

MELA RESEARCH

Outcome evaluation of the Alive & Thrive Intervention on Infant and young child feeding Practices in SNNP, Ethiopia

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Executive Summary

The Operations Research (OR) project on the timed and targeted counseling (TTC) approach is a part of Alive & Thrive (A&T), a five-year initiative funded by the Bill and Melinda Gates Foundation to reduce under-nutrition and death caused by sub-optimal infant and young child feeding (IYCF) practices in Bangladesh, Vietnam and Ethiopia, all of which have a high prevalence of stunting among children under five years of age. The initiative integrates proven strategies into existing efforts to reach vulnerable women and children, while seeking new approaches for creating demand and sustaining improved IYCF at large scale in three distinct learning environments. A&T also generates and shares best practices and innovations about how to reach and impact diverse communities in different environments, and leverages new resources to create sustainable improvements that can inform policies and programs. A&T is implemented by a consortium led by Family Health International 360 (FHI360), and comprising of the International Food Policy Research Institute (IFPRI), GMMB, Save the Children, BRAC, UC Davis and World Vision. World Vision and two other non-governmental organizations (NGOs) have been selected to conduct operations research on different implementation strategies in the countries where the project operates. The OR component in Ethiopia is implemented by World Vision (WV) US through the country office, WV Ethiopia. It has been implemented in four Woredas in SNNPR, namely Chench, Hulla, Humbo and Kochere.

The operations research project was implemented over three years, from October 2009 to November 2012. The project has been implemented in four Woredas in SNNPR, namely Chench, Hulla, Humbo and Kochere. The peer mothers provide Timed and Targeted Counseling (TTC) to mothers based on the child's age. Beginning from the third trimester of pregnancy, follow up TTC visits will be made at delivery, two days after delivery, after four weeks, after four months, after six months, after 12 and 18 months of delivery. Household-level counseling by peer mothers began in October 2010, with monthly review and reporting of activities with HEWs and with project staff along with technical updates for peer mothers.

To document program impact, a baseline and endline surveys, respectively, were conducted in September 2010 and September 2012. Both the baseline and endline surveys were conducted by Mela Research PLC. The evaluation study employed a Non-Equivalent Control Group Design in four intervention and four control Woredas of the SNNPR. Both the baseline and endline surveys employed similar methodology. Difference-in-Difference (DID) approach using multivariate methods was employed to detect significant changes in coverage of IYCF knowledge/ practices and other indicators in the intervention area beyond those occurring in the rapidly changing environment attributed largely to the health extension program. Logit models with dummy-by-dummy interaction were employed to estimate the DID after controlling for several confounding factors. A dose-response approach was also employed to examine exposure to TTC and several outcomes in the intervention Woredas.

Findings of this evaluation, taken together, demonstrated that the overall goals of the A&T operation research project intervention using the TTC approach were largely met. Women's knowledge and implementation of key IYCF practices significantly improved in the intervention area beyond what could have occurred in the rapidly changing environment attributed largely to the health extension program. The intervention also proved to have added values in improving the coverage and uptake of child immunization and vitamin A supplementation as well as the use of

ANC. It can thus be concluded that when rural mothers are exposed to a timed and targeted counselling on IYCF and other related health issues by volunteer peer mothers, it is likely that their knowledge and behaviour regarding IYCF and essential child and maternal health care will improve.

This evaluation has also illuminated some gaps and challenges. First, coverage with TTC is moderate (46%) and about 54% of the women with children 0-23 months in the intervention area did not receive a TTC visit and can represent missed opportunity for TTC. Second, the frequency of the visits were much lower than expected and that dropout from the first (during third pregnancy) to the 12th months (after delivery) visits was about 15% (absolute change). This modest or sub-optimal TTC coverage clearly has implication for the recorded results as we have demonstrated a positive linkage between timely and frequent TTC visit and adoption of the desired IYCF behaviors by the mothers. As a result of which it is likely that this study did not show the maximum possible impact of the intervention. Indeed, had the TTC visits coverage been higher and more frequent we would have seen a much more vivid impact of the program intervention.

Finally, whereas the intervention positively influenced a number of key breastfeeding practices, no similar intervention effect was seen for complementary feeding. It may well be that counseling alone is not adequate to improve dietary diversity and that integrating the TTC approach with other programs targeting to improve complementary feeding practices in rural communities is a viable strategy.

I. Introduction

1.1. General description of the intervention

The Operations Research (OR) project on the timed and targeted counseling (TTC) approach is a part of Alive & Thrive (A&T), a five-year initiative funded by the Bill and Melinda Gates Foundation to reduce under-nutrition and death caused by sub-optimal infant and young child feeding (IYCF) practices in Bangladesh, Vietnam and Ethiopia, all of which have a high prevalence of stunting among children under five years of age. The initiative integrates proven strategies into existing efforts to reach vulnerable women and children, while seeking new approaches for creating demand and sustaining improved IYCF at large scale in three distinct learning environments. A&T also generates and shares best practices and innovations about how to reach and impact diverse communities in different environments, and leverages new resources to create sustainable improvements that can inform policies and programs.

A&T is implemented by a consortium led by Family Health International 360 (FHI360), and comprising of the International Food Policy Research Institute (IFPRI), GMMB, Save the Children, BRAC, UC Davis and World Vision. World Vision and two other non-governmental organizations (NGOs) have been selected to conduct operations research on different implementation strategies in the countries where the project operates. The OR component in Ethiopia is implemented by World Vision (WV) US through the country office, WV Ethiopia. It has been implemented in four Woredas in SNNPR, namely Chench, Hulla, Humbo and Kochere.

The goal of Alive & Thrive is to increase rates of exclusive breastfeeding and improve feeding practices for children 6-24 months of age. Specifically, Alive & Thrive aims to reduce by at least 50% the disability adjusted life years lost (DALYs) due to poor infant and young child feeding (IYCF). In Ethiopia, the goal of A&T is to increase exclusive breastfeeding rates by 25%, to reduce stunting in 353,000 children under two years of age, and reduce infant deaths by 47%. The OR project aims to contribute to this overall goal and objectives and also fits well within the strategies of A&T Ethiopia country program, which are to:

1. Foster positive environment for IYCF implementation through public dialogue, advocacy, and improved programming at national, regional and zonal. Three expectations are to:
 - a. Shift focus and thinking from emergency nutrition and case management to preventive and promotion aspects and to increase coverage of IYCF behaviors
 - b. To work with bilateral and multilateral agencies and with international NGOs to initiate dialogue to mainstream IYCF into their programming
 - c. To work with donors to convince them of the long-term importance of IYCF
2. Shape IYCF demand and practice through behavior change communication (BCC), capacity building, with a high level of cascading to the community level, with the intention of bringing about an increase in coverage through local implementers from public health system and private and community based organizations
3. Increase private sector involvement in IYCF, such as development of high quality complementary foods with animal protein.

4. Measure, document and evaluate, through baseline and process evaluation, rapid assessments of specific IYCF areas, sentinel surveillance of key behaviors, formative research and media reach surveys

Ethiopia was selected for the Alive & Thrive program because it is among the poorest countries in sub-Saharan Africa and has one of the highest rates of malnutrition. Almost half of children under age five are stunted, with long-term consequences on learning capacity and economic productivity. Nutrition programming in the country has focused on emergency nutrition and rehabilitation owing to high levels of acute malnutrition because of widespread food insecurity for the past several years. With the economic progress made in recent years, the food security situation in the country has improved, the calorie gap has begun to be met, with reducing levels of acute malnutrition. In Ethiopia, the Alive & Thrive program is focused on four strategies to achieve the program goal of reducing death, illness and malnutrition caused by sub-optimal feeding of infants and young children:

1.2. The TTC approach

The operations research project was implemented over three years, from October 2009 to November 2012. The project has been implemented in four Woredas in SNNPR, namely Chenchu, Hulla, Humbo and Kochere. The first year of the project was used to finalize the research design, carry out formative research, baseline surveys and to design, test and finalize training and communication material for the intervention.

The operation research project has trained and deployed peer mothers (PM) who were selected from the community. The PMs emerged from graduated model families through the HEP. The peer mothers provide TTC to mothers based on the child's age. Beginning from the third trimester of pregnancy, follow up TTC visits will be made at delivery, two days after delivery, after four weeks, after four months, after six months, after 12 and 18 months of delivery. Altogether, the peer mothers are expected to make about 10 TTC visits until the child is 18 months of age. The TTC focused on several IYCF issues including key breastfeeding practices, complementary feeding among others. Illustrative TTC cards are used to aid the counseling. Household-level counseling by peer mothers began in October 2010, with monthly review and reporting of activities with HEWs and with project staff along with technical updates for peer mothers. HEWs and project staff monitored the process using standardized supervision checklists.

Formative research (FR) conducted in February 2010 aimed to inform the design of key messages and their delivery and studied the feasibility, effectiveness and sustainability of using peer mothers to promote IYCF practices. Separate studies were also carried out on current child feeding practices and food availability, and a review of risk factors for childhood malnutrition in Ethiopia. Based on findings from the formative research, the TTC approach was adapted for the OR's objectives and harmonized with the Ethiopia MOH protocol and related material was translated into Amharic in September 2010.

Project and MOH staff and peer mothers were trained in the TTC approach between July and September 2010. A three-tier cascading approach was used and in the first tier MOH staff members from the Regional Health Bureau and Zonal and District health offices were trained. The project's capacity building manager, the project's director and the nutrition technical specialist from HQ (WV

US) served as master trainers for the first tier. In the second tier, the master trainers trained HEWs in the intervention districts and as the third tier, HEWs trained peer mothers. Two further rounds of training were carried out in November 2011 and April 2012.

Based on findings from the study on current IYCF practices and feedback from peer mothers, some of the behaviors that the intervention laid emphasis on are: increasing frequency of breastfeeding (on demand day and night), addition of meat and other animal products to children's diet, and the process of enriching porridge using a mix of cereals and legumes and including dried and pounded meat.

Quarterly review meetings were held at district and regional levels of MOH and the regional office of the Ministry of Finance and Economic Development. Counseling cards aligned with TTC visits were developed in March 2011 and subsequently used by peer mothers when counseling households. A household survey and qualitative studies were carried out as part of a midterm review in November 2011, which found areas of early success and recommended actions for improvement.

1.3. Evaluation objectives

The overall objective of this endline survey is to assess the impact of the A&T program intervention in the implementation Woredas in SNNPR with emphasis to IYCF knowledge and practices. It in particular assessed the impact of the program intervention with emphasis on the following:

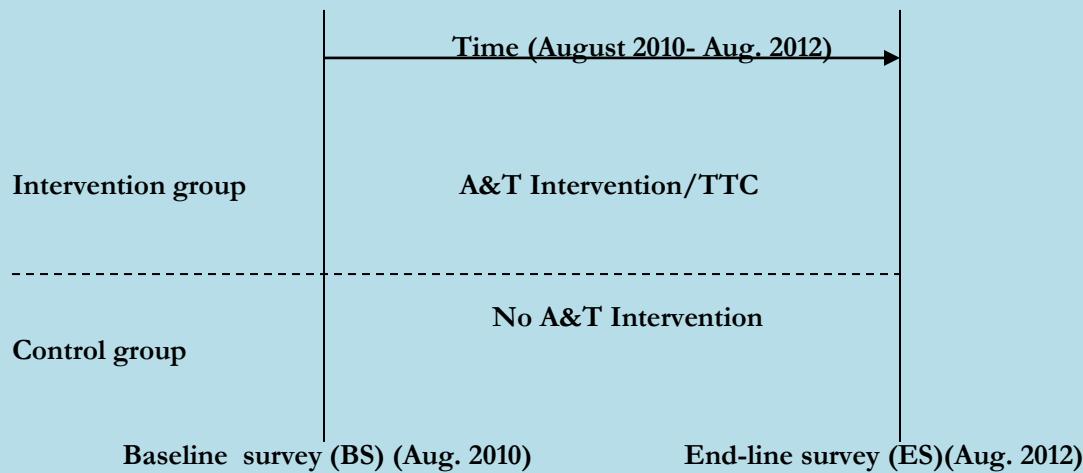
- Knowledge of key IYCF practices
- Early initiation of breastfeeding
- Colostrum feeding
- Pre-lacteal feeding
- Exclusive breastfeeding
- Continuation of breastfeeding
- Timely introduction of complementary feeding
- Minimum Meal Frequency, Minimum Dietary Diversity and Minimum Acceptable Diet
- Nutritional status of children
- Immunization and Child health,
- Use of maternal health care services
- etc

IV. Methodology

2.1. Study design

The study design for this evaluation lends itself to a **Non-Equivalent Control Group Design**¹. This design involves a control group both at baseline and end-line, allowing temporal as well as parallel comparison of key project indicators between the intervention and control areas as well as between the baseline and endline. Figure 1 illustrates the design in the context of the present evaluation.

Figure 1. Illustration of Non-Equivalent Control Group Design for the A&T project evaluation



2.2. Study area and target population

Study area: The baseline and endline surveys were conducted in four A&T implementation Woredas in SNNPR, namely *Chencha, Hulla, Humbo* and *Kochore* and four non-implementation Woredas (control Woredas). The control Woredas include *Bursa, Dita, Kindo Koyisha* and *Wonago*. The selection of the control Woredas considered similarities in livelihood zones, absence of other implementing partners including the Integrated Family Health Program (IFHP), and non-existence of other major interventions that could likely impact feeding practices and nutrition conditions of children, among others.

Target study participants: Mothers and caretakers of young children age 0 to 23.9 months were the primary focus of the study.

2.3. Survey indicators

The study involved a wide range of indicators on feeding practice, child nutrition, maternal health, food insecurity, child health, availability of services, women's decision making, among others.

¹ Fisher, Andrew A. Designing HIV/AIDS intervention studies: an operations reaserch handbook. 2002. The Population Counsel.

Women's access to information on child feeding practices and nutrition was also assessed. In particular, the study collected information on current practice and women's access to timed and targeted counseling (TTC) of IYCF via the HEWs and volunteer community health workers (vCHWs).

2.4. Sample size determination

The key considerations in sample size determination were:

- Exclusive Breastfeeding rate is considered as a key indicator in the estimation of sample size, as the A&T program set a clear target for this indicator
- EB rate is computed for children age 0-5.9 months.
- Baseline exclusive breastfeeding² rate 50% (Recent region wide data on EB is lacking and the safest choice is to take 50%)
- Anticipated increase in exclusive breastfeeding rate by 25%
- 95% Confidence level
- 80% power
- Design effect (cluster sampling)=1.5
- Accordingly, the sample size required:
 - for children 0-5.9 months=393 (intervention) & 393 (control)
 - for children 6-23.9 months=393 (intervention) & 393 (control)

Sample size for implementation: we approximated the sample size to 400 per group for ease administration, yielding 1600 in the entire study groups (800 women with children 0-23 months per group). The same sample size was employed at baseline.

2.5. Sampling

The study employed a cluster sampling method, involving selection of Kebeles and Households. A cluster is a Kebele. A total of 40 Kebeles were selected and included in the survey using probability proportion to size (PPS) – 20 in the intervention and 20 in the non-intervention. In each Kebele we interviewed 40 women – i.e. 20 women with children 0-5.9 months and 20 women with children 6-23.9 months.

The selection of households was based on systematic sampling with a random start. The number of households in a Kebele was obtained from the HEWs to serve as sampling frame. Then, a systematic sample, using an appropriate selection factor based on the total number of families listed and the desired sample size in each group was administered to select the households for the study. Once the households were selected, information was collected from women with children 0-5.9 months and 6-23.9 months. Only those households with children age 0-23.9 were eligible for the survey.

