Development and Delivery of Bio-fortified Crops at Scale (DDBIO) – Uganda

Evaluation of the use of Health Baby Tool Kits (HBT) by caregivers for young child feeding in Uganda

February, 2022

Executive summary

The Development and Delivery of Biofortified Crops (DDBIO) project implemented a focused nutrition training program among caregivers organized in health Living clubs (HLCs) or Mother Care Groups (MCGs) in Uganda. 300 clubs were established in Acholi sub-region (Omoro, Lamwo, Kitgum, Pader and Agago districts); in Karamoja (Moroto and Kotido districts; Eastern Uganda (Butaleja, Tororo, Busia and Bugiri districts) and in Adjumani district. Clubs had 30 caregivers who were either pregnant women, lactating women or caregivers of children under two years. Men, grandmothers, and adolescent girls from the families of caregivers were also invited into the meetings. The novelty in these trainings were that caregivers were trained to use the health baby toolkit (HBT) technology to feed nutritious food to children that were six months to 2 years. In addition, the trainings followed a structured curriculum that required them to meet once every month for eight months. The meetings were interactive as much as possible, involving playing audio messages, cooking demonstrations, visual aids such as charts and goal cards etc. The trainings were intended/made efficient yet cost-effective by training the local village health teams to conduct the trainings, by digitalizing the monitoring system and using the local food sources as much as possible. An operational survey was conducted to evaluate the use of HBTs following the trainings. The study involved a sample of 233 women (98 from Bukedi sub-region in Eastern Uganda and 135 from Acholi sub-region in Northern Uganda). Findings from this study show that there was great enthusiasm by the caregivers to attend the nutritional trainings. The Village health teams (VHTs) were already established in the communities, but they rarely trained communities in nutrition. The nutritional trainings were therefore welcomed by the caregivers. Caregivers appropriately responded to the nutritional questions that were posed to them, an indicator that they understood the content taught to them. The women were utilizing the HBT supplied to them to feed the children. They were willing to buy the HBTs at 1USD in case the ones supplied to them got lost or old. Nutritional knowledge was positively and strongly significant to the willingness to pay for the HBTs. The study thus recommends scaling up of the HBT technology by government and development partners to communities and recommends nutritional trainings to be prioritized in the communities through focused training of the VHTs.

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1.0 Background

1.1 Introduction

Nutrition remains a critical challenge globally but more especially in developing countries. The path towards achieving the Sustainable development goal of food security and nutrition (SDG #2) is still obscure for most developing countries, especially in sub-Saharan Africa. In Uganda, 29% of children are stunted and this is attributed to a large percentage of children (over 75%) that are not fed on the minimal acceptable diet (UDHS, 2016). On a positive trend, vitamin A deficiency has been declining in most of developing countries in sub-Saharan Africa. For example, in Malawi, it declined from 60% to 4% among children of preschool age between 2001 and 2016 (NSO, 2009 and 2016). In Uganda, vitamin A deficiency in children has declined from 33% in 2011to its 9% (UDH,2016). The decline in vitamin A deficiency in SSA is attributed to the global efforts through vitamin A supplementation and fortification of common food products such as cooking oil. For example, in Uganda, 61.6% of children receive vitamin A supplements (UDHS,2016). These two strategies, whereas effective, are not sustainable and equitable to the poorest households in developing countries. The food-based approaches especially biofortification to address malnutrition are plausible since in addition to providing diverse and adequate micronutrients, households are food secure. Food-based approaches are cheap since most households will produce the crops in their own gardens. Vitamin A rich sweetpotato -the Orange fleshed sweetpotato (OFSP) is a low-cost source of vitamin A which, if adopted, households can meet the vitamin A needs by for example children consuming an 100g root of OFSP each day (Low et al, 2001). Feeding children with OFSP reduces incidence of diarrhea and the duration of diarrhea especially in young children (Jones and de Brauw, A., 2015)

For two decades, International Potato Centre and partners in Uganda have put in significant effort to promote OFSP. In 2019, a project- Development and Delivery of Bio-fortified Crops at Scale (DDBIO) was initiated in the country to contribute to the scaling efforts of OFSP especially in fragile environments in Uganda. The project leveraged on already existing technologies especially on the availability of clean varieties to scale up OFSP, but with appropriate nutrition messaging. This was through focused training of mothers organized in small groups (30 in number) for a period of 8 months using a tested curriculum. The key technology promoted were the health baby tool kits (HBTs) which were provided to the mothers to guide on the feeding of children from six months to two years of age on the right

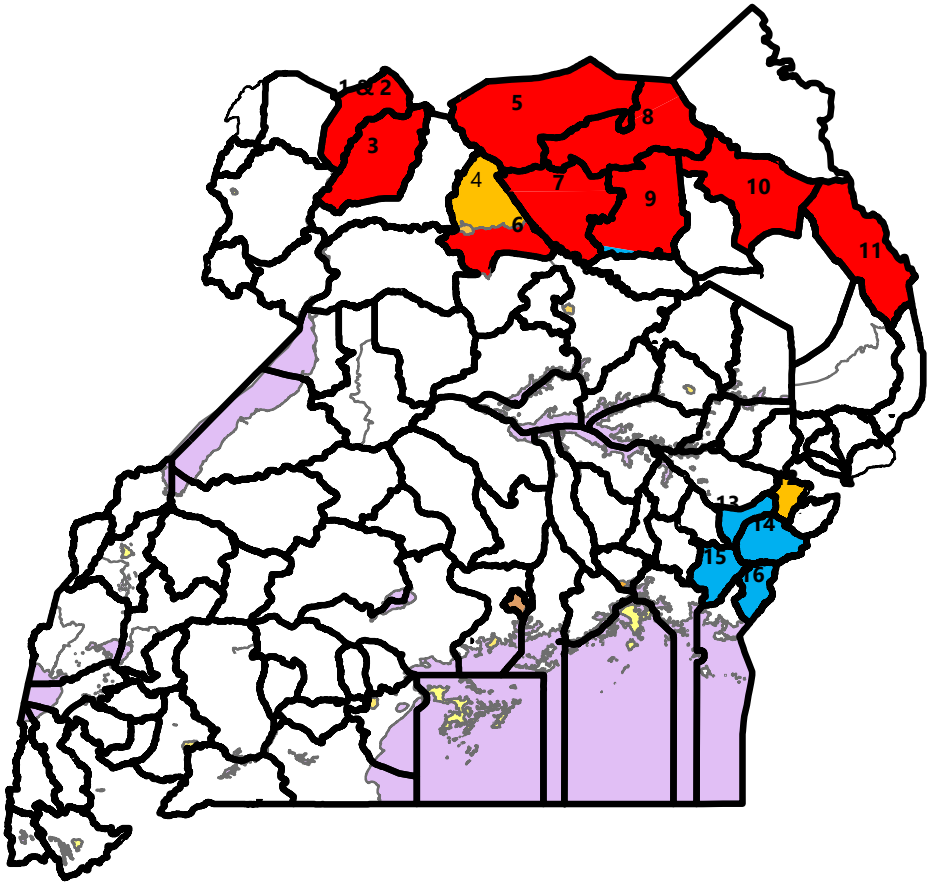
quantity, frequency, and consistency of food. Over 300 clubs, mostly with 30 members participated in the nutrition trainings. The clubs were spread in Northern and Eastern Uganda. This report is a narrative of how the nutrition interventions were carried out and includes and operational study that was done to evaluate the early adoption of the HBTs by the caregivers to feed the children and the relationship between the nutrition trainings attained and the adoption of the HBTs.

