Feed the Future (FtF) of Ethiopia – Midline report 2015

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To be added

Acronyms

5DE	Five Domains of Empowerment in Agriculture
AGP	Agricultural Growth Program
ANH	Agriculture, Nutrition and Health
BMI	Body-Mass Index
CAPI	Computer-Assisted Personal Interviewing
CSA	Central Statistical Agency
DHS	Demographic and Health Survey
DiD	Difference in Difference
EA	Enumeration Area
ENGINE	Empowering New Generations to Improve Nutrition and Economic Opportunities
FtF	Feed the Future
GFDRE	Government of the Federal Democratic Republic of Ethiopia
GPI	Gender Parity Index
GRAD	Graduation with Resilience to Achieve Sustainable Development
HHS	Household Hunger Scale
HICES	Household Income, Consumption and Expenditure Survey
IFPRI	International Food Policy Research Institute
ITT	Intention to treat
KM	Kernel Matching
LMD	Agricultural Growth Program - Livestock Market Development
MAD	Minimum Acceptable Diet
NNM	Nearest Neighbor matching
OPHI	Oxford Poverty and Human Development Initiative
PBS	Population-based Survey
PPP	Purchasing Power Parity
PRIME	Pastoralist Areas Resilience Improvement through Market Expansion
PSM	Propensity Score Matching
PSNP	Productive Safety Net Program
RCT	Randomized Controlled Trial
SNNP	Southern Nations, Nationalities, and People's (Region)
ToT	Training of the Trainers
USAID	United States Agency for International Development
USD	United States dollar
WEAI	Women’s Empowerment in Agriculture Index
WHO	World Health Organization
WOARD	Woreda Office for Agricultural and Rural Development
WOFED	Woreda Office of Finance and Economic Development
ZOI	Zone of Influence

Executive Summary

Chapter 2: The Feed the Future Midline Survey

The FtF baseline report (Bachewe et al, 2014) contains an extensive discussion of our approach to data collection, including the rationales for the data being collected, the calculations underpinning decisions regarding sample sizes, the selection of *woredas* to be included in the baseline survey and the contents of the survey instrument. In chapter 2, we update this information. We describe the process by which the midline survey was implemented, the contents of the *woreda*, community and household questionnaires and our success in tracing and re-interviewing participants in the baseline survey.

Chapter 3: Implementation of the main FtF projects

FtF impact, and our ability to detect FtF impact, hinges on timely and reasonably complete implementation of the main FtF projects taking place in the ZOI: AGP, LMD, GRAD, ENGINE and PRIME. As a prelude to our impact estimates, we thus assess the extent of implementation. We adopt a cascading approach, drawing on data collected at the *woreda*, community and household level.

The interviews with the woreda officials reveal some useful information. First, despite the initial slow roll-out of the projects in the woredas, in 2015 the majority of the projects in the respective FtF woredas have been operational for at least 2 years. Second, the information about the on-going activities in the woredas suggest that the implementation at the woreda level is going well. We also see that the five main projects focus on the activities that they are set to work on. For example, AGP is focusing on institutional strengthening and irrigation activities while ENGINE is active on scaling up of best practices in nutrition.

Zooming into the community level however reveals implementation problems. The most worrying finding is that more than half of the communities in the FtF ZOI did not report having any of the main FtF projects. Hence, by extension, more than half of the households in FtF ZOI do not appear to benefit from any of the main FtF projects. Closer examination of the data shows that more remote communities – those located farther from the woreda center – are less likely to report benefiting from the FtF projects. The data collected at the household level show similar patterns: households located in more remote villages are less likely to report that an FtF project is operational in their village.

When focusing on the communities that do have the program, we find that in 9 out 10 cases the community representatives think that their community is benefitting from it. The community level information about the on-going activities also show that the operational FtF projects are mostly conducting activities that they are set out to do.

Chapter 4: Methods

In chapter 4, we describe the statistical methods used to assess the impact. At the core of our statistical strategy are methods that construct a proxy for the counterfactual outcomes from data on a selected comparison group ("without" the program). We use difference-in-difference approach together with matching to assess the impact.

Chapter 5: Poverty and food security

Chapter 5 updates information on FtF indicators relating to poverty and food security outcomes including poverty headcount, household expenditures and household hunger scale.

Using the recently revised World Bank poverty measure, we find that the headcount poverty fell by 3.9 percentage points in the FtF ZOI. The daily real per capita expenditures rose by 2.7 percent in the FtF ZOI. However, poverty fell even more and real expenditures rose faster in the non-FtF woredas. We cannot attribute these encouraging changes in the FtF ZOI to the FtF investments. Household hunger prevalence remained the same in the FtF ZOI, at 5 percent.

Chapter 6: Nutrition

Chapter 6 updates information on FtF indicators relating to nutrition outcomes including stunting and wasting in children under five years and the prevalence of underweight women. It reports on FtF intermediate indicators relevant to child and maternal nutrition: exclusive breastfeeding of infants; minimum acceptable diets in children; and maternal dietary diversity.

The documented trends in children's nutrition indicators are encouraging. Relative to the baseline survey in 2013, underweight prevalence in the FtF ZOI fell by 5.5 percentage points (18 %) and wasting by 4.8 percentage points (31 %). Reduction in stunting prevalence was more modest and not statistically different from zero. However, the same anthropometric measures also improved in the control areas. Therefore, with the exception of the underweight indicator – in this midline assessment – we cannot causally attribute the changes to the FtF projects. For feeding practices, there are no improvements in the percent of children receiving a minimum acceptable diet relative to the baseline. In contrast, the prevalence of exclusive breastfeeding of infants increased by 7.4 percentage points (10 %) but again – in this midline assessment – we cannot causally attribute this change to the FtF program. The indicators capturing women's nutritional status (underweight prevalence and dietary diversity) are more stagnant – both relative to the baseline and relative to the control areas.

Finally, we look at some of the pathways by which FtF interventions can affect the nutritional status of children including knowledge of child feeding and hygiene practices, growth monitoring, vitamin A supplementation, de-worming and water, sanitation and hygiene. We find little differences in households' exposure to Behavioral Change Communication between the control woredas and FtF ZOI. In addition, the percentages of children receiving vitamin A supplementation or de-worming are similar between these two areas but exposure to growth monitoring is somewhat higher in the FtF ZOI. Households in control areas have similar access to toilets but the access to safe water is more widespread in the FtF ZOI. Moreover, when focusing on the communities where FtF is reported to be active, we find that access to toilets and safe water sources are considerably higher than in the control areas.

Chapter 7: Women Empowerment in Agriculture Index (WEAI)

WEAI is composed of two sub-indexes: one that measures the five domains of empowerment in agriculture (5DE), and the other that measures gender parity in empowerment (GPI) within the household (Alkire et al. 2013; Bachewe et al. 2014). The five domains are agricultural production, resources, income, leadership, and time. The GPI captures the inequality in 5DE profiles between the primary adult male and female in the household. Chapter 7 reports the five domains of empowerment, the GPI and the WEAI for women in both the FtF ZOI and in non-FtF *woredas*.

The WEAI has improved in the FtF ZOI from 0.698 at the baseline (2013) to 0.729 at the midline (2015). However, the index also improved in the control areas. The analysis of the different WEAI domains reveal that access to and decision on credit and leadership are major contributor to the disempowerment among women. Interestingly, the same factors are the main contributors also to the disempowerment among men.

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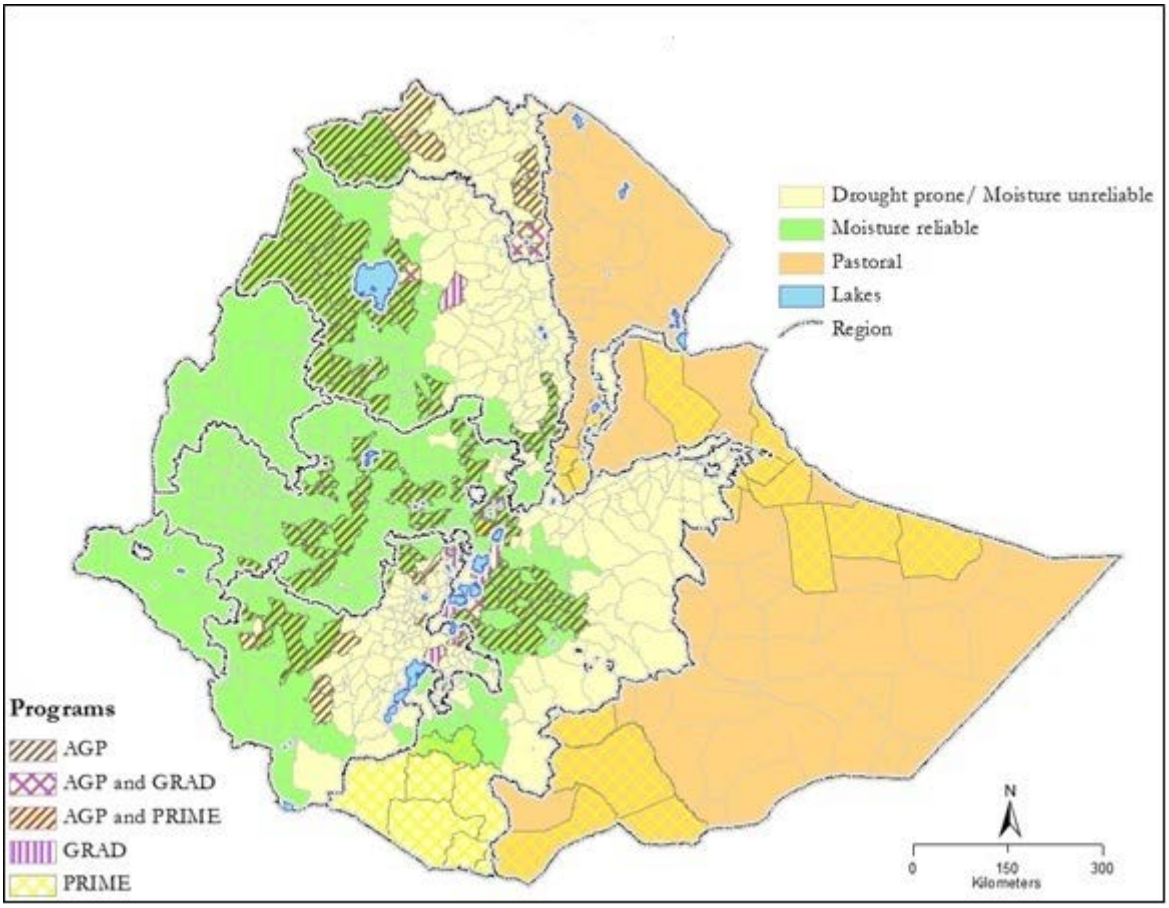
1. Introduction

Feed the Future (FtF) is the U.S. government's signature initiative to address global hunger. It seeks to address the root causes of global hunger by sustainably increasing agricultural productivity to meet the demand for food, supporting and facilitating access to markets, and increasing incomes for the rural poor so they can meet their food and other needs. Recognizing that income growth does not necessarily lead to improvements in the nutritional status of children, it also pays attention to interventions that can reduce stunting and wasting. Across its portfolio of interventions, special attention is paid to gender.

In Ethiopia, as in other FtF countries, USAID concentrates its efforts in a defined area of coverage. This area, termed the Zone of influence (ZOI) comprises 149 *woredas* where the FtF projects will be implemented over the five years period of 2013-2017 (see below).

The total ZOI population is 16.8 million individuals, found in 3.58 million rural households. FtF objectives are to be met through two major components, following the push-pull model detailed in USAID/Ethiopia's Strategy document: Component 1: agricultural growth to enable food security (the "pull" factor) and Component 2: linking the vulnerable to the market (the "push" factor).

Figure 1.1 — Feed the Future in Ethiopia



As part of its FtF strategy, USAID has made a strong commitment to timely and high quality evaluations aimed at providing information and analysis that prevents mistakes from being repeated; and increases the possibility that future investments will yield even more benefits than previous investments. This report reflects that commitment. It has three objectives:

- Update baseline information on indicators for selected FtF Goals, First Level Objectives, Intermediate Results and Sub-Intermediate Results against which progress can be measured;
- Describe the extent to which FtF activities have taken place within the ZOI; and
- Provide preliminary estimates of impact, recognizing that only limited time has elapsed since FtF began operations in Ethiopia.

Table 1.1 summarizes results for selected indicators for the intervention *woredas* in the FtF ZOI. Disaggregated results by sex of head and comparisons with non-FtF woredas are found in the tables listed in the last column. It is worth noting that the interview months, June and July, are characterized as a 'hungry season' in Ethiopia given the fact that they take place only few months before the main harvest. While this seasonality aspect does not affect the impact evaluation since all surveys (baseline, midline and endline) are fielded at the same time of the year, it may explain the low values in some of the indicators.

Table 1.1 — Selected results for FtF Indicators

Type of Indicator	Indicator	FtF Woredas	FtF Woredas	Reference Table
		baseline	**midline**	
Goal: Sustainably Reduce Global Poverty and Hunger	Poverty headcount	30.8 %	26.9 %	Table 5.1
	Prevalence of underweight children under five years of age	31.9 %	26.4 %	Table 6.1
First Level Objective 1: Inclusive Agricultural Sector Growth	Daily per capita expenditures (as a proxy for income) in USG-assisted areas	$1.84 (PPP Dollars)	$1.89 (PPP Dollars)	Table 5.4
	Women's Empowerment in Agriculture Index	0.679	0.792	Table 7.1
First Level Objective 2: Improved Nutritional Status Especially of Women and Children	Prevalence of stunted children under five years of age	49.2 %	47.1 %	Table 6.3
	Prevalence of wasted children under five years of age	15.3 %	10.5 %	Table 6.4
	Prevalence of underweight women	26.9 %	26.7 %	Table 6.11
Intermediate Result 5: Increased Resilience of Vulnerable Communities and Households	Prevalence of households with moderate or severe hunger	4.9 %	5.1 %	Table 5.6
Intermediate Result 6: Improved Access to Diverse and Quality Foods	Prevalence of children 6-23 months receiving a minimum acceptable diet	3.2 %	4.3 %	Table 6.9
	Women's Dietary Diversity: Mean number of food groups consumed by women of reproductive age	1.58	2.20	Table 6.13
Intermediate Result 7: Improved Nutrition-Related Behaviors	Prevalence of exclusive breastfeeding of children under six months of age	71.1 %	78.5 %	Table 6.7

Source: Authors' calculations using data from the FtF Baseline (2013) and Midline (2015) surveys.
Note: Some baseline figures have been revised since the baseline report.