² EB rate (DHS 2005)=31%; EB rate (ESHE 2008)=64%

2.6. Survey instruments

Questionnaire: The same questionnaire as that in the baseline was used. It was a structured and pre-coded questionnaire containing nearly 40 pages. It covers knowledge, attitude and practices regarding appropriate breastfeeding practices (exclusive breastfeeding, initiation, colostrums feeding, frequency and length of breastfeeding), complementary feeding (initiation, types, frequency and nutrient density), maternal and child health (15 days morbidity), vaccination status, types and frequency of foods consumed, iron and vitamin A supplementation status. It also collected information on household, women and children characteristics, access to information, and women's knowledge of child feeding practices, household food insecurity, among others. The end-line questionnaire also collected information about TTC visits by peer mothers, which was not collected at baseline.

Anthropometric measurements: Weight and height of children age 0-59 months were collected. Weight of the children was measured with minimum clothing and without any ornaments on a Salter hanging scale to the nearest 0.1 kg; following the standard procedures recommended by WHO. Laying length of under two children was measured on a wooden board to the nearest 0.1 cm. Standing height of children older than two years was measured without shoes or anything on the head on a wooden board or Leicester stadiometer (Child Growth Foundation, UK) to the nearest 0.1 cm, following the standard procedures recommended by WHO.

2.7. Training of survey teams

Baseline: Twenty-one interviewers/anthro measurers, 4 field supervisors and 2 overall survey coordinators were trained on the baseline survey. A 4-day training was given during August 17-20, 2010 in Hawassa. One Epidemiologist (PhD) and one Nutritionist (PhD) led the study.

Endline: Twenty-four interviewers/anthro measurers, 4 field supervisors and 2 field survey coordinators were trained and deployed. A 5-day training was given during August 27-31, 2012 in Addis Ababa and Hawassa. One Epidemiologist (PhD) and one Nutritionist (PhD) led the study.

In both surveys, the data collectors and supervisors have extensive experience in data collection with most holding university Degrees in public health, nursing, and social science fields. They were recruited from the survey Zones and Woredas. Speaking the local languages was among the requirements for recruiting data collectors. The training encompassed orientation about the A&T project, the objectives of the baseline survey, survey indicators, and methods of data collection. Item by item review of the questions, mock interview and field practice were the major parts of the training. The principal and co-investigators led and facilitated the training. Staff member of the A&T project also attended the training and gave orientation about the project and the objectives of the baseline survey.

2.8. Fieldwork and Data collection

Four data collection teams were formed in both surveys. Each team was given assignment Woredas. All teams were deployed to the field immediately after the training was completed. Close supervision on the survey, include spot checking, field questionnaire editing and frequent meeting with the survey teams and supervisors. Data collection was not without challenges in both surveys. In most

instances, data collectors had to travel over 3 hours on foot to get to the selected Kebeles . We have achieved a 100% completeness rate of the intended sample size in both surveys.

2.9. Data management and analysis

Date entry and quality assurance: Data from the field were computerized using Epi-Info. Four highly experienced data entry clerks entered the questionnaire data. Data entry was carried out at Mela's main office in Addis Ababa.

The data entry team was given orientation on the survey questionnaires, the nature of the data to be computerized, and the data dictionary. In order to control for possible errors during data entry a number of validation controls were employed including spot checking and running intermediate frequencies apart from the programmed skip and range rules. A double data entry was implemented to validate data quality. Post-coding of open-ended responses was part of the data management activities.

The household, women and children as well as anthropometric data were linked and merged using household ID into one file for analysis. Similar data entry template as that used at baseline was used in order to allow easy merging of the data with the baseline.

Difference-in-Difference (DID) approach using multivariate methods was employed. The DID analysis allows us to detect significant changes in coverage of IYCF knowledge/ practices and other indicators in the intervention area beyond those occurring in the rapidly changing environment attributed largely to the health extension program. Logit models with dummy-by-dummy interaction was employed to estimate the DID after controlling for several covariates. We used STATA generated graph to Visualize main and interaction effects of a dummy variable³ .

We also employed Static-group comparison within the intervention area: This method allowed us to compare exposed and non-exposed samples (women who received TTC vs. those who did not receive TTC) within the intervention areas. With this method we also presented, where the data allows, a dose-response analysis within the intervention area.

Software Package: We used STATA 11 for data analysis and WHO Anthro Ver 3.2.2. for anthropometric analysis.

2.10. Qualitative information

A small scale qualitative information was also collected as part of the endline survey. It was based on Focus group discussion (FGDs) with peer mothers and beneficiary mothers in the purposely selected four intervention Woredas. In each intervention woreda, two Kebeles were selected for the qualitative study and two FGDs with peer mothers and one FGD with beneficiary mothers were conducted. The beneficiary mothers were selected to participate in the FGDs in close consultation with the peer mothers and only those who have children 0-23 months and visited by peer mothers at least once in the last two years were recruited. In total eight FGDs with peer mothers and four FGDs with mothers were conducted. Each FGD was attended by 10-12 participants. FGD guides were jointly prepared/developed with World Vision and Mela Research PLC and coordinators of the quantitative study facilitated the focus group discussions. The discussions were tape-recorded

³ The Stata Journal (2005) 5, Number 1, pp. 64–82

and finally transcribed verbatim by the coordinators. The topics and questions in the guide were used as themes/sub-themes and transcriptions were then examined for convergence/divergence of opinions and ideas.

2.11. Ethical Considerations

The study obtained ethical clearance from the SNNPR regional health bureau ethical clearance committee. Participants of the study were given complete information as to the objective of the study and their benefits/risks and only following their consent will they participate in the interview. Data collectors and other survey teams were given orientations on how to maintain the ethical aspect of the study.

The information to be collected was anonymous and no identification, such as, names, identification numbers, etc. were collected that can be used for tracing purpose after the collection of data. All the information and data collected was accumulated, organized, stored, analyzed, and retrieved guaranteeing confidentiality. Information was analyzed as group data and not on individuals. No one outside of the study team has access to any of the information collected.

III. Analysis and presentation of findings

3.1. Household and women characteristics

3.1.1. Household water and toilet

Household access to water and toilet by study arm is shown in Table 1. Several water supply sources were reported in both the intervention and control areas. Access to piped water, which is considered relatively the safest, is in general limited in both areas. Only 15.1% of the household in the intervention area and 23.2% in the control had access to piped water supply. On the other hand, covered well reported to be the predominant water source in the intervention area by 38.1% of the households, followed by protected spring at 20.1%, among others. In the control area nearly one-third of the households reported to have access to protected spring at 32.1%. Other sources including covered well, open well were also reported by a good portion of respondents in the control area. On the whole 73.4% and 72.6% of the households sampled for this study in the intervention and control area, respectively, can be considered having access to clean water supply.

Pit latrine/traditional pit reported to be nearly universal in both areas as reported by over 98% of the households.

Table 1. Household water supply and sanitation, A&T baseline survey, SNNPR, August-September 2012

	Intervention N=800	Control N=800
<u>Source of drinking water</u>		
Piped into dwelling	1.1	1.4
Piped into compound	0.6	1.3
Piped outside compound	13.4	20.5
Covered Well	38.1	17.4
Protected Spring	20.1	32.1
Open Well	6.8	13.8
Open Spring	7.6	7.6
River	9.9	3.0
Pond/Lake/Dam	2.4	2.3
<i>%Households with clean water supply¹</i>	73.4	72.6
Toilet facility		
Pit Latrine/traditional pit toilet	98.1	94.0
Ventilated improved pit latrine	0.3	0.3
Flush toilet	0.1	0.5
No facility/Bush/Field	1.5	5.2

¹*this comprises - piped into dwelling, piped into compound, piped outside compound, covered well and protected spring*

3.1.2. Household economic status

Proxy indicators to household economic status are presented in Table 2. In terms of the materials used for the construction of the floor, the vast majority of the households have natural/earth floor – 87.7% in the intervention and 86.6% in the control. Floor made of wood/bamboo was reported by 11.9% and 10.4% of the households in the intervention and control areas, respectively.

The households in both study areas have their roof predominantly made of grass or leaves as reported by 66.4% and 61.0%, respectively, in the intervention and control area. Corrugated tin, which is an indication of better household economic condition, was reported in 31.9% and 37.6% of the households, respectively.

Two indicators are presented to serve as proxy measures for household economic status – (1) household furniture/appliances possession index⁴ and (2) livestock possession index⁵. Households both in the intervention and control areas can be considered as having low or moderate economic scores in both indicators. In the intervention area 47.4% of the households scored high in the household furniture/appliance possession index. This was significantly higher than the 37.0% for the same in the control area. Livestock possession index showed comparable values between the intervention and control areas. The proportion of households that scored high in the livestock possession index was 41.3% and 35.5%, respectively, in the intervention and control areas.

⁴ For the computation of the index for household economic status availability/possession of electricity supply, watch, radio, TV, mobile phone, telephone (landline), refrigerator, table, chairs, bed, electric *mitad* (Injera stove) were used. The more of these items a family possesses the higher the economic index.

⁵For the computation of the livestock position index weights were given to each domestic animal based on their market price where cow/ox=1; horse=0.4; donkey=0.1; mule=0.2; goat=0.08; sheep=0.08; chicken=0.01

Table 2.. Materials used for the construction of houses, household economic and livestock index, A&T baseline survey, SNNPR, August-September 2012

	Study area	
	Intervention area N=800	Control area N=800
Main floor material		
Natural (earth/sand)	87.7	86.6
Wood/Bamboo	11.9	10.4
Concrete	0.4	3.0
Finished (tile/ceramic/mosaic)	0.0	0.0
Main roof material		
Rudin (Grass, Palm, leaves, Straw)	66.4	61.0
Finished roof (corrugated tin, wood, etc)	31.9	37.6
No roof /others	1.7	1.4
Household furniture/appliance ownership index		
Low	8.6	4.4
Moderate	44.0	58.6
High	47.4*	37.0
Household livestock ownership index		
Low	23.2	30.9
Moderate	35.5	33.6
High	41.3	35.5

* $p < 0.05$

3.1.3. Respondents characteristics

In each study arm 800 women with children age 0-23 months were interviewed. The means age of respondents compares well between the intervention and control areas at 27.7 and 27.6 years, respectively (Table 3). The vast majority of the respondents (over 98%) in both areas were married. In both areas the proportion of women who cannot read or write is notably high at 73.3% and 80.5%, respectively, in the intervention and control.

The majority of the respondents were Protestants (82.1% in the intervention and 75.4% in the control). There was significant difference in the proportion of Protestant followers in the intervention and control area ($p < 0.0$) Next to Protestant, some portion of the respondents reported to be followers of Orthodox Christian at 14.3% and 22.1%, respectively, in the intervention and control areas.

The mean number of children ever born reported at around 3 children per woman in both areas. With a mean age of about 28 years the observed average number of children ever born signals the presence of high fertility in the study area.

Table 3.. Selected characteristics of socio-demographic characteristics of respondents, A&T baseline survey, SNNPR

	Study area	
	Intervention area N=800	Control area N=800
Age		
15-19	3.4	4.4
20-24	25.3	24.7
25-34	57.3	57.7
35-49	14.1	13.3
Mean age	27.7	27.6
Marital Status		
Currently in Union	98.0	98.5
Never married/divorced/widowed	2.0	1.5
Education		
Cannot read or write	73.3	80.5
Read or write only	0.6	0.5
1-6 grade	13.7	11.9
7-8 grade	6.4	4.6
9+ grade	5.9	2.5
Religion		
Protestant	82.1***	75.4
Orthodox	14.3	22.1
Others	3.6	2.5
Children ever born (CEB)		
1	26.6	26.6
2	17.7	18.6
3	15.9	17.5
4+	39.7	37.2
Mean CEB	3.3	3.2

*** $p < 0.0001$

3.2. Peer mothers roles in promoting IYCF in the communities

This section summarizes the opinion of mother FGD participants with regards to their exposure to and awareness of IYCF activities in their communities. It clearly emerged from the discussion with the mothers that the peer mothers are the main providers of information and counseling on IYCF in their communities. In particular, some key messages such as colostrum feeding, avoidance of pre-lacteal feeding, feeding meat and thick porridge preparation were implicated as relatively "new" information to most community members. Indeed, some respondents related the coming of these messages to their community following the deployment of the peer mothers.

On the whole, FGD participants agreed that they were visited and counseled by peer mothers at least once over the previous one year. Most of participants recalled they were first contacted by peer mothers when they were pregnant. However, there were others who said that they were first contacted by peer mothers a week after delivery.

By the mothers' account peer mothers reported to advice them on several IYCF and health related issues, among others, including the following:

- Feeding whole colostrum;
- Start breastfeeding immediately
- Feeding only breast milk during the first six months;
- Preparation and feeding balanced complementary food, such as soft porridge prepared from grains, cereals, eggs, dried meat, fruits, vegetables and
- Initiating food/fluid when a child becomes six months old;
- Regular follow up of antenatal care,
- To strictly adhere to immunization schedule
- Not to wash an infant before 24 hours;
- Not to give any pre-lacteals
- To give breast milk about 12 times in a day
- To wash hands before food preparation and feeding a child
- Keep utensils used for cooking and feeding clean
- To eat foods of preference during pregnancy
- Taking proper rest and not to do heavy work during pregnancy .

Mothers saw the IYCF advice and counseling by peer mothers as useful. In fact, most mothers said that since the peer mothers are solely focusing on IYCF messages the advices and counseling are detailed and precise. Some even attempted to compare the depth and quality of IYCF information they obtained from peer mothers and the HEWs. In most instances they appear to blame the lack of depth of information on IYCF from HEWs, which may be due to the fact that the HEWs are busy with 16 health related package. Community acceptance of peer mothers appeared to be universal. As most participants indicated this was because peer mothers emerged from the same villages and share similar concerns, understanding and experience with the general women.

As to me [IYCF] advice given by peer mothers is better than the advice we get from HEWs. Peer mothers teach us in detail (Mother, Kochere woreda)

Responses of mothers' FGD participants regarding the use of teaching aid/materials by peer mothers during counseling indicated that peer mothers started using TTC cards in some kebeles recently while in some kebeles peer mothers are not still using the cards. They are only using the notes they take during training and a booklet "family health card" prepared by Ministry of Health. The opinions of beneficiary mothers about the counseling/advice delivered by peer mothers is positive. All have the opinion that they learned a lot. They now understand a number of issues related to appropriate child feeding. They all agree that they benefitted a lot. They see positive changes in the wellbeing of their children by adopting what the peer mothers have advised them.

“Advice and counseling of peer mothers is very important for our children’s wellbeing. Now we have seen practically the result of adopting their advice on our children. Since we started to implement what they advised us to do we observed a lot of changes on health and physical condition of our children” (Mother from Hula woreda, Gasse kebele)

“I understand the importance of feeding the first yellow breast milk, the impact of feeding only breast milk for the first 6 months, importance of vaccinating children on time, the importance and how to prepare/feed complementary food” (Mother from Kochore woreda, kore kebele)

“I also understand the importance of regular antenatal checkup, giving birth at health center, getting vaccination and proper way of feeding breast milk for a child” (Mother from Hula wereda Gasse kebele)

Mothers' FGD participants reflected that the advice/counseling they received from peer mothers is clear. Most seemed to agree that most messages by peer mothers was easy to comprehend. Translating the knowledge to practice reported to be easy for those related to breastfeeding while adopting food diversity related messages were the most difficult to put into practice.

“Most mothers complain that they lack money to purchase such food items as meat, eggs and fruits” (Peer Mother, Gasse kebele)

3.3. Exposure to timed targeted counseling (TTC) by peer mothers

TTC by peer mothers is the main intervention approach of the World Vision A&T program intervention in SNNP as described elsewhere above in this report. In the 20 sampled Kebeles an average of 18 women/Kebele were reported to be serving as peer mothers. Their numbers vary by Kebele, ranging between 7 and 34.