1.2 The study context

The Development and Delivery of Biofortified Crops at Scale (DDBIO) is implemented in five countries, i.e Uganda, Kenya, Ethiopia and Bangladesh. The three-year project which started in 2019 is funded by the UK Foreign, Commonwealth and Development Office (FCDO) and is implemented by the International Potato Center (CIP) in Uganda. By scaling up the production and utilization of Orange-fleshed sweetpotato (OFSP) among vulnerable communities and households in Uganda, DDBIO aims to improve the nutritional status of at least 800,000 individuals—60% of which are women of childbearing age, adolescent girls, and children below 5 years. This target will be achieved through release of OFSP varieties, developing the seed system so that households can acquire clean planting material, increased consumption of OFSP and its products through markets and nutritional trainings. CIP partnered with the Government of Uganda (GoU) and international partners; Mercy Corps, World Food Programme (WFP), and the Lutheran World Federation (LWF) to implement its activities in 14 districts across Uganda **(Figure 1)**. These districts are Adjumani, Moyo, Obongi in West Nile region; Lamwo, Kitgum, Pader, Omoro and Agago in Acholi sub-region; Bugiri, Busia, Tororo and Butaleja in Eastern the Eastern region; Moroto and Kotido in Karamoja sub-region. Apart from districts in Eastern Uganda, the other districts are in fragile environments. West Nile and Acholi sub-region are characterized by long dry seasons and host a large population of refugees while Karamoja experiences a long dry spell, faces food insecurity and cattle rustling disrupt farming and the general socio-economic status of the people. Eastern Uganda, specifically Bukedi sub-region has the highest rates of malnutrition in Uganda, at 20% (UDH, 2016).

The DDBIO project is implemented following three delivery models; through schools, markets and humanitarian model. The humanitarian model targets households in fragile environments

where humanitarian agencies operate i.e World Food Program (WFP) in Karamoja, Acholi and West Nile; Lutheran World Federation (LWF) in Acholi and West Nile and Mercy Corps in Karamoja. In communities where these humanitarian agencies work, there exists mother care groups (MCGs) and these formed the core of DDBIO project intervention. The market model targets two main cities (Gulu and Mbale cities), and major towns within the districts in the project. The market model supports organized root farmer groups with clean OFSP vines and trainings to increase their capacity to supply the cities and towns. The school model reaches households through schools. School children take vines to their homes for planting while in schools, school gardens are established to compliment the school feeding efforts.



1-Moyo **2-Obongi** **3-Adjumani** **4-Gulu city** **5-Lamwo** **6-Omoro** **7-Kitgum** **8-Agago**

9-Pader **10-Kotido** **11-Moroto** **12-Mbale city** **13-Butaleja** **14-Tororo** **15-Busia** **16-Bugiri**

Figure 1 DDBIO implementation districts

Figure 2*: Children in Bunyadet primary school in Busia district receive vines to take home for planting. Through the school model, many households received OFSP vines. Credit N. Kwikiriza 2021 April 2021*

The nutrition interventions aim at improving maternal, infant and young child nutrition (MIYCN) by cost-effectively scaling out of an innovative feeding toolkit for use by primary caregivers of children below 5 years [1] through a community-based nutrition-specific Social and Behavior Change Communication (SBCC) program led by community frontline health workers. The SBCC component was implemented through **healthy living clubs** (**HLCs**) or **Mother Care Groups (MCGs) [henceforth referred to as clubs]** designed to support caregivers to adopt and maintain evidence-based Maternal, Infant and Young Child Nutrition (MIYCN) behaviors/practices [2] that would improve nutrition outcomes among children below 2 years (**Figure 2)**.

[1] Owais et al., "A Nutrition Education Program in Rural Bangladesh Was Associated with Improved Feeding Practices but Not with Child Growth."

[2] Lamstein et al., "SBCC Pathways for Improved Maternal, Infant, and Young Child Nutrition Practices."

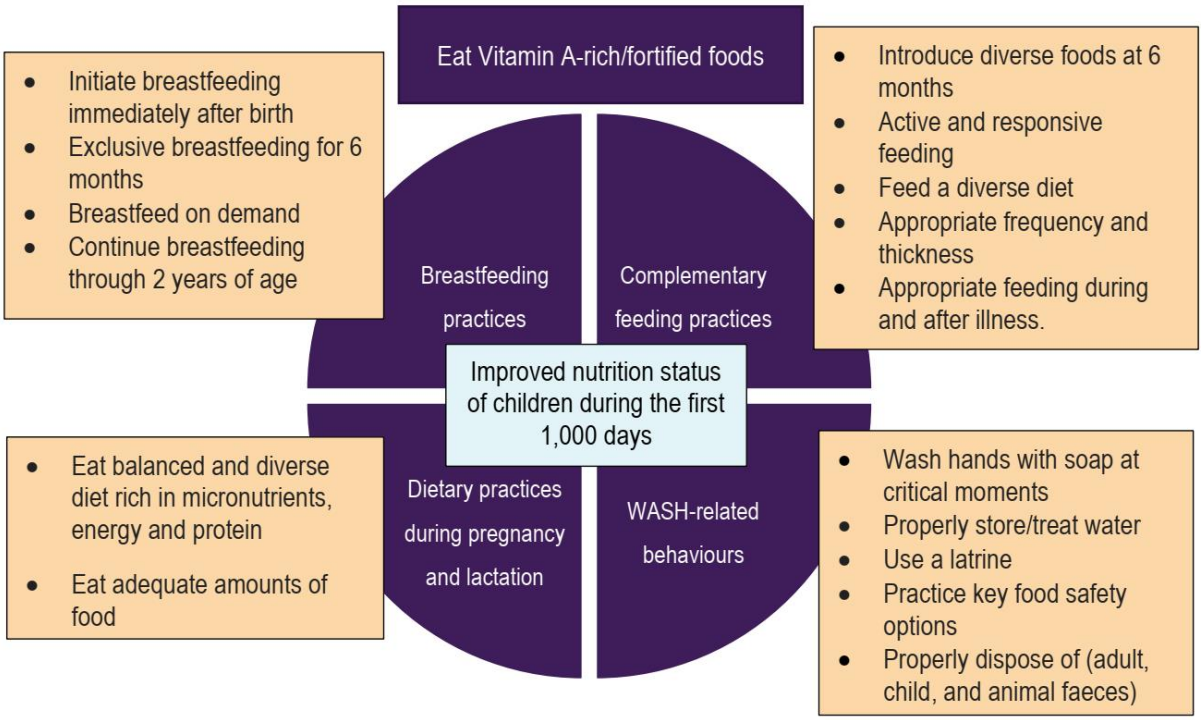


Figure 3 Evidence-based MIYCN practices and behaviours targeted by DDBIO nutrition SBCC program under the healthy living clubs.

