegetables, TIPs households reported that household food security was at its best during and shortly after harvest (i.e. April - July/August). Within six months of the harvest, food security deteriorated, reaching its lowest level during the rains (i.e. January to March). Meal frequency and quality deteriorated concomitant to increased food insecurity.

This picture fits the classical seasonality-nutrition scenario in that at the end of the dry season and during the rainy season food stocks run low, food prices increase and food consumption decreases. The rainy season is also a period of intensive agricultural work with higher energy needs, coupled with greater exposure to infectious diseases due to the wet conditions (Wijesinha-Bettoni *et al.*, 2013). Since women are actively involved in agriculture, especially during the busy planting season, and children are especially susceptible to infections, the nutrition status of these groups is negatively affected (Figure 9; Hoorweg *et al.*, 1995, in Wijesinha-Bettoni *et al.*, 2013).

A primary objective of the IFSN is to mitigate precisely this scenario by increasing availability of locally produced nutrient-dense foods. In its current phase, this includes promoting orange-fleshed sweet potatoes, cassava, vegetables and fruits to reduce seasonal food availability gaps and increase access to micronutrient-rich foods. Households are also being encouraged to consume whole maize (*mgaiwa*) meal year round. As mentioned above, *ufa woyera* is a refined meal, approximately a quarter of maize volume is lost in the refinement process. *Ufa woyera* is also less nutritious than *mgaiwa* flour because the germ is removed during processing.

Regarding animal-source foods, small livestock “pass on” activities are supported by the IFSN project. Chickens and goats are distributed to farmers in targeted EPAs to increase access to animal-source foods. Distribution is conditional on recipients’ “pass on” of chicks and kids to additional farmers who are then

themselves obliged to reciprocate in the same manner. The pass on is managed by the government animal husbandry officers together with local leaders and supervised by the IFSN project. Through the pass-on scheme it is anticipated that households will shift from the “livestock kept exclusively as assets” model to a “livestock for assets and home consumption” model.

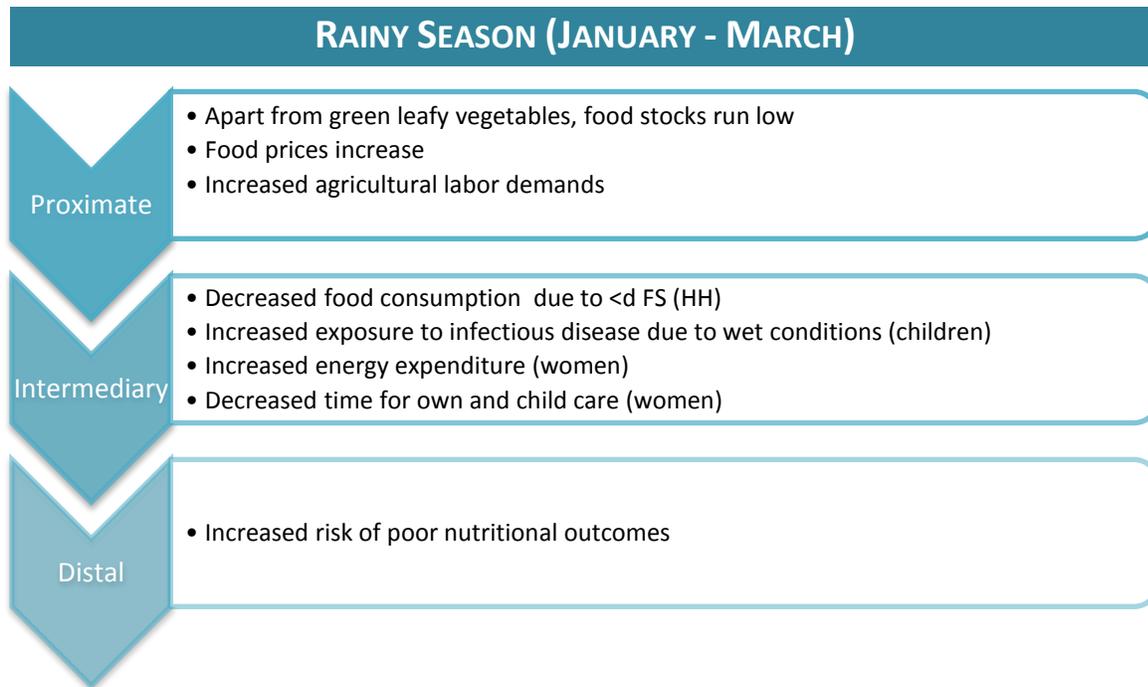


Figure 9: Effects of the Rainy Season, through a nutrition lens

However, data collected through TIPs suggest that issues of targeting households need to be addressed to ensure that at-risk households with young children will gain access to the livestock distribution scheme. As mentioned above, the TIPs household recruitment process was separate from the participatory rural appraisal process used to identify households eligible for food security services provided through the IFSN.

Subsequent targeting for the IYCF nutrition education intervention has also been separate. Households with children under two were not systematically identified as being at-risk during the IFSN food security appraisal process. As such, it is unclear how many low income households with young children are gaining access to livestock distribution and other food security activities under the IFSN. This is one of the fundamental shortcomings of the IFSN (and integrated agriculture-nutrition projects generally) and is discussed in more detail in section 7.

5. FINDINGS: BREASTFEEDING AND COMPLEMENTARY FEEDING PRACTICES

In addition to interviewing caregivers and other family members regarding household food security and family meals, TIPs facilitators also used their initial home visit during rainy season TIPs to collect information on IYCF practices. Taken together with the family food security and meals data, this information laid the groundwork for the iterative counselling and recommendation process upon which later visits were based.

5.1 Summary of (pre-TIPs) child feeding practices (n_{household}=99)

Positive child feeding practices included: age-appropriate daily meal frequency for children aged 6-8 months; provision of freshly prepared complementary food; offering healthy snacks (bananas, mangoes, pawpaws and oranges); and feeding small children from their own plate. These practices were encouraged further during TIPs.

Negative child feeding practices included: Early introduction of other fluid and food than breast milk (low frequency and/or water and other preparations given to children under six months); low provision of porridges enriched with vegetables, legumes, animal-source foods, and fat; low provision of snacks, especially to children aged 9-23 months; excessive salt use in complementary food; low provision of solids (other than *nsima*) to children aged 6-11 months in particular; and inappropriate feeding of sick children. Table 7 summarizes observed feeding problems in children by age group.

While not systematically identified as such, many of these negative practices appeared to be influenced by cultural norms. These range from fairly common perceptions with respect to which foods are harmful for children, to the small sample of caregivers who reported giving herbal tonics and thin porridge to their 0-5 month olds due to perceived prophylactic qualities. Other examples include the widespread practice of giving watery porridge, and the belief that solids should only be fed whole to children old enough to chew, as opposed to mashed or otherwise processed.

As a result, while seasonal variations in purchasing power and food availability inarguably affect household meal practices with implications for complementary feeding, information collected on the latter during TIPs also indicated substantial leeway for improvement, even when working within the constraints posed by seasonal fluctuations in food security.

Table 7: Reported child feeding problems by age group, beginning of rainy season TIPs

Household with children aged 0-5 months (n=20)	Total households
Caregivers not exclusively breastfeeding	9
Caregivers breastfeeding less than 8 times a day (primarily those in Kasungu District)	4
Household with children aged 6-8 months (n=28)	
Feeding plain <i>ufa woyera</i> porridge with salt and occasionally a little sugar	18
Children not given snacks in addition to main meals	14
Alternating <i>ufa woyera</i> and <i>mgaiwa</i> porridge with salt and occasionally a little sugar	10
Preparing watery porridge	8
Kasungu caregivers breastfeeding 4-6 times a day	5
Feeding plain <i>mgaiwa</i> porridge with salt and occasionally a little sugar	2
Households with children aged 9-11 months (n=30)	
Feeding plain <i>mgaiwa</i> porridge with salt and occasionally a little sugar	22
Giving children <i>nsima</i> with liquid part of relish (<i>musuzi</i>)	12
Not giving snacks in addition to main meals	12
Partially enriching porridge with groundnuts/soybean but not vegetables	8
Feeding plain <i>ufa woyera</i> porridge with salt and occasionally a little sugar	5
Preparing watery porridge	4
Alternating <i>ufa woyera</i> and <i>mgaiwa</i> porridge with salt and occasionally a little sugar	3
Kasungu caregivers breastfeeding 4-6 times a day	2
Giving expensive and salty commercial snacks and biscuits	2
Households with children aged 12-23 months (n=21)	
Giving only 1 snack a day	11
Not giving snacks in addition to main meals	7
Feeding plain <i>mgaiwa</i> porridge with salt and occasionally a little sugar	5
Feeding plain <i>ufa woyera</i> porridge with salt and occasionally a little sugar	5
Partially enriching porridge with groundnuts/soybean but not vegetables	9
Alternating <i>ufa woyera</i> and <i>mgaiwa</i> porridge with salt and occasionally a little sugar	4
Kasungu caregivers breastfeeding 4-6 times a day	3
Giving expensive and salty commercial snacks and biscuits	3

5.2 Breastfeeding practices for children aged 0-5 months (n_{household}=99)

Ninety-seven⁸ households reported having given colostrum to newborn children as indicated in Table 8. Of 20 TIPs mothers with children under six months, 11 reported to exclusively breastfeed; others

⁸ Per Section 3.1, not all interviews were complete. Incomplete answers were left out of the analysis. As a result, sample sizes vary for specific food groups and are indicated at the beginning of each sub-section.

reported offering water, *dawale*⁹ or a mixture of water, *dawale, chithibu*¹⁰ and plain maize porridge with a little salt. Caregivers indicated that the choice not to breastfeed exclusively was based on advice given by elders that “small children also get thirsty and need protection from diseases.” Water, *dawale, chithibu* and complementary foods were also reportedly given when the child cried often and if the mother felt she was not producing sufficient milk.

Table 8: Breastfeeding practices in Kasungu and Mzimba Districts.

Breast feeding practices	Number of households (n _{total} =99)		
	Kasungu	Mzimba	Total
Give colostrum	47	50	97
Breastfeeding ≥8 times a day	29	49	78
Breastfeeding less than 8 times a day	14	0	14

Forty-nine of 50 TIPs mothers in Mzimba District reported breastfeeding eight times a day or more, a figure also reported in focus-group discussions conducted prior to TIPs. Twenty-nine of 49 TIPs mothers in Kasungu District reported breastfeeding eight or more times a day. Most children were reportedly breastfed until two years of age. Grandmothers and husbands had a strong influence on when the child should stop breastfeeding. To terminate breastfeeding, most caregivers reported putting pepper on their breasts to discourage children from demanding breast milk, while giving other foods that the children liked most.