The report is organized in the following fashion.

Chapter 2: The Feed the Future Midline Survey

Our report on the FtF baseline survey (Bachewe et al, 2014) contains an extensive discussion of our approach to data collection, including the rationales for the data being collected, the calculations underpinning decisions regarding sample sizes, the selection of *woredas* to be included in the baseline survey and the contents of the survey instrument. In chapter 2, we update this information. We describe the process by which the midline survey was implemented, the contents of the *woreda*, community and household questionnaires and our success in tracing and re-interviewing participants in the baseline survey.

Chapter 3: Implementation of the main FtF projects

FtF impact, and our ability to detect FtF impact, hinges on timely and widespread implementation of the main FtF projects taking place in the ZOI: AGP, LMD, GRAD, ENGINE and PRIME. As a prelude to our impact estimates, we assess the extent of implementation. We adopt a cascading approach, drawing on data collected at the *woreda*, community and household level.

Chapter 4: Methods

An important part of our work is the estimation of the impact of FtF efforts on its beneficiaries. Doing so requires that we address the fundamental challenge faced by all evaluations; it is generally not possible to observe the counterfactual, what outcomes for program beneficiaries would have been had they not had access to the program. Because these households are already in the program ("with" the program), their counterfactual is unknown. At the core of our statistical strategy are methods that construct a proxy for these counterfactual outcomes from data on a selected comparison group ("without" the program). In chapter 4, we describe these statistical methods.

Chapter 5: Poverty and food security

The key goal of the Feed the Future (FtF) initiative is to sustainably reduce global poverty and hunger. Chapter 5 provides the estimates for the two FtF measures of poverty – the poverty headcount and household daily per capita expenditure – and self-reported hunger scale.

The chapter begins by describing the methodology for the calculation of the poverty head count and household daily per capita expenditures. Of note here is that the official FtF document determines poverty headcount using the poverty line of $1.25/person/day in 2005 PPP prices. This poverty line has recently (October 2015) been updated by the World Bank to $1.9/person/day in 2011 PPP prices. A number of explanations and justifications are provided by the World Bank team for updating the line. We use this new poverty line to estimate poverty in this midline report.

Chapter 6: Nutrition

An important feature of FtF is the explicit attention paid to the nutritional status of children and mothers. This attention reflects the fact that improved nutrition has both intrinsic and instrumental value. As evidenced by its inclusion in the new Sustainable Development Goals, better nourished children and mothers is inherently

a worthwhile objective. But, as FtF notes, better nutrition is also instrumental for other development goals including schooling, employment and wages in adulthood.

Chapter 6 performs several functions. It updates information on FtF indicators relating to nutrition outcomes including stunting and wasting in children under five years and the prevalence of underweight women. It reports on FtF intermediate indicators relevant to child and maternal nutrition: exclusive breastfeeding of infants; minimum acceptable diets in children; and maternal dietary diversity. Finally, it looks at some of the pathways by which FtF interventions can affect the nutritional status of children including knowledge of child feeding and hygiene practices, growth monitoring, vitamin A supplementation, de-worming and water, sanitation and hygiene.

Chapter 7: Women Empowerment in Agriculture Index

Feed the Future sees the reduction of gender inequalities and improvements in women's status as being critical for improvements in global food security. FtF monitors this through the Women Empowerment in Agricultural Index (WEAI). The WEAI is composed of two sub-indexes: one that measures the five domains of empowerment in agriculture (5DE), and the other that measures gender parity in empowerment (GPI) within the household (Alkire et al. 2013; Bachewe et al. 2014). The five domains are agricultural production, resources, income, leadership, and time. The GPI captures the inequality in 5DE profiles between the primary adult male and female in the household. Chapter 7 reports the five domains of empowerment, the GPI and the WEAI for women in both the FtF ZOI and in non-FtF *woredas*.

2. The Feed the Future Midline Survey

2.1 Introduction

The primary objective of the FtF midline survey was to provide information about the progress of the FtF program in Ethiopia; its implementation and the progress on key outcome indicators. These data will also contribute to the USAID's FtF learning agenda. This chapter provides an overview of the midline survey.

2.2 Survey instruments

The FtF midline survey was implemented using woreda, community, and household level questionnaires. Some components of the questionnaires used in the midline survey were slightly modified versions of those in the baseline survey.

Woreda questionnaire

The survey team visited all 84 woredas and interviewed woreda officials who had involvement with, and knowledge of, how the various FtF projects are operating in the woreda. Typically, heads of WOARD, WOFED, and WHO of each woreda, or their representatives were interviewed. The interviews focused on the presence of the main FtF projects and the FtF related activities that were taking place in the woreda. We also collected information about the infrastructure development, access to services (health, education, water, agricultural extension, media etc) and general agriculture related information (typical crops, access to fertilizers and seeds etc).

Community questionnaire

At the community level, we visited all 252 communities. The community questionnaire collected extensive information about the on-going FtF projects, households' access to health and educational services, access to agricultural and health extension services. We also asked about village level formal and informal groups and access to agricultural inputs.

The data were collected using focus group discussion with a group of individuals who were knowledgeable about the community, such as community leaders, PA chairmen, elders, priests and teachers). In order to ensure appropriate representation of different sexes and generations, each group consisted at least one woman and a representative of youth.

In addition to these data, the community supervisors visited local markets and collected extensive price information on food and non-food products.

Household questionnaire

The key piece of data comes from the household survey based on 6,696 household interviews. The core of the household survey instrument consist of the modules found in the standardized survey instrument developed by the Monitoring and Evaluation Division in USAID's Bureau of Food Security. [1] As discussed in the baseline report, these were modified to suit the circumstances in Ethiopia. Additional modules were also included for three primary reasons. First, it is necessary to obtain detailed information on the livelihood characteristics and options of the households and communities in order to capture the context within which FtF investments occur. Second, additional modules are useful to provide information necessary for impact evaluation using matching methods (see chapter 4). Finally, such data are also required towards answering

[1] The guidelines are available at: http://feedthefuture.gov/sites/default/files/resource/files/ftf_vol8_populationbasedsurveyinstrument_oct2012.pdf.

some of the questions in FtF's Learning Agenda. Each household questionnaire's modules comprise (the additional modules are marked with asterisk):

Module A: Household Identification

Module B: Informed Consent

Module C: Household Roster and Demographics

Module D: Dwelling Characteristics

Module E: Household Consumption expenditure

Module F: Household Hunger Scale

Module G: Role in Household Decision-making around Production and Income Generation

Module H: Women's Dietary Diversity and Anthropometry

Module I: Child Anthropometry and Infant and Young Child Feeding

Module O: Employment, Agricultural Productivity and Input Use *

Module P: Crop Utilization *

Module Q: Agricultural Extension, Technology and Information Networks *

Module R: Livestock Ownership and Income from Livestock and Livestock Products *

Module S: Shocks *

Module T-A: Non-Farm Income and Business Activities – Own Business Activities *

Module T-B: Off-Farm Employment *

Module T-C: Credit *

Module U: Trust, Control and Agency *

Module X: Household Assets (Non-Land) *

Module Y: Transfers, Gifts and Remittances *

Module Z: Aspects of Market Supply and Access and Farm Productivity *

Similar to the baseline survey administered in 2013, household level data collection was conducted using Computer Assisted Personal Interview (CAPI) during the midline survey. Enumerators and supervisors were provided with trainings on CAPI based data collection.

2.3 Timelines

The survey preparations began with the training of the trainers (ToT). This took place from April 24, 2015 to May 5, 2015, including Saturdays, at the CSA premises in Addis Ababa. Total of 8 trainers and 26 (+5 waiting list) IFPRI supervisors were trained on the survey instruments and key concepts were discussed. The trainers also provided feedback on the survey instruments and the questionnaires were adjusted accordingly. As part of the ToT, there was also a two days pilot to check the possibility of splitting the module into two sections and also see the flow of the concepts.

The training of supervisors and statisticians began on 27 May. This 2-day training took place in Hawassa and more than 100 staff members from 16 branch offices from Amhara, Oromiya, Somale, SNNP and Tigray regions attended.

The enumerator training began in 29 May in Hawassa and took 24 days during which a total of 470 enumerators were trained. The training covered the whole household questionnaire and also provided the enumerators with key computer and interviewing skills. The enumerator training ended with a pilot in rural areas near Hawassa. This gave the enumerators a chance to practice their interviewing skills with real households.

The actual data collection began in 25 June and ended in 22 July during which nearly 7000 households were interviewed (for more details see the next section).

The CSA provided IFPRI the cleaned household data in August 2015.

2.4 Survey outcomes

The baseline survey in 2013 interviewed a total of 6,977 households sampled from 84 woredas (252 Kebeles) (see Table 2.1 in Berhane et al. 2014).[2] Out of these 6,977 households 6,696 continued to reside in the same woredas and were interviewed in the midline survey. This resulted an attrition rate of 4%. This is considered low compared to surveys of similar size. Table 2.1 provides the distribution of the sample across the five regions and by interview round.

Table 2.1 – Distribution of the panel sample across regions and year

Region	Tigray	Amhara	Oromiya	Somale	SNNP	Total
Baseline (2013) households	670	1843	2401	395	1668	6977
Midline (2015) households	646	1760	2292	368	1630	6696
Attrited households	24	83	109	27	38	284
Attrition %	3.6	4.5	4.5	6.8	2.3	4.07

[2] In Berhane et al (2014) we incorrectly reported the final sample as 7,011 households. The correct figure is 6,977 households reported here. The 34 households were listed in the household demography data file but did not contain data in other sections.

3. Implementation of the main FtF projects

3.1 Introduction

This chapter studies the implementation of the FtF program. We focus on the main FtF projects taking place in the ZOI: AGP, LMD, GRAD, ENGINE and PRIME. The assessment is done through woreda, community and household level surveys administered as a part of the FtF midline survey.

As discussed in the previous chapter, the survey team visited all 84 woredas and interviewed woreda officials who had involvement with, and knowledge of, how the various FtF projects are operating in the woreda. Typically, heads of WOARD, WOFED, and WHO of each woreda, or their representatives were interviewed. The interviews focused on the presence of the main FtF projects and the FtF related activities that were taking place in the woreda.

At the community level, we visited all 252 communities and collected similar information at the community level. The data were collected using focus group discussion with a group of individuals who were knowledgeable about the community, such as community leaders, PA chairmen, elders, priests and teachers). In order to ensure appropriate representation of different sexes and generations, each group consisted at least one woman and a representative of youth.

Finally, household level data is based on 6,696 household interviews.

3.2 Implementation of the FtF at the woreda level

This sub-section assesses the implementation of the main FtF projects at the woreda level.

Table 3.1 shows the distribution of the main FtF projects in our sample woredas. There is considerable overlap of the projects in the woredas. For example, we see that AGP project has 27 woredas in total: 23 alone and 2 together with GRAD and 12 with ENGINE. AGP-LMD has 11 woredas in total and co-exists with GRAD in 3 of these. PRIME has 7 woredas (2 in Oromiya and 5 in Somale) and does not overlap with other main FtF projects.

Table 3.1 – FtF Sample Woredas, grouped by FtF Program and region

	Total	Tigray	Amhara	Oromiya	Somale	SNNP
AGP	37	3	12	13	0	9
AGP	*23*	*0*	*8*	*10*	*0*	*5*
AGP+GRAD	*2*	*2*	*0*	*0*	*0*	*0*
AGP+ENGINE	*12*	*1*	*4*	*3*	*0*	*4*
LMD	11	2	2	5	0	2
LMD	*8*	*2*	*1*	*4*	*0*	*1*
LMD+GRAD	*3*	*0*	*1*	*1*	*0*	*1*
GRAD	1	0	0	1	0	0
PRIME	7	0	0	2	5	0
Total	**56**	**5**	**14**	**21**	**5**	**11**

Source: USAID/Ethiopia.

In order to understand the implementation of the FtF projects, we triangulated this information received from the USAID against the data from our woreda questionnaires. Table 3.2 compares the information provided

in Table 3.1 against the information given by the woreda officials. We see that 36 woredas (out of the 37) reported that they had AGP. This means that AGP is not active in one woreda. Interestingly, LMD is not active in any of the woredas where it was supposed to be active. GRAD is active in all woredas where we expected it to be active. ENGINE and PRIME are not active in one and two woredas, respectively. The woreda data also reveal that some of the FtF projects seem to be expanding to new woredas in the FtF ZOI. These marked as 'new woredas' in Table 3.2. LMD is reported to operate in 10 new woredas and GRAD in 2 additional woredas. The ENGINE project has more than doubled its presence in the FtF ZOI according to the woreda level data. Table 3.3 shows the number of woredas with active FtF projects by region.

Table 3.2 – Implementation of the main FtF projects at the woreda level

	active	not active	new woredas	total active
AGP	36	1	0	36
LMD	0	11	10	10
GRAD	6	0	2	8
ENGINE	11	1	26	37
PRIME	5	2	0	5

Source: FtF Midline (2015) data.