The nutrition component works through the school model and the humanitarian model. In schools, four villages near the schools were selected. Clubs consisting of up to 30 women, from different households, who were either pregnant and/or caregivers of children below 2 years were formed. Recruitment of the members into the clubs was led by community Health Workers (CHWs), locally known as Village Health Teams (VHTs) who had been trained by the project on MIYCN **(see Appendix B**). Selection of club members in the humanitarian model was done by partners, but in these clubs, membership varied between 10-30 members. Some of these clubs established by partners were already existing before the project. In total, the project operated 300 clubs in the country.

The clubs met to discuss one MIYCN topic every month for a period of 8 months following a validated MIYCN curriculum manual (**see Appendix B**). Each club meeting was facilitated by one or two VHTs under the supervision of the Health Assistants (HA) of the health facility closest to the club. Clubs were leveraged as a cost-effective scale out platform for the healthy baby toolkit (HBT). Each club member was given an HBT set and was taught how to use it in measuring food amounts, determining the right food texture, and how often (frequency) to feed children below 2 years. (See **Appendix A**). Furthermore, clubs were entry points for orange-

fleshed sweetpotato (OFSP) in the implementing communities. Each club member was given 150–200 (30cm) vines to establish an OFSP garden.

Nutrition activities were inaugurated by a series of 51 workshops (49 sub-counties and 2 at district level) which ran from July 29 to October 2020 across 12 districts where the nutrition activities were specifically implemented (i.e Adjumani, Omoro, Lamwo, Kitgum, Agago, Pader, Kotido, Moroto, Butaleja, Bugiri, Busia and Tororo). The workshops were aimed at training VHTs, health assistants and health facility in-charges on MIYCN using the validated curriculum manual as well as acquainting sub-county political leaders (chairpersons and chiefs) with project activities in their respective precincts. Agricultural officers (AO), Community Development Officers (CDO), Headteachers and focal teachers in the project-supported schools were also invited. A total of 923 people attended the workshops**.**

Figure 4: Dr. Fred Grant demonstrating how to use the HBT during a nutrition training in Moroto district in April 2021. Credit Joshua Okonya, 2021

The VHTs were the primary facilitators of the HLC/MCG meetings but supported by health assistants to ensure they competently delivered to their fellow members in the groups. Audio stories related to the nutrition topic for the day were played to the groups at the very start of the meetings. The members were expected to answer questions from the stories. The VHTs were expected to go through the content, with great emphasis on demonstrations. In addition, each member was given a goal card with key lessons summarized on these goal cards. Members

were expected to report in the subsequent meeting a specific action on the goal card that they implemented. Each member was encouraged to invite the spouse (husband), grandmother and adolescent girls (10-19 years) to attend these meetings since these (husband and grandmother) have special roles in supporting others/caregivers while adolescent girls, in addition to requiring good nutrition, they were prepared for future good parenting.

Figure 5: A VHT, a mother and a child under five years, showing items used during the club sessions, i.e the HBT, the pictorial description of the HBT and the goal card

2.0 Research Methods

2.1 Study area, sampling, and data collection

The study targeted a few districts where the project was implemented. In the Northern region, the study was done in the Acholi sub-region in the districts of Omoro, Lamwo, Agago and Pader. In the Eastern region, the study was done in Bukedi sub-region in the districts of Butaleja, Tororo, Busia and Bugiri[3]. The districts were purposively selected because the care groups had completed or were near completion of the curriculum.

Mixed method, both quantitative and qualitative were used in this study. These were (a) the use of structured questionnaire, the focus group discussions (FGDs)[4] and monitoring of field activities as they happened. Respondents for the quantitative survey were randomly selected from the clubs. Four clubs were purposively selected in each district based on the level of completion of the curriculum and membership in the clubs (i.e with at least 25-30 members). Eight respondents were randomly selected from each club with the help of the research randomizer software. With this procedure, 135 respondents were sampled in Acholi sub-region and 98 from Bukedi sub-region. There were nine respondents more than targeted number, to cater for any incomplete data or for eventuality of missing respondents from other clubs. The quantitative data collection was done in September 2021 with the help of enumerators who used digital tools (tablets) to collect this data.

Monitoring of the clubs was done through physical visits to the clubs as they carried ou the sessions by the DDBIO team and through the health assistants. It was however not possible to visit all the clubs. The following were done to efficiently and cost effectively monitor the clubs

(a) Monitoring tools were developed to track the attendance of the meetings. These tools were

    (i) The club registration form which included important information such as age of the club member, education level, household size, number of children in

[3] Bugiri district is located in Busoga sub-region but neighbours Bukedi sub-region. For purposes of this study, it will be analysed together with the three Bukedi sub-region districts.

[4] The FGDs were conducted in December 2021 and analysis of the results is still on-going. This report does therefore not discuss the findings from the FGDs

households less than 2 years, children 2-5 years and number of adolescent girls in the household

(ii) Club attendance forms with information detail such as the topics discussed during the session, record of attendance by the husband, adolescent girls and grandmothers from the households and mobile phone contact

(iii) Observation checklist for the attendance of the clubs. This included observations made during the conduct of the sessions, session management and organization, facilitation and teaching skills, the environment where the clubs met from etc

To minimise paperwork, the monitoring forms were digitalized. Since the DDBIO staff could not reach to all the clubs, the health assistants were trained to track the performance of these clubs. The health assistants were trained on how to capture information digitally. To minimize the cost during the digital data collection, health assistants were trained on how to use their Android phones to collect this monitoring data. Thus, a health assistant observed the VHTs as they facilitated the sessions while they entered monitoring information into their android phones. The information was sent to the DDBIO team immediately the sessions were concluded. The information sent included the photos taken during the session as a check on whether the sessions were held. The DDBIO team sampled a few clubs every month using the observation checklists.

Figure 6: *Health Assistants from Lamwo trying out data entry into the digital tool during their training at Jaflo Gardens Hotel, Kitgum on 13th February 2021.*

The quantitative data collected from respondents was analyzed using STATA software. A comparative analysis was made between the two sub-regions. This is because the sub-regions significantly differ on a few social economic variables. For example, Acholi sub-region is one of the poorest in the country with 67.7% of its people poor compared to 34.7% poor people in Bukedi sub-region; 78% of households in Acholi sub-region are in the subsistence economy compared to 58.3% in Bukedi sub-region (UNHS 2019/20). Bukedi sub-region has high rates of malnutrition than Acholi sub-region. For continuous variables, comparative analysis was done using the independent t-tests. Where comparison was done between variables, paired t-tests and correlations were run. Chi square tests were done for categorical variables.