5.3 Quality and frequency of complementary feeding practices for children aged 6-23 months (n_{household}=79¹¹)

All children aged 6 to 23 months who participated in TIPs were reportedly consuming maize porridge by 6 months of age. Thus, late introduction of complementary food was not identified as a problem.

However, the consistency of the complementary food was of low quality for some children. Twelve out of 58 caregivers with children aged 6-11 months reported that they were offering watery porridge to their children as indicated in Table 7. Among this group, eight caregivers had children aged between 6 and 8 months. These findings are in line with a nationwide TIPs study jointly conducted by the Infant and Young Child Nutrition Project of the United States Agency for International Development (USAID), Bunda College and the World Bank in 2009. Those trials found this practice to be widespread across Malawi, and cited it as a major barrier to adequate dietary intake during the 6-8 month window, when families believe that babies are still too small to swallow and digest foods of thicker consistency (IYCN, 2011).

Out of 79¹² caregivers with children 6-23 months, 31 reported giving porridge made from whole maize (*mgaiwa*) meal to their children, 18 reported alternating *mgaiwa* and *ufa woyera* (made from refined

⁹ *Dawale* is water with local herbs given to the child once within the first 2 months of life.

¹⁰ *Chithibu* is a very thin and watery uncooked porridge, given once within the first two months of life.

¹¹ Sum of TIPs rainy season households with children aged 6-8m (n=28), 9-11m (n=30) and 12-23m (n=21)

maize meal) porridge and 30 caregivers prepared only *ufa woyera* porridge. About three-quarters of caregivers were reportedly adding salt and sugar to porridge, though data regarding the amount of salt and sugar added are unavailable.

While none of the caregivers with children aged between 6-8 months enriched porridges, 17 of the 51 caregivers with children between 9-23 months enriched porridges with common groundnuts or soybeans, an improvement that caregivers learned from health centers and non-governmental organizations working in the area. In addition, 4 caregivers reported adding fish flour to porridge, and one had added milk. Four caregivers also reported adding vegetables to porridge¹³.

Although households did appear aware of the health benefits of adding vegetables, pumpkins, sweet potatoes, fish, eggs and meat to the child’s diet, most caregivers reported delaying their introduction until children were able to pick up and chew these foods. Processing or mashing cooked foods to the correct consistency for a small child was not common practice. Eggs, pumpkins, Irish and sweet potatoes, fish and leafy vegetables were all introduced into the children’s diet between 9 and 11 months of age

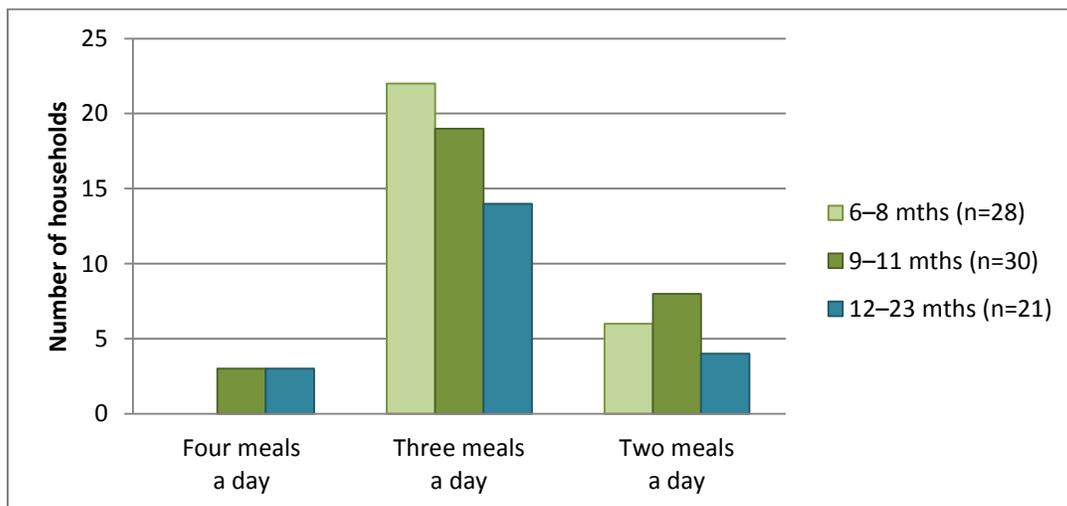


Figure 10: Daily frequency of complementary feeding by age group (n_{household}=79)

All caregivers with children aged 6-23 months reported that their children were consuming one or two meals per day from the family pot. However, pre-TIPs focus-group discussions with caregivers revealed that children aged 9-11 months consumed predominantly *nsima* with the liquid part of the relish (“relish water” or *musuzi*) only, and that only children aged 12-23 months consumed *nsima* with solid “adult” relish as they were the only age group considered old enough to chew. This finding is in line with the one immediately above, regarding not processing or mashing cooked foods. It is also similar to the fact that 6-8 month olds are given watery porridge because they are considered too small to handle foods of thicker consistency.

¹² Mothers may have used diverse feeding options.

¹³ Data were not disaggregated to reveal how much overlap there was between households adding groundnuts, fish flour, milk and vegetables.

Out of 28 households with children aged 6-8 months, all were reportedly within the recommended range of two to three meals a day (Figure 10). Eight out of 30 households with children aged 9-11 months and 4 out of 21 households with children aged 12-23 months, were reported to consume only two meals a day, which is below the recommended frequency for children of those ages.

5.4 Types of snacks and frequency of consumption (n_{household}=79)

Bananas, mangoes, papaws and oranges were the main snacks offered to children from six months of age. Fruits were the only snacks given to children aged 6-8 months, but two caregivers with children aged 9-11 months and three with children aged 12-23 months reported giving children commercially produced puffy and salty snacks (Jiggies and Kambas) as well as biscuits (sweet cookies) occasionally.

- *Children aged 6-8 months:* Fourteen out of 28 caregivers with children aged 6-8 months reportedly did not provide snacks. Twelve caregivers reported offering one snack a day to their children, while the remaining two offered two snacks a day.
- *Children aged 9-11 months:* Fifteen out of 30 caregivers with children aged 9-11 months provided one snack a day. Three caregivers reported offering two snacks a day, while 12 caregivers did not provide any snack to their children in this age group.
- *Children aged 12-23 months:* Eight of 21 caregivers with children aged 12-23 months offered one snack a day; eight caregivers provided two snacks a day, while in five households children received no snack.

5.5 Feeding sick children aged 6-23 months (n_{household}=79)

Of the 79 caregivers with children aged 6-23 months, 55 reported feeding sick and healthy children in the same manner, 23 gave more food and fluids to sick children than healthy children and one indicated that she gave less food and liquid to sick children than to healthy children because sick children refused to eat.

5.6 Perceptions of “bad” foods (n_{household}=99)

Ninety-nine caregivers provided information on foods they considered bad for small children. The seven most commonly mentioned are listed in Table 9. Notably, the majority of items on the list are nutrient rich, especially with respect to bioavailable iron and zinc (meat and fish if the latter is processed as a powder) and Vitamin A (eggs and sweet potato if the latter is orange-fleshed). Iron, zinc, and calcium have been found to be limiting nutrients in children’s diets in Malawi, exacerbated by the poor bioavailability of iron and zinc, which is a problem in maize-based food cultures (IYCF, 2011).

Table 9: Foods considered bad for small children and reasons for this belief (n_{household}=99)

Food considered bad for small children	No. of households that indicated that the food was bad	Reasons given
Cassava	22	Causes constipation and is difficult to chew
Meat	18	Baby cannot chew and may therefore choke
Fish	17	Bones can choke baby
Sweet potato	12	Causes constipation and is difficult to chew
Eggs	10	Cause epilepsy
Bananas	6	Cause constipation
Beans	5	Difficult to chew

5.7 IYCF information and decision-making channels (n_{household}=99)

Identification and utilization of appropriate information channels is essential to successful promotion of improved IYCF practices. As such, caregivers were asked about common sources of information on IYCF. They were also asked to indicate which of those information sources they were likely to follow.

The initial assessment in November 2011 clearly showed that mothers do not always decide on child feeding. Grandmothers and husbands also influence child care and feeding decisions and husbands were reported to have strong control over what foods are purchased.

Out of 99 caregivers, 95 reported receiving IYCF information from health center staff. Forty-seven also reported receiving information from their grandmothers. Thirty-two caregivers reported hearing IYCF information on the radio.

Caregivers who cited health centers as a source of information considered information received from center staff to be reliable. Forty-one considered grandparents to be reliable information sources; 22 considered the radio to be reliable.

6. FINDINGS: TRIALS OF IMPROVED PRACTICES

6.1 Overview

Previous sections have discussed findings from the initial rainy season assessment visits conducted by TIPs facilitators. These results provided important background information on the food security and IYCF contexts, pre-TIPs. This section discusses findings from the next stage of the study, based on interviews conducted with households during all household visits, including pre- and post-harvest season TIPs. Per the TIPs model, these later visits used an iterative process of counselling, recommendations, and feedback, based on information gathered in the first home visit. Caregivers had the general advice to prepare improved porridges by enriching staple foods with legumes or animal-source food and vegetables as well as with oil (if not adding groundnuts or soya beans). The process of giving the recommendations was one of negotiation; caregivers were given the opportunity to accept or propose modifications to the suggested actions. Table 10 provides a summary of TIPs recommendations and the problems they aimed to address. Table 13 (see chapter 8, page 043) provides a final summary of the acceptance of improved IYCF practices and barriers to their adoption. It also lists modifications to each of the recommendations which formed the basis for the nutrition education materials used in the IFSN project (FAO, 2012b, 2012c and 2012d).