Table 3.3 – Implementation of the main FtF projects at the woreda level, by region

	AGP	LMD	GRAD	ENGINE	PRIME
Tigray	3	3	4	3	0
Amhara	11	2	1	11	0
Oromiya	13	4	2	11	1
Somale	0	0	0	4	4
SNNP	9	1	1	8	0
Total	**36**	**10**	**8**	**37**	**5**

Source: FtF Midline (2015) data.

Table 3.4 reports the year in which each project began in different woredas. AGP began in 2010/11 with 28 woredas. One woreda (out of 36) reported an earlier year (2009) and in 8 woredas the project started in 2012 or 2013. LMD was rolled out more gradually, starting in 2011 in one woreda, then in 5 woredas in 2012 and the remaining 4 woredas in 2013 and 2014. GRAD project was similarly roller-out in phases. The program was introduced in 2011 in four woredas out of total of eight. ENGINE began in 2011/12 with 16 woredas. The project expanded to 15 more woredas in 2013 and to 7 more in 2014 and 2015. PRIME began in 2011/12 in four woredas and added one more woreda in 2015.

Table 3.4 – Roll-out of the main FtF projects at the woreda level

	2009	2010	2011	2012	2013	2014	2015	Total
AGP	1	6	21	1	7			36
AGP-LMD			1	5	2	2		10
GRAD		1	4	1	2			8
ENGINE			5	11	14	3	4	37
PRIME			1	3			1	5

Source: FtF Midline (2015) data.

Finally, we also asked the woreda officials to report the four major on-going FtF activities in their woreda. We categorized their responses under five broad themes: Institutional Strengthening and Development; Scaling up of best practices; Market and Agribusiness Development; Small Scale Agricultural Water Development and Management; and Small Scale Market Infrastructure Development and Management. The specific activities under these five themes are listed in Appendix A. We see that AGP focuses on institutional strengthening with 86 percent of the AGP woredas reporting activities under this theme. Small Scale Irrigation activities are also high on the agenda with 81 percent of the AGP woredas reporting that such activities are taking place in their woreda. Scaling up best practices and developing markets and agri-businesses are, as expected, the focus points of the LMD project. ENGINE focuses on scaling up of best practices in nutrition; all ENGINE woredas reported activities under this theme. This theme is also important in the PRIME and GRAD projects.

Table 3.5 – Activities of FTF-supported projects in the woredas

Type of activity	AGP (%)	LMD (%)	GRAD (%)	ENGINE (%)	PRIME (%)
Institutional Strengthening and Development	86	56	50	81	20
Scaling up of best practices	73	89	100	100	80
Market and Agribusiness Development	59	89	36	38	60
Small Scale Agricultural Water Development and Management	81	11	29	3	40
Small Scale Market Infrastructure Development and Management	43	22	0	3	20

Source: FtF Midline (2015) data.

3.3 Implementation of the FtF at the community level

Next we zoom into the community level. We organized focus group discussions in each of the 252 communities in our sample. As discussed above, we have 56 FtF woredas in our sample and we collected household and community level data from 3 communities in each woreda. This means that we have community level data for 168 FtF communities (56 woredas x 3). Table 3.6 shows how the FtF is implemented at the community level. The second column shows the expected number of communities where the program is active based on the information from the woreda officials (Table 3.2). The third column provides the actual number of communities that report having the project. First we see that out of these 168 FtF communities, only 80 (48 %) report having one of the main FtF projects active in the community. This means that FtF has not been implemented in 52 percent of the communities. The table breaks this further by program. We see that AGP is implemented in 65 percent of the communities where it is expected to operate according to the woreda data. GRAD is active in 42 percent and ENGINE in 20 percent of the communities. LMD is active only in 13 percent and PRIME is not active in any of the communities in our sample.

Table 3.6 – Implementation of the main FtF projects at the community level

	expected	reported	%
Any main FtF project	**168**	**80**	**48%**
AGP	108	70	65%
AGP-LMD	30	4	13%
GRAD	24	10	42%
ENGINE	111	22	20%
PRIME	15	0	0%

Source: FtF Midline (2015) data.

Table 3.6 breaks this further by region, again triangulating the woreda level information provided earlier in Table 3.3. The implementation percentage of AGP is above 50 percent in all the main four regions. LMD implementation lags behind in Oromiya and Tigray where in total of 21 communities did not report having the project despite the project being active in the woreda. GRAD implementation percentage is high in Amhara and SNNP but the project implementation is lagging behind in Oromia. ENGINE is implemented in one third of the (expected) communities in Tigray and Amhara while the project implementation is at 18 percent level in Oromia. The implementation of ENGINE implementation is seriously lagging behind in Somale (0%) and SNNP (4%) where 36 eligible communities are without the project. Finally, according to the information from the woreda officials, PRIME is supposed to active in 15 communities but none of the communities in our community data reported having the project.

Table 3.7 – Implementation of the main FtF projects at the community level, by region

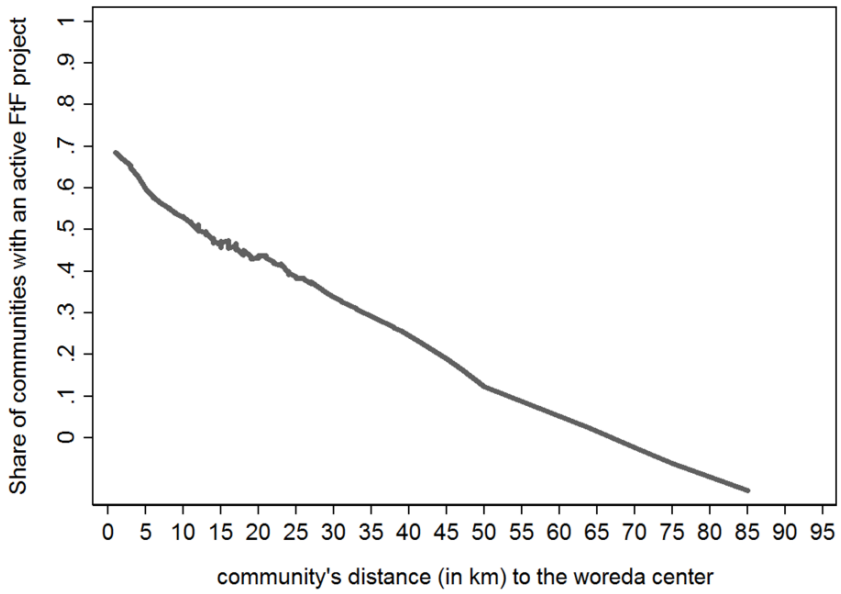
	AGP			LMD			GRAD		
	E	R	%	E	R	%	E	R	%
Tigray	9	5	56	9	0	0	12	5	42
Amhara	33	20	61	6	3	50	3	2	67
Oromiya	39	26	67	12	0	0	6	1	17
Somale	0	0	n/a	0	0	n/a	0	0	n/a
SNNP	27	19	70	3	1	33	3	2	67
Total	**108**	**70**		**30**	**4**		**24**	**10**	

	ENGINE			PRIME		
	E	R	%	E	R	%
Tigray	9	3	33	0	0	n/a
Amhara	33	12	36	0	0	n/a
Oromiya	33	6	18	3	0	0
Somale	12	0	0	12	0	0
SNNP	24	1	4	0	0	n/a
Total	**111**	**22**		**15**	**0**	

Note: E refers to expected, R to reported number of communities with the project.
Source: FtF Midline (2015) data. Sample of 168 FtF communities.

Taken together the information provided by the communities raises serious concerns about the implementation of the FtF. The patchy implementation may reflect the fact that the FtF ZOI is extremely large, covering nearly 17 million people in 149 *woredas* in the five largest regions of the country. Indeed, one of the hypotheses raised during discussions with USAID/Ethiopia was that the FtF program is less likely to be implemented in communities located farther from the woreda center. To assess this, we calculated the community's 'as-the-crow-flies' distance to the woreda center. [3] Figure 3.1 shows how the probability of a community reporting having an FtF project decreases sharply with distance to the woreda center. This means that communities located closer to the woreda center are much more likely to have an FtF project than those located farther away. One worry with this analysis is that the relationship estimated in Figure 3.1 might be skewed by the fact that the implementation of FtF is completely lacking in the Somale – a region characterized by long distances. To check this, Figure 3.2 reproduces Figure 3.1 without the 15 Somale communities. Omitting the Somale communities makes the estimated regression like somewhat less smooth but the general story remains: communities located farther away from the woreda center are considerably less likely to benefit from the program.

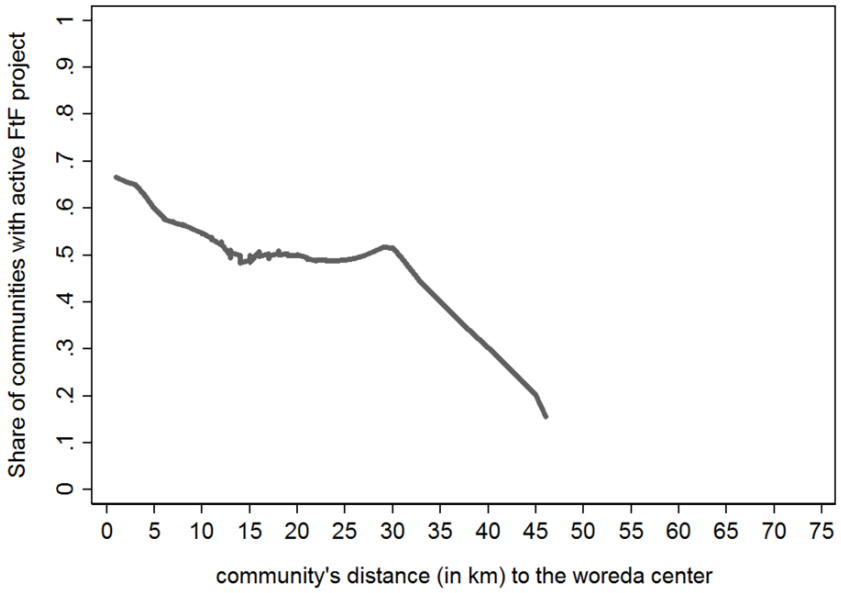
Figure 3.1 – Share of communities reporting an FtF project and distance to the woreda center



Note: Locally weighted regression (LOWESS).
Source: FtF Midline (2015) data. Sample of 168 FtF communities.

[3] The distance is computed from the GPS coordinates that we have for both the woreda and village center.

Figure 3.2 – Share of communities reporting an FtF project and distance to the woreda center, Somale communities omitted



Note: Locally weighted regression (LOWESS).
Source: FtF Midline (2015) data. Sample of 153 FtF communities in Amhara, Oromia, SNNP and Tigray.

Next we focus on the communities where the FtF is active. First, we asked the community leaders, elders and other key people about their satisfaction with the support received through the FtF projects.[4] Table 3.8 shows that the overwhelming majority of the communities that have FtF projects think that the project is beneficial to their community.

Table 3.8 – Satisfaction with support, by FtF project

Project	number of communities	% satisfied
AGP	66	93
LMD	4	100
GRAD	10	90
ENGINE	20	95
PRIME	0	n/a

Note: the last column shows the % of communities that 'Strongly Agree' or 'Agree' with the statement: "The support given by this program is beneficial to your community". Data missing for 4 AGP communities and 2 ENGINE communities.
Source: FtF Midline (2015) data.

Table 3.9 then provides the types of activities taking place in these communities by project type. We categorized the different activities into 8 themes: Agricultural Activities; Infrastructural Development; Food related; Environmental protection; Market linkages; Credit and saving related; Mothers & children; and Health

[4] More specifically, we asked the focus group their opinion on the following statement: "The support given by this program is beneficial to your community" with the following response options: 1) strongly agree 2) agree 3) I am in between 4) disagree 5) completely disagree 6) don't know.

related. Appendix B provides further information about the types activities under each theme. As expected, AGP is focusing on Agricultural related activities (reported by 85 % of the communities where AGP is active), improving infrastructure (mainly related to irrigation) and protecting the environment (mainly soil conservation) in the communities where it is found active. The sole focus of LMD is on agriculture related activities. GRAD attempts to improve the livelihoods of food insecure households through agricultural related investments and credit provision. The agricultural related activities in the ENGINE project focus on supplying improved seed and livestock variety to households and training farmers on new farming methods. The project also distributes food and educates mothers on child feeding practices. As discussed above, the PRIME project was not found to be active in any of the communities in our sample. The last row combines all nutrition and health related categories (Food, Mothers & children and Health related). Nearly 60 percent of the communities with the ENGINE project report to have nutrition and health related activities. The fact that this is not near 100 percent is somewhat surprising as ENGINE is considered as the main nutrition treatment arm of the project.