3.0 Results and discussion

3.1 Demographic characteristics of the caregivers

The nutritional trainings targeted pregnant women, breastfeeding women and caregivers of children below 5 years organised in clubs. There were 300 clubs, each with an average of 30 members. Therefore, over 9000 mothers were reached though these trainings. From the sampled respondents in Bukedi and Acholi sub-regions, the demographic characteristics are summarized in Table 1. The club members were young (28.5 years). The women in Bukedi sub-region had, on average, completed seven years of schooling while in Northern Uganda, they had completed six years. This average level of schooling implies that they can read and write and can comprehend nutritional messages if presented in local languages and most preferably through role play and practical demonstrations. Taking ownership of a phone as a measure of wealth, a significant proportion of households (68%) did not have phones. Ownership of mobile phones was higher in Bukedi sub-region than in Acholi sub-region. A paltry 1.7% had smart phones. The less ownership of phones implies that nutritional messages can be best conveyed through the traditional face to face meetings. A significant proportion (10.3%) of women in Acholi sub-region (P-value 0.029) were either single, widowed or divorced compared to a smaller proportion (4.1%) in Bukedi sub-region. Generally, households had an average of two children under 5 years. The role of the grandmothers in taking care of children was more prominent in Acholi sub-region than in Bukedi sub-region. This corresponds with the higher proportion of caregivers in the North who were single, divorced or widowed. The distribution in the population shows that most women were lactating (53.2%) compared to 8.6% who were pregnant.

Table 1: Demographic characteristics of caregivers that received nutrition training

Variable		*Bukedi (n=98)*	*Acholi (n=135)*	*Overall (n=233)*
Mean age of members (years ±SD)		27.5 (7.77)	29.2 (9.42)	28.5 (8.79)
Average no. of years of schooling by caretaker		6.5 (2.69)	5.9 (3.33)	6.1 (3.05)
Average no. of children under 5		1.9 (1.06)	1.7(0.98)	1.8 (1.02)
Average age of children (Months)		16.8 (12.27)	17.6 (12.22)	17.9 (12.21)
Marital status of caretaker	Single	3.06	4.44	3.86
	Married	95.92	85.19	89.70
	Widowed	0.00	5.93	3.43
	Divorced	1.02	4.44	3.00
Average no. of pregnancies		4.0 (2.22)	3.8 (2.38)	3.9 (2.31)
Relationship to reference child	Biological mother	97.96	91.11	93.99
	Grand mother	2.04	8.15	5.58
Current state of caretaker	Pregnant	9.18	8.15	8.58
	Not pregnant	10.20	14.81	12.88
	Lactating	55.10	51.85	53.22
	Not lactating	24.49	22.22	23.18
	Not in reproductive stage	1.02	2.96	2.15

3.2 Conduct of the nutrition sessions

Prior to the nutritional trainings organized in the clubs, only 33.9% of respondents had received some form of nutrition training before joining the clubs (Table 2). Most of these trainings had happened in Northern Uganda because of the partners (LWF) and other NGOs operating in the area and were largely facilitated by health professionals. There is humanitarian need in Northern Uganda to reach to refugees and the generally fragile environment that is still experiencing post-war effect. Whereas the Government of Uganda recently established VHTs in most of the villages in Uganda to help work with health professionals to reach communities in all aspects of health, this finding implies that before DDBIO intervention, the VHTs interacted with community members on other health related issues but less on nutrition.

Figure 7: Care givers attending a health living club session in Northern Uganda

On average, women attended 5 sessions and missed only one session. This indicates enthusiasm by women to attend the club meetings. Most women attended session three and sessions four, all of which were important in training about the use of HBTs. Some clubs had not done sessions 6-8 at the time of the study and thus knowledge, especially about OFSP were not yet introduced to them. During the project implementation, health assistants facilitated 23.1% and VHTs facilitated majority (76.8%) of the sessions which represents a big shift to how the trainings were conducted before. This shows that if VHTs are well equipped, they can help in the training of their fellow community members. The 23% trainings conducted by health workers however shows that some VHTs may not be confident or competent enough to lead the sessions. Whereas sessions were planned to last on average one hour, the sessions took over 2 hours. Members spent more time longer in clubs especially when there were cooking demonstrations. In some clubs, other aspects beyond the nutrition training, such as saving clubs etc were discussed, which shows other impact beyond the nutrition trainings.

Table 2: Conduct of the HLC sessions

Variable	Detail	Bukedi (n=98)	Acholi (n=135)	Overall (n=233)	P-value
Proportion that received nutritional training before HLC education		28.57	37.78	33.91	0.143
Year of last nutrition training (n=79)	Before 2020	42.86	43.14	43.04	0.981
	2020 and above	57.14	56.86	56.96	
Who conducted the training before project intervention (n=79)	Health professionals	60.71	65.52	63.69	**0.019****
	VHTs	21.43	20.69	20.93	
	Others	17.85	13.78	15.12	
Proportion that received HLC training on maternal nutrition for exclusive breastfeeding		93.88	78.52	84.98	**0.001*****
Proportion that received HLC training on complementary feeding - texture		89.80	90.37	90.13	0.885
Proportion that received HLC training on complementary feeding- frequency and volume		82.65	88.15	85.84	0.235
Proportion that received HLC training on responsive feeding and feeding during illness		65.35	98.15	67.81	0.897
Proportion that received HLC training on Vitamin A and OFSPs for the family		31.63	48.89	41.63	**0.008*****
Proportion that received HLC training on OFSP recipes for complementary feeding and dietary diversity		14.29	28.15	22.32	**0.012****
Proportion that received HLC training on Complementary feeding as children age and maternal nutrition		0.00	5.19	3.00	**0.022****
Who facilitated most of the trainings attended after project intervention	Health assistant	14.29	29.63	23.18	**0.006*****
	VHT	85.71	70.37	76.82	
Average no. of sessions attended		4.72	4.73	4.73	0.9690
Average no. of sessions missed		0.67	1.17	0.96	**0.0015*****

Average time spent in each session (Minutes)[5]	126.12 (31.64)	141.19 (49.37)	134.85 (43.38)	**0.0086*** **

3.3 Knowledge on the use of the HBTs

All (100%) respondents confirmed to have received the HBT bowl and slotted spoon while 82.3% received the brochure which was meant as a guide on how to use the HBTs. During monitoring, it was observed that some women preferred more pictures than the words. Thus, the brochure which had annotated pictures was important for comprehension on the use of the HBTs. Ninety-nine (99.1%) percent of respondents had been trained on how to use the HBTs where 58.2% were trained by VHTs and 41.8% by health assistants. The HBTs were used on daily basis (88.5%) to either feed the children or for their own feeding.