Table 10: Problems identified during TIPs and subsequent recommendations

	Problem	Recommendation
For babies 0-5 months		
1	Sub-optimal breast feeding, including low frequency and premature introduction of water, other liquids and watery porridge	Stop giving water and porridge, breastfeed exclusively on demand, preferably eight or more times per day, until baby is six months old
For babies and children 6-23 months		
2	Offering watery, plain starchy porridge made of refined maize meal with salt and/or sugar	Prepare thick enriched whole maize (<i>mgaiwa</i>) porridge instead of refined maize (<i>ufa woyera</i>) porridge after children turn six months old
3	Delayed introduction of solids: offering only liquid from the relish as opposed to the solid, due to belief that children were not ready for the “adult” relish until they could chew	Mash/pound/chop relish
4	Vegetables not offered daily	Add green leafy and non-leafy vegetables to complementary food
5	Legumes not offered daily	Add legumes to complementary food
6	ASF not offered daily	Add ASF to complementary food
7	Food does not include sufficient fat	Add oil to complementary food if not using groundnuts or soybeans
8	Over-reliance on maize as main ingredient in complementary food	Diversify complementary food dishes by using roots and tubers

9	Snacks are insufficient or not provided, or foods of minimal nutritional value are offered as snacks	Provide at least one nutritious snack a day for children aged 9-11 months and two nutritious snacks a day to those aged 12-23 month. Reduce provision of sugary and salty commercial snacks in favor of healthier snacks, in particular fruits
10	Insufficient quantities of food offered	Provide age-appropriate quantities of complementary food
11	Use of salt is excessive	Reduce quantity of salt used to a single two-finger pinch

Recommendations were made during the second “counselling” visit. During the third and fourth visits, follow-up interviews were conducted to explore caregivers’ experiences with the new proposed practices, including whether or not they had tried the practice, whether they had modified the recommendation in any way to make it more feasible, and/or whether they abandoned the practice altogether.

Although two rounds of TIPs were conducted, for the purposes of this section, results are presented along a continuum beginning with the very first rainy season TIPs assessment and ending with the very last harvest season TIPs follow-up-cum-evaluation. As such, the first household visit for harvest season TIPs is labelled “reassessment” for the graphics in this section. It is also important to note that, for the purposes of this section, data for children 6-23 months are not, for the most part, disaggregated as in previous sections, but rather presented as a single sub-sample. This group increased from 79 to 91 households with children aged 6-23 months from beginning of the rainy season TIPs till the end of harvest season TIPs due to the “graduation” of under six months old children to the higher age categories. However, owing to the fact that five questionnaires were not completed at the end of the harvest season, data is not available on all variables for the total number of 91 households.

Results are presented by recommendation, as follows:

6.2 Stop giving water and porridge until the child is six months old, breastfeed children exclusively on demand, preferably eight or more times per day

Caregivers in Kasungu District who were breastfeeding fewer than eight times a day during the initial rainy season assessment reported increased breastfeeding to at least eight times a day by the rainy season follow-up/evaluation. By the conclusion of the harvest season, caregivers reported to continue breastfeeding as recommended. Only one caregiver from Mzimba with a child in the age group 12-23 months had already stopped breastfeeding.

The recommendation to stop giving liquids was less successful than the encouragement to increase breastfeeding frequency. In 8 out of the 9 cases where babies had not been exclusively breastfed, caregivers had given water with herbs (*dawale*) and/or a very thin uncooked porridge (*chithibu*). *Dawale* and *chithibu* are given a single time during the first one to 2 months of age as they are believed to have prophylactic qualities. These are as such, the effect of counselling on this particular practice will only be apparent with a subsequent child. The mothers listened carefully to the facilitators and stated that they will start introducing liquids and other foods at the age of 6 months.

At the end of rainy season TIPs, seven children had crossed over from the 0-5 months' to the 6-8 months' old group and this was a good opportunity to see if the mothers were adopting the recommendations. Four out of seven were adding two to three ingredients to *mgaiwa* porridge, especially green leafy vegetables, groundnuts/soya. Two mothers were giving *ufa woyera* porridge and salt (did not have time to cook the enriched porridge and said that the ingredients were not available). One mother had not yet started giving complementary food (still thinking that the baby is too young for solid food).

6.3 Prepare thick, enriched whole maize (*mgaiwa*) porridge instead of refined maize (*ufa woyera*) porridge after children are six months old

At the time of the initial rainy season TIPs assessment, 45 out of 79 caregivers reported giving their children *ufa woyera* porridge, which as previously mentioned is refined maize meal and hence less nutritious. However, by the end of rainy season TIPs, 80 out of 86 caregivers with children aged 6-23 months reported preparing *mgaiwa* porridge (Figure 11).

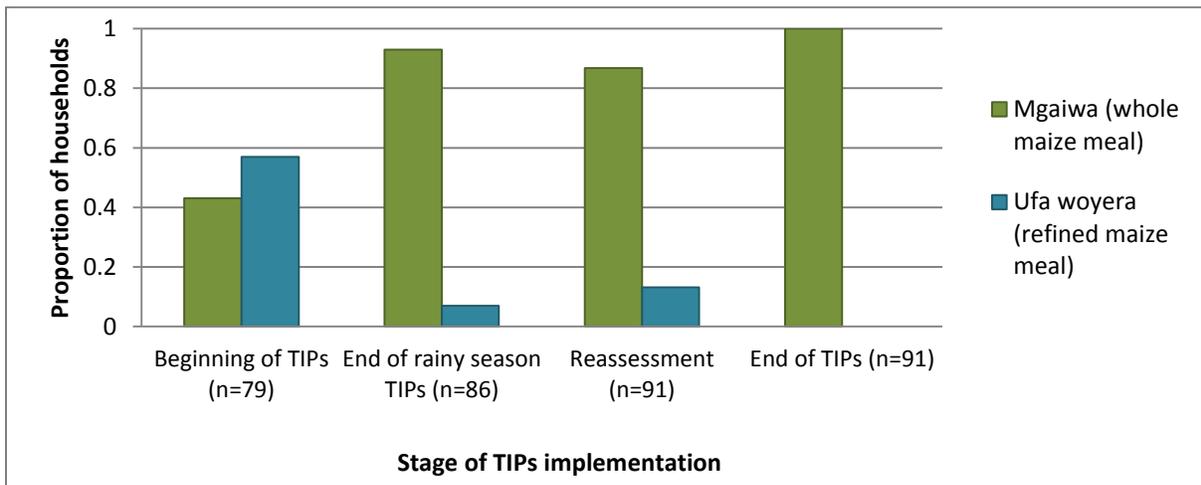


Figure 11: Proportion of households with children aged 6-23 months preparing *mgaiwa* or *ufa woyera* porridges.

There was a slight decrease in the use of whole maize and a concomitant increase in the use of refined maize meal between the two rounds of TIPs, as indicated by the data collected during the reassessment at the beginning of harvest season TIPs. This may be due to decreased adherence as round one of the counselling sessions wound down, combined with increased availability of *ufa woyera* due to the season. Given these factors, the fact that 100 percent of caregivers reported using whole maize meal by the end of the study - when refined maize meal is presumably still affordable for many - indicates considerable potential for successful promotion of this practice.

6.4 Mash/pound/chop relish to make it appropriate for infants

At completion of rainy season TIPs, it was found that all children aged 12-23 months were eating family meals mainly consisting of nsima with the liquid part of the relish. If relish was given, it was not mashed or made appropriate. Hence, it was reinforced to mash/pound or chop the vegetables, beans, fish or eggs to increase the nutritional value of the relish.

By July 2012, 10 out of 21 caregivers with children aged 6-11 months reported mashing vegetables, beans, fish or eggs when offering *nsima*. Relishes comprised: beans and green leafy vegetables (4 households); green leafy vegetables with pounded groundnuts (1); fish/eggs and vegetables (3); and green leafy vegetables alone (2).

In addition to the data collected by TIPs facilitators on this subject, a sub-sample (n=57) of TIPs households were surveyed on a number of topics which included offering of *msuzi* or relish water as opposed to the actual relish. Based on 24 hour recall data collected prior to rainy season TIPs counseling and then two months later, the proportion of children that received only relish water decreased from 74 percent at baseline to 2 percent after the first round of rainy season TIPs counseling (FAO, 2012a).

6.5 Add green leafy and non-leafy vegetables to complementary food

Very few caregivers reported adding green leafy vegetables to complementary food during the initial rainy season assessment (see Figure 12). Heavy workloads, low availability and children's dislike of vegetables were cited as the primary challenges.

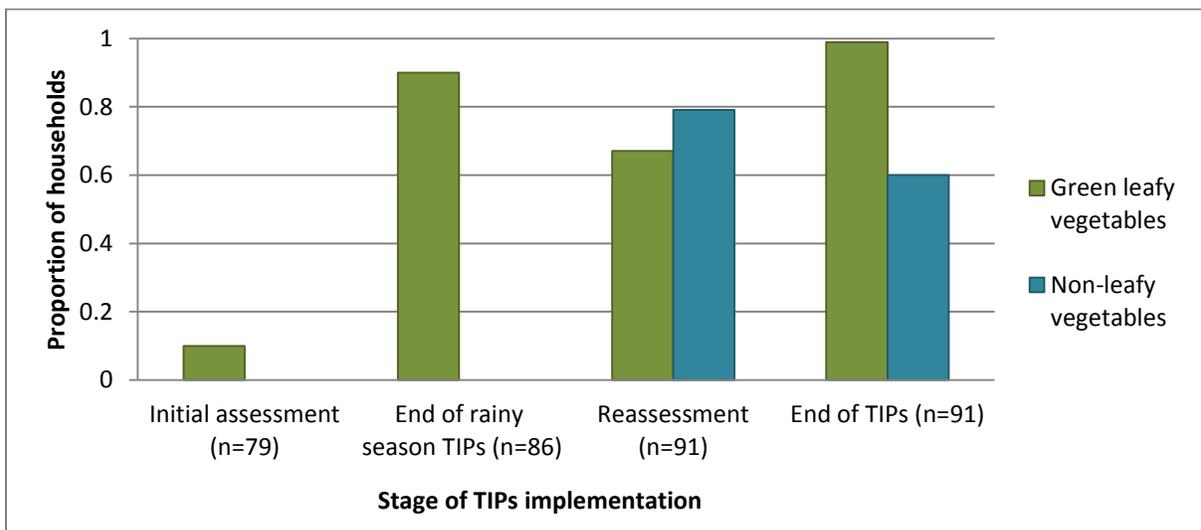


Figure 12: Proportion of households with children aged 6-23 months adding vegetables to complementary foods on the day prior to data assessment¹⁴

¹⁴ Owing to the fact that data was not available for 5 children between beginning and end of rainy season TIPs, data is presented for complete data sets only.

As a result, caregivers who felt too time-strapped to pound vegetables were counselled to finely shred them instead. Caregivers who felt that their children did not like eating porridge with green leafy vegetables were encouraged to attend the group cooking demonstrations, where they would be exposed to children who enjoyed eating this type of complementary food.

By the end of rainy season TIPs, 74 out of 86 households with children aged 6-23 months were reportedly adding leafy greens to complementary food. By the end of harvest season TIPs, 90 out of 91 caregivers with children aged 6-23 months reported using leafy greens.

6.6 Add legumes to complementary food

By the end of harvest season TIPs, legume use had increased dramatically. Initially, only 11 out of 74 households with children aged 6-23 months (15 percent) reported adding common groundnuts and soybeans to children’s porridge; zero reported using other legumes (Figure 12).