Respondents in the intervention area were asked whether they were visited by peer mothers in relation to their most recent pregnancy or birth in the last two years. Those who responded affirmatively to this question were further asked the receipt of visit at different point in time i.e. - at the third trimester of pregnancy, at delivery, at the 4th week, at the 4th , 6th month, 8th and 12th month after delivery. Furthermore, women were asked to spontaneously respond to the type of information they received at each visit by the peer mothers.

Visit in the third trimester of pregnancy. As shown in Figure 1, among all women with children 0-23 months, 40% said they were visited by a peer mother during the third trimester when they were pregnant with their most recent child in the last two years. During this visit women reported that they were told a number of important information relevant to IYCF. Of those visited in the third

trimester, about 87% were told to initiate breastfeeding within an hour of birth and an almost equal percentage of women reported that the peer mothers told them to feed the first breast milk (colostrum). Over 78% of the mothers reported that they were told by the peer mothers to avoid pre-lacteals and also to feed only breast milk in the first six months (Table 4).

A peer mother's remark further corroborates the type of information given to mothers during the third trimester of pregnancy. In fact, most respondents including peer mothers emphasized that colostrum feeding has been greatly promoted by the peer mothers during the pregnancy visit.

"I visit a pregnant mother in her house and advise her to immediately breast feed her child and to feed the first yellow milk and not to express and throw the first yellow milk. I tell her that the first yellow milk is important for her child's health and that it will facilitate quick discharge of placenta" (Peer Mother, Sochora Abela kebele)

Visit at delivery. Of the 800 women interviewed in the intervention area, 37% said they were visited by a peer mother at delivery of their most recent child in the last two years. During delivery visit peer mothers reported to provide IYCF information and counseling to mothers including initiation of breastfeeding within an hour (74.2%), colostrum feeding (79.7%), avoiding pre-lacteals (78.4%) and the benefits of feeding only breast milk in the first six months (86.1%).

Apart from early initiation of breastfeeding and colostrum feeding, peer mothers reported to give advice on a number of issues at the time of delivery. Frequently reported counseling and advice to the mothers at delivery include practical demonstration of how to hold, attach and properly breastfeed infants. Encouraging mothers to seek postnatal care and child immunization immediately after delivery was also reported to be among the key messages bby peer mothers at delivery. Peer mothers participating in the FGDs also reported that they often advise mothers on essential newborn care practices such as exposing the child to morning sun, use of a new blade/scissors to cut the cord, not to wash the infant before 24 hours, not to give anything (prelacteals such as water, raw butter, juice of a herb called *Hamessaf*.) except breast milk until the child is six month.

Visit at the 4th week. This indicator is restricted to mothers with children age four weeks to 23 months. There were 736 mothers/children falling in this category as shown in Figure 1. Data show 37.1% of the mothers were visited by the peer mothers when the child was four weeks old. Three key IYCF related messages and counseling were given to the mothers during this visit. Among those visited at the fourth week after delivery, the vast majority (96%) were told to feed only breast milk up to six months, 83.1% were told to consult a health professional if the child has any problem, and about 77% to monitor infant's weight gain.

Visit at the 4th month. We compute this indicator for mothers with children age 4-23 months (n=529). About 36% of such mothers reported to receive visit by peer mother when their most recent child was four-month old. Key messages and counseling given to mothers during this visit include feeding the baby only breast milk in the first six months (88.4%), consulting health professional if the child any problem (75.8%), waiting up to six months to start complementary feeding (83.7%) and monitoring infant's weight (60%).

⁶ A kind of juice traditionally given to the newborn

Visit at the 6th month: Nearly half of the sampled women had children age 6-23 months. Only about a third (32.3%) said they were visited when the child was six months old. Two of the most important IYCF counseling messages delivered to mothers at the 6th month include introduction of complementary feeding as reported by 97% and continuing breastfeeding by 82.2%.

Visits during the 4-6 months predominantly focus on exclusive breastfeeding as reported by FGD participants of beneficiary mothers and peer mothers. Nevertheless, other advices were also reported. Peer mothers frequently mentioned that seeking care in health institutions if the child is sick, continuing breastfeeding even when the child is sick, frequency of breastfeeding and having children get immunization according to the schedule were the some of the most important messages they provide to the mothers during these visits.

"I advise a mother who has a child less than 6 months old to only breastfeed, not to give any food, even water, until a child becomes 6 months old. I also advise her to breastfeed her child frequently, about 8 to 12 times in a day and not to discontinue breastfeeding when a child get sick" (Discussant from hula woreda, Gassie Kebele

Visit at the 8th month: A total of 366 women with children age 8-23 months were the target for this indicator. About 30% said they were visited when the child was eighth months old. Akin to the information given by the peer mothers in the 6th months, introduction of complementary feeding and continuing breastfeeding were reported by 87%-93% of the mothers. Mothers who were told to monitor infant weight gain at the 8th month were 73.4%.

A more detailed account of the type of information given to the mothers during the visits by peer mothers when a child is 6-8 months has been obtained from the FGDs. Main messages mostly revolve around feeding balanced food prepared from a diversified food sources available at home. Feeding soft and thick porridge prepared from diversified food sources (mix of various grains like beans and peas, a mix of cereals like teff, wheat and barley, eggs, dried meat, butter, oil, fruits like papaya, banana and vegetables like cabbage etc.) and continuation of breastfeeding as reported by the peer mothers and mother FGD participants. Timely and frequently feeding, at least five times a day, were also mentioned among the main messages during this period. Keeping the utensils clean during preparation of food and during feeding of a child were also mentioned by few among the advices given to the mothers.

"We advise mothers of children aged 8-9 months to give balanced supplementary foods such as soft porridge made from a mix of various grains like beans, peas and cereals like teff, wheat and barley and eggs, dried meat, butter, oil and any food items available at home in addition to breast milk" (PM discussants from Humbo woreda Sochora Abela kebele)

"I also advise the mother to keep the utensils she uses to prepare food and feed the child, (such as pots, cups and spoons) clean" (PM discussants from Hula woreda loya kebele)

In almost all focus groups discussions with mothers and peer mothers adopting proper and balanced complementary feeding practices for children age 6 months and older remains a major challenge. It has been emphasized that even if mothers understand and respective of the importance of feeding their children from diversified food sources, they often lack the resources to put it into practice.

Most say that grains, meat and egg are not easily available at their homes and often are not available locally in the markets. Even when they are available in markets, most mothers said they did not have the resources to purchase these food items.

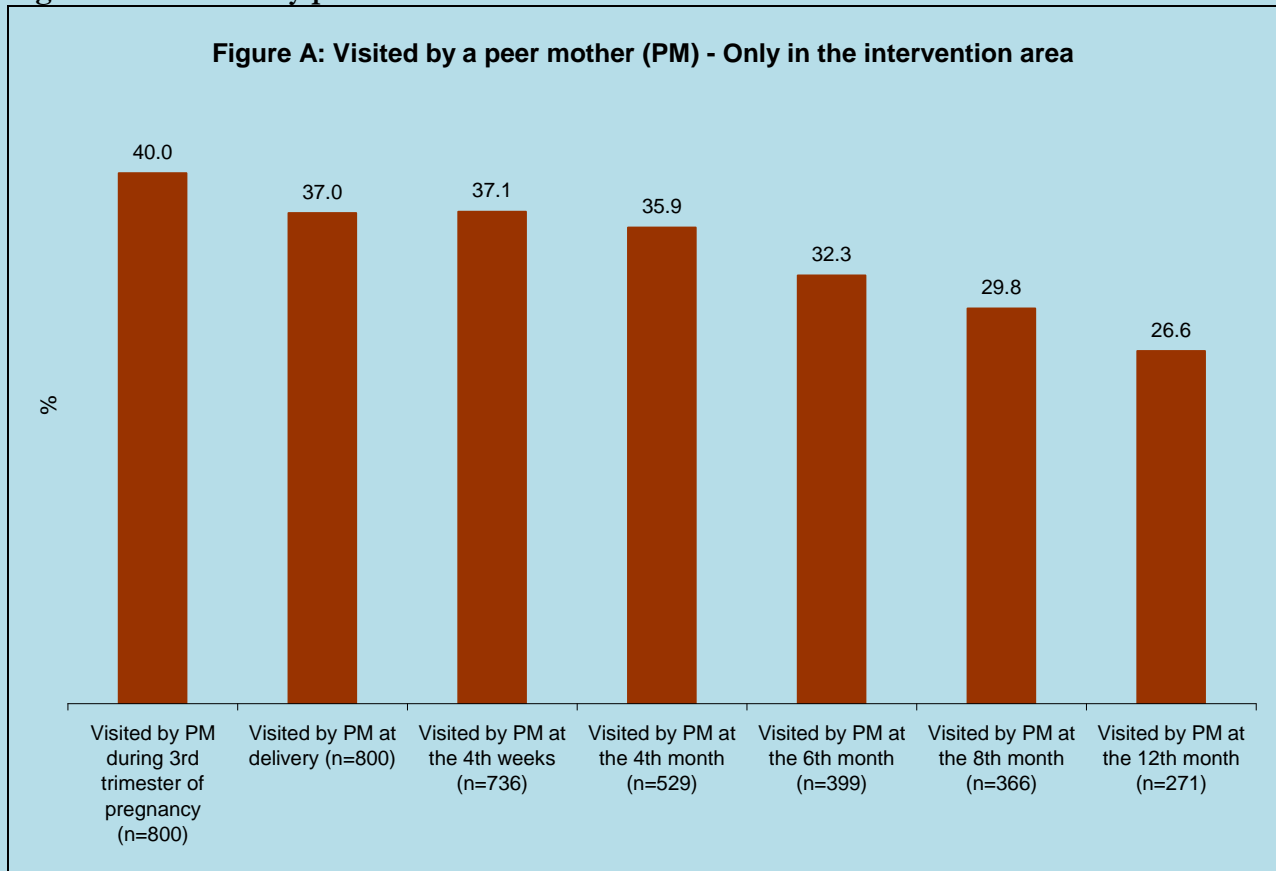
"Although we have tried to feed our children whatever foods we have at home, there are some food items that we can't get easily in the local markets, and even when the food items are available in the markets we lack financial capacity to purchase them" (Mother participant, Hula woreda, Gassie kebele)

Visit at the 12th month: Of the 271 women with children 12-23 months, about 27% were visited by a peer mother when the child was 12 months old. Nearly all mothers (97%) were told to give complementary feeding by the peer mothers and 79.2% were told to continue breastfeeding.

Peer mothers elaborated what they advised to the mothers when the child is 12 months old. Increasing the frequency of feeding has been emphasized as the main message given to the mother while continuing breastfeeding. Feeding the child on time frequently at least 3-5 times in a day, increasing the amount as the child gets older, and continuing breastfeeding until the child is at least two years old were frequently implicated.

"We advice a mother who has a child 12 months old that it is important to feed enriched and balanced foods prepared by mixing foods from diversified sources (grain, cereals, eggs, fruits, vegetables meat) and feed her child on time, at least 3 to 5 times in a day, and increasing the volume of the food as the child gets older" (Peer mother, Hula woreda, Loya kebele)

Figure 1. TTC visit by peer mother at different time in the intervention area



Number of TTC visits: Women with children 12-23 months are expected to receive at least 7 TTC visits by peer mothers. Figure 2 shows the percentage distribution of women with children 12-23 months according to the number of TTC visits received. About 46% of such women in the intervention area received one or more visits. The mean number of TTC visit by peer mothers among women with children 12-23 months was 2.2 (95% CI: 1.9-5.6), which is sub-optimal compared to the expected number of visits. Six or more visits were received by only 21.4% of the women with children 12-23 months. On the other hand, 54.2% of the women with children 12-23 months in the intervention area did not receive any TTC visits at all.

Figure 2. Number of TTC visits by peer mothers among those with children 12-23 months (n=271) in the intervention area

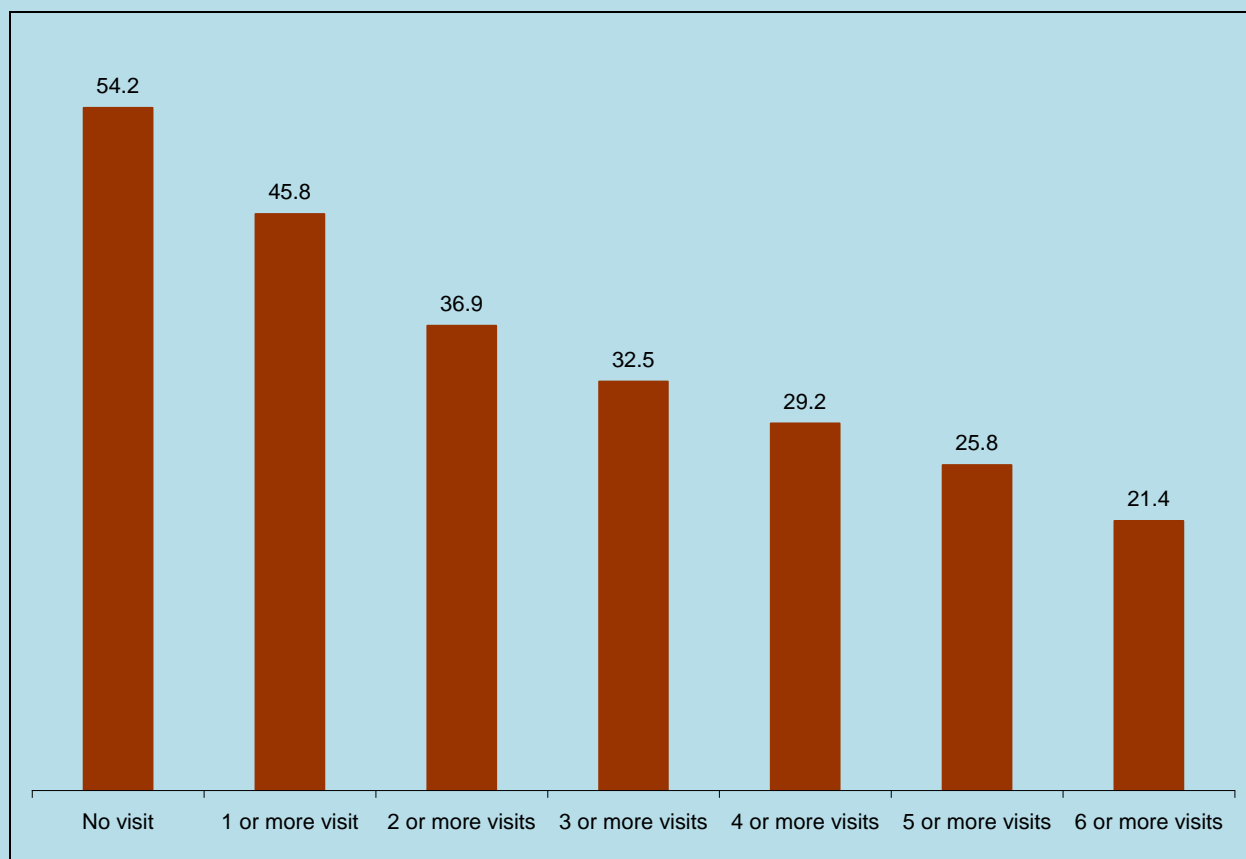


Table 4. Timed and targeted counseling on child feeding practices by the Peer Mother, A&T endline survey, SNNPR, August-September 2012

	Intervention area
Type of information received from peer mothers at the Third Trimester (among visited):	N=324
Putting baby on the breast immediately within 1st hr	86.7
Giving colostrums to the baby	87.3
Pre-lacteal feeding is not necessary	78.4
The benefit of feeding only breast milk first 6 months	78.4
Type of information received from peer mothers at the day of birth (among visited):	N=296
Putting baby on the breast immediately within 1st hr	74.2
Giving colostrums to the baby	79.7
Pre-lacteal feeding is not necessary	78.4
The benefit of feeding only breast milk first 6 months	86.1
Type of information received from peer mothers at Four weeks after birth:(among visited)	N=273
Feed only breast milk up to six months	96.0
Consulting health professional if any problem	83.1
Monitoring Infant weight gain	76.9
Type of information received from peer mothers at the 4th month after birth (among visited):	N=192
Feed only breast milk up to six months	88.4
Consulting health professional if any problem	75.8
Monitoring Infant weight gain	60.0
Waiting up to six month to start supplementary feeding	83.7
Type of information received from peer mothers at the 6 th month after birth (among visited):	N=129
Introducing complementary feeding	96.9
Continuing breastfeeding	82.2
Type of information received on child feeding practices from peer mothers at the 8 th month after birth (among visited):	N=109
Introducing complementary feeding	87.2
Continuing breastfeeding	92.8
Monitoring Infant weight gain	73.4
Type of information received from peer mothers at the 12 th month after birth (among visited):	N=72
Introducing complementary feeding	98.6
Continuing breastfeeding	79.2

3.4. Women's knowledge of child feeding practices

3.4.1. Endline comparison of intervention and control areas

We compared women's knowledge of selected IYCF practices between the intervention and control areas as shown in Table 5. In general, women in the intervention area exhibited significantly higher knowledge of the different IYCF practices as compared to those in the control.