There was high adoption of the HBTs for use in the feeding of children. The indicators for high adoption are: 93.0% of the club members were using the HBTs (92.5% in Bukedi and 93.4% in Acholi). A high percentage (88.5%) were using the HBTs daily. Other indicators are: 94% indicated that HBTs have helped children to feed better and 93% were willing to pay for the HBTs if they lost them. Almost all HLC members (98.7%) indicated that they would recommend HBTs to non HLC/MCG members. The price the respondents were willing to pay did not differ significantly (P=0.522). The respondents in Bukedi were willing to pay UGX 3461 (1USD) compared to UGX 3700 (USD 1.1USD) for the Acholi. This gives an indication of the costing of the HBTs once rolled to the markets.

Most of the components of the HBT tool were understood by the caregivers. About 95% understood that the hole in the slotted spoon was to measure the consistency of the food. However, there were differences on the number of markings respondents observed on the HBT. About 65% of the respondents in Bukedi mentioned three marking compared to 29.5% in Acholi, while only 33.3% in Bukedi observed all the marking compared to 65.6% in Acholi. The difference in the knowledge is surprising considering that all the health assistants and VHTs were trained by the same trainers. Over 80% of respondents understood that the first line was an indication for feeding children 6-9 months; the second line for feeding children 9- 12 months and the third line for feeding children beyond 12 months. For those who knew the

[5] On continuous variables, figures indicated in the table are the means and t-test P-values. Those in the parentheses are standard deviations

fourth line, they rightly indicated that it was an indicator for an extra meal for breastfeeding and lactating mothers. Whereas 87.4% had seen the triangles and squares in the bowls, many did not know the meaning of those markings. About 29% in the Bukedi and 35% in Acholi rightly understood that the markings meant the frequency of feeding the children. This result could be because, one, the trainers probably did not pay attention to training about these markings, and also, that the markings are obscure hence a need to improve on the design of the HBT.

Table 3: Knowledge on the use of the HBT tool

Variable	Detail	Bukedi (n=98)	Acholi (n=135)	Overall (n=233)	P-value
No. of markings ever seen in the HBT (n=215)	One marking	0.00	0.82	0.47	**0.000***
	Two markings	1.08	1.64	1.40	
	Three markings	64.52	29.51	44.65	
	All the markings	33.33	65.57	51.63	
	None	1.08	2.46	1.86	
Proportion who knew the meaning of the 1st line in the bowl (n=211)		91.30	94.96	93.36	0.290
Proportion who knew the meaning of the 2nd line in the bowl (n=211)		85.87	85.71	85.78	0.974
Proportion who know the meaning of the 3rd line in the bowl (n=211)		80.43	84.03	82.46	0.495
Proportion who know the meaning of the 4th line in the bowl (n=211)		60.87	63.87	62.56	0.656
Reasons for having a hole in the spoon (n=215)	To measure thickness	94.62	95.90	95.35	0.670
	To feed the child	2.15	0.82	1.40	
	To cool the porridge	0.00	0.82	0.47	
	Do not know	3.23	2.46	2.79	
Proportion who had seen triangles/ squares on each line of the bowl (n=215)		89.25	86.07	87.44	0.485
Proportion who knew the meaning of bowl triangles/ squares (n=188)		28.92	35.24	32.45	0.358

Proportion that thought HBT had helped in feeding children better (n=215)	94.62	93.44	93.95	0.719
Proportion that were willing to pay if they lost their current HBT (n=215)	96.77	94.26	95.35	0.386
Average price respondents were willing to pay (Ugx)	2432.49	2802.57	2642.87	0.5220
Proportion that would recommend HBT to HLC non-member mothers	100.0	97.54	98.60	0.128

3.4 Nutritional knowledge acquired during the HLC club meetings

The knowledge score for the nutrition training was very high, between 4.0 -4.5. A score of four represents good knowledge on what the caregivers were trained on. On all the scores, the Bukedi respondents scored higher than the Acholi score, but the difference was not significant. The only exception was the knowledge in baby food preparation which was significantly higher for Bukedi than in the Acholi at 10% level of significance (P=0.075). The good knowledge on the item scores can be attributed to the design of the curricula which best suited the learning of the caregivers. The training that comprised of both pictorial (goal cards and HBT user manual), audio (the radio player) and the demonstrations (cooking demos) and the repeated meetings can be associated to the grasping of the most important aspects of child nutrition. Further analysis showed that the willingness to pay for the HBTs was highly significant with the higher score in nutrition (P=0.000). Thus, nutrition training, and not only training about use of HBT is necessary for increased adoption of the HBTs.

Table 4: Score on the nutritional knowledge of caregivers

Variable	Bukedi (n=98)	Acholi (n=135)	Overall (n=233)	P-value
Score of knowledge in baby foods preparation	4.39	4.20	4.28	0.075
Score of knowledge on number of times a baby of any age should be fed	4.06	4.03	4.04	0.773
Score of knowledge on number of times a baby should be breastfed	4.20	4.06	4.12	0.193
Score of knowledge on how to use the slotted spoon	4.40	4.28	4.33	0.340

Score of knowledge on how to keep hygiene of the tool kit	4.52	4.50	4.50	0.593
Score of knowledge on how to prevent older children from using the tool kit	4.22	4.24	4.23	0.907
Score of knowledge on nutrition for breastfeeding or pregnant women	4.07	4.01	4.03	0.532
Overall score (Max=35)	29.87	29.29	29.53	0.216

Generally, the caregivers were aware that a child should be exclusively breastfed for six months (Table 5). The disparity between the knowledge and actual practice of exclusive breastfeeding was significant (P-value=0.0024). A significantly large proportion of caregivers in Bukedi were aware that their children should be breastfed up to six months compared to those in the Acholi. The findings indicate that at least 42.5% (34.74% in Bukedi and 51.1% in the Acholi) began supplementing at six months. Caregivers rightly mentioned that children should eat at least four times a day, with caregivers in Bukedi recommending at least 4.5 times compared to 3.9 for Acholi. The recommended number of times for feeding the children did not vary significantly with the actual practice of feeding the children. Findings however show that a big proportion of caregivers were not sure of the amount of food a child should start with at the start of the supplementary feeding. A satisfactory proportion of caregivers (over 75%) understood that the slotted spoon was important in measuring the texture of food fed to children.