In contrast, by the end of rainy season TIPs, 63 households (76 percent) reported adding groundnuts or soybeans and 38 households (46 percent) reporting adding other legumes, despite the critical shortage of legumes for general household use during the rains.

Use of all three legume types (soybean, groundnut, beans) dropped between the two rounds of TIPs by 10 percent, however by the harvest season evaluation, use had increased again, most notably for groundnuts which were reportedly being added by 82 caregivers (ninety percent) by the end of the study.

As all three legumes are widely available during harvest and not available during the rains, the initial increase recorded between the beginning and end of rainy season TIPs is perhaps more noteworthy than the fact that caregivers reported greatest use at the end of the study, which coincided with the end of harvest season, when availability was highest.

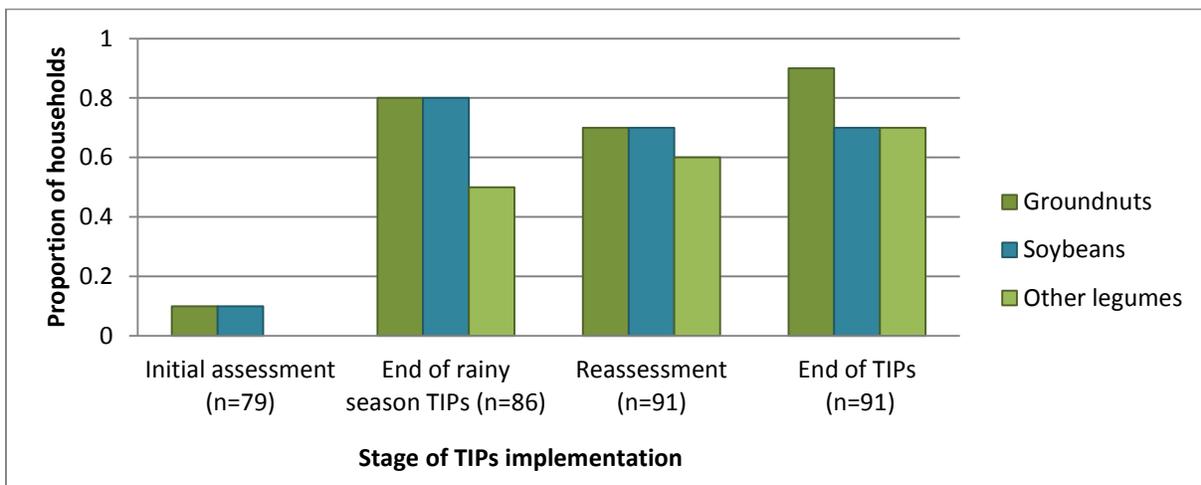


Figure 13: Proportion of households with children aged 6-23 adding legumes to complementary foods once a day

6.7 Add animal-source foods to complementary food

Although very few caregivers reported adding animal-source foods to complementary food at the initial rainy season assessment, the number of households adding fish (primarily roasted and pounded into flour), eggs and eventually dairy increased steadily over time (Figure 14).

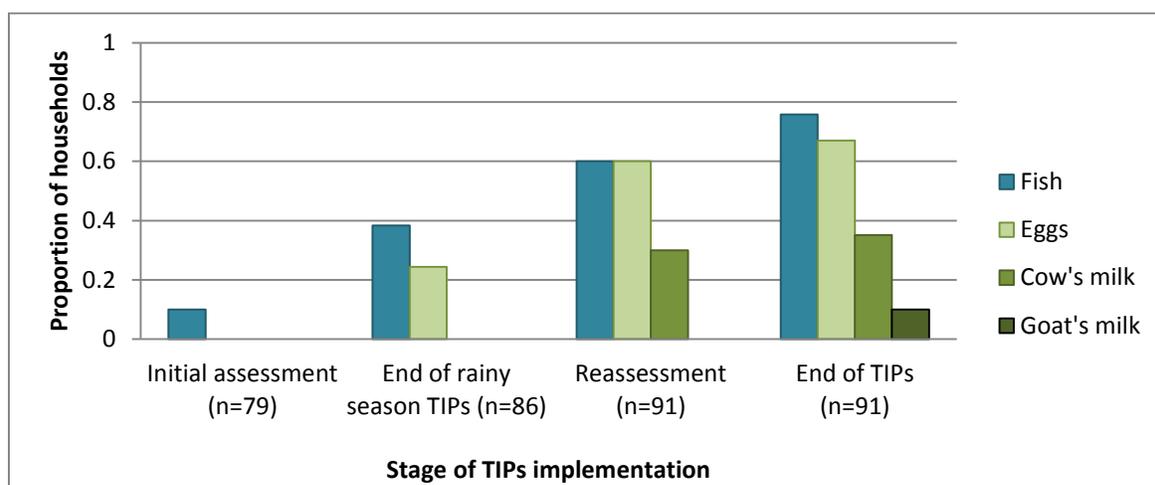


Figure 14: Proportion of households with children aged 6-23 adding animal-source foods to complementary foods at least once a week

By the end of rainy season TIPs, 33 households were adding fish at least once a week, with seven adding it three or more times a week (Table 11). By the end of harvest season TIPs, 69 households were offering fish at least once a week; 13 were offering fish three times or more per week, and 10 were adding fish to complementary foods every day (Table 11).

Some caregivers noted that complementary food dishes enriched with fish were unacceptable because of the strong smell. To increase acceptability, these households were counselled to roast fish for 3-5 minutes to reduce the fishy smell before pounding it into flour. In addition, a fish sauce prepared from fish flour was developed as an alternative to adding fish flour to porridge. Acceptability of these modified practices was tested during harvest season TIPs with positive outcomes. Seventy-three out of 84 women who tasted the recipe with the fish flour sauce reported to have liked it.

Table 11: Frequency of adding fish, eggs and milk to complementary foods per household (HH) at the end of rainy season TIPs and harvest season TIPs

Food	End of rainy season TIPs		End of harvest season TIPs		
	≥3 times per week [HH]	1-2 times per week [HH]	Once per day [HH]	≥3 times per week [HH]	1-2 per week [HH]
Fish	7	26	10	13	46
Eggs	5	16	2	12	47
Cow's Milk	0	0	6	8	18

Also by the end of harvest season TIPs, 61 were offering eggs at least once a week with 2 households offering eggs daily. Thirty-two caregivers were offering cow's milk at least once a week with 6 caregivers offering it daily.

6.8 Add oil to complementary food if not using groundnuts or soybeans

One of the problems identified during preliminary household visits was that children were not getting adequate fat through complementary foods. However by the end of rainy season TIPs, 45 out of 86 households with children 6-23 months reported adding oil to complementary food. The number had increased further to 83 out of 91 households by the end of the harvest season. It is likely that the initial rainy season increase was constrained by the high price of oil, which as mentioned above makes its purchase prohibitive for many households during this period.

6.9 Diversify complementary food dishes by using roots and tubers

Twenty out of 91 households with children aged 6-23 months reported using sweet potato or Irish potato as the main ingredient in complementary food by the end of harvest season TIPs. Sweet potatoes are predominantly available during and shortly after harvest and hence, very seasonal. The majority of caregivers reportedly offered them to children as boiled snacks.

6.10 Provide at least one nutritious snack a day for children 9-11 months and two nutritious snacks a day to those 12-23 month. Reduce salty and sugary commercial snacks in favor of healthier snacks

Frequency of snack consumption: The number of households not offering nutritious snacks to children declined from 33 out of 79 at the time of the initial rainy season assessment, to 24 out of 91 households at rainy season reassessment and only one out of 67 at the end of the trials in August 2012.

Also at the time of the initial rainy season assessment, 38 of 79 households offered nutritious snacks once a day. By the end of TIPs, 38 out of 67 households were offering nutritious snacks at least twice a day. It was observed that caregivers did not adequately increase the amount of snacks per day when their children crossed over from the age groups 9-11 to 12-23 months. However, the reinforcement of the recommendations on snack provision for children aged 12-23 months during harvest season TIPs, led to an increased snack frequency among children crossing-over age groups. The share of caregivers meeting the recommendations of 2 to 3 snacks per day for children aged 12-23 months increased from approximately 30 percent at reassessment to 52 percent at the end of rainy season TIPs. Fruit was offered more than any other snack food throughout the entire study period. However, diversity - predictably - increased during the harvest season, with caregivers also offering boiled sweet potato, Irish potato, and pumpkin. The availability of these three items is highest during harvest.

The occasional provision of commercial snacks (*jiggies, kambas* and biscuits) increased during harvest, from five caregivers at the time of the initial rainy season assessment to 51 during reassessment at the beginning of harvest season TIPs. Twenty-one of these households provided commercial snacks on a daily basis. In response to this trend, harvest season TIPs facilitators recommended reducing the

provision of commercial snacks in favor of healthier snacks, especially fruit. TIPs households responded positively. The number of caregivers that reported offering commercial snacks daily dropped from 21 to 12 at the end of harvest season TIPs and only 13 additional households reported to occasionally offer commercial snacks. The number of caregivers offering fruit daily rose from 14 at reassessment to 41 at the end of TIPs.

While data on caregiver perceptions of commercial snacks were not collected during the Kasungu/Mzimba trials, the afore-mentioned nationwide TIPs study (IYCN, 2011) found that mothers did not appear to have any understanding of commercial snack food's poor nutritional quality. The same study reports that, after being counselled to substitute fruit, milk, sweet potatoes or other locally available healthy options for commercial snacks, mothers expressed relief at not having to buy the extra food. These caregivers also reported that they would continue the practice because their children seemed to like the fruit (IYCN, 2011).

The fact that both samples of mothers bought commercial snacks when incomes permitted (i.e. during harvest when purchasing power increases), and that the 2009 nationwide sample was "relieved" to learn that these snacks were not healthy and hence not worth the money, hints at the influence of misleading marketing campaigns. The impact of processed food advertisements was not an explicit focus of TIPs. Nevertheless, the potential influence of commercial campaigns on caregiver behavior and practices should not be underestimated.

6.11 Provide age-appropriate quantities of complementary food

Initially, TIPs facilitators did not have the skills and equipment to estimate the quantity of complementary food offered to children. By the beginning of harvest season TIPs, they had received the training and equipment needed to do so. As such, provision of age-appropriate quantities of complementary food could only be assessed during the second half of the trials.

With the exception of nine out of 91 caregivers who prepared too little porridge, caregivers were giving age-appropriate quantities of complementary food to their children at the beginning of the harvest season TIPs¹⁵. By the end of the trials, only 6 caregivers were giving too little complementary food.