Three indicators were used to assess women's knowledge of breastfeeding practices (1) correct timing of breastfeeding initiation (2) colostrum feeding and (3) continuation of breastfeeding beyond 1 year. In general, women in both the intervention and control areas have notably high awareness about initiation of breastfeeding - 94.6% and 90.5%, respectively. However, the noted difference between the two areas was statistically significant ($p < 0.05$). Knowledge of colostrum feeding was also high in both areas but women in the intervention area had significantly better awareness about colostrum feeding at 80.1% vis-à-vis 76% in the control ($p < 0.05$). Awareness about continuation of breastfeeding beyond one year is almost universal in both areas.

We also assessed women's knowledge of the correct age of introduction of fluid and solid food. Significantly higher proportion of women in the intervention area than in the control (78.3% vs. 65.8%, $p < 0.0001$) mentioned that a child should start fluid at the age of six months. Similarly, women in the intervention area appeared to have significantly higher knowledge of the correct time to initiate food (solid or semi-solid food) at 76.9% compared to those in the control at 64.5% ($p < 0.0001$).

Table 5 also presents women's knowledge of minimum meal frequency of children in the different age brackets. In the whole, women both in the intervention and control areas have notably high knowledge of the minimum number meals that children aged 6-8, 9-11 and 12-23 months should eat a day. Nevertheless, knowledge of minimum meal frequency was found to be significantly higher in the intervention area than in the control.

Table 5. Women's knowledge of child feeding practices, A&T baseline survey, SNNPR, August-September 2012

	Study area	
	Intervention area N=800	Control area N=800
<u>Knowledge of Breastfeeding:</u>		
% mothers who said a child should start breastfeeding immediately after birth	94.6*	90.5
% mothers who said a child should be given the first breast milk (colostrums)	80.1*	76.0
% who said a child should continue breastfeeding for one year	99.1	99.9
<u>Knowledge of age at introduction of complementary feeding:</u>		
% mothers said a child should start liquids (including water) in addition to breast milk at the age of 6 months	78.3***	65.8
% mothers said a child should start food in addition breast milk at the age of 6 months	76.9***	64.5
<u>Knowledge of the number of meals for children per day</u>		
% who said a child age 6-8 months should eat a minimum of 3 times a day	97.5***	93.4
% who said a child age 9-11 months should a minimum of 4 times a day	97.6***	93.5
% who said a child age 12-23 months should a minimum of 4 times a day	97.5***	93.5

* $p < 0.05$, *** $p < 0.0001$

3.4.2. Difference-in-difference (DID) estimates on women knowledge of IYCF

The DID approach was described in the method's section of this report. Using multivariate logistic regression model that controlled for several confounding factors and introduced an interaction effect (DID), we estimated the marginal impact of the intervention on women's knowledge of key

IYCF practices. As shown in Table 6, with the exception of women's knowledge of the correct timing of breastfeeding initiation, the intervention has a net positive impact on women's awareness of the need for colostrum feeding (Interaction term/DID - $\beta=0.61$, $p<0.0001$), and the correct timing of initiation of fluid ($\beta=0.59$, $p<0.0001$) and solid or semi-solid foods (Interaction term/DID - $\beta=0.49$, $p<0.05$).

The predicted differenced estimate is also shown in Table 6. Accordingly, the model predicted a 12% increase in women's knowledge of colostrum feeding that is associated with exposure to the intervention. The predicted increase in women's knowledge of the correct timing to start of fluid and solid food that are associated with the TTC intervention were 12% and 10%, respectively. Figures 3 A-D provide graphical representations of the DID for the four knowledge indicators.

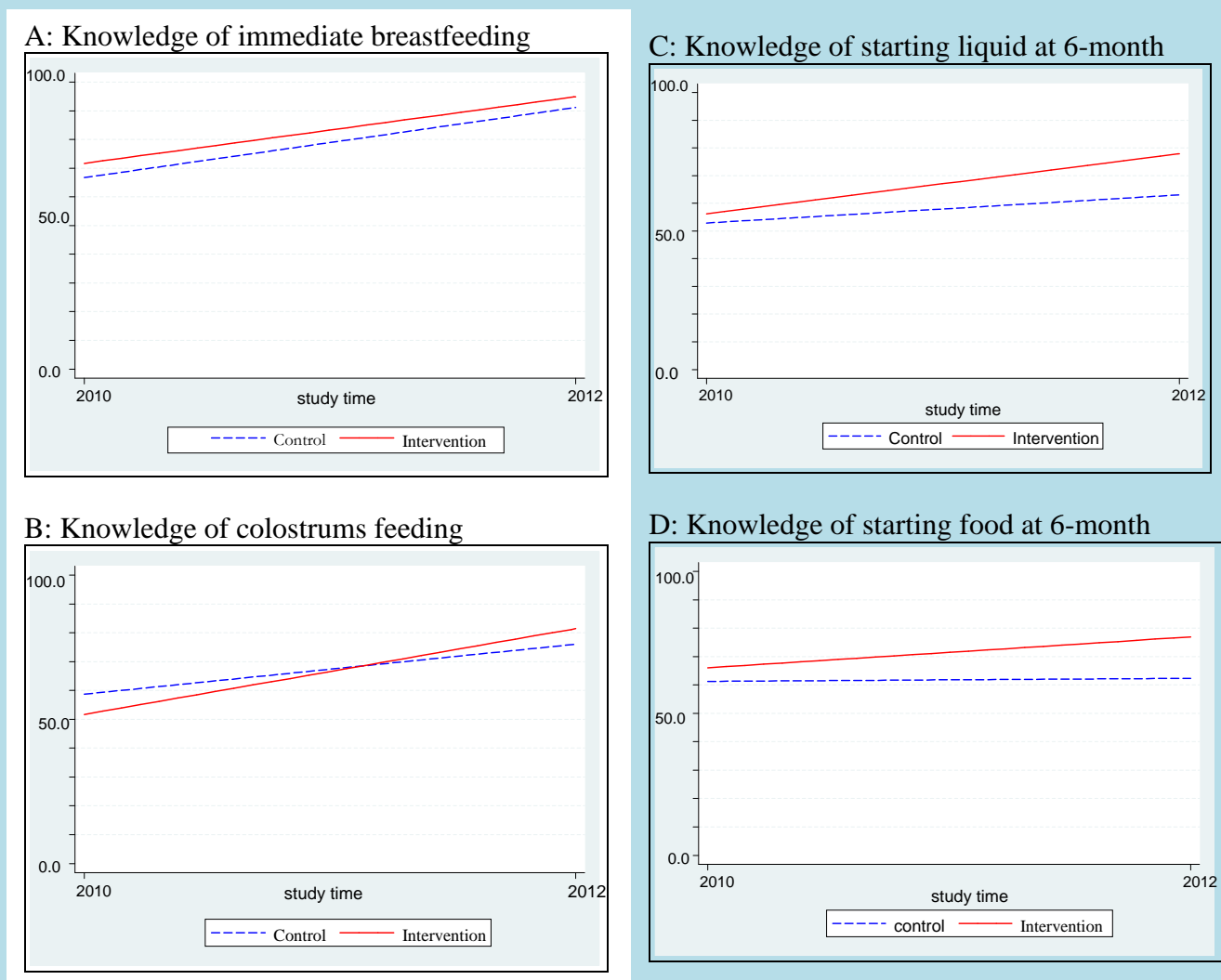
There are also important findings from the multivariate analysis that deserve mentioning. Both in the intervention and control areas there has been significant and positive trend in women's awareness of these key IYCF practices with the exception of the knowledge on the introduction of solid foods. Baseline differences between the intervention and control areas in two of the indicators (i.e. knowledge of breastfeeding initiation and colostrum feeding) are also apparent from the analysis. At baseline the likelihood a woman reporting breastfeeding should be initiated within an hour of birth was significantly higher in the intervention area than in the control. The reverse was noted concerning women's knowledge of colostrum feeding. Baseline data suggest that women in the intervention area were significantly less likely than those in the control to report the fact that colostrum should be given to newborns.

Table 6. Multivariate logistic regression coefficients with interaction effect (**Difference-in-Difference- DID**) for selected knowledge of breastfeeding practices

	Knowledge of breastfeeding practices			
	Know initiation of breastfeeding within an hour β	Know colostrums should be fed β	Know fluid should be started at age 6th month β	Know food should be started at age 6th month β
Study time				
Baseline (2010)-ref	0.00	0.00	0.00	0.00
Endline (2012)	1.64***	0.80***	0.42***	0.05
Study arm				
Control -ref	0.00	0.00	0.00	0.00
Intervention	0.23*	-0.28*	0.13	0.21
Interaction/DID (time X arm)	0.36	0.61***	0.59***	0.49*
DID predicted (%)	-1.0	12.0	12.0	10.0

Multivariate analysis adjusted for women's education, age, religion, number of children ever born, economic status
* $p<0.05$, *** $p<0.0001$

Figure 3 A-D. Trends in women's knowledge of selected breastfeeding practices by study arm



3.4.3. Comparison of exposed and non-exposed women

In the intervention area about 46% of the women were visited at least once by peer mothers while the remaining 54% were not visited by peer mothers. This allows cross-sectional comparison of exposed and non-exposed groups. A further stratification of the data by the number of visits by peer mothers provide a more useful analysis. This analysis is based on a univariate comparison, which is subjected to selection bias. Rigorous statistical method such as propensity score matching provide a relatively better and unbiased results. We grouped the women in the intervention area into three: (1) not visited by peer mothers (2) visited 1-3 times by peer mothers and (3) visited 4 or more times by peer mothers.

In almost all IYCF knowledge indicators presented in Table 6 below, women who were visited 4 or more times appeared significantly more likely than the others to know about the various IYCF practices. For instance the proportion that said breastfeeding should be initiated within an hour of birth was 93.3% among women in the intervention area but not visited by peer mothers, and this has

increased to 94.5% and 98.1%, respectively, among those who received 1-3 and 4 or more visits. A more vivid dose-response effect can be apparent in women's awareness of colostrum feeding in association with exposure to the TTC by peer mothers. The proportion that said colostrum should be fed increased from 74% among women in the intervention area that were not visited at all by peer mothers to 84.9% and 89.1%, respectively, among those who received 1-3 and 4 or more TTC visits. Dose-response relationship is also apparent for women's knowledge of the correct timing of start of fluid and solid/semi-solid foods.

Table 6. Knowledge of breastfeeding practices according to exposure to TTC via peer mothers

	Intervention area			Control area N=800
	Did not receive any TTC visit from peer mother N=425	1-3 TTC visits by peer mothers N=226	4 + TTC visits by peer mothers N=149	
<u>Knowledge of Breastfeeding:</u>				
% mothers who said a child should start breastfeeding immediately after birth	93.3	94.5	98.1*	90.5
% mothers who said a child should be given the first breast milk (colostrums)	74.0	84.9	89.1***	76.0
% who said a child should continue breastfeeding for one year	99.0	99.5	98.7	99.9
<u>Knowledge of age at introduction of complementary feeding:</u>				
% mothers said a child should start liquids (including water) in addition to breast milk at the age of 6 months	71.9	84.5	86.8***	65.7
% mothers said a child should start food in addition breast milk at the age of 6 months	72.6	79.0	84.8***	64.5
<u>Knowledge of the number of meals for children per day</u>				
% who said a child age 6-8 months should eat a minimum of 3 times a day	98.1	95.9	98.2**	93.4
% who said a child age 9-12 months should a minimum of 4 times a day	98.1	96.3	98.2**	93.5
% who said a child age 13-23 months should a minimum of 4 times a day	98.1	98.1	95.9	93.5

* $p < 0.05$ ** $p < 0.001$ *** $p < 0.0001$

3.5. Breastfeeding practices

3.5.1. Endline comparison of intervention and control areas

As shown in Table 7, five key breastfeeding indicators are presented and compared between the intervention and control area at end-line, stratified by children's age. These practice indicators are computed in association with the most recent child.

Of note, any observed differences in these practice indicators between the intervention and control areas do not necessarily reflect the presence or lack of impact of the intervention and should be interpreted with caution. This is because endline indicator coverage differences between the intervention and control areas are certainly influenced by baseline differences. The next section present the DID analysis that clarify the likely impact of the intervention.

The proportion of mothers with children 0-23 months that initiated breastfeeding within an hour of birth was 75.2% in the intervention and 68.6% in the control and this difference was statistically significant ($p < 0.05$). This difference persisted among women with children 0-11 months but not among women with children 12-23 months.

Pre-lacteal feeding is giving liquids or foods other than breast milk prior to the establishment of regular breastfeeding. In this survey mothers were asked whether they gave liquids or foods to their children immediately after birth. Pre-lacteal feeding though low in both areas it was significantly higher in the control area than in the intervention for all age brackets. Among women with children 0-23 months, the proportion with pre-lacteal feeding was 7.4% in the control and 3.3% in the intervention and this difference was statistically significant at $p < 0.0001$.

The practice of colostrum feeding appeared significantly more common in the intervention than in the control area at endline. Among women with children 0-23 months, the proportion that fed colostrum was significantly higher in the intervention area at 83% compared to 69% in the control.

Of note, other indicators such as exclusive breastfeeding and continuing breastfeeding did not show significant difference between the intervention and control area at endline. Also it important to note that these indicators have notably high values in both areas.