Table 5: Measure of implementation of knowledge learnt during the club meetings

Variable		Bukedi	Acholi	Overall	P-value
Average recommended duration of exclusive breastfeeding (Months)		6.21 (1.84)	7.42 (5.36)	6.91 (4.27)	**0.0337****
Average actual duration of exclusive breastfeeding (Months)		5.89 (2.27)	6.42 (3.64)	6.19 (3.13)	0.034
Mentioned 6 months as the period they exclusively breastfed their children (%)		83.7	72.3	77.2	0.202
Began supplementing at 6 months (%)		62.2	48.2	55.4	0.216
Began supplementing before 6 months (%)		3.06	0.7	2.15	
Average age to start supplementing a child (Months)		6.41 (0.78)	6.73 (0.97)	6.59 (0.91)	0.0074***
Average recommended no. of times a child should feed if not breastfeeding		4.4 (1.31)	3.89 (1.09)	4.13 (1.22)	0.0004***
Average actual no. of times a child feeds if not breastfeeding		4.28	2.14	3.92	0.4776
Quantity of food a child should start with	Begins with 2 spoons	59.18	54.07	56.22	0.438
	Has no idea/ mentions wrong amount	40.82	45.93	43.78	
Texture commonly given to a child	Foodstuffs that can stay on HBT spoon	70.41	79.26	75.54	0.119
	Spoon not mentioned for identification of food texture	19.39	8.89	13.30	
	Other	7.14	9.63	8.58	
	Do not know	3.06	2.22	2.58	

3.5 Vitamin A and consumption of other nutritious foods

The proportion of households that were consuming OFSP in the household was proportionately high in Bukedi (63.3%) than in Acholi (35.7%). This is because in Acholi, many beneficiaries lost their vines due to the long dry season. The beneficiaries who had lost their first crop were given vines to replace the lost ones but at the time of the study, the crop was still in the field. In Bukedi, the health living club members kept the vines since they did not get much affected by the dry spell.

A large proportion of respondents (over 80%) were mindful of other vitamin A rich foods. This is attributed to the nutrition training that emphasized food diversity and dietary diversity. Indeed, results (Table 6) show that over 85% of caregivers in all the regions fed their children on fruits and vegetables. Figure 8 shows that animal sources were the most consumed vitamin A sources by the children one month before the study. This is because of the growing popularity of silver fish (Mukene) which is consumed whole. Focus group discussions revealed that other animal sources such as eggs, liver were rarely consumed in the communities. The figure shows that OFSP is the second most consumed in the list of vitamin A sources, overtaking dark green leafy vegetables and the vitamin A rich fruits.

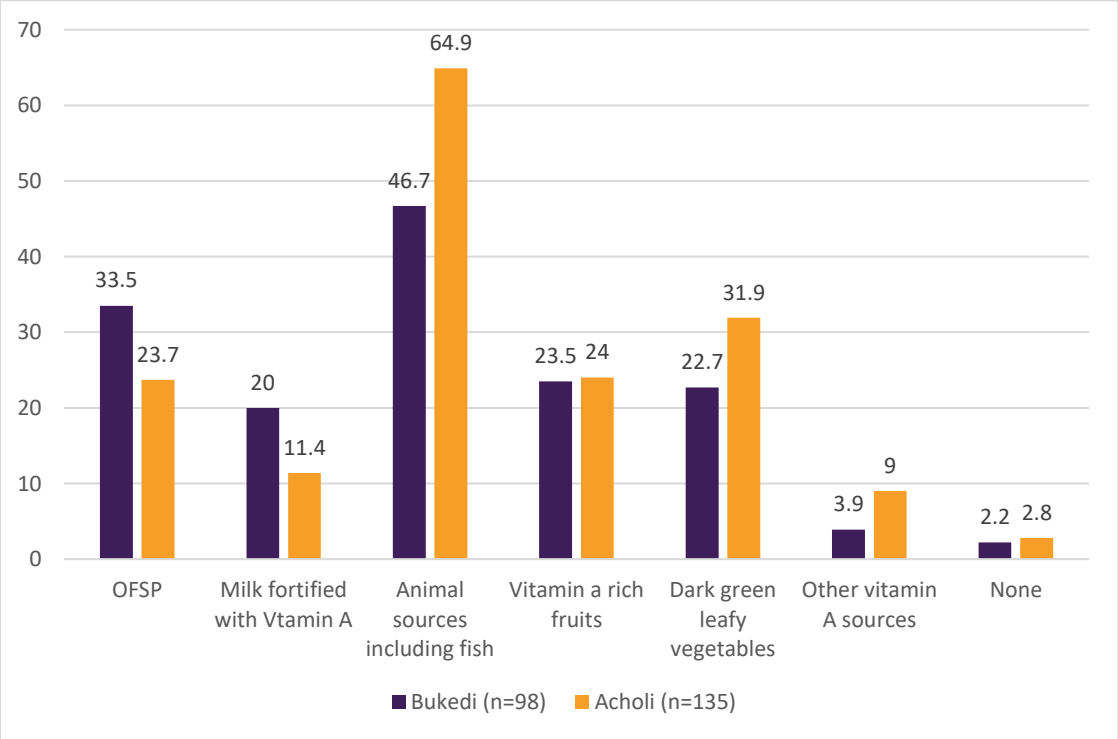


Figure 8: Common vitamin A foods consumed in the households

As an indicator for the need for better nutrition in the communities, over 55% of the caregivers mentioned that their children had fallen sick within one month before the study (Table 6). Over 15 different kinds of illnesses were mentioned. The common illnesses mentioned are presented in Table 6. Findings indicate that Malaria remains the most common disease. The second to Malaria, i.e fevers may indicate symptoms of malaria or other illnesses. Colds and flue were the third mentioned illnesses. Other illnesses mentioned by less than 2% of the respondents were typhoid, oral candisasis, measles, injuries, ear infections and body sores. Illnesses mentioned by more than 2% but less than 5% of the respondents were cough for more than 2 weeks, loss of appetite, vomiting and pneumonia. As expected, over about 90% of the children had received vitamin A supplements. This did not vary between regions since vitamin a supplementation is spread in the whole country.

Table 6: common illnesses mentioned by the club members in Bukedi and Acholi sub-regions

Variable	Detail	Bukedi (n=98)	Acholi (n=135)	Overall (n=233)	P-value
Proportion that often feed their children on OFSP		3.27	35.56	47.21	**0.000*** **
Proportion that are often mindful of other Vit A rich foods in feeding children		82.65	87.41	85.41	0.310
Proportion that ensure children feed on fruits, vegetables & other VitA sources		92.86	87.41	89.70	0.177
Proportion that identified illness with their children in the past one month		55.10	61.48	58.80	0.329
Illnesses identified in the children in the past 1 month	Cold and flu	24.14	15.79	18.32	0.294
	Cough for less than 2 weeks	3.45	9.77	7.85	
Total no. choices from the East = 58	Fevers	17.24	24.06	21.99	
Total no. choices from the North = 133	Diarrhea	8.62	7.52	7.85	
	Malaria	37.93	25.56	29.32	
The last time the child had the disease/ infection	The child was unwell	18.52	21.69	20.44	0.466
	A week before	16.67	16.87	16.79	
	2 weeks before	31.48	22.89	26.28	
	A month before	16.67	22.89	22.63	
	Always sickly	5.56	1.20	2.92	
	Others	11.11	10.84	10.95	
Proportion of respondents with children that have been receiving Vit A supplement as recommended by Ministry of health		94.44	86.75	89.78	0.146
Last time the child received dietary supplement	Less than 6 months ago	62.96	49.40	54.74	**0.000*** **
	The supplementation is on-going	14.81	20.48	18.25	
	More than 6 months ago	16.67	2.41	8.03	