Table 3.9 – Activities of FTF-supported projects in the communities where projects are active

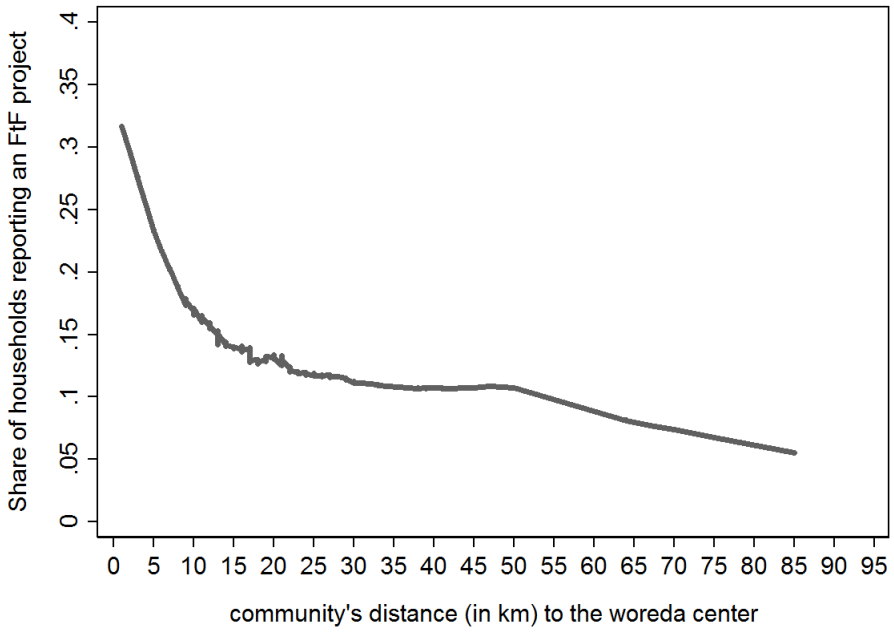
Activity type	AGP (%)	LMD (%)	GRAD (%)	ENGINE (%)	PRIME (%)
Agricultural Activities	85	100	50	59	n/a
Infrastructural Development	21	0	0	5	n/a
Food related	1	0	0	41	n/a
Environmental protection	14	0	10	9	n/a
Market linkages	0	0	0	0	n/a
Credit and saving related	0	0	30	5	n/a
Mothers & children	5	0	10	27	n/a
Health related	0	0	0	5	n/a
Food, Health or Mothers & children	18	0	10	59	n/a

Source: FtF Midline (2015) data.

3.4 Implementation of the FtF at the household level

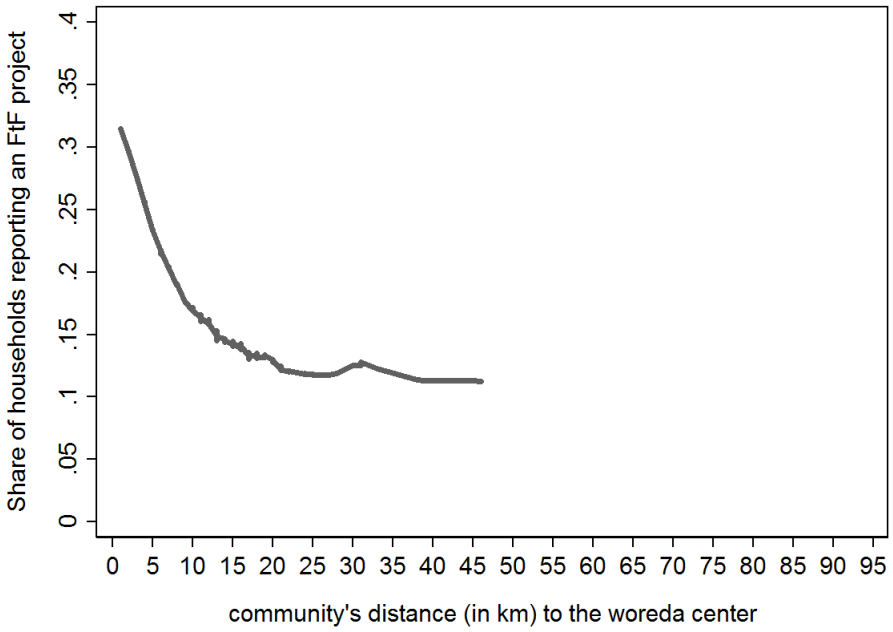
Assessing the implementation at the household level is not straightforward because within each project there are multiple interventions (see Table 3.9). In the household questionnaire we did ask the households whether they were aware about different FtF projects taking place in their villages. We consider this as a rather noisy measure of program implementation as households may not necessarily know what projects are taking place in their village, let alone distinguish between different (FtF and non-FtF) projects. Potentially reflecting this, only about 16 percent of the households in the FtF ZOI reported to know that an FtF project is operating in their village. Still, we see some similarities with the community data. Figure 3.3 shows again how the probability of households reporting an FtF project decreases sharply with the community's distance to the woreda center. The pattern is similar to the one observed in the community level data (see Figure 3.2). As before, this result holds if we omit Somale households from the sample (Figure 3.4).

Figure 3.3 – Share of households reporting an FtF project and distance to the woreda center



Note: Locally weighted regression (LOWESS).
Source: FtF Midline (2015) data.

Figure 3.4 – Share of households reporting an FtF project and distance to the woreda center, Somale households omitted



Note: Locally weighted regression (LOWESS).
Source: FtF Midline (2015) data. Sample of 153 FtF communities in Amhara, Oromia, SNNP and Tigray.

3.5 Summary

The interviews with the woreda officials reveal a number of useful pieces of information. First, despite the initial slow roll-out of the projects in the woredas, in 2015 the majority of the projects in the FtF woredas have been operational for at least 2 years. Third, the information about the on-going activities in the woredas suggest that the implementation at the woreda level is going well. We also see that the five main projects focus on the activities that they are set to work on. For example, AGP is focusing on institutional strengthening and irrigation activities while ENGINE is active on scaling up of best practices in nutrition.

Zooming into the community level however reveals serious implementation problems. The most worrying finding is that more than half of the communities in the FtF ZOI did not report having any of the main FtF projects. Hence, by extension, more than half of the households in FtF ZOI do not benefit from any of the main FtF projects. Closer examination of the data shows that more remote communities – those located farther from the woreda center – are less likely to benefit from FtF. The data collected at the household level show similar patterns: households located in more remote villages are less likely to report that an FtF project is operational in their village.

When focusing on the communities that do have the program, we find that in 9 out 10 cases the community representatives think that their community is benefitting from it. The information about the on-going activities also show that the active FtF projects are mostly conducting activities that they are set out to do.

4. Methods

4.1 Introduction

Our goal is to measure the effect of Feed the Future (FtF) on its beneficiaries by comparing their outcomes to what those outcomes would have been in the absence of FtF. The fundamental challenge involved is that it is generally not possible to observe the counterfactual, that is, what outcomes for program beneficiaries would have been had they not had access to the program. Because these households are already in the program ("with" the program), their counterfactual is unknown. At the core of our statistical strategy are methods that construct a proxy for these counterfactual outcomes from data on a selected comparison group ("without" the program).

Why is this important? Suppose an evaluation only collected data from beneficiaries, and that in the time between the baseline survey and the follow-up, some adverse event occurred (such as a drought) that makes these households worse off. In such circumstances, beneficiaries may be worse off – the benefits of the programme being more than offset by the damage inflicted by the drought. An evaluation without a proper counter-factual analysis would conclude that the program had no impact on beneficiaries. Alternatively, suppose that another donor funds improvements in roads and this allows households to generate higher incomes. These effects would show up in the difference over time in the intervention group, in addition to the effects attributable to the programme. More generally, restricting the evaluation only to "before/after" comparisons makes it impossible to separate programme impacts from the influence of other events that affect beneficiary households. To ensure that the evaluation of FtF is not adversely affected by such a possibility, it is necessary to know what these indicators would have looked like had the programme not been implemented. This requires an evaluation design which includes data on households "with" and "without" the programme.

An additional consideration is the need to ensure that at baseline, treatment and comparison households have similar characteristics. Suppose, for example, that on average treatment households reside in localities that have better roads and that better roads are needed to get agricultural products to market. If we subsequently observe higher levels of marketing of agricultural products by treatment households, we will not be able to tell if this is because of the intervention – FtF – or because the treatment households lived in localities where marketing of products is easier. One design that addresses these concerns is one where access to FTF is randomized across woredas. But because USAID/Ethiopia decided to undertake purposive woreda selection, this most powerful quantitative impact evaluation method – randomized control trial (RCT) design – is ruled out.

Given this, we construct the counterfactual in two steps. First, we carefully selected woredas *outside* the FtF ZOI that are similar in characteristics of the woredas within the FtF ZOI. [5] This was done in a following way. We used a host woreda level variables [6] to create an aggregate index for all the woredas in the country. Using this index we then matched the woredas outside of FtF ZOI with those within the ZOI. This resulted in a list of one-to-one matched control woredas for each FTF woreda. The CSA used this list to select the final sample of the control woredas. Second, to further ensure that we are comparing similar households in non-treated and treated areas, we use matching methods. Matching involves the statistical construction of a comparison group of households or individuals in the non-FtF woredas that are sufficiently similar to the treatment group before the program. Done carefully, matching produces a control group that serves as a good indication of what the counterfactual outcomes would have been for the treatment group. Here we

[5] By interviewing households both inside and outside of the ZOI minimizes the risk that our counterfactual is not contaminated by spill-over effects. See baseline report for more details.

[6] These woreda level variables were region, zone, yields of the 5 major crops, average cattle population, mean elevation, mean slope, rainfall, road density, population density and number of primary and secondary schools.

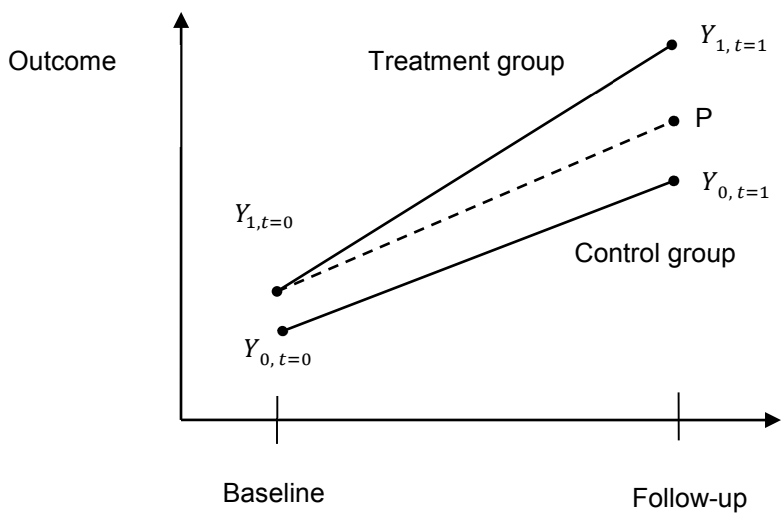
combine difference in difference with matching. This approach is considered one of the most convincing methods to establish a robust impact estimate in the absence of RCT.

Finally, the treatment is defined at the woreda level but it is mostly up to households in these woredas whether they take up the speficing interventions or not. Therefore, our impact estimate should be considered as the so called Intention to Treat (ITT): the impact assessment is based on the initial assignment of the treatment (household resides in an FtF woreda) and not on whether or not the household (in the FtF ZOI) actually benefitted directly from the intervention.

4.2 Difference in Difference

Difference in Difference (DiD) method requires data for at least two time periods and for both the treated and un-treated groups. To see how the DiD method works, consider Figure 4.1. The vertical axis measures an outcome that the FtF is aiming to improve (e.g. household expenditures) and horizontal axis measures time. The two dots at the baseline show the mean pre-treatment outcome for the group that will receive the treatment (treatment group) and for the group that will not receive the program (control group). In this example, the mean outcome at the baseline is slightly higher for the treatment group. The program then begins after the baseline and by the follow-up we see that that mean outcome in the treated group is much higher than in the control group. However, since the two groups did not start at the same level at the baseline, the whole difference between the control and treatment groups should not be attributed to the program. Instead, we need to measure the difference in the treated group with and without the program. This is where we benefit from the presence of the control group. Assuming that the only difference between the treatment and control groups is that the control group did not receive the program, we can use the trend in the control group as 'yard-stick'. The dotted line in the figure shows the assumed trend in treatment group if the program did not take place. The difference between $Y_{1,t=1,i}$ and P is the estimated average programme effect.

Figure 4.1 – Difference in difference



More formally, the difference in difference estimate is obtained by subtracting the pre-existing differences from the difference after the programme has been implemented:

(4.1) $$\beta_{DiD} = \left(\frac{1}{n_1}\sum_i Y_{1,t=0,i} - \frac{1}{n_0}\sum_i Y_{0,t=0,i}\right) - \left(\frac{1}{n_1}\sum_i Y_{1,t=1,i} - \frac{1}{n_0}\sum_i Y_{0,t=1,i}\right)$$

where n_1 refers to the number of treated individuals and n_0 to the number of non-treated individuals. This can be further arranged into:

(4.1') $$\beta_{DiD} = \frac{1}{n_1}\left(\sum_i Y_{1,t=0,i} - \sum_i Y_{1,t=1,i}\right) - \frac{1}{n_0}\left(\sum_i Y_{0,t=0,i} - \sum_i Y_{0,t=1,i}\right)$$

The invaluable strenght of the DiD approach is that by taking the differences over the two time periods, we remove all *time-invariant* unobserved characteristics that may simultaneously affect both the program participation and outcome of interest, thereby biasing our impact estimate. Indeed, the DiD approach provides a causal impact estimate if the two groups (treated and control) groups are subject to common macro trends. This is the common trend assumption, implicitly made in Figure 4.1. Differential trends may arise, for example, if rainfall shocks are systematically different in between the two areas or if the markets where the households operate have very different characteristics. These concerns were partly addressed during the sampling stage that selected control woredas that had similar characteristics to the woredas in the FtF ZOI.

4.3 Matching methods

The Matching Method is used to mimic the treatment group using the observations in the non-treated group. The matching idea was first introduced in the academic literature by Rosenbaum and Rubin (1983). The basic idea of the matching technique is to group subjects with similar probabilities (or propensities) that they receive program benefits and then compare their outcomes. This technique is referred to as Propensity Score Matching (PSM). PSM begins by estimating the probability that the subject is taking part in the program on selected covariates that are assumed to be correlated with both the program participation and the outcome of interest (e.g. household characteristics; household size, household head's sex or community characteristics; access to markets, infrastructure). This step requires that we have rich data on the characteristics of the program participants and non-participants both at the household and community level.[7] When we fielded the baseline survey, we made sure that such data was collected.