Table 7. Prevalence of key breastfeeding practices by age, A&T baseline survey, SNNPR, August-September 2012

	Intervention area	Control area
Initiation of breastfeeding within one hour after birth, by age of child		
Children 0-11 (n)	n=529	n=560
% initiated breastfeeding within one hour after birth (0-11 months)	77.9**	69.2
Children 12-23 (n)	n=271	n=240
% initiated breastfeeding within one hour after birth (12-23 months)	70.1	67.1
Children 0-23 (n)	n=800	n=800
% initiated breastfeeding within one hour after birth (0-23 months)	75.2*	68.6
Pre-lacteal feeding		
Children 0-11 (n)	n=529	n=520
% with pre-lacteal feeding (0-11 months)	2.7	7.1**
Children 12-23 (n)	n=268	n=245
% with pre-lacteal feeding (12-23 months)	4.4	7.9*
Children 0-23 (n)	n=800	n=800
% with pre-lacteal feeding (0-23 months)	3.3	7.4***
Colostrum feeding		
Children 0-11 (n)	n=532	n=555
% who received colostrums (0-11 months)	85.6***	71.4
Children 12-23 (n)	n=268	n=245
% who received colostrums (12-23 months)	77.9***	63.3
Children 0-23 (n)	n=800	n=800
% who received colostrums (0-23 months)	83.0***	69.0
Exclusive breastfeeding, by age of child		
0-3 months old (n)	n=271	n=264
% exclusively breastfeeding (0-3 month)	82.8	81.0
0-5 months old (n)	n=400	n=400
% exclusively breastfeeding (0-5 month)	82.8	81.0
Among children age 12-23 months (n)		
% continued breastfeeding at 1 year	n=271 98.1	n=240 98.3

* $p < 0.05$ ** $p < 0.001$ *** $p < 0.0001$

3.5.2. Difference-in-difference (DID) estimates on breastfeeding practices

The multivariate results are shown in Table 8. The multivariate interaction terms/DID for the four indicators namely, initiation of breastfeeding within an hour ($\beta=0.38$, $p < 0.05$), colostrum feeding ($\beta=0.67$, $p < 0.0001$), pre-lacteal feeding ($\beta=(-)0.75$, $p < 0.0001$) and exclusive breastfeeding ($\beta=0.47$, $p < 0.05$) are all statistically significant. The implication of these findings is that the intervention has a net positive effect in improving these breastfeeding practices. It is also important to emphasize the fact that the multivariate model adjusted for a number of potential confounders including study time (baseline/endline), study arm (intervention/control), women's education, women's age, religion, number of children ever born and household economic status.

The predicted DID estimates for the indicators are also shown in the Table below. It appears that a 7% increase in the proportion who initiated breastfeeding within an hour was associated with the TTC intervention. Likewise, the TTC intervention is predicted to bring about a 11% increase in the

proportion of women who fed colostrum. Pre-lacteal feeding was predicted to decline by (-)2% in association with the TTC intervention.

Children who fed only breast milk with no other liquids (including water) or food—on demand for the first 6 months of life are considered being exclusively breastfed. Breastfeeding status for children under 6 months was determined on the basis of a mother’s recall of her child’s intake over the previous 24-hour period (past day and night). Our analysis show that the intervention also had a net positive effect on exclusive breastfeeding practices. The predicted DID showed a 9% increase in exclusive breastfeeding that was associated with the TTC intervention. Figures 4 A-D present a graphical representation of the DID for the indicators.

The multivariate analysis also depicted that exclusive breastfeeding have improved significantly both in the intervention and control area although the improvement was much more vivid and significant in the intervention.

Table 8. Multivariate logistic regression coefficients with interaction effect (**Difference-in-Difference- DID**) for selected breastfeeding practices

	Breastfeeding practices			
	Initiation of breastfeeding within an hour (0-23 months) β	Colostrums feeding (0-23 months) β	Pre-lacteal feeding (0-23 months) β	Exclusive breastfeeding up to age 6 months (0-5 months) β
Study time				
Baseline (2010)-ref	0.00	0.00	0.00	0.00
Endline (2012)	0.22	0.05	-0.83***	0.81***
Study arm				
Control -ref	0.00	0.00	0.00	0.00
Intervention	-0.03	0.17	-0.14	-0.28
Interaction/DID (time X arm)	0.38*	0.67***	-0.75***	0.47*
DID predicted (%)	7.0	11.0	-2.0	9.0

Multivariate analysis adjusted for women's education, age, religion, number of children ever born, economic status
* $p < 0.05$, *** $p < 0.0001$

Figure 4 A-D. Predicted trends in selected breastfeeding practices by study arm

Figure A: % initiated breastfeeding within 1 hr(0-23 months)

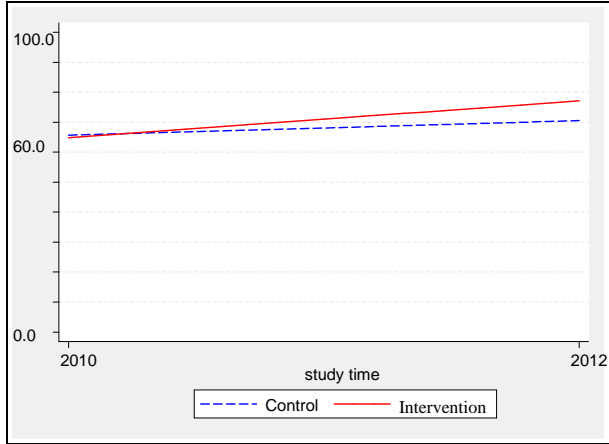


Figure C: % who gave pre-lacteal feeding(0-23 months)

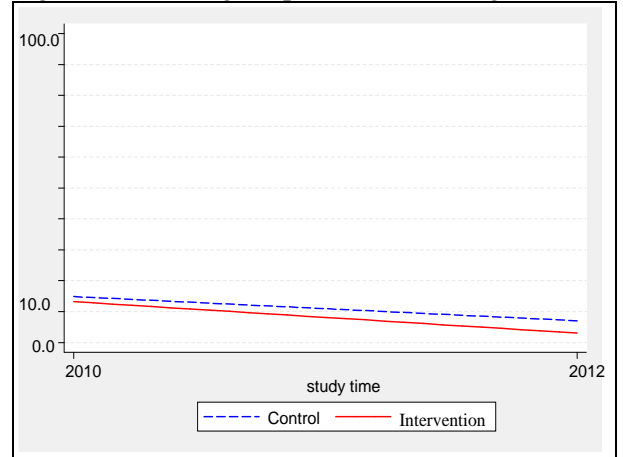


Figure B: % who fed colostrums (0-23 months)

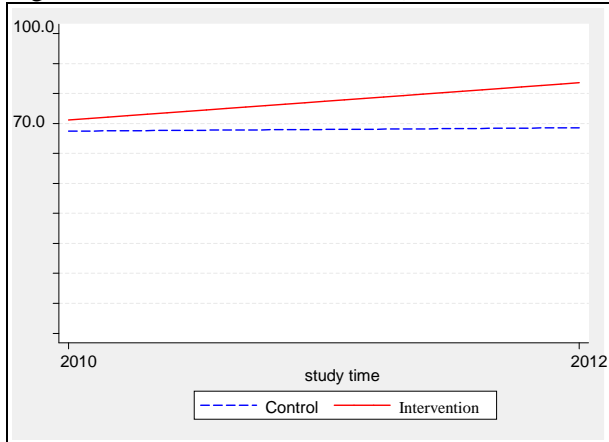
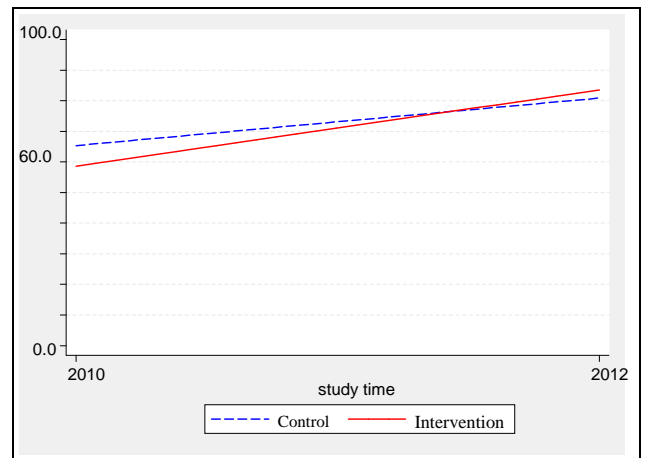


Figure D: % exclusive breastfeeding (0-5 months)



3.5.3. Comparison of exposed and non-exposed women

The TTC rests on a focused counseling approach primarily based on a child's age and that peer mothers reach out to a mother with information and counseling at the different age of a child in order to effectively influence subsequent behaviors. Visits during the third trimester of pregnancy or at delivery are critical to influence the following behaviors: early initiation of breastfeeding within an hour of birth, colostrum feeding and avoidance of pre-lacteal feeding. In order to test whether these visits are associated with better outcomes in relation to these three breastfeeding practices we stratified the women in to three groups: (1) women in the intervention area who were visited by peer mothers either during the third trimester or at delivery (2) women in the intervention area who were not visited by peer mothers in the third trimester and at delivery; and (3) women in the control area.

Figure 5 compares key breastfeeding practices across the three exposure groups. It appears that when women received TTC visits during the third trimester of pregnancy or at delivery they are more likely to practice the desired behaviors. The proportion who initiated breastfeeding within an hour reported the highest at 78.7% among those women who were visited by peer mothers in the third trimester or at delivery compared to 72.5% among those in the intervention area without any visit during the third trimester or at delivery. This difference was statically significant. The effect of these visits appeared more vivid for colostrum feeding. The highest coverage of colostrum feeding of about 89% was reported by women who were visited in the third trimester or at delivery. On the other hand, significantly lower proportion of women (78.3 %) in the intervention area who were not visited by peer mothers in the third trimester or at delivery reported to feed colostrum. Pre-lacteal feeding was found to be close to nil at 1.1% in those visited in the third trimester or at delivery. The corresponding percentage for those who did not receive any TTC visit in the third trimester or at delivery was about 5%. This notable difference was statistically significant.

Significantly higher exclusive breastfeeding coverage appeared to be associated with the receipt of TTC visit any time before the child was 6 months old. The proportion who exclusively breastfed reported at 89% among women who received TTC any time before the child was 6 months old compared to 76.8% for the same among those who resided in the intervention area but did not receive any TTC prior to the child was 6 months old.

On the whole, there appears a dose-response relationship between the TTC visits and the different breastfeeding practices. These interesting univariate results, however, need to be further examined using a more rigorous statistical procedure such as propensity score matching.

Figure 5. Selected breastfeeding indicators (among women with children 0-23 months) according to visits by peer mothers during the third trimester of pregnancy or at delivery

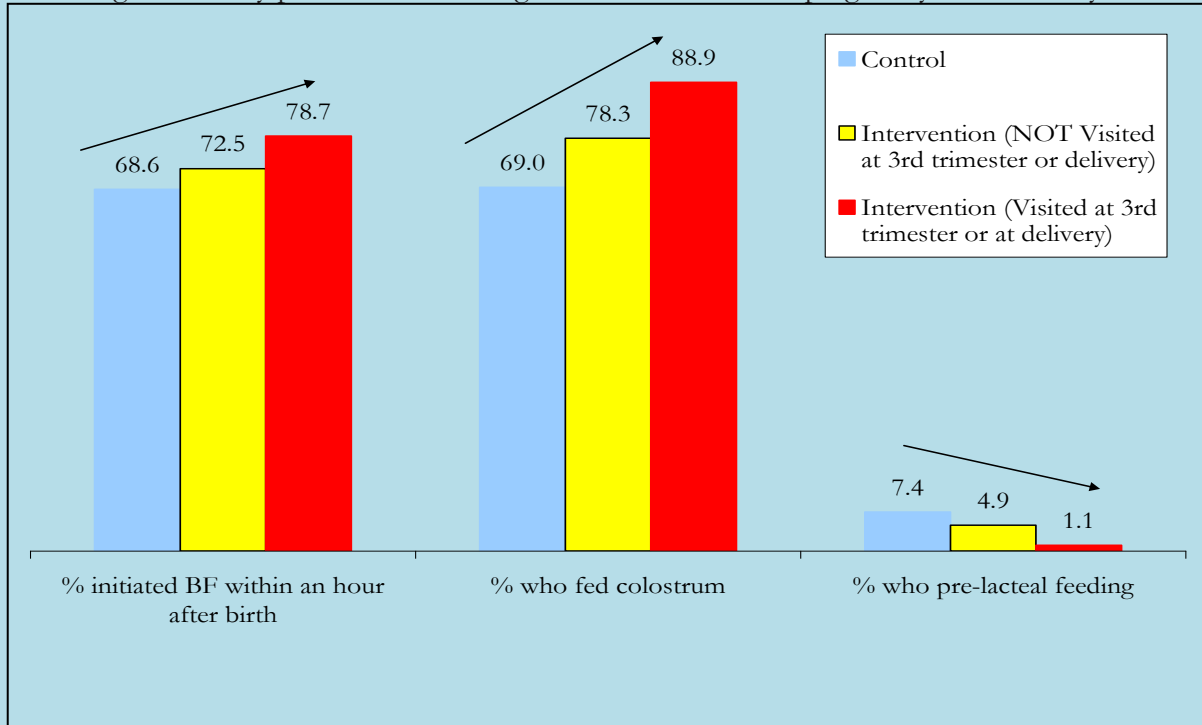
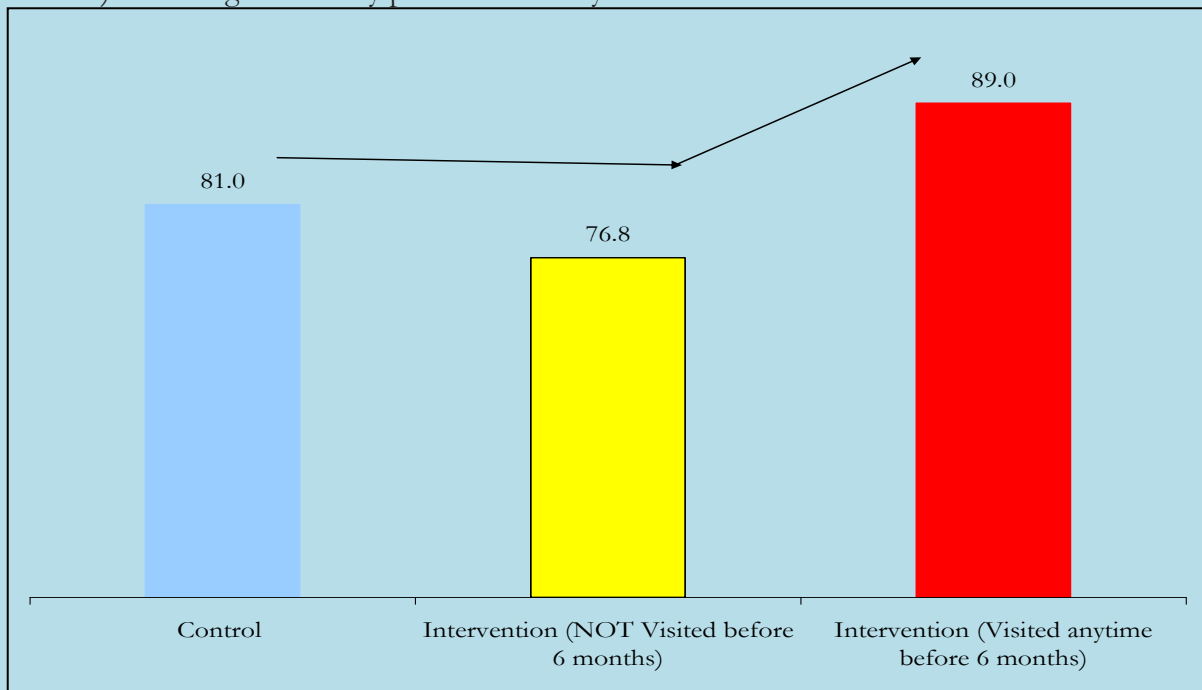


Figure 6. Proportion who practiced exclusive breastfeeding (among women with children 0-5 months) according to visits by peer mothers anytime before the child was six months old



3.6. Complementary feeding practices

3.6.1. Endline comparison of intervention and control areas

Introduction of solid, semi-solid or soft foods: The proportion of children age 6-8 months who received solid, semi-solid or soft foods in the previous day is used to measure the timely introduction of complementary feeding. In general the timely introduction of complementary feeding can be considered reasonably high in both areas. As shown in Table 9, 90.2% and 84.4% of the children age 6-8 months in the intervention and control areas, respectively, had received solid, semi-solid or soft foods in the previous day.