	Others	5.56	27.71	18.98

*** Significant at 1% **Significant at 5% *Significant at 10%

4.0 Conclusion and recommendations

Nutrition interventions for health are primarily mindset change interventions. These require innovations in training and technology to cause the desired change. The MIYCN interventions and the corresponding technology of the health baby tool kits (HBTs) were implemented with the intention to bring this mindset change for better nutrition of the most vulnerable groups in the population, i.e children under 2 years, pregnant women, lactating mothers and adolescent girls. The eight meetings organized among the caregivers in mother clubs, one meeting conducted each month, were intended to influence caregivers to feed themselves and their children with diverse diets and nutritious foods in the right quantity, right frequency and for the children the right texture. The enthusiasm and the consistency of club members in attending these meetings, the confidence and the right responses to nutritional questions that were posed to them during the evaluation are all evident that nutritional trainings, if well planned and structured to be interactive with various training and learning techniques can cause the desired change. The willingness to pay for the health baby tool kits at a cost of one US Dollar implies that the technology can be scaled out to entrepreneurs if the relevant user information about the HBTs and relevant nutritional information accompany the HBTs.

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Appendices

A. Healthy Baby Toolkit (HBT)

Why use the Healthy Baby Toolkit?

Without sufficient food and care the first two years of life, children will struggle with mental and physical development. They may not grow in weight and height to their potential and they may struggle with intellectual achievement in school. In some cases, these deficiencies cannot be overcome in later years. Thus, the amount of food children eat, the number of times per day children eat, and the texture of food children eat will impact how they grow.

What is the Healthy baby toolkit?

The healthy baby toolkit is designed for use with infants 6-23 months of age to ensure they receive the recommended amount of food at each meal to ensure optimum growth and development. The toolkit includes:

1. A bowl with lines and symbols that cue age-appropriate meal **frequency** and **volume** for children at different ages[6]: 6-9 mos, 9-12 mos, 12-23 mos

2. A **slotted spoon** to guide **optimal thickness/texture** of infant foods and complementary foods. If the food does not drip through the holes in the spoon, it is thick enough to ensure sufficient energy and nutrient density.

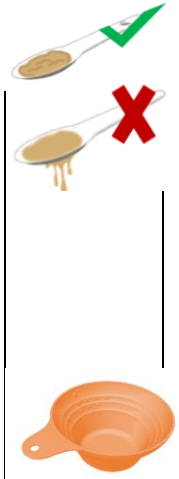
3. A pictorial counseling card that uses *locally adapted images* to explain how to use the toolkit to achieve optimal dietary diversity, infant and young child feeding practices, and safe handwashing and food/water preparation.

[6] These portion sizes and meal frequencies are in accordance with WHO/NICEF 2006 infant and young children counseling guidelines. The volumes indicated in the feeding bowl correspond to the approximate functional stomach capacity of most children at the appropriate ages: 6-8 months old - 125 ml (meal frequency: 2 meals/day), 9-12 months old – 150 ml (meal frequency: 3 meals/day) and, >12 months/ 12-23 months - 250 ml (meal frequency: 3 meals/ day).

How do you use the Healthy baby toolkit?

Child's age	Key nutrition message	Comments
0 – 6 months	Infants ONLY need breastmilk for the first six months of life. It is their food, water, and medicine. Babies tummies aren't fully developed until 6 months. An infant under six months who is given other foods / drinks gets sick more often, and does not achieve optimal physical and mental development compared to those infants who are given only breastmilk.	If a baby urinates several times a day and defecates every day, then s/he is likely getting enough breastmilk, even if the baby is crying a lot. Breastfeed frequently during the day and at night at least 6-8 times every 24 hours. Mothers should eat two extra meals per day while they are breastfeeding. This extra food gives mothers strength and energy. Infants can get the benefits of milk, porridge, water, and/or traditional medicine from their mother's breastmilk. Instead of giving these to the baby directly, give it to the mother and the baby will benefit.

Child's age	Key nutrition message	Amount of food per meal	Frequency of meals	Texture of food	Illustration
6-9 months	At approximately 6 months, babies need more than breastmilk to grow and develop well. Feed your baby a variety of foods from different food groups (*see the counseling card*) for strong and healthy growth and development. Infants are ready for food and liquids other than breastmilk when they are able to sit up and move their heads on their own.	To help children > 6 months learn how to eat, feed them food before switching to breastfeeding. That way they will be most hungry when food is given to them and will be more likely to practice eating, chewing and swallowing. Begin with 2 tablespoons and gradually increase to the level of 6-9 months as indicated on the toolkit bowl.	As a child ages and their stomach grows, they should be fed more often and more food at each meal. Feed the child 3 meals a day and add 1-2 nutritious snacks. Boiled orange-fleshed sweetpotatoes are a safe, tasty and healthy snack for babies.	A child's stomach is small and fills up quickly. Therefore, they need to be fed thick and enriched porridge several times a day. Foods that can stay on the **toolkit spoon** are thick enough for children.	  

				Begin with mashed family foods and thick, *enriched* porridges.	
9-12 months	Food provides the fuel for children to grow, learn and play. Without it, they will not be as active, healthy or smart as they could be. Different types/groups of food help children's bodies in different ways. For example, foods from animals – like meat, milk and eggs – build up muscles and help their bodies grow strong and fight illness. Fruits and vegetables provide essential vitamins and help build immunity to protect against illness. It is important for children to eat foods from these different groups as often as possible to gain all the possible benefits.	Serve the baby food up to the level of 9-12 months indicated in the **toolkit bowl**. When children are just starting to learn to eat (at 6 months) they may not be able to eat a lot of food. Parents should encourage children to eat more food and gradually increase the amount fed to them at each meal until they are able to eat **up to their mark on the toolkit bowl.**	3-4 meals with breastfeeding and 1-2 nutritious snacks per day. Boiled orange-fleshed sweetpotatoes are a safe, tasty and healthy snack for children. Ensure that children eat from at least 4 of the 6 food groups.	Mashed or finely chopped food that can be picked up by the child. Foods that can stay on the **toolkit spoon** are thick enough for children.	
12- 23 months (or >12 months)	Older infants may try to feed themselves – encourage them to do so! Children may be messy and take a long time to eat. That is normal and a part of learning to feed themselves.	Serve the baby food up to the level of >12 months indicated in the **toolkit bowl**. Never force children to eat. If the child does not finish the food, families should cover the food and store it for up to one hour in case the child gets hungry later. It should be eaten or discarded after one hour.	Feed the child a variety of locally available family foods from 4 or more of the 6 food groups. Children in this age group should eat 5 times a day (3 meals and 2 snacks). Continue to breastfeed.	Finely chopped small, soft pieces of food which can be picked, chewed and swallowed comfortably by the child. Mashed foods and porridges can also be given. Foods that can stay on the **toolkit spoon** are thick enough for children.	