During reassessment, the vast majority of caregivers reported that their children finished the food offered. In the few instances where there were leftovers, these were reportedly given to an older sibling. The exceptions to this rule were three mothers who reported keeping leftovers for the next meal. These caregivers received counselling on the dangers of storing cooked complementary food for later use. By the end of the trials, zero caregivers reported keeping leftovers.

6.12 Reduce quantity of salt per a single two-finger pinch of fine salt

During the reassessment at the beginning of harvest season TIPs, facilitators asked caregivers to show them how much salt they added to each meal. Facilitators also asked whether caregivers were using

¹⁵ PAHO/WHO recommends age-appropriate meal frequency and quantities of complementary food per meal. The quantities are half a cup (250ml cup) for 6-8 months old children, three quarters of a cup for 9-11 months old children and one cup for 12-23 months old children (PAHO/WHO 2003).

rock salt or fine iodized salt. Caregivers who reported using too much salt were advised to reduce the quantity to a single two-finger pinch per meal. Those using rock salt were advised to grind it or to purchase fine iodized salt instead.

Nearly all caregivers reported the use of rock salt in May 2012. By the end of the trials, this figure had declined by half. The number of caregivers using too much salt per meal also declined, from 27 to 8) between May and July 2012.

6.13 Willingness to continue improved complementary feeding practices

By the end of harvest season TIPs; all 91 caregivers expressed willingness to continue improved complementary feeding practices, subject to accessibility of relevant foods. Their reasons for continuing were that children:

- grew well according to records on the child health card (61),
- gained weight (35),
- appeared healthier, more alert and active and did not get sick often(35) and
- liked the new dishes and ate well (24)

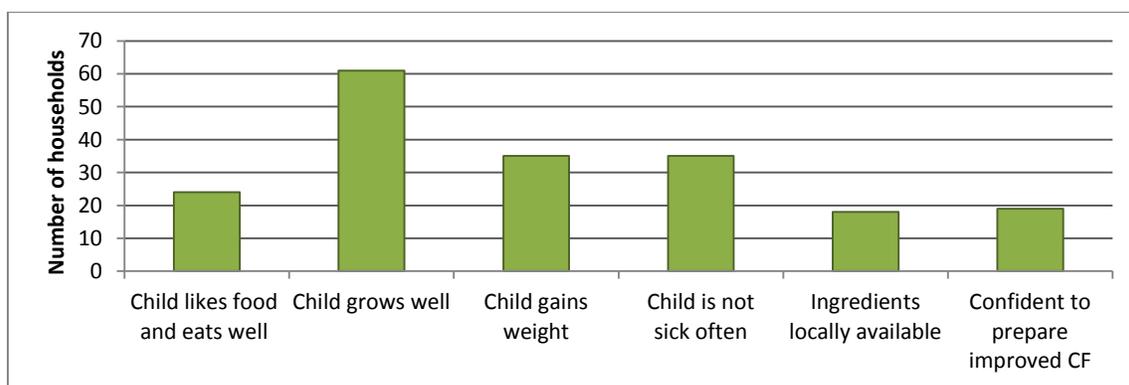


Figure 15: Reasons for willingness to adopt IYCF practices assessed at end of harvest season TIPs (n=91)

Around 20 percent of caregivers also cited local availability of ingredients (18) and confidence in preparing improved complementary foods (19) as reasons to continue. Box 2 on the following page provides selected quotes from caregivers and other household members regarding their positive perceptions of the trials.

For most households, the primary reported constraint to adopting complementary feeding recommendations was lack of access to diverse ingredients for enriching complementary food. This important finding was as expected and is in line with the challenges of seasonal food variability cited above suggesting a need for measures to close seasonal food availability gaps.

As mentioned above, each round of TIPs also included participatory cooking demonstration. These demonstrations aimed to create awareness of underutilized nutrient-rich local foods. They also created the opportunity to test the acceptability of enriched dishes with children and caregivers. Recipes tested during the rainy season trials focused primarily on enriching maize based porridge (although 3 potato-

based recipes were also included). Harvest season recipes were - predictably - more diverse and included a wider variety of ingredients. By the end of rainy season TIPs, 90 caregivers rated all recipes according to their preferences. This exercise was repeated with 84 caregivers by the end of harvest season TIPs.

- ✓ *"I can see that many grand children whose mothers are participating in the sessions are growing well"* (Grandmother, Elia Saka village - Malawi)
- ✓ *"My child liked the mixed food, he is healthy and he is cleverer than the older child."* (Father, Chikunthu village - Malawi)
- ✓ *"At Katete hospital they are wondering; is FAO also distributing medicine to children in the villages."* (Caregiver, Chikumukumu village - Malawi)
- ✓ *"The porridge doesn't look nice with the green color but the taste is good"* (Caregiver, Chikumukumu village - Malawi)
- ✓ *"I have now seen that caregivers in the village are giving the children porridges that contains all more food groups and children are gaining weight and are not getting sick often."* (Grandfather, Mphere Village- Malawi)
- ✓ *"Initially I fed my children watery porridge without anything added. I now have more time to be cultivating rather than being at the hospital"* (Caregiver, Nkhulande village - Malawi)

Box 2: Quotes from caregivers and household members

Table 12 summarizes the main findings for rainy and harvest season recipes. A more detailed summary is provided in chapter 8 (Table 14) on the acceptance of tested recipes for complementary feeding and barriers to preparation. It lists modifications of the recipes and their final adaptations for publication in the IYCF recipe books for Malawi (FAO, 2014a and 2014b) in Chewa and Tumbuka.

Maize porridge with groundnuts was the most popular dish among rainy season TIPs recipes (41 %). Caregivers also liked the preparation with eggs. In some villages, caregivers reported to occasionally modify recipes by adding cassava and sweet potato.

Caregivers reported lower acceptance of recipes with fish, soya and amaranth due to unfamiliar flavors, tastes and smells in combination with complementary foods. To improve the taste, some caregivers added pumpkin to the amaranth dish. In order to increase the acceptance of fish as a complementary food, mothers suggested serving fish as part of a separate sauce.

Harvest season recipes were then adapted to the preferences of caregivers to increase their willingness to continue the preparation of enriched porridges. The acceptance of the new recipes was tested by the end of harvest season TIPs with a significantly higher share of positive feedback. Most popular recipes were maize porridge and pumpkin (92%) followed by *futali* (89%) and fish flour sauce (87%). Caregivers reported to prefer these recipes because of an improved taste, color and smell, their easy preparation and because their children liked the dishes.

Table 12: Recipes that were liked by caregivers with regard to palatability, appearance and practicability

Recipes rainy season TIPS	[%]	Recipes harvest season TIPS	[%]
Maize porridge with groundnuts	41	Maize porridge with groundnuts/soya and mashed pumpkin	92
Maize porridge with eggs	27	Mashed sweet potatoes and groundnuts (<i>futali</i>)	89
Maize porridge with soya beans	22	Fish flour sauce (Thendo)	87
Maize porridge with fish	20	Maize porridge milk and vegetables	79
Maize porridge with beans	17	Limanda (okra) with groundnuts	79
Irish potato porridge with groundnuts	12	Mashed pumpkin with sweet potato (<i>mtakula</i>)	63
Irish potato porridge with fish	8	Avocado with mashed pumpkin	30
Irish potato porridge with egg	7	Sweet/Irish potato with meat	17

However, the novel harvest season recipes with sweet potatoes and avocado as meal bases seemed to meet less approval than the maize-based recipes in general. Given the emphasis on maize-based meals in Malawian culture, this reaction is not surprising. Introducing new practices and foods, although available locally but not in common use for IYCF is one of the challenges facing the IFSN-nutrition education intervention.

7. SUMMARY OF RESULTS, DISCUSSION AND CONCLUSIONS

7.1 Summary of results

Improvements to complementary feeding observed across the entire TIPs process included the following:

- Almost all households increased their use of the more nutritious whole maize (*mgaiwa*) meal to prepare complementary food for children from the age of six months. This is a shift from the traditional practice, which consists of preparing porridge made with plain, refined maize meal (*ufa woyera*) with salt and occasionally sugar for children aged 6-8 months, then starting preparing plain *mgaiwa* porridge, occasionally enriched with groundnuts and soybeans, for children from 8-9 months old.
- The preparation of thick porridges (as opposed to thin, watery porridges) increased
- Households increased their use of: (i) green leafy vegetables and non-leafy vegetables when in season; (ii) fish and eggs; (iii) milk including goat milk; and (iv) oil when not using groundnuts and soybeans.
- Households increased provision of age-appropriate quantities of cooked complementary food.
- Nearly all households began offering a wider range of healthy snacks (fruits, boiled sweet potato and Irish potato and pumpkin) in between main meals during the harvest season. The number of households offering salty commercial snacks daily to children declined during harvest season.
- More households started using fine iodized salt, which is preferable because it is easier to measure than rock salt; and the number of households adding too much salt per meal declined.

7.2 Discussion and conclusions

Breastfeeding

Although breastfeeding issues were not comprehensively investigated during the trial, interviews indicated that only 11 out of 20 TIPs mothers with children under six months reported exclusively breastfeeding; the rest of the children were prematurely offered water, *dawale* and/or *chithibu* (four children) or a mixture of water, *dawale*, *chithibu* with plain maize porridge and a little salt (four children). This is in line with the 41 percent exclusive breastfeeding reported by the JLU baseline survey of 2011 (Kuchenbecker *et al.*, 2012) and the 43 percent reported by the nationwide TIPs study (IYCN, 2011). It is in contrast to the results of the 2010 MDHS, which reported a national average of 70 percent of mothers breastfeeding exclusively (NSO & ICF Macro, 2011).

The other important breastfeeding finding was that adequate frequency was low in Kasungu District (70 percent), relative to Mzimba (100 percent). One hypothetical explanation for the difference is that culturally prescribed pro-breastfeeding practices were “diffused” in Kasungu because this district - unlike Mzimba - is comprised of tenant tobacco farmers from various parts of the country. It is also possible that tobacco production increased the demands placed on women’s labor and time, thus further reducing the possibility of frequent and prolonged breastfeeding.

Exclusive breastfeeding and breastfeeding frequency were commonly suboptimal. It is recommended therefore to encourage health staff in clinics and extension levels to actively address breastfeeding

issues during the wider promotion of complementary feeding practices. In particular, they should seek to encourage exclusive breastfeeding and increased breastfeeding frequency.