Minimum Dietary Diversity: Proportion of children 6-23 months who received foods from 4 or more food groups in the previous day is considered meeting the minimum dietary diversity. To compute a value for this indicator, a 7 food group⁷ score variable was created. To create the seven food groups categories we asked mothers of the type of food the child had the previous day and the different food items were grouped into the 7 food groups. A score, based on the food groups, was categorized into two as (1) 4 or more food groups and (2) less than 4 food groups. This indicator was also presented separately in three age categories as age 6-11, 12-23 and 6-23 months. Figure 8B presents the distribution of children age 6-23 months who received from the different food groups in the previous day. The vast majority of children received food made of grains the previous day – 87.5% in the intervention and 84.7% in the control. Dairy products were reported to be received in the previous day by 45.1% of the children in the intervention area and 25.7% in the control. Next to this, children reported to eat vitamin A rich foods as reported by 29.6% and 17.2% in the intervention and control areas, respectively. Other food groups received by small proportion of children include legumes, eggs and very few had flesh and other fruits and vegetables. Of note only 7.3% of the intervention and 1.2% of the control children age 6-23 months received flesh food the previous day. It can be concluded that food diversity for children age 6-23 months is a real challenge in the study with most receiving grains, followed by dairy products and vitamin A rich foods.

The proportion of children age 6-23 months who met the minimum dietary diversity can be considered notably low at 10% in the intervention and 1.2% in the control (Table 9). The difference in the proportion with minimum dietary diversity appeared significantly better in the intervention area than in the control. Similar pattern of minimum dietary diversity rate can be noted by child's age both in the intervention and control area.

Minimum Meal Frequency: Proportion of breastfed and non-breastfed children 6-23 months who received solid, semi-solid or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more the previous day. Minimum is defined as - 2 times for breastfed children age 6-8 months, 3 times for breastfed children 9-23 months, and 4 times for non-breastfed children 6-23 months⁸. 'Meals' include both meals and snacks (other than trivial amounts), and frequency is based on mothers/caregiver report.

⁷ The 7 food groups used for calculation of this indicator are: (1)Grains, roots and tubers, (2)Legumes and nuts, (3)Dairy products (milk, yogurt and cheese), (4)Flesh foods (meat, fish, poultry and liver/organ meats), (5)Eggs, (6)Vitamin-A rich fruits and vegetables, and (7)Other fruits and vegetables

⁸ CARE. Infant and Young Child Feeding Practices: Collecting and Using Data: A Step-by-Step Guide. Cooperative for Assistance and Relief Everywhere, Inc. 2010.

Based on the definition for minimum frequency for breastfed and non-breastfed children, 73.2% and 69.2% of the children age 6-23 months in the intervention and control areas, respectively, have met the minimum meal frequency (Table 9). There was an increasing trend in the proportion who met the minimum meal frequency by age. In the intervention area, the proportion of children age 6-11 months who received the minimum meal frequency was 66.4%. This has increased to 76.4% for children 12-23 months. The corresponding values for the two age brackets in the control area were 67.5% and 70.4%, respectively. Of note, there was no significant difference in the proportion who received the minimum meal frequency between the intervention and control areas.

The minimum meal frequency was also computed separately by breastfeeding status. Among currently breastfeeding children age 6-23 months, 74.7% and 71.2% in the intervention and non-intervention areas, respectively, have met the minimum meal frequency the previous day. The vast majority of the children age 6-23 months (over 96%) were breastfeeding.

Minimum Acceptable Diet: The Minimum acceptable diet indicators are computed for children age 6-23 months, first separately by child's breastfeeding status⁹ and, then by combining breastfeeding and non-breastfeeding children to yield a single indicator. The minimum dietary diversity and minimum meal frequency scores computed above were combined to form the minimum acceptable diet indicator. However, for non-breastfed children, the dietary diversity component of this indicator is different from the individual practice indicator calculated earlier (which did not distinguish between breastfed and non-breastfed children). A dietary diversity for non-breastfeeding children was computed using a 6 food group score (instead of the 7 food group score above) in order to exclude the dairy group from the calculation. The number of milk feeds was counted separately for non-breastfed children to determine if the child received at least 2 milk feeds, the minimum number required for this indicator. Table 9 summarizes the minimum acceptable diet for children 6-23 months, stratified by age of child and breastfeeding status. On the whole, data suggest that the vast majority of children both in the intervention and control areas did not receive the minimum acceptable diet the previous day. Only 7.5% and 1% of the children in the intervention and control areas, respectively, were considered meeting the minimum acceptable diet the previous day.

⁹ **For breastfeeding children:** [Breastfed children 6-23 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day / breastfed children 6-23 months]

For non-breastfed children: [Non-breastfed children 6-23 months of age who had at least the 2 milk feedings and had at least the minimum dietary diversity and the minimum meal frequency during the previous day / non-breastfed children 6-23 months]

Table 9. Complementary feeding practices, Minimum dietary diversity, Minimum meal frequency and Minimum acceptable diet by age, A&T baseline survey, SNNPR, August-September 2012

	Intervention area	Control area
6-8 months old, n	n=51	n=81
Introduction of solid, semi-solid or soft foods among children 6–8 months of age	90.2	84.0
Minimum dietary diversity, by age of child		
6-11 months old, n	n=128	n=160
% Minimum dietary diversity (6-11)	8.6*	1.2
12-23 months old, n	n=271	n=240
% Minimum dietary diversity (12-23)	10.7**	1.2
6-23 months old, n	n=400	n=400
% Minimum dietary diversity (6-23)	10.0***	1.2
Minimum meal frequency		
By age of child		
6-11 months old, n	n=128	n=160
% Minimum meal frequency (6-11)	66.4	67.5
12-23 months old, n	n=271	n=240
% Minimum meal frequency (12-23)	76.4	70.4
6-23 months old, n	n=400	n=400
% Minimum meal frequency (6-23)	73.2	69.2
By breastfeeding status		
currently breastfed, n	n=387	n=386
% Minimum meal frequency (6-23)	74.7	71.2
Not currently breastfed. n	n=13	n=14
% Minimum meal frequency (6-23)	25.0	14.3
Minimum acceptable diet		
By age of child		
6-11 months old, n	n=128	n=160
% Minimum acceptable diet (6-11)	6.2*	1.2
12-23 months old, n	n=271	n=240
% Minimum acceptable diet (12-23)	8.1***	0.8
6-23 months old, n	n=400	n=400
% Minimum acceptable diet (6-23)	7.5***	1.0

* $p < 0.05$ ** $p < 0.001$ *** $p < 0.0001$

3.6.2. Difference-in-difference (DID) estimates on selected complementary feeding practices

Multivariate analysis revealed the lack of intervention impact on MMF, MDD and MAD (Table 10). The predicted DID estimates for MDD of 4% and MAD of 2% are not significantly different from the null value and thus do not show any added value of the intervention on these indicators.

The multivariate result in Table 10 also showed that the prevalence of MMF increased significantly between the baseline and endline both in the intervention and control areas ($\beta=0.70$, $p < 0.0001$). Baseline intervention-control difference is also apparent for MDD and MAD. At baseline there was significantly higher likelihood of meeting the MDD among children 6-23 months in the intervention area than in the control ($\beta=1.37$, $p < 0.001$). Similar result can be noted for MAD at baseline where children in the intervention area were found more likely than those in the control to meet the minimum acceptable diet ($\beta=12$, $p < 0.05$). The graphical presentations in Figures 7 A-C further illustrate these results.

Table 10. Multivariate logistic regression coefficients with interaction effect (**Difference-in-Difference- DID**) for selected complementary feeding practices

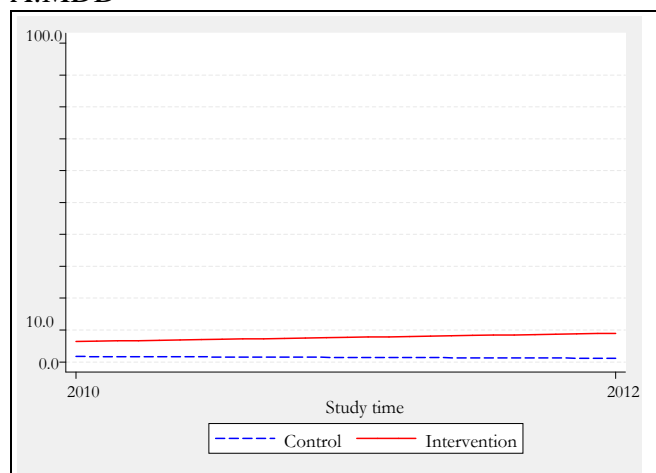
	MDD (6-23 months) β	MMF (6-23 months) β	MAD (6-23 months) β
Study time			
Baseline (2010)-ref	0.00	0.00	0.00
Endline (2012)	-0.38	0.70***	0.43
Study arm			
Control -ref	0.00	0.00	0.00
Intervention	1.37**	0.05	1.12*
Interaction/DID (time X arm)	0.75	0.08	0.81
DID predicted (%)	4.0	0.0	2.0

Multivariate analysis adjusted for women's education, age, religion, number of children ever born, economic status

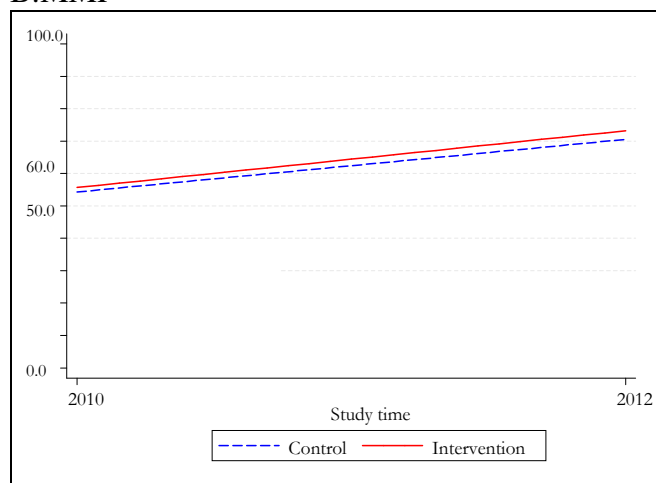
* $p < 0.05$, *** $p < 0.0001$

Figure 7 A-C. Predicted trend in the prevalence of A: minimum dietary diversity (MDD), B: minimum meal frequency (MMF) and C: minimum acceptable diet (MAD) among children 6-23 months by study arm (2010-

A:MDD



B:MMF



C:MAD

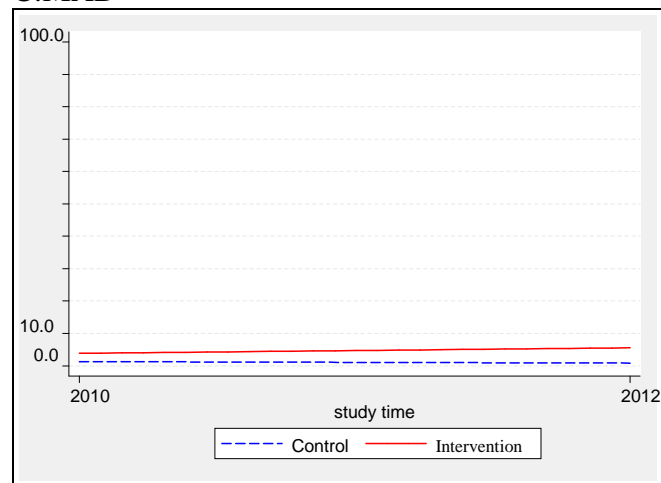
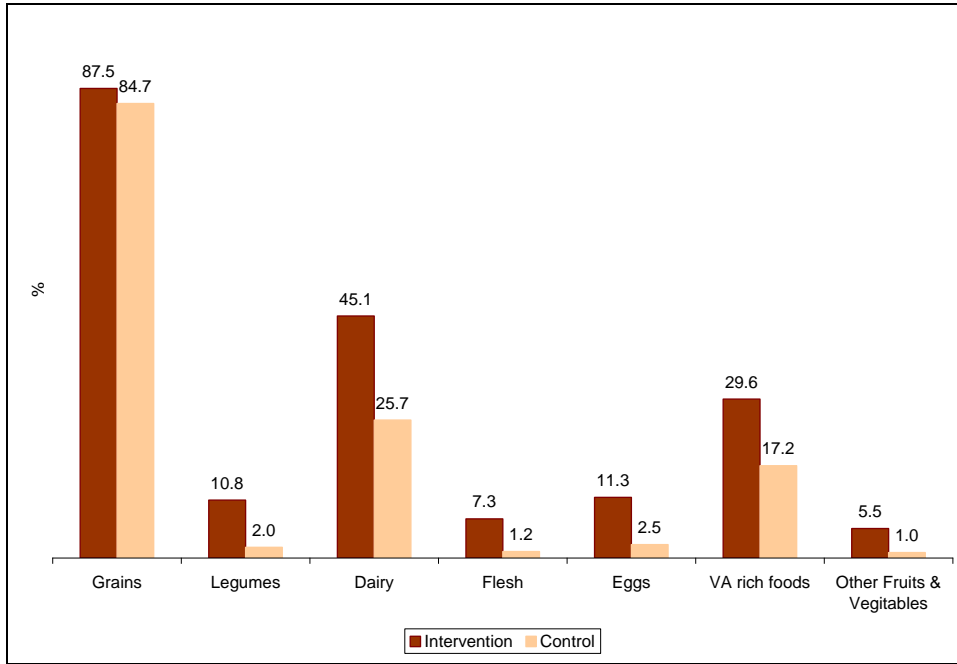
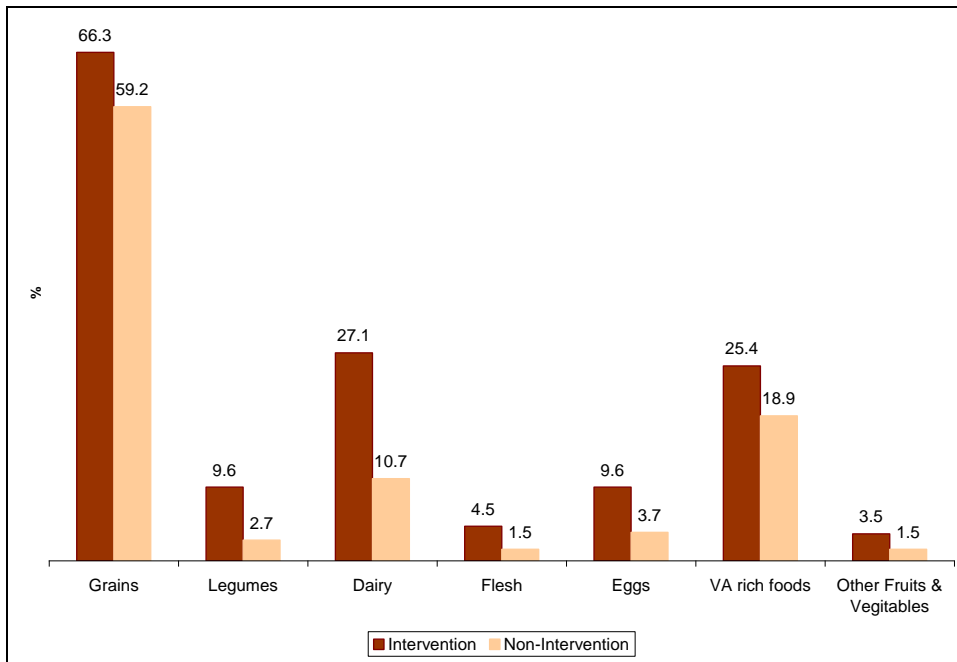