Choosing the right set of covariates is a delicate process but if done well, the comparison group will provide a good estimate of counterfactual outcomes for program beneficiaries. A successful PSM also requires that for each beneficiary household and for all observable characteristics, a comparison group of non-beneficiaries with similar propensity scores exists. In other words, we need to ensure that the propensity score is balanced between the program beneficiaries and comparison group. The propensity score is then used to match households in the program beneficiary and non-beneficiary groups. This can be done by using

[7] It is worth noting here that the treatment variable is at the woreda level so one option would be to estimate the propensity score at the woreda level on woreda level characteristics. However, this approach has already been implemented during the sampling stage (see above). We therefore match using only community and household level characteristics.

different techniques, the most common ones being the Nearest Neighbor Matching (NNM) and the Kernel Matching (KM).[8]

A key assumption in matching is that the selection into the program is based on characteristics that can be observed in the survey data. If the selection into the program is based on characteristics that cannot be observed, matching produces biased estimates of the impact of the program participation. However, since the treatment is defined at the woreda level and the control woredas are selected based on similar characteristics (see above), this issue is less of a concern in our application.

4.4 Difference in difference with matching

The DiD approach will not work if the two groups are subject to different macro trends or the labor or input and output markets are very different between the two groups. While part of this problem is taken care of through our sampling of control woredas (see above), combining DiD with matching methods further reduces this problem as we can make sure that households are as comparable as possible. More specifically, combining matching with DiD alleviates this issue because taking the difference over the two period removes all unobserved characteristics that do not change over time. This approach also addresses the concerns the program was already in operation in some woredas before the baseline survey took place (see Table 3.4).

We use this estimator for all household level indicators (poverty headcount, household per capita expenditures and hunger prevalence). For the other indicators we use a slightly modified approach (see below).

Following Smith and Todd (2005), the DiD matching estimator (DiDM) can be expressed as:

(4.2) $$\beta_{DiDM} = \frac{1}{n_1}\sum_i \left\{ \left(Y_{1,t=0,i} - Y_{1,t=1,i}\right) - \sum_i W(i,j)\left(Y_{0,t=0,i} - Y_{0,t=1,i}\right) \right\}$$

where:

- i refers to household
- n_1 refers to the number of treated households,
- $Y_{1,t=0,i}$ is the outcome observed for a treated household at the baseline
- $Y_{1,t=1,i}$ is the outcome observed for a treated household at the follow-up
- $Y_{0,t=0,i}$ is the outcome observed for a non-treated household at the baseline
- $Y_{0,t=1,i}$ is the outcome observed for a non-treated household at the follow-up
- $W(i,j)$ is the weight based on the propensity score and the matching method

For each treated household, the estimator finds households with similar characteristics from the control woredas and compares the differences in the outcomes over the two periods. As discussed above, more

[8] NNM attempts to find the closest propensity score in the control group for each observation in the treated group. NNM then assigns a weight one to the closest non-treated observation and zero to all others. KM follows a similar idea but instead of considering only the closest observations, it uses all observations in the control group that fall under a certain neighborhood. KM gives more weight to the observations closer to the treated observation, and zero weight to observations that are outside of the neighborhood. By using more observations per each treated observation, KM reduces the variability of the estimator compared to NM. It is for this reason that KM is considered to produce less biased estimates compared to NM (Blundell and Dias 2009).

weight is put on households in the control group that have the same propensity to receive the treatment and less weight on other observations.

The DiD matching begins by estimating the weights ($W(i,j)$) (i.e. propensity scores). This is based on a probability model that estimates the probability of the household taking part in the program. Table 4.1 describes the variables used to predict household participation and provides their means and standard deviations.

Table 4.1 – Summary statistics of the covariates used in the propensity score estimation

variable	mean	std. dev.
household size	4.96	2.21
number of dependents / household size	0.24	0.22
age of household head	44.97	15.16
household head is female	0.29	0.45
community has electricity	0.34	0.47
community has a daily market	0.04	0.21

Note: dependents refer to children less than 5 years of age or adults who are more than 60 years of age. Source: FtF baseline data (2013).

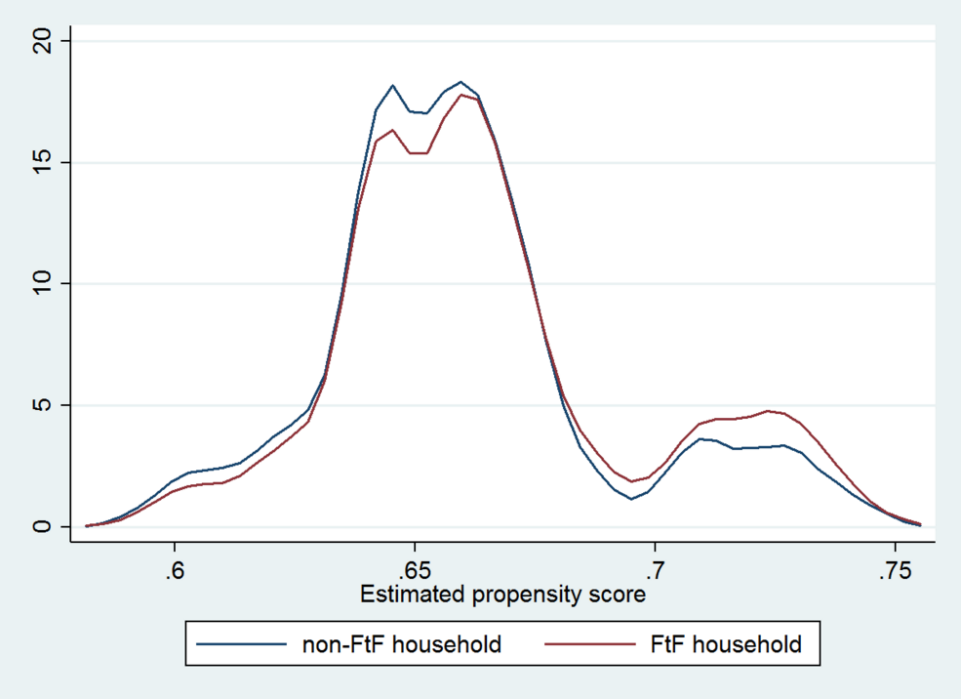
Table 4.2 provides the results of the propensity score estimation. We see that most of the household and community characteristics predict program participation. Matching cannot be done unless we find a sufficient number of households with similar propensity to take part in the program in both treatment and control groups. This condition, known as the common support assumption, can be assessed by comparing the propensity score distributions across the two groups. Common support exists when the predicted propensity scores for the FtF beneficiary households and the non-beneficiary households overlap. As seen in Figure 4.2 this condition is fully satisfied. The near-perfect common support suggests that the initial sampling strategy for the control woredas (see above) was extremely successful: the households residing in these woredas share similar observable characteristics.

Table 4.2 – Propensity score estimation results

	coefficient	std. err.	Z	p-value
household size	0.01	0.01	0.98	0.33
number of dependents / household size	0.14	0.08	1.86	0.06
age of household head	0.00	0.00	-1.45	0.15
household head is female	0.04	0.04	1.06	0.29
community has electricity	0.18	0.04	4.41	0.00
community has a daily market	-0.10	0.05	-2.16	0.03
constant	0.39	0.06	6.12	0.00

Source: FtF baseline data (2013)

Figure 4.2 – Common Support



Note: The region of common support is [0.583, 0.756]
Source: FtF baseline data (2013)

The case of repeated cross-sectional data

Equation (4.2) requires panel data; each household has to be observed in both periods. Unfortunately, this estimator cannot be implemented for all FtF outcomes. For example, children's anthropometric indicators (underweight, stunting and wasting) are constrained to children who are less than 5 years of age. Similarly, the exclusive breastfeeding indicator only considers children who are less than 6 months of age. This means that we do not necessarily observe the same child in both periods, either because s/he is no longer eligible (older than 5 years or 6 months) at the follow-up or because s/he was not yet born at the baseline. The solution is to treat our data as repeated cross-section data. In the case of repeated cross-section data, following Smith and Todd (2005), equation (4.2) transforms into

$$\beta_{DiDM} = \frac{1}{n_{1,t=0}} \sum_i \left\{ \left(Y_{1,t=0,i}\right) - \sum_i W(i,j)\left(Y_{0,t=0,i}\right) \right\} - \frac{1}{n_{1,t=1}} \sum_i \left\{ \left(Y_{1,t=1,i}\right) - \sum_i W(i,j)\left(Y_{0,t=1,i}\right) \right\} \quad (4.3)$$

The first row estimates the mean of the weighted difference in the outcome between the treatment and control group at the baseline. This is then subtracted from the mean of the weighted difference at the follow-up. It is worth noting the similarity between this equation and Equation (4.1') presented earlier.

The estimation of the propensity scores follows a similar strategy as described above. However, in order to estimate Equation 4.3, we now need to estimate the propensity scores twice; once for the baseline to

construct the weights for the first part of the equation and once for the midline to construct the weights for the second part. We also include some individual level characteristics, such as age and sex (where applicable), to the propensity score estimation.

5. Poverty and food security

5.1 Introduction

The key goal of the Feed the Future (FtF) initiative is to sustainably reduce global poverty and hunger. It focuses on two measures of poverty – the poverty headcount and household daily per capita expenditure – and self-reported hunger scale.

This chapter reports indicators for the following Goals, First Level Objectives and Intermediate Results:

- Goal: Sustainably Reduce Global Poverty and Hunger:
    - Prevalence of Poverty: Percent of people living on less than $1.9/person/day in 2011 prices.
- First Level Objective 1 – Inclusive Agricultural Sector Growth:
    - Daily per capita expenditures (as a proxy for income) in USG-assisted areas
- Intermediate Result 5: Increased Resilience of Vulnerable Communities and Households:
    - Prevalence of households with moderate or severe hunger

Of note is that the official FtF document determines poverty headcount using the poverty line of $1.25/person/day in 2005 PPP prices. This poverty line has recently (October 2015) been updated by the World Bank to $1.9/person/day in 2011 PPP prices. A number of explanations and justifications are provided by the World Bank team for updating the line. [9] In accordance with the revision, FtF baseline poverty estimates need to be updated. As a result, the estimates of the indicators for the midline need to reflect the changes.

5.2 Household consumption expenditure data

In order to compute headcount poverty and per capita household expenditure, a full-fledged information is gathered on overall household consumption expenditure in both rounds. As discussed in the literature, for example in Deaton (1997), the preference for using consumption expenditure data over income is justified mainly for two reasons. The first reason is getting accurate income data is hard and, more specifically, income suffers more from under-reporting. In contrast, expenditure data are mostly less prone to error and easier to recall. The second reason is that consumption expenditure is more stable over time and is a better measure of welfare than income.

Households were asked to report their consumption bundles of the past week, month, quarter and year depending on the type of consumption goods involved. The durability of the goods is the primary yardstick of classification. Accordingly, the consumption module has six modules: (1) food consumption of the past seven days, (2) non-food expenditure of the past one week and one month (such as fuel, toiletries, and transport), (3) non-food expenditure of the past three months (including clothing), (4) non-food expenditure of the past one year, (5) annual housing expenditure (examples include school fees, medical expenses), and (6) annual durable goods expenditure. [10] For both rounds, the cleaning procedure was adopted in computing total household consumption expenditure. For some of the commodities, like consumption from own production, there is a need to convert quantity expenditure in to values/monetary units. In such instances, the retail price datasets of 2013 and 2015, collected by the Central Statistical Agency (CSA) of

[9] See Cruz et al. (2015) and Jolliffe and Prydz (2015).
[10] The household questionnaire is submitted with the report.

Ethiopia, were used to convert the consumed quantities to expenditure in Birr for both the baseline and midline rounds, respectively.

Earlier research has documented how consumption and poverty outcomes vary across different agricultural seasons in Ethiopia (Dercon and Krishnan 2000). Both the baseline and midline FtF surveys were fielded in a pre-harvest season during which the household food stocks are particularly low. We therefore expect that the expenditure and poverty indicators are somewhat worse than they would have been had the survey been fielded during a different season (e.g. post-harvest season). This does not pose a concern to the FtF impact evaluation since the follow-up survey is also administered during the same season. However, any comparison with statistics based on other surveys should flag this difference in timing of the FtF survey in the calendar year.

5.3 Prevalence of poverty

Computing the poverty line

The FtF baseline and midline poverty estimates are computed by using the P_α class of poverty introduced by Foster, Greer, and Thorbecke (1984) (FGT). The P_α class of poverty measures are referred as the poverty headcount index, the poverty gap index and the poverty severity index. The details of computation and aggregation of these poverty indicators is provided below. Defining the per capita consumption expenditure of household i by Y_i, and ranking Y_i, as:

$$Y_1 \leq Y_2 \leq .....Y_q \leq Z <_{q+1} ..... \leq Y_N,$$

Where Z is poverty line, N is the total population, and q is the number of poor. Consequently, we can classify an individual poor if the real per person consumption expenditure is less than Z (Y<Z) and non-poor if the real per person consumption expenditure is greater than or equal to Z (Y>=Z). Once we classify an individuals into poor and non-poor, we can aggregate poverty at national and sub-national level using the P_α class of poverty measures given by:

$$P_\alpha = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{Z - Y_i)}{Z}\right)^\alpha \;;\; \alpha \geq 0, \text{ for } Y < Z.$$

When α=0, the corresponding poverty index is called the headcount index (P_0). Hence P_0 corresponds to the fraction of individuals falling below the poverty line. If α=1, the poverty index is called the poverty gap index (P_1) and it measures the aggregate poverty deficit of the poor relative to the poverty line, whereas α=2 leads to the poverty severity index which measures the squared proportional shortfalls from the poverty line.