Improving complementary feeding practices year-round

Although the frequency of general household meals declined as food stocks dwindled, particularly during the rains, meal frequency for small children did not fluctuate with season. A majority of caregivers reported offering at least three meals a day to their children, even when other household members were reporting consuming at best one or two meals a day. The afore-mentioned IYCN study also reported preferential treatment of children in times of food scarcity.

Notable improvements were reported in children's dietary diversity during the harvest season. By the final evaluation, a majority of households reported using at least three food groups (staple, green leafy vegetables and legumes) in preparing cooked complementary foods. Fruit consumed as snacks constituted an additional fourth or fifth food group, depending on the type of complementary food recipe. This level of dietary diversity meets the minimum dietary diversity standard recommended by WHO, i.e. children aged 6-23 months should consume at least four out of seven food groups recommended by WHO (WHO, 2008).

During the rainy season, however, minimum dietary diversity was achieved on only 2-4 days a week, suggesting the need to improve households' awareness of and access to more and a wider variety of foods during this season. Meeting this need is an underlying goal of the IFSN and recommendations were made to the project to diversify agricultural production and ensure the provision of inputs and agricultural advice to families to address: 1) seasonal food availability gaps by stepping up production and productivity and 2) lack of adequate availability of nutrient-dense foods throughout the year by diversifying food production through the provision of inputs to enable families to access more easily diverse nutrient-dense foods, especially animal source foods, vegetables and fruit, and legumes.

Among families, the awareness of local foods has to be strengthened so as to use seasonal variations in food availability as incentive for dietary diversification, as opposed to seeing it as an obstacle to food security. Greater utilization of foods that are available across the rains combined with increased year-round access to animal-source foods are means to this end. Despite noted dietary diversity, including improved use of animal-source foods, overall usage of animal-source foods in complementary feeding still remained low. However, more frequent consumption of animal-source foods by children is not likely to increase substantially unless access to these foods is increased. The selection of beneficiary households for future food security livestock interventions should deliberately target at-risk households with young children to ensure their improved access to animal-source foods while nutrition education needs to explain and reinforce their appropriate use. Likewise, nutrition education should target men particularly for sessions on animal-source foods. Men are usually responsible for deciding on the purchase of meat and other animal-deriving foods. Their obligatory participation in IYCF sessions on the importance of animal products for improving nutrition of infants and young children increases the potential that new behaviors are adopted and sustained by all household members.

The focus on locally available foods also applies to regular and preferably daily consumption of vegetables and fruit. As such, careful planning and selection of food security interventions, including the establishment of vegetable home gardens and the planting of fruit trees (e.g. fast maturing varieties of pawpaw) are crucial for minimizing seasonality in food availability and improving access to these foods. For example, Hotz and Gibson (2001) and IYCN (2011) both stressed the need for a combination of these types of strategies to achieve optimal year-round child feeding in Malawi.

The integrated agriculture-nutrition approach is the lynchpin of the IFSN and, as mentioned at the beginning of this report, is considered far more effective than single-component projects. However in practice, ensuring that food security interventions, such as the “pass-on” livestock distribution scheme supported by the IFSN, reaches households with small children can be a challenge. This is due, at least in part, to fundamental differences in targeting criteria between the two sectors. While conventional health and nutrition interventions target women and children, target populations for food security and agriculture-based activities have a much wider scope. They are likely to include “smallholders” but may also include “producers”, “low income consumers”, “value chain actors” and a variety of other demographics which may not necessarily have much overlap with a population targeted according to nutrition criteria (Meerman *et al.*, 2014).

Precisely for these reasons, it is recommended that targeting criteria in agriculture-nutrition programs should include households with children under two in the beneficiary pool to ensure that families with young children are able to gain access to livestock distribution and other food security activities under the IFSN project. There is increasing recognition in projects aiming to reach nutrition outcomes that efforts are needed to improve and harmonize targeting criteria used by the health and agriculture sectors to ensure greater coverage of vulnerable households, especially those with young children, with appropriate nutrition advice.

Household and community sensitization

The initial assessment in November 2011 clearly showed that mothers do not always decide on child feeding. Grandmothers and husbands also influence child care and feeding decisions and husbands were reported to have strong control on which foods are purchased. Any attempt to change IYCF behaviors must thus involve grandparents and husbands. As evidenced by Aubele *et al.*, the inclusion of grandmothers in nutrition education interventions led to improved health and nutrition advice from grandmothers at household level and increased support from grandmothers to pregnant and breastfeeding women regarding their diet and workload. Moreover, their increased knowledge on improved childcare and feeding practices strengthened their commitment to grand-children’s well-being. It was observed that grandmothers included husbands in nutrition-related discussions initiating a raise in husbands’ support for health and nutritional needs of women in reproductive age (Aubele *et al.*, 2004). This point was emphasized by TIPs facilitators during the final TIPs evaluation workshop.

Peer education also holds potential for dissemination of good practices. A number of TIPs participants started teaching neighbors, friends and relatives without being asked, thus demonstrating potential for peer education. Identifying interested and capable early adopters of improved complementary feeding behaviors and involving them in promoting improved complementary feeding as peer educators will greatly accelerate the adoption and establishment of a new complementary food culture in target communities.

Peer education by early adopters should also be incorporated into the promotional strategy to increase the sustainability of complementary food improvements. Promotional efforts should initially be planned for one year, with the timeframe being adjusted depending on observations made during monitoring.

Sub-district capacity

As mentioned at the beginning of this report, Malawi now has substantial institutional “architecture” for nutrition at national and municipal level, but only minimal nutrition staff below district level, leaving

area supervisor, extension workers and villages with little to work with in terms of operationalisation. For TIPs and the IFSN, this included inadequate anthropometry equipment and a vacant Food and Nutrition Officer post at the Kasungu District office (Chakholoma, 2014).

TIPs facilitators were drawn from an existing pool of MOAFS and MOH extension workers who required training on basic nutrition and nutrition education/communication. Technical and financial support for these trainings was provided by the IFSN project and implementation of follow-up activities continues to be under FAO/IFSN. However, it is unclear to what degree nutrition knowledge and sensitivity will be sustained as a priority in Kasungu and Mzimba extension training after the IFSN closes. Extension staff themselves are spread extremely thin, country-wide, some districts have vacancy rates of 40 percent (Bagnall-Oakeley *et al.*, 2014). As such, defining a sustainable mechanism for local nutrition messaging may require substantial lobbying for multi-sectoral nutrition funding in district budgets.

Health and agricultural extension staff must receive practical training in nutrition, nutrition counselling and nutrition-sensitive agriculture if they are to effectively facilitate transformation of communities' food production, processing and utilization behaviors. This training should be provided both at recruitment and in service.

8. SUMMARY OF MODIFIED RECOMMENDATIONS AND RECIPES FOR IMPROVED IYCF PRACTICES

Table 13 summarizes the acceptance of improved IYCF practices and barriers to their adoption. It lists modifications to each of the recommendation and provides suggestions to improve the implementation of the IYCF sessions.

Recommendations of improved practices given to caregivers		Acceptance among caregivers	Barriers	Modified recommendations, additions and suggestions	
For babies 0-5 months					
Breastfeeding	1a	Breastfeed children exclusively on demand, preferably eight or more times per day.	All mothers understood the importance of the recommendation and adopted it accordingly. It was positively noted, that caregivers generally continue breastfeeding from 6-23m.	Inaccurate assumption among mothers that breastfeeding should be stopped when being pregnant again.	Breastfeeding during pregnancy is safe. Continue breastfeeding on demand for up to 2 years of child age with a minimum frequency of six to eight times during day and night for 6-8 m and six times during day and night for 9-11 m.
	1b	Stop giving water and porridge until the child is six months old.	The majority of caregivers struggled to adopt this practice and continued the premature provision of water, other liquids and watery porridge before the age of 6 m.	Traditional and cultural beliefs persist which associate <i>dawale</i> and <i>chithibu</i> with positive effects on child health (e.g. opening/ preparation of the stomach).	Breast milk provides essential nutrients to your child that cannot be found in any other liquid. More frequent nursing increases breast milk production. <i>It is suggested to include grandmothers in sensitizations and trainings to increase the reach of messages on improved practices. Future research should assess the extent of children consuming black tea in Malawi and the resulting potential to decrease nutrient bioavailability.</i>
For babies and children 6-23 months					
Consistency	2	Prepare thick, enriched whole maize (<i>mgaiwa</i>) porridge instead of refined maize (<i>ufa woyera</i>) porridge after children are six months old.	Caregivers stopped offering watery, plain starchy porridge made of refined maize meal with salt and/or sugar and adopted the recommendation to prepare <i>mgaiwa</i> porridge. They expressed willingness to continue this improved practice due to the ingredients being economically affordable.	Some caregivers thought that plain, thin porridges were adequate for children aged 6-11 m due to their similar consistency to breast milk. Others with children aged 12-23 m were afraid that thick foods would be difficult to swallow, would get stuck in their throats, or would give constipation.	At 6 m of age, breast milk alone is not enough food for the baby, it is important to introduce nutritious, mashed and semi-solid foods that will complement breast milk. Thicker porridge gives more strength to your child than watery porridge. At 7 - 8 m, and 9-11 m the baby is growing and his/her energy needs are increasing, therefore increase the amount of food in proportion to age and thicken the consistency. Keep on feeding enriched complementary foods to children 9-23 m and gradually introduce family meals by the age of 12 m.
	3	Mash/pound/chop relish to make it appropriate for infants.	Caregivers accepted this new practice, although they had to be accustomed to the fact that "adult foods" can turn to complementary food by mashing and chopping it appropriately.	Some caregivers believed that children were not ready for the "adult" relish until they could chew.	For children 6-8 m, mash/pound/chop relish well. Likewise provide pounded, mashed/chopped foods to children 9-23 m and add nutritious soft complementary foods.
Dietary diversity	4	Add green leafy and non-leafy vegetables to complementary food.	Caregivers were able to improve the porridge of their children with the resources available in the household.	In some areas, caregivers were not able to offer a daily variety of vegetables due to availability of only greens, tomatoes and onions. Other caregivers reported that their children disliked vegetables or that they did not have sufficient time to chop/shred the vegetables. Vegetables were also reported to be perceived as "poor man's food".	Encourage the use of vegetables as well as fruits. These prevent illnesses and promote a healthy skin and healthy sight. Feed at least one vegetable source (e.g.: pumpkin, orange fleshed sweet, carrots) per day, and boiled pumpkin at least 3 times per week. Establish a vegetable garden and grow pawpaw trees. <i>Joint cooking demonstrations in the communities can improve the perceptions of mothers regarding taste preferences of their children. They can also boost the acceptance of vegetables as nutritious complementary and family foods.</i>
	5	Add legumes to complementary food.	Pulses and beans were more affordable for families than animal foods. Caregivers especially adopted the practice to add groundnuts when their seasonal availability was high.	In many areas beans and soybeans were scarce food items.	Legumes and pulses such as like beans, groundnuts, peas, soybeans are good sources of protein that should be added to child's food every day for proper growth. Grow oil seeds such as groundnut, sesame, sunflower, pumpkin and soybeans and include them grinded/pounded, etc. to complementary foods.