Figure 8 A-B. Percentage distribution of children age 6-23 months who received foods from the different groups in the previous 24 hours by study arm - A: Endline ; B: Baseline

A: ENDLINE



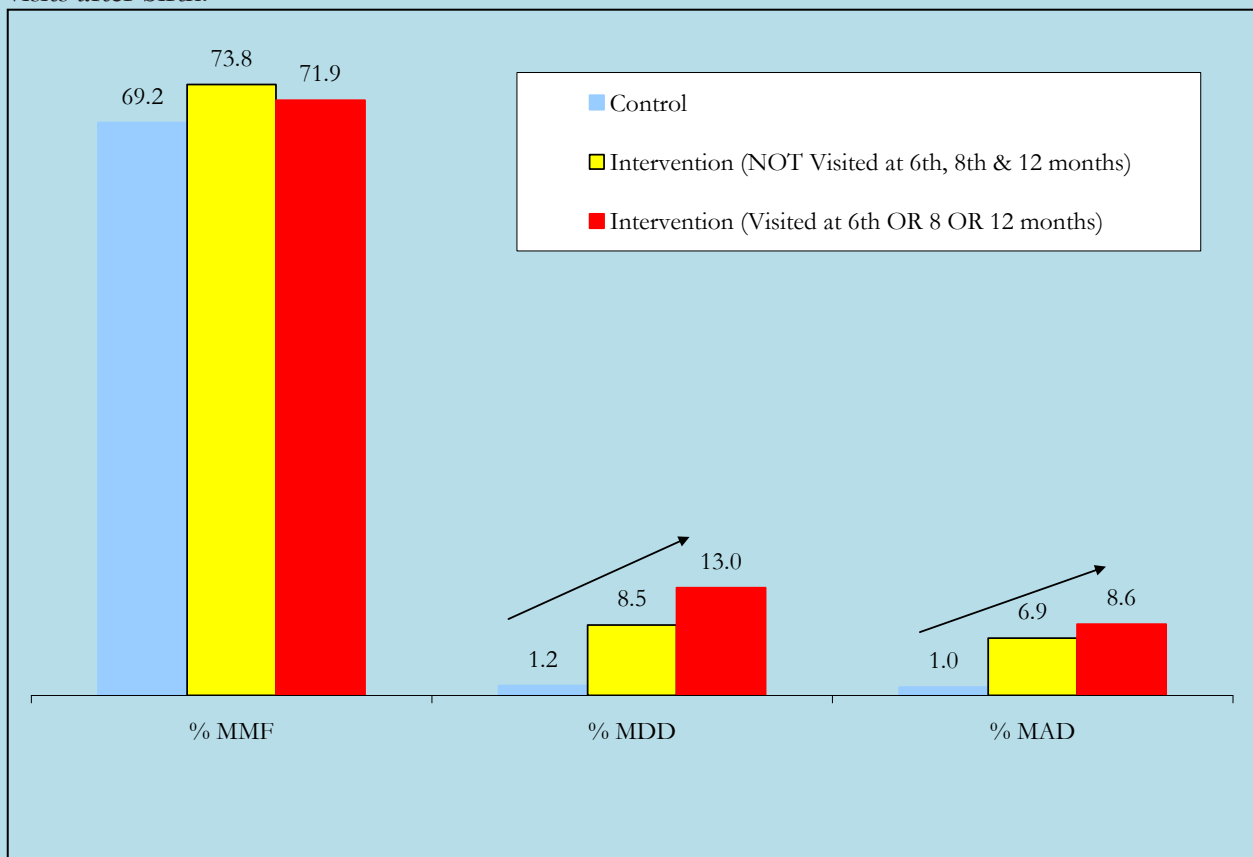
B: BASELINE



3.6.3. Comparison of exposed and non-exposed women

According to the TTC approach implemented by the A&T program intervention, the critical times to provide information and counseling on complementary feeding to mothers by the peer mothers were the 6th, 8th or 12th months TTC visits after birth. Figure 9 attempts to examine the association between the receipt of visit during these times and selected complementary feeding indicators. While there was no association between visits in these time periods and the MMF, higher values of MDD and MAD appeared to be associated with the receipt of such TTC visits. Among women who received TTC visits during the 6-12 months after birth 13% reported to have met the MDD. The corresponding rate for women in the intervention area who were not visited during the 6-12 months after birth was lower at 8.5%. Similarly higher MAD rate is associated with the receipt of such visits at 8.6% compared to 6.9% among those who were not visited during the 6-12 months period after birth. Although this analysis is based of univariate method and did not adjust for selection bias, it provides some important clue for a potential marginal impact of the intervention in these indicators. Further interpretation of these findings is not possible due to methodological limitation.

Figure 9. Selected complementary feeding indicators (among women with children 6-23 months) according to women's exposure to TTC visit by peer mothers at the 6th, 8th or 12th months TTC visits after birth.



3.7. Nutritional status of children

The data on weight and height of children age 6-23 months were used to calculate three summary indices of nutritional status (according to WHO child growth standard), which affects susceptibility to disease and their chance of survival. These indices are height-for-age, weight-for-height, and weight-for-age. The three nutritional status indices are expressed in standard deviation (SD) unit (z-score) from the median for the international population. Children, who fall more than 2 standard deviations below the reference median are considered to be malnourished, while those who fall more than 3 standard deviations units below the reference median are considered to be severely malnourished.

Each of the indices provides somewhat different information about the nutritional status of children. The height-for-age index measures linear growth retardation among children. Children who are more than 2 SD below the median of the reference population in terms of height-for-age are considered short for their age or *stunted* (chronically malnourished). The weight-for-height index measures body mass in relation to body length. Children who are more than 2 SD below the median of the reference population in terms of their weight-for-height are considered to be thin or *wasted* (acutely malnourished). Weight-for-age is a composite measure which takes into account both chronic and acute under-nutrition. Children who are more than 2 SD below the reference median on this index are considered *underweight*.

WHO Anthro (version 3.2.2, January 2011)¹⁰ was used to calculate the nutritional indices. Since a different method was used at baseline, we recalculated the baseline nutritional indices using the WHO Ver 3.2.2. to maintain comparability with the endline. Table 11 presents the three nutritional status indices for children age 6-23 months stratified by study arm and time.

Baseline nutritional status of children 6-23 months: Among children 6-23 months, the proportion of children stunted (<-2SD) were 27.1% and 31.3%, respectively, in the intervention and control area and the observed difference was not statistically significant. The corresponding proportions for wasted (<-2SD) was 9.7% and 8.4%, respectively. Underweight, which is a composite measure, did not vary significantly between the intervention and control area at baseline - 15.6% and 17%, respectively.

Endline nutritional status of children 6-23 months: Among children 6-23 months, the proportion of children stunted (<-2SD) at endline were 29% and 37.3%, respectively, in the intervention and control area and the observed difference was statistically significant ($p < 0.05$). The proportions wasted (<-2SD) was 4% and 5.7%, respectively, in the intervention and control area. While underweight appeared to vary significantly between the two areas at endline - 10.7% in the intervention and 18.2% in the control ($p < 0.05$).

¹⁰ <http://www.who.int/childgrowth/software/en/>

Table 11. Percentage of children (age 6-23 months) classified as malnourished according to [WHO references] three anthropometric indices of nutritional status: height-for-age, weight-for-height and weight-for-age by child's age, A&T baseline survey, SNNPR, August-September 2012

Age 6-23 months	Baseline		Endline	
	Intervention	Control	Intervention	Control
HEIGHT-FOR-AGE				
% below -2 SD	27.1	31.3	29.0	37.3*
% below -3 SD	12.6	14.3	9.2	15.2*
WEIGHT-FOR-HEIGHT				
% below -2 SD				
% below -3 SD	9.7	8.4	4.0	5.7
	4.3	2.4	0.6	1.0
WEIGHT-FOR-AGE				
% below -2 SD	15.6	17.0	10.7	18.2*
% below -3 SD	6.4	5.1	2.7	5.5*

* $p < 0.05$ (compares intervention and control areas at endline)

Difference-in-difference (DID) estimates on nutritional status of children: The multivariate results in Table 12 show net and significant decline in the proportion of children 6-23 months that were underweight (Interaction term $\beta = (-)0.53$, $p < 0.05$) in the intervention area as compared to the control. The model predicted that underweight has exhibited a 6% net decline in the intervention area as compared to the control area. Whereas no similar significant declining trend in the proportion stunted and wasted was seen both in the intervention and control areas.

Furthermore, the multivariate results also revealed that the observed (univariate) temporal increase in stunting in both the intervention and control area was not statistically significant. Likewise, the noted declining trend in wasting in the univariate analysis did not hold in the multivariate analysis that adjusted for several factors. Figure 10 A-C present the graphs for the predicted values.

Table 12. Multivariate logistic regression coefficients with interaction effect (difference-in-difference- DID) in the estimation of stunting, wasting and underweight among children 6-23 months

	Breastfeeding practices		
	Stunting (6-23 months) β	Wasting (6-23 months) β	Underweight (6-23 months) β
Study time			
Baseline (2010)-ref	0.00	0.00	0.00
Endline (2012)	0.30	-0.44	0.09
Study arm			
Control -ref	0.00	0.00	0.00
Intervention	-0.23	0.18	-0.11
Interaction/DID (time X arm)	-0.22	-0.52	-0.53*
DID predicted (%)	-6.0 (NS)	-2.0	-6.0

Multivariate analysis adjusted for women's education, age, religion, number of children ever born, economic status

* $p < 0.05$, NS=not significant

Figure 10 A-C. **Predicted trend in proportion of children (age 6-23 months) who were stunted, wasted and underweight by study arm**

Figure A: % Stunting

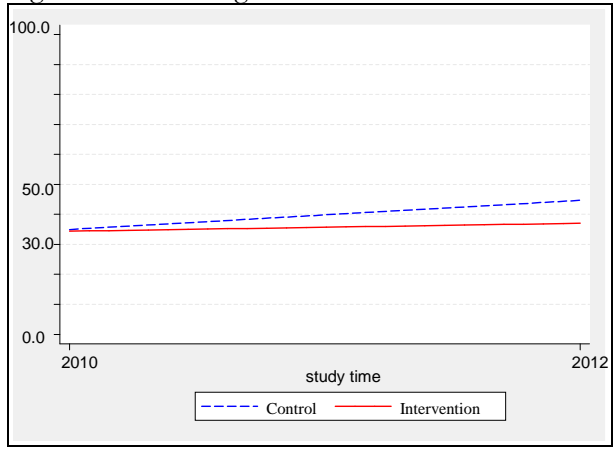


Figure B: % Wasting

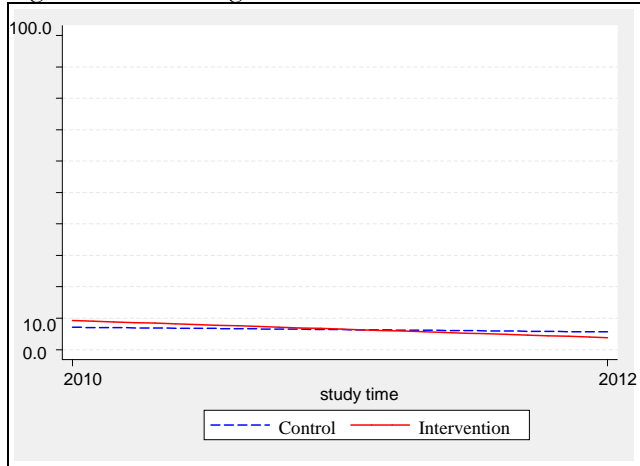
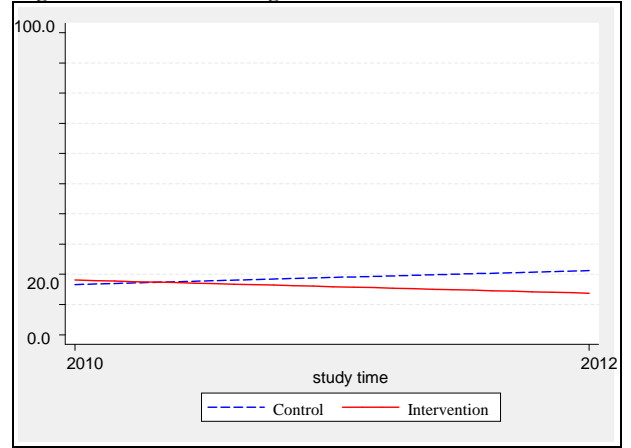


Figure C: % Underweight



3.8. Vitamin A and deworming (children 6-23 months)

3.8.1. Endline comparison of intervention and control areas

Among children age 6-23 months about 44% in the intervention area and 28% in the control reported to have received Vitamin A during the six months prior to the survey (Table 13). In the same age group, de-worming tablets were received by 15.8% and 9.5% of the children in the intervention and control areas, respectively. Both vitamin A and deworming coverage were found significantly higher in the intervention area than in the control at endline.

Table 13. Among children age 6-23 months, the proportion who received Vitamin A and deworming in the previous 6 months, A&T baseline survey, SNNPR, August-September 2012

	Intervention area N=400	Control area N=400
% children age 6-23 months who received vitamin A in the past 6 months	43.9***	28.0
%children age 6-23 months who received medicine for worm in the past 6 months	15.8*	9.5

* $p < 0.05$; *** $p < 0.0001$

3.8.2. Difference-in-difference estimates for vitamin A coverage

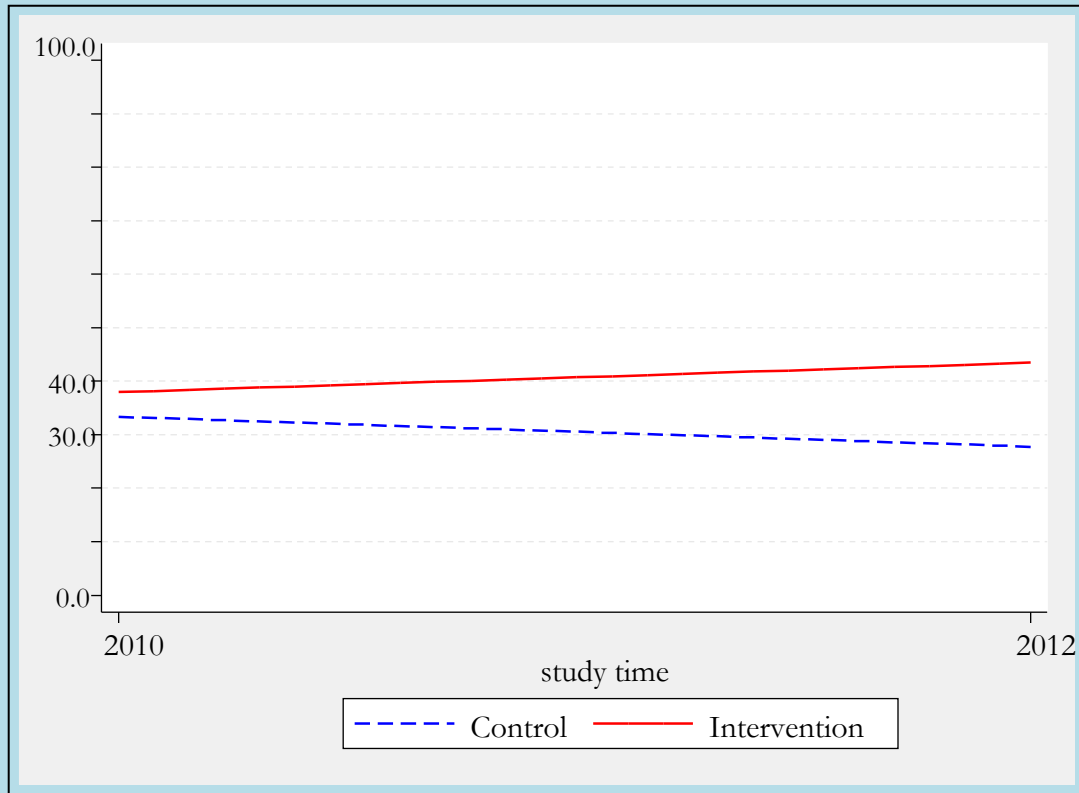
Multivariate analysis shows a net effect of the intervention in improving the coverage of vitamin A (Table 14). The adjusted coefficient associated with the interaction term was statistically significant ($\beta = 0.49$, $p < 0.05$). The model predicted a 10% net increase in the coverage of vitamin A in the intervention area beyond what could have occurred in the absence of the intervention. Figure 11 helps to visualize the predicted effect of the intervention on vitamin A coverage.