B. Healthy Living Club (HLC) Curriculum

#	HLC	Session Goal	Activities & Tools	Who Should Attend
1	Agriculture and HLC Introduction	Introduce participants to the Healthy Living Club, begin developing positive group dynamics, and motivate continued participation.	• Develop a group song	• Mothers • Fathers
2	Maternal Nutrition for Exclusive Breastfeeding	Discuss the importance of maternal nutrition during lactation and its implications for baby and the family; address mothers' and grandmothers' concerns and perceived barriers of exclusive breastfeeding *Toolkit bowls and counseling cards distributed*	• Develop Group Song • Audio Story • Counseling Card	• Mothers • Fathers • Grandmothers
3	Complementary Feeding— Texture	Discuss the importance of feeding thick, enriched porridge for children 6-23 months. *Toolkit spoons distributed to families with ≥5.0- month-old infants*	• Diet Diversity Wheel (1 per family) • Consistency Demonstration and Taste Testing • Toolkit Spoons	• Mothers • Fathers
4	Complementary Feeding—Frequency and Volume	Discuss the importance of meal frequency and volume for children 6-23 months. *Toolkit spoons distributed to families with ≥5.0- month-old infants who have not yet received one.*	• Audio Story • Meal Frequency & Amount Supplemental Page (on back of Dietary Diversity Wheel)	• Mothers • Fathers • Grandmothers
5	Responsive Feeding and Feeding During Illness	Introduce parents to the idea of responsive feeding, provide them with responsive feeding strategies and discuss appropriate feeding of children during and after illness. *Toolkit spoons distributed to families with ≥5.0- month-old infants who have not yet received one.*	• Audio Story • Responsive Feeding Practice	• Mothers • Fathers • Grandmothers
6	Vitamin A and Orange fleshed sweetpotatoes for the Family	Identify the benefits of vitamin A and introduce participants to ways to prepare and the taste of orange fleshed sweet potato	• Diet Diversity Wheel	• Mothers • Fathers

		Toolkit spoons distributed to families with ≥5.0- month-old infants who have not yet received one.	• Cooking Demonstration with Orange Fleshed Sweetpotatoes and Leaves	
7	Orange Fleshed Sweetpotato Recipes for Complementary Feeding & Dietary Diversity (Jan)	Reinforce vitamin A messages, with a particular emphasis on children and dietary diversity	• Dietary Diversity Wheel • Cooking Demonstration with OFSP and Leaves	• Mothers • Fathers • Grandmothers (if desired)
		Toolkit spoons distributed to families with ≥5.0- month-old infants who have not yet received one.		
8	Complementary Feeding as Children Age and Maternal Nutrition (Feb)	Describe complementary feeding practices for older children and maternal nutrition during pregnancy	• Audio Story • Meal Frequency & Amount Supplemental Page (on back of Dietary Diversity Wheel)	• Mothers • Fathers
		Toolkit spoons distributed to families with ≥5.0- month-old infants who have not yet received one.		
9	Graduation	Congratulate families on completing the HLC and encourage parents to continue practicing new behaviors as children age, new children are born.	• Graduation Ceremony	• Mothers • Fathers • Grandmothers (if desired) • Other Community Leaders (HDAs/VHTs/CHWs/CNSs, HEWs, District Nutritionist, Ministry of Health Staff)

C. Healthy Baby Toolkit Survey Questionnaire

HEALTHY BABY TOOL KIT USAGE AND APPLICATION

Assessing the effects/impact of the healthy baby tool kit on IYCF and vitamin A/OFSP consumption

Vitamin A intake, OFSP and Health outcomes of children 0-23 month with and without involvement in the healthy baby tool kit sessions

Name of the interviewer ……
Telephone contact for the interviewer ……

District of health living club attendance ……
Sub-county/parish …….
Attending person or session facilitator……..
Last conduct of the session……
Number of sessions conducted with the club to date ……..

Child and mother Characteristics

1. **Age of the child……..……..**
2. **Sex of the child……..**
4. **Age of the mother/caretaker**
5. **Level of education of the mother /caretaker**
6. Is the caretaker the biological mother ……

Prior to any of the sessions, have you ever received any training on infant and young child feeding
( ) Yes
( )No

3. Number of sessions attended so far
4. Duration of the sessions
5. Have you received any education sessions regarding the healthy baby too kit

( ) Yes
( ) No
If No go to ⟶

6. Components of the sessions/ what the mother has learnt from the sessions
7. What are the 3 major components of the healthy baby tool kit that you have learnt from the healthy session
   ( ) When to start complementing a baby
   ( ) Quantity and amount of foods to be given to a child
   ( )Texture of the foods given to a child
   ( ) This is the first session to be attended by the mother
   ( ) others specify……..
8. What are the practical aspects that you have learnt from the sessions
   ( ) how to prepare the baby foods
   ( ) number of times a baby of any age should be fed in day
   ( ) number of times to breastfeed child under 6 months
   ( )

9. **How long did you child exclusive breastfeeding**

( ) 6 months
( )< 6 months
( ) > 6 months
( ) Never breastfed

10. **When do you start supplementing the child**

( ) 4- 6 months
( ) at 6 months
( ) others specify
( ) I don't know

11. How many times should a child feed in a day, if they are not breast feeding

( ) <3 meals
( ) 3-4 meals
( )> 4meals

12. How many times do you feed the child in day

( ) <3 meals
( ) 3-4 meals
( )> 4meals

13. What quantity of food did you start your child off with

( ) begins with 2 spoons and gradually increases based on the bowl
( ) mother has no idea/mentions wrong amount
( ) I don't know

14. What texture do you commonly give to the child

( ) food stuffs that can stay on the toolkit spoon
( ) Mother does not mention the spoon for the identification of the food texture
( ) I don't know
( ) others specify…….

15. Conduct a food frequency questionnaire or screener for the child

Screener focusing on vitamin A rich foods or OFSP

16. Please describe to me; from around the same time yesterday, what have you given you child to eat (please mention all the child ate, was given including amount)- The interviewer should probe for all the foods and drinks given the child in the 24 hour period and record all the foods and the amount). You can start off the mother by telling her the current time

17. What illnesses have you identified with your child in the past 1 months (tick all that apply)

( ) Cold and flu
( ) Cough for more than 2 weeks
( ) Cough for less than 2 weeks
( ) Fevers
( ) Loss of appetite
( ) Vomiting
( ) Pneumonia

( ) Diarrhoea
( ) Reduced play
( ) Others specify ……

If the child has not been unwell in the last month skip to question …….21

18. If ticked any of the responses above, When was the last time the child had this disease/infection

( ) The child is currently unwell
( ) a week ago
( ) 2 weeks ago
( ) a month ago
( ) always sickly
( ) Others specify

19. Has this child been receiving the vitamin A supplement as recommended by the Ministry of health

( ) Yes
( ) No
( ) Have not complied with the 6 months routine

( ) Others specify……

20. When was the last time the child received a dietary supplement

( ) Less than six months ago
( ) The supplementation is update

( ) others specify ……..

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