Dietary diversity	6	Add animal-source foods to complementary food.	The majority of caregivers intended to adopt the improved child feeding practice and increased the provision of animal-source foods according to their purchasing power and/or the availability at household level through livestock rearing. Caregivers were particularly able to add fish or fish powder. Hence, fish was one of the most commonly used animal-source foods.	Most mothers communicated the economic burden of purchasing meat, poultry, fish, or eggs. Additionally, they reported about traditional barriers to using available animal source foods in babies' food. These include that chicken and goats are sold for cash and not often consumed by the household. Eggs are used for hatching and not seen as a regular food for children. Goat's milk is an acquired taste and only drunk in some parts of the country. Some also believe that young children cannot eat meat.	Foods from animal sources are a high source of first class protein. Give animal-source foods to your child to enable proper growth, to prevent stunting and/or protein energy malnutrition and to promote good health. Provide animal-source food at least 3 x per week with fish being added at least once a week. Vary recipes by giving fish sauce, pounded mice sauce, dry meat sauce or one egg. Add goat milk to the child's diet at least 3 times per week and ensure its safety through sufficient decoction. Rear small animals such as chicken, goats and use the eggs (at least one egg per day/two days per week) and milk from these animals to add to children's food. <i>Reach out to fathers as providers of animal-source foods</i>
	7	Add oil to complementary food if not using groundnuts or soybeans.	Some caregivers reported to increase their use of oil.	The high price of oil was often perceived as a barrier to maintaining the improved practice.	Fats and oils are a source of energy and particularly improve digestion of vegetables. Along with groundnuts, soybeans and avocado, many (traditional) seeds including pumpkin seeds are other sources of fat. Add oils and sources of fat to each meal of your child.
	8	Diversify complementary food dishes by using roots and tubers.	Caregivers reported to occasionally provide their children with boiled sweet potatoes as a snack.	Most caregivers were found to over-rely on maize as main ingredient in complementary food. They were also constrained by seasonality and high prices of roots and tubers.	Eat all the six food groups at any time of the year and be aware of seasonality of foods. Use locally available food to diversify the child's diet and that of the family. Diversify complementary food dishes by using roots and tubers and add at least 2 other food groups. Substitute maize with sorghum or finger millet.
Portion	9	Provide at least one nutritious snack a day for children 9-11 m and two nutritious snacks a day to those 12-23 m. Reduce sugary and salty snacks in favor of healthier choices.	Generally, caregivers adopted the practices and provided more nutritious and less sugary and salty commercial snacks. Especially during harvest season, caregivers put improved practices into action due to increased availability and diversity of fruits and vegetables.	Higher incomes during harvest season misled many caregivers to purchase commercial snacks. They had difficulties to understand the poor nutritional quality of commercial snacks. Only after re-counselling, caregivers started to avoid these.	Give the baby healthy snacks in between meals. Give more than 2 different fruits as snacks. Commercial sugary and salty snacks are only of poor nutritional value for your child. <i>Recommendations on snacks should be given in conjunct with the recommendations on the use of vegetables and fruits. This reinforces their utilization instead of commercial snacks.</i>
	10	Provide age-appropriate quantities of complementary food.	The majority of caregivers provided age-appropriate portions to their children. They learned how to measure portions and to how to give the right amount of food to child. It was positively noted that caregivers provided an adequate meal frequency during rainy season as well as during harvest season.	A minority of caregivers use to keep left-overs of complementary foods for the next day which decreases food safety if not done properly.	Provide your child with age-appropriate quantities (1 cup = 250 ml): ½ cup for children 6-8 m, ¼ -¾ cup for children 9-11 m and ¾-1¼ cup for children 12-23 m. Increase the amount of complementary food as the infant grows. At 12-23 m, introduce family meals. Offer food on a separate plate in order to assess how much the child is eating. <i>Cooking demonstration help to visualize the increasing requirements of young children.</i>
Salt	11	Reduce quantity of salt used to a single two-finger pinch.	Caregivers willingly adopted the practice to use less salt.	Caregivers that used rock salt had difficulties to do correct measurements.	Grind salt or purchase fine iodized salt instead.

Table 14 summarizes the acceptance of tested recipes for complementary feeding and barriers to preparation. It lists modifications of the recipes and their final adaptations for publication in the IYCF recipe book for Malawi.

Recipes tested in the trials	Barriers to preparation	Modifications*	Adapted recipe for single child	Adapted recipe for groups
Legumes				
<ul style="list-style-type: none"> • Maize with groundnuts porridge • Sweet or Irish potato with groundnuts mash • Futali as a snack • Sweet or Irish potato with beans porridge • Maize with beans porridge • Sweet or Irish potato with soya beans porridge • Maize with soya beans porridge 	Low accessibility and low availability of soya beans, mothers did not know how to process soya beans.	Favorite recipe is the combination with groundnuts. However, utilization of a variety of legumes needs to be encouraged in the recipes.	<ul style="list-style-type: none"> • Grain, Legume & Vegetable Porridge • Tuber, Legume & Vegetable Mash 	<ul style="list-style-type: none"> • Grain, Legume & Vegetable Porridge • Tuber, Legume & Vegetable Mash • Grain & mashed bean porridge • Tuber, Cooked Bean & Vegetable Mash
Fish				
<ul style="list-style-type: none"> • Maize with fish porridge • Sweet or Irish potato with fish mash 	Fish flour in porridge caused strong flavor and smell.	Fish to be roasted to reduce strong smell and flavor, reduced cooking time, reduced fish content in tuber mash.	<ul style="list-style-type: none"> • Grain, Fish & Vegetable Porridge • Tuber, Fish & Vegetable Mash • Introduction of an additional recipe: fish flour sauce 	<ul style="list-style-type: none"> • Grain, Fish & Vegetable Porridge • Tuber & Fish Mash
Eggs				
<ul style="list-style-type: none"> • Maize with egg porridge • Sweet or Irish potato with egg mash 	Mothers feared epilepsy.		<ul style="list-style-type: none"> • Grain, Egg & Vegetable Porridge • Tuber, Egg & Vegetable Mash 	<ul style="list-style-type: none"> • Grain & Egg porridge • Tubers & Egg Mash
Milk				
<ul style="list-style-type: none"> • Porridge with milk • Sweet/Irish potatoes with milk 	Adding goat milk to children's porridge was perceived strange because mothers had never seen it before.	Reduced content of milk in the recipes.	<ul style="list-style-type: none"> • Mashed pumpkin, sweet potato, milk and maize 	
Pumpkin				
<ul style="list-style-type: none"> • Porridge with mashed pumpkin • Pumpkin- and sweet potato-based snacks • Avocado and pumpkin mash 	Color of pumpkin porridge was partially reported not to be appealing to the eye.	By adding pumpkin to a variety of recipes, its sweeter taste leads to higher acceptance of the complementary foods.		<ul style="list-style-type: none"> • Grain, Legume & Pumpkin Porridge
Vegetables				
<ul style="list-style-type: none"> • Okra with groundnuts (Limanda) • Sweet potato leaves and groundnuts 	Pounding vegetables took too much time, some vegetables were perceived as tasting too strong.	Vegetables as basic ingredient of all improved recipes; reduced cooking time after adding of vegetables to decrease loss of heat-sensitive nutrients.		
Fats				
<ul style="list-style-type: none"> • Oil, groundnuts, soya, avocado as sources of fat 	No resources to buy oil.	Use peanut butter or butter where available.		
Meat				
<ul style="list-style-type: none"> • Maize with Meat Porridge • Sweet or Irish potato with Meat Mash 	No resources to buy meat.	Recipes with meat only for group cooking demonstrations.		<ul style="list-style-type: none"> • Grain & Meat porridge • Tuber & Meat Mash

* Portion sizes of all recipes were modified for the age group 6-8 m and adapted to age groups 9-11 and 12-23 m. Improved recipes are not segregated anymore into recipes based on maize and recipes based on potatoes, but recipes based on grains (which includes millet, sorghum, etc.) or on tubers (which includes cassava).

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ANNEX 1.

TIPs Facilitator Guidelines for community mobilization and selection of households

In the community mobilization you do three main things:

- introduce the TIPS to the village community
- do a cooking demonstration to illustrate the aims of TIPS
- select households to take part in TIPS.

Since this is a research project, it is good if all the TIPS teams follow much the same procedure for mobilization, so that the conditions are the same. This is a suggested procedure.

A) PREPARATION FOR THE COMMUNITY MOBILIZATION

1. PREPARE THE DRAFT PROGRAM

- Decide on the outline of events (see draft program on last page).
- Write the outline in Chichewa to give to the headman; make a copy for yourselves.
- Decide two dishes to prepare. Choose two different staple foods (e.g. *mgaiwa*, sweet potatoes, cassava) and two different kinds of high-protein food (e.g. soya flour, groundnuts, beans, fish, egg). Use ingredients which are easy to cook and which don't take much time (e.g. groundnut powder, egg, pumpkin leaves).
- Decide what equipment and ingredients should be provided by the community for the cooking demonstration (e.g. spoons and bowls for the children; pots; cups for measuring; cooking spoons; firewood). For ingredients, FAO will provide fish, oil, soya flour and beans: the village should provide the other ingredients.

2. CONTACT THE VILLAGE (headman, community leaders, lead farmers) a few days before the community mobilization event. These are the points to cover:

<i>Program</i>	Present and explain the proposed program (see last page). Establish dates, times and meeting place and write them in. Leave a copy of the program.
<i>Invitations</i>	Invite the whole village, with special mention of - parents of children under two years (both mothers and fathers) - lead farmers - grandmothers.
<i>Cooking equipment</i>	Ask for the village to provide cooking equipment and ingredients (FAO will provide fish, oil, soya flour and beans for demonstrations but not for household visits.)
<i>Household selection</i>	Explain the criteria for selection below and discuss how the village will organize the selection. NB it is necessary to have a socio-economic spread, but poor households should not be openly identified and stigmatized. <ul style="list-style-type: none">▪ Two children under 6 months, one well off, one not so well off▪ 3 or 4 children 6-8 months, one well off, one/two middling, one not so well off

- 3 or 4 children 9-11 months, one well off, one/two middling, one not so well off
- 2 children 12-18 months, one well off, one not so well off.