Table 14. Multivariate logistic regression coefficients with interaction effect (**Difference-in-Difference- DID**) in the estimation vitamin A uptake among children 6-23 months

	Vitamin A β
Study time	
Baseline (2010)-ref	0.00
Endline (2012)	-0.26
Study arm	
Control -ref	0.00
Intervention	0.20
Interaction/DID (time X arm)	0.49*
DID predicted (%)	10.0

Multivariate analysis adjusted for women's education, age, religion, number of children ever born, economic status
* $p < 0.05$, NS=not significant

Figure 11. Predicted trend of the proportion of children (age 6-23 months) who received vitamin A in the previous 6 months by study arm



3.9. Antenatal care

3.9.1. Endline comparison of ANC use between intervention and control areas

The proportion of women who received one or more ANC visits in health facilities during their most recent pregnancy in the previous two years was significantly higher in the intervention area (67.1%) than in the control (55.4%). In general fewer women received four or more ANC visits in both areas although the proportion was significantly higher in the intervention than in the control - 20.9% and 14.7%, respectively.

Table 15. Among women with children age 0-23 months, the proportion who had antenatal care in health facilities, the number of visits and places where service received, A&T baseline survey, SNNPR, August-

	Intervention area N=800	Control area N=800
Received ANC in health facility	67.1***	55.4
Number of ANC visits		
None	32.9	44.6
1	8.4	5.0
2	13.0	13.7
3	21.5	19.4
4+	20.9*	14.7
Missing	3.4	2.5

***p<0.0001; *p<0.05

3.9.2. Difference-in-difference estimates for ANC use

Table 16 presents the multivariate analysis for ANC use. The results show that the receipt of four or more ANC visits has increased significantly in the intervention area (Interaction term: $\beta=0.46$, $p<0.05$) while there has not been similar trend in the control area. A 6% increased in the uptake of four or more ANC visits was predicted beyond what could have occurred in the absence of the intervention. Figure 12 B presents the predicted trend for the uptake of four or more ANC.

On the other hand we didn't find any significant added value of the intervention on the uptake of one or more ANC visits by the women. In both the intervention and control areas, however, the likelihood of one or more ANC visit improved significantly over the years ($\beta=0.45$). At baseline, women in the intervention area were more likely than those in the control to uptake one or more ANC visits.

Table 16. Multivariate logistic regression coefficients with interaction effect (**Difference-in-Difference- DID**) in the estimation ANC use

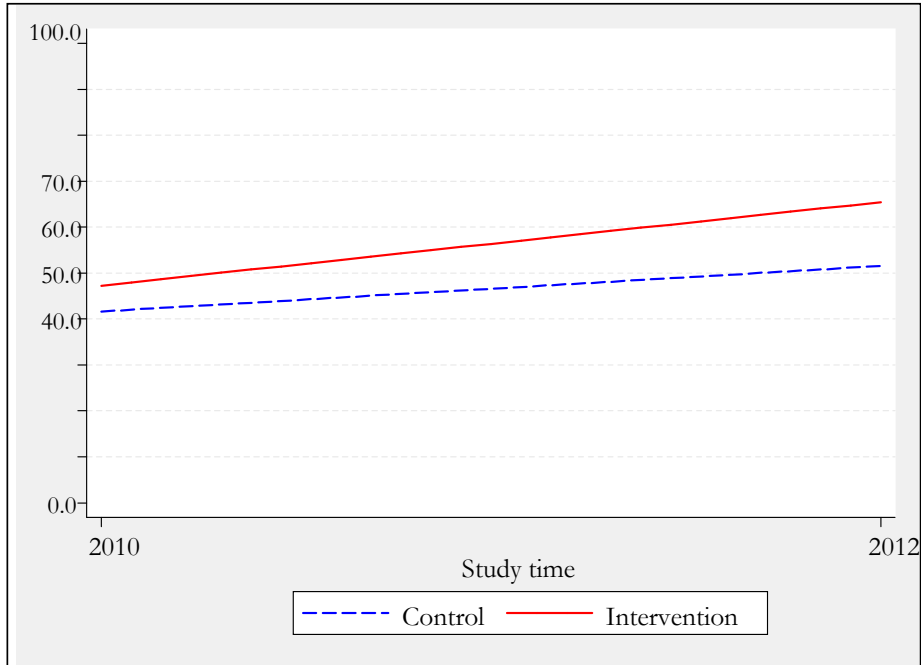
	ANC one plus (one or more ANC visits) β	ANC 4 plus (Four or more ANC visits) β
Study time		
Baseline (2010)-ref	0.00	0.00
Endline (2012)	0.45*	-0.11
Study arm		
Control -ref	0.00	0.00
Intervention	0.33*	0.09
Interaction/DID (time X arm)	0.14	0.46*
DID estimate (%)	8.0 (NS)	6.0

Multivariate analysis adjusted for women's education, age, religion, number of children ever born, economic status

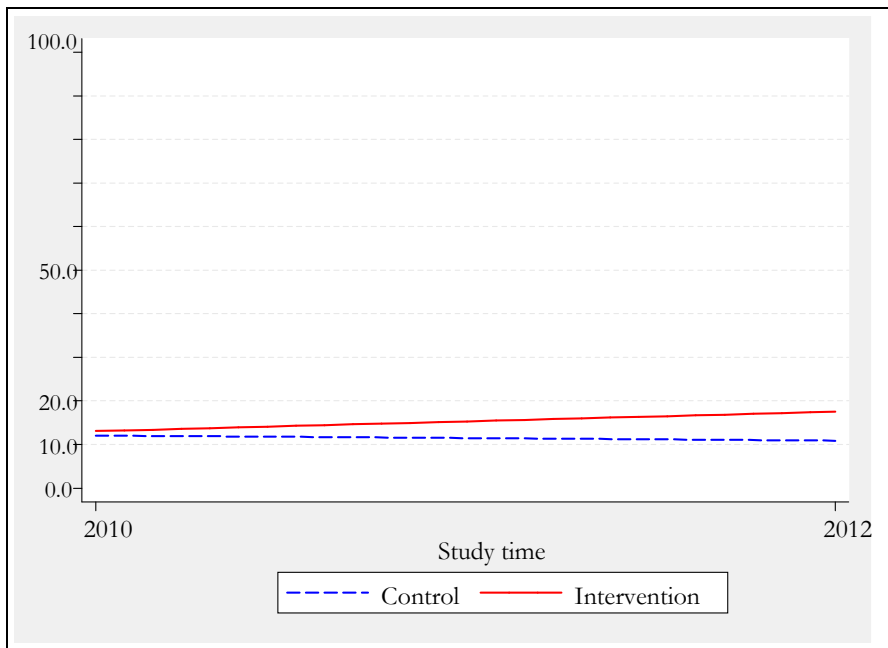
*p<0.05; NS= Not significant

Figure 12. Predicted trend in the coverage of ANC by study arm; A: one or more ANC visit, B: Four or more ANC visits

A: One or more ANC visits



B: Four or more ANC visits



3.10. Child Immunization

This survey computed child immunization indicators based on the sub-sample of children age 12-23 months. In these survey woman who has a child age 12-23 months was asked whether she had a vaccination card for the child. If card was available, the interviewer was required to copy carefully the dates on which the child received vaccinations against each disease. When the mother could not produce the card, she was asked whether the child had received a vaccination against tuberculosis (BCG), Pentavalent¹¹ (PENTA), poliomyelitis (Polio) and measles. For PENTA and Polio, information was also obtained on the number of injections or oral doses given. Although card data is the most valid, history data have been confirmed to be reliable worldwide for monitoring EPI performance.

3.10.1. Endline comparison of child immunization coverage between intervention and control

Table 17 shows the percentage of children age 12-23 months who have received the various vaccinations. Vaccination cards were seen by the interviewers for only 42% and 26.2% of the children in the intervention and control areas, respectively. This difference was statistically significant.

In the whole, children in the intervention area appeared more likely than those in the control to have received immunization. Based on the information either recorded on the card or reported by the mother, 45.4% and 35.4% of the children in the intervention and control areas, respectively, are fully vaccinated. The noted higher fully immunized coverage in the intervention area was statistically significant ($p < 0.05$). It is important to note that at baseline the proportion fully vaccinated was significantly higher in the control than in the intervention area at 30.2% and 22.4% , respectively.

¹¹ Pentavalent is a multi-dose vaccine consisting of the following 5 vaccines: Diphtheria, Tetanus Toxoid, Pertussis, Hepatitis B, and Haemophilus Influenza (Hib)

Table 17. Among children age 12-23 months, the proportion of children that received the different vaccines, A&T baseline survey, SNNPR, August-September 2012

	Intervention area N=271	Control area N=240
% With vaccination card	41.7***	26.2
BCG	80.1	74.2
POILO0	27.7	17.1
POLIO1	76.7	72.5
POLIO2	68.6	62.1
POLIO3	52.4**	38.3
PENTA 1	78.6	72.1
PENTA 2	72.7	65.8
PENTA 3	55.0	44.2*
Measles	63.5	50.8*
Fully immunized ¹	45.4*	35.4
<u>Drop-out rate:</u>		
PENTA 1 to PENTA 3	30.0	38.7

*** $p < 0.0001$ ** $p < 0.001$ * $p < 0.05$

3.10.2. Difference-in-difference estimates for ANC use

A net effect of the intervention on the child vaccination can be noted from Table 18 and Figure 13. It appears that the proportion of fully vaccinated is predicted to increase by 16% in the intervention area beyond what could have occurred in the absence of the intervention. During the TTC visits peer mothers reported to give information and advice to mothers concerning the benefits of child immunization and encourage mothers to have their children vaccinated. This is apart from the main focus of their visit, which revolves around IYCF.

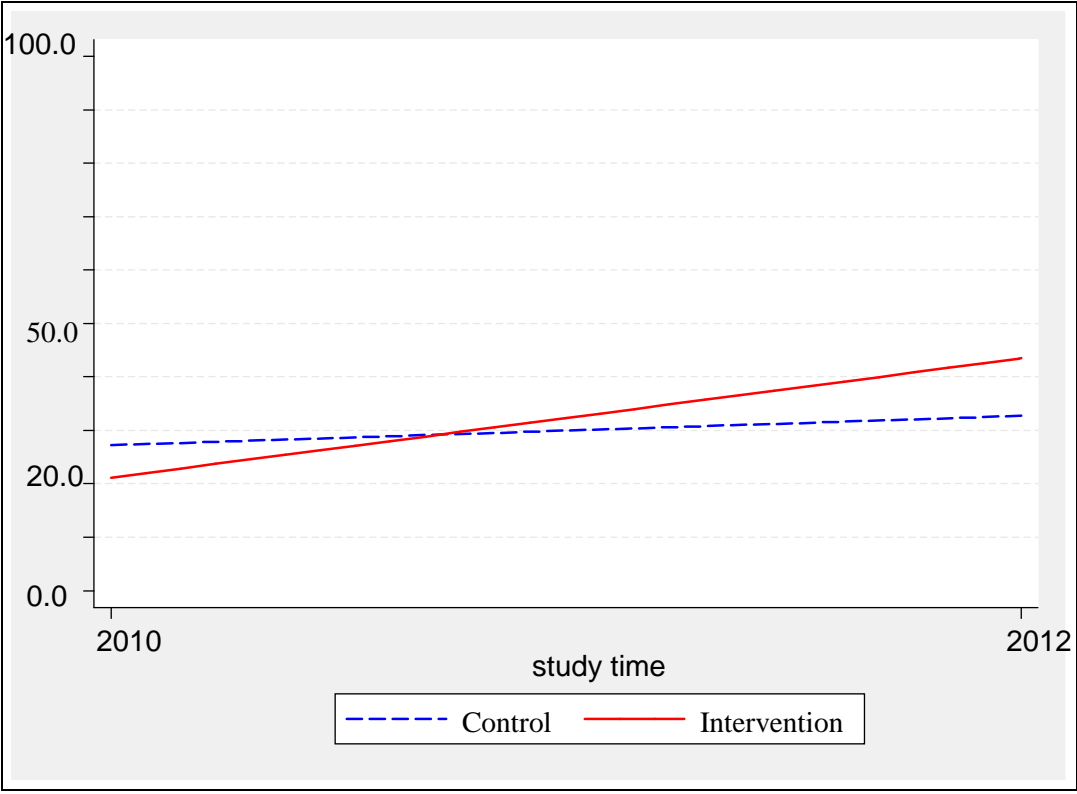
Table 18. Multivariate logistic regression coefficients with interaction effect (**Difference-in-Difference-DID**) in the estimation of the probability of fully vaccinated (among children 12-23 months)

	Fully vaccinated β
Study time	
Baseline (2010)-ref	0.00
Endline (2012)	-0.33
Study arm	
Control -ref	0.00
Intervention	0.26
Interaction/DID (time X arm)	0.79*
DID estimate (%)	16.0

Multivariate analysis adjusted for women's education, age, religion, number of children ever born, economic status

* $p < 0.05$

Figure 13. Predicted trend in the proportion of children (age 12-23 months) fully vaccinated according to study arm



IV. Conclusion

Findings of this evaluation, taken together, demonstrated that the overall goals of the A&T operation research project intervention using the TTC approach were largely met. Women's knowledge and implementation of key IYCF practices significantly improved in the intervention area beyond what could have occurred in the rapidly changing environment attributed largely to the health extension program. The intervention also proved to have added values in improving the coverage and uptake of child immunization and vitamin A supplementation as well as the use of ANC. It can thus be concluded that when rural mothers are exposed to a timed and targeted counselling on IYCF and other related health issues by volunteer peer mothers, it is likely that their knowledge and behaviour regarding IYCF and essential child and maternal health care will improve.

This evaluation has also illuminated some gaps and challenges. First, coverage with TTC is moderate (46%) and about 54% of the women with children 0-23 months in the intervention area did not receive a TTC visit and can represent missed opportunity for TTC. Second, the frequency of the visits were much lower than expected and that dropout from the first (during third pregnancy) to the 12th months (after delivery) visits was about 15% (absolute change). This modest or sub-optimal TTC coverage clearly has implication for the recorded results as we have demonstrated a positive linkage between timely and frequent TTC visit and adoption of the desired IYCF behaviors by the mothers. As a result of which it is likely that this study did not show the maximum possible impact of the intervention. Indeed, had the TTC visits coverage been higher and more frequent we would have seen a much more vivid impact of the program intervention.

Finally, whereas the intervention positively influenced a number of key breastfeeding practices, no similar intervention effect was seen for complementary feeding. It may well be that counseling alone is not adequate to improve dietary diversity and that integrating the TTC approach with other programs targeting to improve complementary feeding practices in rural communities is a viable strategy.