In order to compare the incidence of poverty (poverty head count index) between groups, we use a test developed by Kakwani (1993) to test whether poverty indices ($P\alpha$) differ significantly between different groups pairwise. This requires computation of standard errors for incidences of poverty and difference in incidence of poverty.

Determining poverty line

In the baseline report, the poverty line was determined to be $1.25/person/day in 2005 PPP prices. In computing the baseline poverty line, PPP data series of 2005 to 2011, included in the World Bank WDI dataset, was extrapolated to arrive at 2013 PPP. Once the PPP figure is obtained, adjustment was also made for the period 2005-2013 cumulative domestic inflation in order to express all the prices in 2005 prices.

Recently, the World Bank updated the internationally poverty line in 2011 PPP prices to be $1.9/person/day, which is an equivalent of $1.25 person/day in 2005 PPP prices (Cruz et.at. (2015) and Jolliffe and Prydz (2015). The World Bank also released a revised set of PPP local currency conversion factors. Using the updated poverty line, $1.9/person/day, and the corresponding PPP conversion factor, we computed the poverty line in Ethiopian Birr and in 2011 prices. Once the poverty line is determined, adjustment is made for domestic inflation using CSA consumer price index series. This CSA price series is also based in 2011 prices. As per CSA's consumer price index report, the cumulative inflation rates from 2011 to 2013 and 2011 to 2015 are 125.7 and 146.0, respectively. Taking the international poverty line ($1.9 per person per day), the updated PPP local currency conversion factor for Ethiopia in 2011 is 4.92, and the CPI of 1.257 (2013) and 1.46 (2015), the poverty line is computed to be 11.75 and 13.65 Ethiopian Birr for 2013 and 2015 respectively. Households below these poverty lines are considered to be poor in the two respective periods. Unlike the baseline computation, where extrapolated figures are used, in this report we have used actual data set and update information of PPP conversion factor. What is important to note here is that, in this midline report, the poverty cutoffs are found to be lower than the one used in the baseline report. Although the line is lower than the one reported in the baseline report, it is still higher than the national poverty line, which is 10.61 Birr, when annualized it equals 3,871 Birr, in 2011 Ethiopian prices. Thus, although there are differences with the national estimate, we can expect that, as a result of having a relatively lower poverty line, the national headcount index will still be lower than the estimated poverty numbers of this report.

Prevalence of poverty in the FtF ZOI

Table 5.1 presents the headcount, poverty gap and poverty severity of the FtF baseline and midline surveys. The headcount poverty for the baseline is estimated to be 36.7 percent and the index declined to 30.7 percent in the midline. When disaggregated, the headcount figures for the FtF households are found to be 30.8 percent in the baseline while it declined to 26.9 percent in the midline. In non-FtF, or control, woredas the starting headcount figure was very high, 45.1 percent, and it dropped to 36.2 in the midline. Similar declining pattern is observed in the other two poverty indicators.

Table 5.1 – Poverty by survey round and non-FtF and FtF woredas (%)

	non-FtF woredas			FtF woredas		
	BL	ML	diff	BL	ML	diff
Headcount (H0)	45.1	36.2	-8.9	30.8	26.9	-3.9
Poverty Gap (H1)	15.6	11.6	-4.0	9.7	7.9	-1.8
Poverty Severity (H2)	7.2	5.2	-2.0	4.4	3.3	-1.1

BL refers to baseline survey (2013) and ML to midline survey (2015). Poverty line at baseline is 11.75 birr and midline 13.65 birr.

The results above imply that poverty declined in the FtF ZOI. Next we assess whether this decline can be attributed to the FtF investments. To do so, we estimate a difference-in-difference matching model described in Section 4. It is worth reminding here that the model estimate gives the net effect (or impact) of the program relative to the situation in the absence of the program. Table 5.2 provides the results. We find that there is no statistically significant impact of the program (i.e. FtF investment) for the decline in poverty. Thus, the decline in poverty cannot be (causally) attributed to the FtF. The FtF-supported programs are still underway and it may be rather early to expect statistically significant impact on poverty at this stage. It is helpful to look back at the Section 3 on implementation.

Table 5.2 – Double-difference, Matched Estimates of Impact of FtF on Poverty

Outcome	Size of impact	Standard Error	t-statistic	p-value	Interpretation
Change in poverty headcount	0.016	0.017	0.94	0.349	The FtF has no statistically significant impact on this outcome.

Note: Unit of observation is household.

Table 5.3 breaks the poverty estimates by the gender of the household head. The headcount poverty has declined from 34 to 32 percent in female headed households and from 37 to 30 in male headed households. The decline was somewhat faster in male headed households in the non-FtF woredas than female headed households, but starting from a higher baseline rate.

Table 5.3 – Prevalence of poverty by gender, survey round and non-FtF and FtF woredas

		Baseline			Midline		
		H0 Headcount	H1 Poverty Gap	H2 Poverty Severity	H0 Headcount	H1 Poverty Gap	H2 Poverty Severity
Female HHHs		34.2	11.2	51.0	32.5	10.6	4.7
Male HHHs		37.3	12.4	5.7	30.2	9.1	3.9
Female HHHs	Non-FtF woredas	39.3	13.1	5.8	36.7	12.4	5.6
	FtF woredas	30.8	9.9	4.6	29.6	9.3	4.1
Male HHHs	Non-FtF woredas	46.6	16.3	7.5	36.0	11.4	5.0
	FtF woredas	30.8	9.7	4.3	26.1	7.5	3.1

5.4 Household expenditure

Table 5.4 provides the mean daily real household expenditure expressed in adult equivalent terms. The average daily real expenditure per adult equivalent in the FtF ZOI is calculated using the PPP conversion factor and computed to be $1.84[11] and $1.89 per day for the baseline and midline respectively. There is a 2.7 percent increment in real expenditure in the FtF ZOI across the two rounds. We also computed the expenditure values using in nominal and per capita terms. These results are reported in Appendix C.

Table 5.4 – Daily per adult equivalent expenditures by survey round and non-FtF and FtF woredas

	non-FtF woredas			FtF woredas		
	BL	ML	diff	BL	ML	diff
Daily per adult equivalent expenditures (PPP dollars)	1.53	1.66	0.13	1.84	1.89	0.05

BL refers to baseline survey (2013) and ML to midline survey (2015).

[11] In converting nominal expenditure to real expenditure, we have used the updated 2011 PPP price. Thus there is slight difference in these figures compared to those presented in the baseline report.

Table 5.5 shows the difference in difference estimate based on the matching method described in Chapter 4. The estimated impact is nearly zero and statistically insignificant. Thus, FtF had no impact on changes in household expenditures.

Table 5.5 – Double-difference, Matched Estimates of Impact of FtF on Poverty

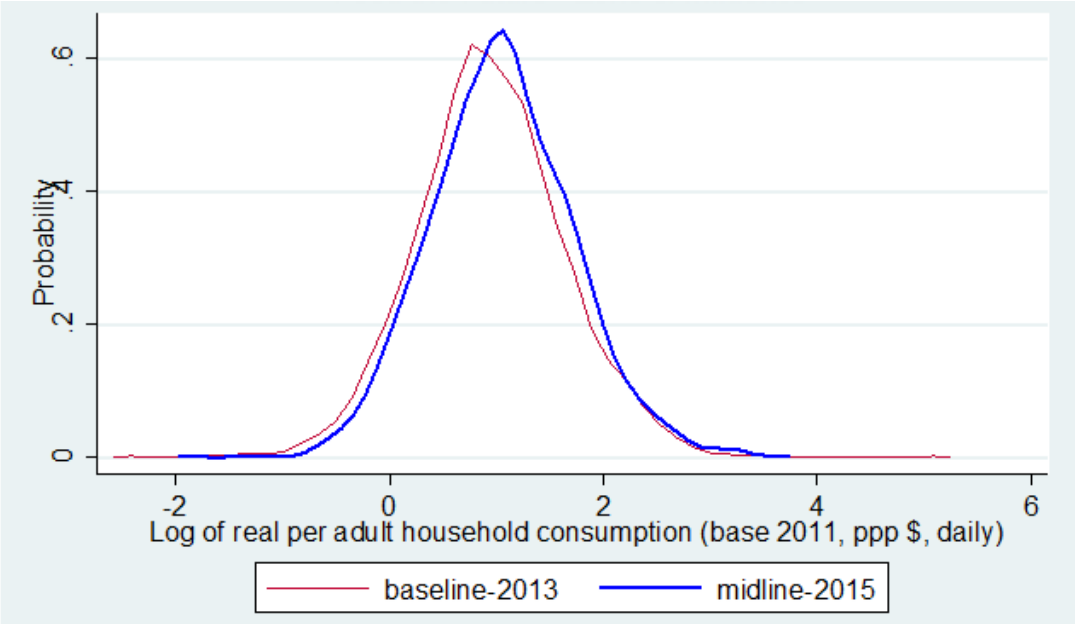
Outcome	Size of impact	Standard Error	t-statistic	p-value	Interpretation
Change in daily per adult equivalent expenditures (PPP dollars)	-0.006	0.07	-0.08	0.937	The FtF has no statistically significant impact on this outcome.

Note: Unit of observation is household.

Dominance analysis

So far we have looked at the changes in the mean and the bottom part (poverty head count) of the consumption expenditure distribution. In this section, we study the movement across the entire distribution (i.e. dominance analysis). Using the data for FtF ZOI only, Figure 5.1 depicts the density estimate of real per capita expenditure of the two rounds. We see that a uniform shift to the right in the consumption-expenditure distribution. This suggests an overall improvement in wellbeing by the midline. The dominance graph thus implies that, for any chosen poverty line, the poverty headcount for the midline will be lower than that for the baseline.

Figure 5.1 Density estimates of consumption expenditure



5.5 Household hunger scale

USAID uses household hunger scale (HHS) to measure food security in the FtF ZOI. HHS is constructed from the self-reported frequencies of three events that attempt to capture information about household's experience of hunger. More specifically, households were asked whether they experienced the following in the past 4 weeks: 1) no food at all in the house; 2) went to sleep at night hungry; 3) went a whole day and night without eating anything. HHS score is then constructed by adding up the values linked to the answers of these three questions: never (value=0), rarely or sometimes (value=1), often (value=2). Higher scores are associated with higher risk of hunger. A total value of 2 or more is taken as evidence of household suffering from moderate or severe hunger.

Table 5.6 shows the percent of households reporting moderate or severe hunger in the non-FtF and FtF woredas by survey round. The percentage of households reporting hunger increased marginally, by 0.22 percentage points (from 4.91 % to 5.13 %) or 4.5 % in the FtF woredas. This observed difference between the baseline and midline in the FtF-woredas is not, however, statistically different from zero. Meanwhile, in the non-FtF woredas percentage of households reporting hunger reduced by 0.11 percentage points (from 4.45 % to 4.56 %) or 2.5 %. This difference between the two survey rounds in the non-FtF woredas is not however, statistically different from zero.

Table 5.6 – Proportion of household reporting moderate or severe hunger by survey round and non-FtF and FtF woredas

	non-FtF woredas			FtF woredas		
	BL	ML	diff	BL	ML	diff
Hunger prevalence	4.45	4.56	0.11	4.91	5.13	0.22

Note: Statistical significance tested using proportion test based on adjusted Wald test.
Significance denoted by *** p<0.01, ** p<0.05, * p<0.1.

Table 5.7 provides the impact estimate based on the comparison of the difference in the differences in the FtF and non-FtF woredas. The estimated impact of FtF on prevalence of hunger is nearly zero and statistically insignificant. In other words, the FtF has no impact on this outcome.

Table 5.7 – Double-difference, Matched Estimates of Impact of FtF on percent of households reporting hunger

Outcome	Size of impact	Standard Error	t-statistic	p-value	Interpretation
Change in hunger prevalence	-0.001	0.008	-0.14	0.890	The FtF has no statistically significant impact on this outcome.

Note: Unit of observation is household.

5.6 Summary

Using a recently revised World Bank poverty measure, we find that the headcount poverty fell by 3.9 percentage points in the FtF ZOI. The daily real per capita expenditures rose by 2.7 percent in the FtF ZOI. However, poverty fell even more and real expenditures rose faster in the non-FtF woredas. As a result, we cannot attribute these encouraging changes in the FtF ZOI to the FtF investments. Household hunger prevalence remained the same in the FtF ZOI, at 5 percent. However, it is worth noting that previous studies

point out that the household hunger scale may not be an appropriate measure of food security in the Ethiopian context (Maxwell, Coates, and Vaitla 2013).

6. Nutrition

6.1 Introduction

The primary goal of USAID's Feed the Future initiative is to sustainably reduce global poverty and hunger. This goal is to be met through the achievement of two objectives: inclusive agricultural growth; and improved nutritional status of women and children. This chapter reports descriptive baseline and midline data on indicators relevant to this goal and objectives which capture the nutrition dimension. We also provide the impact estimates that compare the changes in the FtF woredas to those in the control woredas – woredas that have not received any FtF investments.

This chapter reports indicators for the following Goals, First Level Objectives, Intermediate Results and Sub-Intermediate Results:

- Goal: "Sustainably Reduce Global Poverty and Hunger"
    - Prevalence of underweight children under five years of age
- First Level Objective 2: Improved Nutritional Status Especially of Women and Children
    - Prevalence of stunted children under five years of age
    - Prevalence of wasted children under five years of age
    - Prevalence of underweight women
- Intermediate Result 6: Improved Access to Diverse and Quality Foods
    - Prevalence of children 6-23 months receiving a minimum acceptable diet
    - Women's Dietary Diversity: Mean number of food groups consumed by women of reproductive age
- Intermediate Result 7: Improved Nutrition-Related Behaviors
    - Prevalence of exclusive breastfeeding of children under six months of age

6.2 Child anthropometric outcomes: prevalence of underweight, stunting and wasting

We begin with reporting the child anthropometric outcome indicators:

- Prevalence of underweight children under five years of age
- Prevalence of stunted children under five years of age
- Prevalence of wasted children under five years of age

The prevalence of underweight children is calculated by comparing children's weight, given their age and sex, to international reference standards and expressing this in terms of z-scores. The international reference standard used throughout this report is based on WHO (2006). Underweight, stunting and wasting are population level measures. The mean weight-for-age z-score for a population of healthy and well-nourished children will be zero. A child is categorized as underweight if he or she has a weight-for-age z-score below -2. In a healthy and well-nourished population only fewer than 2.5 percent of children will be underweight.