NB *SFACS and CAPs* Having a greater variety of easily grown nutritious crops is good for improving children's diet. The headmen and lead farmers should have been oriented on making and interpreting seasonal food availability calendars (SFACS) and community action plans (CAPs). Find out if they have already discussed these with the village. If not, they may like to do this within the TIPS meeting with the help of the TIPS facilitators.

3. PREPARE THE SESSION

- Collect the ingredients for your dishes the day before.
- Decide what to do about hand-washing before cooking. Take soap or opt for wood ash instead of soap. You may wish to delay the hand-washing a little to see if the cooks do it automatically. If they do not it will indicate a training need.
- Prepare the voting table (see below) on flipchart paper and take some marker pens.
- Make sure you know all about the ingredients and how each one helps the child, especially the oil, *mgaiwa*, green leaves and high-protein foods. It will then come naturally to talk about these things as you chop the vegetables or stir in the oil. In this way villagers not only learn to make the dish but also know what makes it good

B) THE COMMUNITY MOBILISATION EVENT

NB To save time, prepare the cookfires before the meeting and put the water to boil.

1. COMMUNITY MEETING

- a. **Opening formalities, welcomes**
- b. **Explanation of the TIPS activity**

2. COOKING DEMONSTRATION

- a. **Introduction**
 - Young children need to eat well in order to develop, to keep healthy, to learn well at school, to be successful in life.
 - Ask what the young children (6 months to two years) eat.
 - Explain that they need to eat the same foods as we do:
 - some kind of staple (e.g. maize, cassava, potatoes)
 - some legumes or animal foods (e.g. beans, soya, groundnuts, peas; fish, eggs)
 - some vegetables (green leafy vegetables and others, e.g. tomatoes, pumpkin)
 - a little oil
 - some fruit.
 - It is not difficult to give children what they need. Show the foods to be cooked today - do you have them all at home?
 - So now we are going to prepare two good dishes for children, with your help, and then find out if the children like them.
 - Divide into two groups, organize cooks and hand-washing and start.

b. Food preparation

- During the food preparation, go round to make sure things are happening right.
- Also keep up a commentary for the audience on the ingredients and the cooking process, asking questions and explaining - e.g.

What do you think the green leaves are good for?

Do you put oil in the porridge? Why do children need a little oil?

Do you use mgaiwa or white maize flour? Which is better?

How much salt is good for one dish for one child?

Do you put sugar in the porridge? Why?/Why not?

What do you think about this kind of meal for children?

Will your children like it?

- When the dishes are ready, cover them and label them. Put aside a little from each dish to offer to village leaders.

c. Tasting and testing

- Put up a voting table (see below).
- Explain that children under 6 months should NOT eat this food (they should still be exclusively breastfeeding). Also explain that children should taste first. The audience should observe the children’s reactions to see if they like it.
- Children taste the first dish. Get a vote on children’s reactions and record the numbers in the table.
- Adults taste the dish and give reactions and reasons.
- Do the same for the other dish.
- Ask which dish is the favorite with the children.
- Say that these dishes will make children grow well and healthy because of the extra ingredients. Ask the audience if they agree that
 - a. children can enjoy these rich porridges
 - b. they are easy to make
 - c. they use available foods
 - d. they are low cost.

Voting table

Name of dish	Number who like it 😊	Number who dislike it	Reasons
.....	Children Adults	Children Adults
.....	Children Adults	Children Adults
.....	Children Adults	Children Adults

3. SELECTION OF HOUSEHOLDS

- Explain** that we need their help.
 - We have only tried two dishes, to see if they are easy to make and if the children like them. But there are many other possibilities
 - We are looking for a few households who will work with us to prepare different recipes and give feedback on what is easy, practical and low cost and what the children like.

- We will be visiting the village four times. In the first visit we will ask households about what they grow and what their children eat. In the second visit we will discuss what foods to try.
- b. Selection process** Hand over to the headman to facilitate the selection.
- c. Collect** the suggested names of households.

4. CONCLUSION

- a. Thank the headman and the village and the cooks.
- b. Make contact with the selected households and arrange for the first home visits.

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(DRAFT PROGRAM)

COMMUNITY MOBILISATION FOR TIPS

Date Time

*WHEN DO YOUR CHILDREN START TO EAT NORMAL FOOD?
WHAT DO THEY EAT?*

GOOD COMPLEMENTARY FEEDING MAKES CHILDREN HEALTHY, INTELLIGENT AND SUCCESSFUL IN LIFE.

- *What is good food for young children? What do children like to eat?*
- *How can you feed young children well with the food you have?*
- *What is easy to prepare? How do you prepare it?*

THE PROGRAM FOR THE DAY

1. Opening

Introductions
Explanation of TIPS

2. Making and trying out good complementary foods

- Cookery demonstration: is it easy and practical?
Visitors and villagers prepare good foods for young children
- Tasting and testing: what is most popular?
Young children taste the dishes and show what they like

3. Selection of households to help with TIPS

We are asking for 10-12 households who can help us. We need:
2 children under 6 months
3/4 children 6-8 months
3/4 children 9-11 months
2 children 12-18 months

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ANNEX 2.

Two seasonal food availability calendars used in IMCF and TIPs

“Enrich food with diversified foods from six food groups based on your food availability calendar”



Food Group	Foods	Rainy & Hot Dec – Mar	Moist & Cool Apr – Jul	Dry & Hot Aug – Nov	ACTION
Vegetables	Amaranth	✓	✓		<ul style="list-style-type: none"> ▪ Dry, powder ▪ Increase varieties
	<i>Limanda</i> (Hibiscus)	✓	✓		
	Cassava leaves	✓	✓	✓	
Fruits	Papaya		✓	✓	<ul style="list-style-type: none"> ▪ Dry ▪ Increase varieties
	<i>Mbula</i> fruit	✓		✓	
	Mango	✓			
Legumes & Nuts	Cow Pea		✓		<ul style="list-style-type: none"> ▪ Multiply ▪ Share pigeon peas
	<i>Kamumpanda</i> (lima bean)		✓	✓	
	<i>Mtedza</i> Groundnut	✓	✓		
Animals	Chicken Eggs	✓	✓	✓	<ul style="list-style-type: none"> ▪ Preserve fish & insect powders
	Fish	✓		✓	
	Termites	✓		✓	
Staples	Green Banana	✓	✓	✓	<ul style="list-style-type: none"> ▪ Preserve & multiply
	Yams	✓	✓	✓	
	Millet		✓		
Fats	Sunflower Seeds		✓	✓	<ul style="list-style-type: none"> ▪ Make oils / oilseed powders
	Pumpkin Seeds		✓	✓	
	Avocado Pear	✓			

Source: Chakholoma, 2014



Adequate



Inadequate



Not Available

	Food Type	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Staples	Maize	✗	✗	☹	😊	😊	😊	😊	😊	😊	😊	☹	☹
	S. Potatoes	✗	✗	☹	😊	😊	😊	☹	☹	✗	✗	✗	✗
	Cassava	😊	😊	😊	☹	✗	✗	✗	✗	✗	✗	✗	☹
	I. Potatoes	✗	✗	☹	☹	☹	☹	✗	✗	✗	✗	✗	✗
Legumes	Groundnuts	✗	✗	✗	☹	😊	😊	😊	😊	😊	☹	☹	✗
	Beans	✗	✗	☹	😊	😊	😊	😊	😊	😊	☹	✗	✗
	Soya beans	✗	✗	✗	☹	😊	😊	😊	😊	☹	✗	✗	✗
Vegetables	Green Leafy	😊	😊	😊	😊	😊	😊	😊	😊	☹	☹	✗	✗
	Pumpkins	✗	☹	😊	😊	😊	😊	☹	✗	✗	✗	✗	✗
Fruits	Mangoes	😊	😊	☹	✗	✗	✗	✗	✗	✗	✗	☹	😊
	Bananas	☹	☹	☹	☹	☹	☹	☹	☹	☹	☹	☹	☹
	Paw paws	✗	✗	✗	✗	☹	😊	😊	😊	😊	☹	✗	✗
	Guavas	✗	☹	😊	😊	☹	✗	✗	✗	✗	✗	✗	✗
	Oranges	✗	✗	✗	☹	😊	😊	☹	✗	✗	✗	✗	✗
Effect of Availability of Staple on Daily Meal Frequency													
Daily Meal Frequency		1-2 Meals a Day				3 ≥Meals a Day				2-3 Meals a Day			

Source: Dirorimwe, 2011

ANNEX 3.

List of recipes tested during rainy season TIPs with summaries of caregivers' feedback (n_{household} = 90)

	Numbers of caregivers who liked and disliked different recipes								Feedback provided by caregivers for liking and disliking the recipe
	Maize meal-based complementary feeding recipes with					Irish-potato-based complementary feeding recipes with			
	bean	groundnut	soybean	fish	egg	groundnut	fish	egg	
Liked	15	37	20	18	24	11	7	6	<ul style="list-style-type: none"> • Child liked the new dishes and ate more; • Child was more alert and active; • Child did not cry often, but played happily without disturbing mother. • Good taste, colour and smell and easy to cook for some.
Disliked	2	0	0	8	0	0	2	2	<ul style="list-style-type: none"> • Child did not like the food; • Difficulties to cook/time consuming for a few caregivers.

ANNEX 4.

List of recipes tested during harvest season TIPs with summaries of caregivers' feedback (n = 84)

	Numbers of caregivers who liked and disliked different recipes								
	Maize porridge with groundnuts/soybean and pumpkin	Maize porridge with milk, leafy veg	Fish-flour sauce	<i>Futali</i> (sweet-potato mash with groundnuts)	<i>Limanda*</i> with groundnuts	Avocado and pumpkin mash	Pumpkin with sweet-potato <i>mtakula</i>	Maize porridge meat with leafy veg	Irish/sweet potato, meat
Positive feedback									
Like	77	66	73	75	66	25	53	25	14
Good taste	13	9	15	14	12	2	7	4	2
Good colour	18	14	14	16	16	13	14	7	5
Good smell	13	11	13	12	10	3	8	3	2
Child likes it	10	12	15	15	12	3	13	3	3
Easy to cook	13	16	12	12	7	0	6	8	2
Negative Feedback									
Dislike	7	8	11	9	13	10	10	7	5
Bad taste	4	7	10	7	9	3	6	3	2
Bad colour	5	6	9	8	8	3	5	1	3
Difficult to cook	4	7	9	5	9	0	5	5	1
Child does not like it	7	8	11	9	13	10	10	7	5

* Semi-cultivated local green-purple leafy vegetable