Table 6.1 shows the prevalence of underweight children under 5 years of age in the non-FtF and FtF woredas by survey round. Prevalence of underweight reduced by 5.5 percentage points or 18 % in the FtF treatment woredas (from 31.9 % to 26.4 %). This observed difference between the baseline and midline in the FtF-woredas is statistically different from zero at the 1 % significance level. Meanwhile, in the non-FtF woredas, underweight prevalence fell 2.5 percentage points or 7 % (from 34.5 % to 32.0 %). However, this difference between the two survey rounds in the non-FtF woredas is not statistically significant. The table also provides the underweight prevalence for both gender groups.

Table 6.1 – Prevalence of child underweight by survey round and non-FtF and FtF woredas

	non-FtF woredas			FtF woredas		
	BL	ML	diff	BL	ML	diff
All children	34.5	32.0	-2.5	31.9	26.4	-5.5***
Female children	34.1	30.8	-3.3	31.0	26.6	-4.4**
Male children	34.7	33.4	-1.3	33.1	26.2	-6.9***

Note: Sample of children who are less than 5 years of age. Statistical significance tested using proportion test based on adjusted Wald test. Significance denoted by *** p<0.01, ** p<0.05, * p<0.1. BL refers to baseline survey (2013) and ML to midline survey (2015).

Table 6.2 provides the impact estimate based on the comparison of the difference in the differences in the FtF and non-FtF woredas. Using the double-difference matching estimator described in Chapter 4, we find suggestive evidence that the FtF is reducing underweight prevalence. The estimated impact is 4.4 percentage points and the estimate is statistically different from zero at 10 % level.

Table 6.2 – Double-difference, Matched Estimates of Impact of FtF on child underweight prevalence

Outcome	Size of impact	Standard Error	t-statistic	p-value	Interpretation
Change in underweight prevalence	-0.044*	0.023	-1.94	0.052	Prevalence of child underweight reduced by 4.4 percentage points in the FtF ZOI. The impact is statistically different from zero at less than 10 % level.

Sample of children who are less than 5 years of age.

Stunting, or low height for child's age, is considered a long-term, *chronic* measure of under-nutrition. Children who are two standard deviations below the international growth standard are categorized as stunted: short for their age.

Table 6.3 shows the prevalence of stunting among children under 5 years of age in the non-FtF and FtF woredas by survey round. Prevalence of stunting reduced by 2.1 percentage points or 4 % in the FtF treatment woredas (from 49.2 % to 47.1 %). This observed difference between the baseline and midline in the FtF-woredas is, however, not statistically different from zero. Meanwhile, in the non-FtF woredas, stunting prevalence fell 0.2 percentage points or 0.4 % (from 51.4 % to 51.6 %). This difference between the two survey rounds in the non-FtF woredas is not statistically significant. The table also provides the stunting prevalences for both gender groups.

Table 6.3 – Prevalence of child stunting by survey round and non-FtF and FtF woredas

	non-FtF woredas			FtF woredas		
	BL	ML	diff	BL	ML	diff
All children	51.4	51.6	0.2	49.2	47.1	-2.1
Female children	53.2	51.2	-2.0	45.8	46.3	0.5
Male children	49.5	52.0	2.5	52.5	48.0	-4.5*

Note: Sample of children who are less than 5 years of age. Statistical significance tested using proportion test based on adjusted Wald test. Significance denoted by *** p<0.01, ** p<0.05, * p<0.1. BL refers to baseline survey (2013) and ML to midline survey (2015).

Table 6.4 provides the impact estimate based on the comparison of the difference in the differences in the FtF and non-FtF woredas. We see that while the estimated impact of FtF on child stunting prevalence is negative (suggesting that FtF is reducing stunting prevalence), the estimate is not statistically different from zero. In other words, the change in stunting rates cannot (yet) be causally attributed to the FtF investments.

Table 6.4 – Double-difference, Matched Estimates of Impact of FtF on child stunting prevalence

Outcome	Size of impact	Standard Error	t-statistic	p-value	Interpretation
Change in stunting prevalence	-0.020	0.029	-0.68	0.500	The FtF has no statistically significant impact on this outcome.

Sample of children who are less than 5 years of age.

The final anthropometric measure reported in this section is wasting. Wasting indicates low weight-for-height and captures acute under nutrition. A child is considered wasted if his or her weight-for-age is 2 standard deviations below the international growth standard.

Table 6.5 shows the prevalence of wasting among children under 5 years of age in the non-FtF and FtF woredas by survey round. Wasting prevalence declined by 4.8 percentage points (from 15.3 % to 10.5 %) or 31 % in the FtF treatment woredas. This observed difference between the baseline and midline in the FtF-woredas is statistically different from zero at the 1 % level. Meanwhile, in the non-FtF woredas, wasting prevalence fell 3.2 percentage points (from 14.8% to 11.6 %) or 21 %. This difference between the two survey rounds in the non-FtF woredas is statistically significant at the 10% level.

Table 6.5 – Prevalence of child wasting by survey round and non-FtF and FtF woredas

	non-FtF woredas			FtF woredas		
	BL	ML	diff	BL	ML	diff
All children	14.8	11.6	-3.2*	15.3	10.5	-4.8***
Female children	14.4	10.2	-4.1*	15.0	9.5	-5.5***
Male children	15.2	13.0	-2.2	15.6	11.6	-4.0**

Note: Sample of children who are less than 5 years of age. Statistical significance tested using proportion test based on adjusted Wald test. Significance denoted by *** p<0.01, ** p<0.05, * p<0.1. BL refers to baseline survey (2013) and ML to midline survey (2015).

Table 6.6 provides the impact estimate based on the comparison of the difference in the differences in the FtF and non-FtF woredas. While the estimated impact of FtF on child wasting prevalence is negative

(suggesting that FtF is reducing wasting prevalence), the estimate is not statistically different from zero. In other words, the FtF has no impact on this outcome.

Table 6.6 – Double-difference, Matched Estimates of Impact of FtF on child wasting prevalence

Outcome	Size of impact	Standard Error	t-statistic	p-value	Interpretation
Change in wasting prevalence	-0.020	0.019	-1.07	0.286	The FtF has no statistically significant impact on this outcome.

Sample of children who are less than 5 years of age.

Compared to the baseline, statistically significant changes were recorded at midline in the fraction of children underweight, wasted (both male and female children) and stunted (male children only) in FtF woredas. Similarly significant changes were not detected in non-FTF woredas with the exception of wasting. Nevertheless, the changes discovered are not causally attributable to FtF programs except underweight prevalence.

6.3 Child feeding practices: exclusive breastfeeding of infants and minimum acceptable diet

This section reports the indicators related to child feeding practices:

- Prevalence of exclusive breastfeeding of children under six months of age
- Prevalence of children 6-23 months receiving a minimum acceptable diet

Table 6.7 shows the prevalence of exclusive breastfeeding among children less than 6 months of age in the non-FtF and FtF woredas by survey round. Breastfeeding prevalence increased by 7.4 percentage points or 10 % in the FtF treatment woredas (from 71.1 % to 78.5 %). However, this observed difference between the baseline and midline in the FtF-woredas is statistically different from zero only at the 10 % level. Meanwhile, in the non-FtF woredas, breastfeeding prevalence fell by 2.3 percentage points or 3 % (from 74.3% to 71.1 %). This difference between the two survey rounds in the non-FtF woredas is, however, not statistically significant. [12]

Table 6.7 – Prevalence of exclusive breastfeeding by survey round and non-FtF and FtF woredas

	non-FtF woredas			FtF woredas		
	BL	ML	diff	BL	ML	diff
All children	73.4	71.1	-2.3	71.1	78.5	7.4*
Female children	77.0	80.5	3.5	71.7	76.6	4.9
Male children	70.1	59.0	-11.1	70.7	80.4	9.7*

Note: Sample of children who are less than 6 months of age. Statistical significance tested using proportion test based on adjusted Wald test. Significance denoted by *** p<0.01, ** p<0.05, * p<0.1. BL refers to baseline survey (2013) and ML to midline survey (2015).

[12] It is worth noting that the sample sizes are small. We have 160 male and 168 female children who are less than 6 months of age in the baseline survey while the corresponding figures for the midline survey are 216 and 227, respectively. As a result, small changes in the number of breastfed children cause large changes in percentage terms. Therefore, the gender specific statistics should be interpreted with extreme caution.

Table 6.8 provides the impact estimate based on the comparison of the difference in the differences in the FtF and non-FtF woredas. The estimated impact of FtF on child wasting prevalence is positive suggesting that FtF is increasing exclusive breastfeeding prevalence. However, the estimate is not statistically different from zero. In other words, the FtF has no impact on this outcome.

Table 6.8 – Double-difference, Matched Estimates of Impact of FtF on exclusive breastfeeding prevalence

Outcome	Size of impact	Standard Error	t-statistic	p-value	Interpretation
Change in exclusive breastfeeding prevalence	0.089	0.065	1.37	0.171	The FtF has no statistically significant impact on this outcome.

Sample of children who are less than 6 months of age.

One of the objectives of FtF investments is to improve the access to diverse foods. For children 6-23 months of age, the indicator to measure the success in reaching this goal is minimum acceptable diet (MAD). MAD is a composite measure of dietary diversity and feeding frequency. The minimum dietary diversity for breastfed children in this age groups is defined as four or more food groups out of the following food groups: 1. Grains, roots and tubers; 2. Legumes and nuts; 3. Dairy products (milk, yogurt, cheese); 4. Flesh foods (meat, fish, poultry and liver/organ meats); 5. Eggs; 6. Vitamin-A rich fruits and vegetables; 7. Other fruits and vegetables. The minimal meal frequency for breastfed children is two or more feedings of solid, semi-solid, or soft food for 6-8 month old children and three or more for 9-23 month old children For non-breastfed children the minimum dietary diversity is defined as four or more food groups out of the following groups: 1. Grains, roots and tubers; 2. Legumes and nuts; 3. Flesh foods (meat, fish, poultry and liver/organ meats); 4. Eggs; 5. Vitamin-A rich fruits and vegetables; 6. Other fruits and vegetables. The minimum meal frequency for the non-breastfed children is defined as four or more feedings of solid, semi-solid, soft food, or milk feeds for children 6-23 and where at least two of these feedings must consist of milk.

Unfortunately, the baseline and midline surveys did not do a good job in collecting data on children's meal frequency. Caregivers did not understand what is meant by soft, semi-solid or solid foods; when asked whether the child ate soft, semi-solid or solid foods in the previous day the typical response was 'no', despite the fact that the according to the dietary diversity questions the response should have been 'yes'. As a result, the MAD prevalence rates reported in the baseline report were extremely low, below 1 percent. Meanwhile, according to the 2011 DHS report, the MAD number for rural Ethiopia is 3.4 percent for breastfed children and 1.6 for non-breastfed children (Central Statistical Agency and ICF International 2012). To rectify this issue, we used DHS data to correct our meal frequency measure. Appendix D explains this approach in detail. It is worth noting that this solution should not lead to any systematic differences between the control and treatment groups and therefore bias our impact estimates in any obvious way.

Table 6.9 shows the prevalence of minimum acceptable diet (MAD) among children 6 to 23 months of age in the non-FtF and FtF woredas by survey round. MAD prevalence increased by 1.1 percentage points or 34 % in the FtF treatment woredas (from 3.2 % to 4.3 %). However, this observed difference between the baseline and midline in the FtF-woredas is not statistically different from zero. Meanwhile, in the non-FtF woredas, breastfeeding prevalence fell by 0.9 percentage points or 39 % (from 2.3% to 3.2 %). This difference between the two survey rounds in the non-FtF woredas is, however, not statistically significant.

Table 6.9 – Prevalence of minimum acceptable diet by survey round and non-FtF and FtF woredas

	non-FtF woredas			FtF woredas		
	BL	ML	diff	BL	ML	diff
All children	2.3	3.2	0.9	3.2	4.3	1.1
Female children	2.2	3.3	1.1	4.2	3.8	-0.4
Male children	2.3	3	0.7	3.2	4.9	1.7

Note: Sample of children who are 6 to 23 months of age. Statistical significance tested using proportion test based on adjusted Wald test. Significance denoted by *** p<0.01, ** p<0.05, * p<0.1. BL refers to baseline survey (2013) and ML to midline survey (2015).

Table 6.10 provides the impact estimate based on the comparison of the difference in the differences in the FtF and non-FtF woredas. The estimated impact of FtF on Minimum acceptable diet is FtF nearly zero and not statistically significant. In other words, the FtF has no impact on this outcome.

Table 6.10 – Double-difference, Matched Estimates of Impact of FtF on minimum acceptable diet

Outcome	Size of impact	Standard Error	t-statistic	p-value	Interpretation
Change in minimum acceptable diet prevalence	0.007	0.016	0.45	0.653	The FtF has no statistically significant impact on this outcome.

Sample of children who are 6 to 23 months of age.

6.4 Women's nutritional status: prevalence of underweight and dietary diversity

This sub-section reports the indicators related to women's nutritional status:

- Prevalence of underweight women
- Women's Dietary Diversity: Mean number of food groups consumed by women of reproductive age

Improving women's nutritional status is a first level objective of FtF. Maternal health is an outcome of current and past nutrition and it is closely linked with children's health. For example, undernourished women are likely to give birth to children with small body size (Victora et al. 2008). Using WHO recommended cut-off values for the Body-Mass Index (BMI), women are categorized as underweight if their BMI is below 18.5.

Table 6.11 shows the prevalence of underweight among non-pregnant women 15-49 years of age in the non-FtF and FtF woredas by survey round. We see negligible change in this outcome. Prevalence of underweight reduced by 0.2 percentage points in the FtF treatment woredas. This observed difference between the baseline and midline in the FtF-woredas is, however, not statistically different from zero. Meanwhile, in the non-FtF woredas, underweight prevalence fell 0.1 percentage points. As expected, this difference between the two survey rounds in the non-FtF woredas is not statistically significant.

Table 6.11 – Prevalence of underweight women by survey round and non-FtF and FtF woredas

	non-FtF woredas			FtF woredas		
	BL	ML	diff	BL	ML	diff
Prevalence of underweight						
All women (15-49 years)	30.1	30.0	0.1	26.9	26.7	0.2

Note: Sample of non-pregnant women 15-49 years of age. Statistical significance tested using proportion test based on adjusted Wald test. Significance denoted by *** p<0.01, ** p<0.05, * p<0.1. BL refers to baseline survey (2013) and ML to midline survey (2015).

Table 6.12 provides the impact estimate based on the comparison of the difference in the differences in the FtF and non-FtF woredas. The estimated impact of FtF on women underweight prevalence is nearly zero and not statistically different from zero. In other words, the FtF has no impact on this outcome.

Table 6.12 – Double-difference, Matched Estimates of Impact of FtF on women underweight prevalence

Outcome	Size of impact	Standard Error	t-statistic	p-value	Interpretation
Change in underweight prevalence of women	-0.008	0.017	-0.47	0.637	The FtF has no statistically significant impact on this outcome.

Sample of women 15-49 years of age.

Women's Dietary Diversity is measured as the mean number of food groups consumed. The focus here is on women of reproductive age (15-49 years old). The indicator reports the number of food groups consumed in the day preceding the interview. A total of nine food groups are used: 1. Grains, roots and tubers; 2. Legumes and nuts; 3. Dairy products (milk, yogurt, cheese); 4. Organ meat; 5. Eggs; 6. Flesh foods and other misc. small animal protein; 7. Vitamin A dark green leafy vegetables; 8. Other Vitamin A rich vegetables and fruits; 9. Other fruits and vegetables.

Table 6.13 shows the mean dietary diversity among women 15-49 years of age in the non-FtF and FtF woredas by survey round. Dietary diversity score improved by 0.62 food groups or 39.4 % in the FtF treatment woredas (from 1.58 food groups to 2.20 food groups). This observed difference between the baseline and midline in the FtF-woredas is statistically different from zero at the 1 % significance level. Meanwhile, in the non-FtF woredas, dietary diversity prevalence improved by 0.73 food groups or 53 % (from 13.9 food groups to 2.12 food groups). This difference between the two survey rounds in the non-FtF woredas is also statistically significant.

Table 6.13 – Prevalence of women's dietary diversity by survey round and non-FtF and FtF woredas

	non-FtF woredas			FtF woredas		
	BL	ML	diff	BL	ML	diff
All women (15-49 years)	1.39	2.12	0.73***	1.58	2.20	0.62***

Note: Sample of women 15-49 years of age. Statistical significance tested using t-test. Significance denoted by *** p<0.01, ** p<0.05, * p<0.1. BL refers to baseline survey (2013) and ML to midline survey (2015).

Table 6.14 provides the impact estimate based on the comparison of the difference in the differences in the FtF and non-FtF woredas. The estimated impact of FtF on women's dietary diversity is negative and statistically significant at the 10 % level. This implies that the FtF is reducing women's dietary diversity. However, the estimated impact is extremely small (0.08 food groups) and therefore meaningless from a nutritional perspective.

Table 6.14 – Double-difference, Matched Estimates of Impact of FtF on women's dietary diversity

Outcome	Size of impact	Standard Error	t-statistic	p-value	Interpretation
Change in women's dietary diversity	-0.079	0.043	-1.86	0.064*	The FtF has a negligible (0.08 food groups) though statistically significant (less than 10 % level) on women's dietary diversity.

Sample of women 15-49 years of age.

6.5 Potential pathways

In the light of the limited implementation of the FtF projects in the ZOI (see Chapter 3), it is not surprising that many of the nutrition indicators show little movement over time or relative to the control woredas. Still, in Section 6.2 we saw impressive reductions in underweight and wasting prevalences in the FtF ZOI relative to the baseline. Compared to stunting, these two weight-based indicators are thought to reflect more acute forms of malnutrition. Therefore, it is expected that a successful nutrition intervention would first show an impact on children's weight whereas impact on linear growth faltering (stunting) would show with some delay.

In this section we try to understand the potential pathways for the observed positive trends in some of the nutrition indicators and the lack of movement in others.

Nutrition knowledge outreach

One of the ways FtF is attempting to improve nutrition outcomes is by improving the existing community-based nutrition care practices as well as expanding the access to and improving the quality of health care services. Much of this work is done together with the Ministries of Health, Agriculture and Education and the relevant more localized actors at the woreda and kebele levels. It is important to note that the government of Ethiopia has a nutrition strategy that is being widely implemented across the country. Since the 2008 National Nutrition Programme, Ethiopia's nutrition strategy has followed a community based approach where community serves as a delivery platform for various health services (Lemma and Matji 2013). The community based approach is part of the national Health Extension Programme (HEP), initiated back in 2003. The community based nutrition program is widespread, covering nearly all woredas of the country. Since its initiation, more than 30,000 Health Extension Workers have been trained and placed into communities (White and Mason 2012). One of the key tasks of the health extension workers is the provision of health education. This is done together with volunteers from the communities (Wakabi 2008). HEP typically deploys two or three health extension workers per health post. FtF supports these existing efforts and aims to build the capacity of the health workers at the woreda and kebele levels through training, supervision and research inputs.

In addition, both the FtF and the government of Ethiopia target media through capacity building and by providing nutrition information materials to the media outlets (GFDRE 2013). Radio and TV broadcasts contain nutrition related messages that promote dietary diversity and talk about the importance of micro-nutrients.

Table 6.15 shows the percentage of households with young children (less than 5 years of age) exposed to different health and nutrition outreach activities in 2015. Households in the control woredas were more likely to be visited by a health agent (social workers, health extension workers or volunteers) than households in the FtF ZOI. There are no marked differences in the coverage of specific nutrition outreach events such as percent of households taking part of cooking demonstrations. Overall then, the lack of differences here re-inforce the finding of limited implementation and the modest changes most of the nutrition indicators.

The third column shows the percentages for households residing in communities where the FtF program is active (based on information provided in Table 3.6). The percentages are surprisingly similar to the ones presented in the second column for FtF ZOI. Households in these communities have slightly better access to nutrition messages through radio and TV than the households in the control woredas.

Finally, ENGINE is considered as the main nutrition arm of the FtF program. In the last column of Table 6.15 we assess whether the exposure to these activities was higher in communities where the ENGINE project is active (based on information provided in Table 3.6). This seems to be true for some of the activities but not for all. We see that households in these ENGINE communities are more likely to have received information about feeding practices, or heard/seen such information over the radio or TV. Moreover, they were more likely to have received training from the Development Agents on new farming techniques of homestead gardening.

Table 6.15 – Nutrition knowledge outreach

	Non-FtF	FtF	FtF active	ENGINE
Visited by a health agent [a]	30	25***	26*	28
Household sought services at health post or health centers	15	15	15	16
Given information about feeding practices	13	11	13	15*
Heard/seen information feeding practices over radio or TV	9	10	11**	12**
Saw a cooking demonstration	4	4	5	6
Saw posters, leaflets or brochures about foods to feed young children	2	2	2	3
Took part in community conversation or discussion on feeding practices	6	5	5	6
Received information on production or consumption of diversified foods	8	7	6	7
DAs taught new farming techniques or homestead gardening	11	10	11	15**

Note: Share of households that received the listed interventions within the last month. Weighted means based on the survey weights. [a] social worker, health extension worker, Women's Development Army or voluntary community health worker. DA refers to Development Agent. Unit of observation is household with less than 5-year old children.
Statistical significance (relative to the non-FtF woredas) denoted by *** p<0.01, ** p<0.05, * p<0.1.
Source: Midline Survey (2015).

Vitamin-A supplementation, de-worming and growth monitoring coverage

Next we look at the coverage of vitamin-A supplementation, de-worming and growth monitoring in the six months prior the interview. The percent of children (6-59 months of age) who received Vitamin A supplements is higher in the non-FtF (48 %) than in the FtF ZOI (44 %). This difference is statistically significant only at 10 percent level. The coverage is similar to non-FtF areas in communities where FtF is active (48 %). However, Vitamin A supplementation coverage is considerably higher in communities where the ENGINE project is active: 58 percent of the children received vitamin A supplements six months prior the interview.

There are little differences in de-worming rates among children 12 to 59 months old. About one-fourth of the children in this age range are reported to have received deworming. Growth monitoring was more common in the FtF woredas compared on the non-FtF woredas. However, the percent of children who were measured by a health worker was lower in the in the communities where the ENGINE was reported to be active.

Table 6.16 – Vitamin-A supplementation, deworming and growth monitoring coverage

	non-FtF	FtF	FtF active	ENGINE
Vitamin A supplementation (children 6-59 months)	48	44*	48	58***
Deworming (children 12-59 months)	25	25	26	24
Growth monitoring (children less than 24 months)	29	35**	37***	28

Note: Weighted means based on the survey weights. Unit of observation is child in a given age bracket. Statistical significance (relative to the non-FtF woredas) denoted by *** p<0.01, ** p<0.05, * p<0.1.
Source: Midline Survey (2015).

Access to water and sanitation

Finally, improving access to water, sanitation and hygiene (WASH) services is another focus point of FtF. Recent evidence suggests that improvements in sanitation have been a major driver in the reduction in children's undernutrition rates over the last decade in Ethiopia (Headey 2015).

Table 6.17 shows percentage of households with access to sanitation and safe water source. We see that access to sanitation and safe water is considerably higher in communities where the FtF program is active. About 62 percent of the households in the non-FtF areas reported to have access to toilet and 58 percent to safe water. In the communities where FtF is active, 73 percent of the households reported to have access to toilet and 66 percent to safe water. The percentages are similar in the communities where ENGINE is active.

Table 6.17 – Changes in access to water and sanitation

	non-FtF	FtF	FtF active	ENGINE
Toilet [a]	62	63	73***	68**
Safe water source [b]	58	65***	66***	70***

Note: Percent of households that have access to toilet or safe water source. Weighted means based on the survey weights. Unit of observation is household. [a] Households with flush or pit latrine or access to community toilet. [b] Piped water (to dwelling, yard, or public) and protected water (well, dug well, or spring) are considered as safe water sources. Statistical significance (relative to the non-FtF woredas) denoted by *** p<0.01, ** p<0.05, * p<0.1.
Source: Midline Survey (2015).

6.6 Summary

The documented trends in children's nutrition indicators are encouraging. Relative to the baseline survey in 2013, underweight prevalence in the FtF ZOI fell by 5.5 percentage points (18 %) and wasting by 4.8 percentage points (31 %). Reduction in stunting prevalence was more modest and not statistically different from zero, except for male children (at 10 % level). However, the same anthropometric measures also improved in the control areas. Therefore, with the exception of the underweight indicator – in this midline assessment – we cannot statistically attribute the changes to the FtF program. For feeding practices, there are no improvements in the percent of children receiving a minimum acceptable diet relative to the baseline. In contrast, the prevalence exclusive breastfeeding of infants increased by 7.4 percentage points (10 %) but again – in this midline assessment – we cannot attribute this change to the FtF program. The indicators

capturing women's nutritional status (underweight prevalence and dietary diversity) are more stagnant – both relative to the baseline and relative to the control areas.

Finally, we looked at some of the pathways by which FtF interventions can affect the nutritional status of children including knowledge of child feeding and hygiene practices, growth monitoring, vitamin A supplementation, de-worming and water, sanitation and hygiene. We find little differences in households' exposure to Behavioral Change Communication between the control woredas and FtF ZOI. In addition, the percentages of children receiving vitamin A supplementation or de-worming are similar between these two areas but exposure to growth monitoring is somewhat higher in the FtF ZOI. Households in control areas have similar access to toilets but access to safe water is more widespread in the FtF ZOI. Nevertheless, when focusing on the communities where FtF is reported to be active, we find that access to toilets and safe water sources are considerably higher than in the control areas.

7. Women's Empowerment in Agricultural Index (WEAI)

7.1 Introduction

Feed the Future program has the goal of improving women empowerment in rural areas along with alleviating poverty. Women's empowerment is measured through Women Empowerment in Agricultural Index (WEAI). The WEAI has been developed by researchers at USAID, IFPRI, and the Oxford Poverty and Human Development Initiative (OPHI).

As discussed in Berhane et al (2014), the WEAI is composed of two sub-indexes: one that measures the five domains of empowerment in agriculture (5DE), and the other that measures gender parity in empowerment within the household (GPI). The five domains are agricultural production, resources, income, leadership, and time. Each domain is weighted equally. The 5DE sub-index contributes 90 percent of the weight to the WEAI and it is constructed using a robust multidimensional methodology known as the Alkire-Foster Method (for details, see Alkire et al. (2013)).

The GPI is a measure of relative inequality. It is designed to capture the inequality in 5DE profiles between the primary adult male and female in the household. Typically, the primary adults are husband and wife but not in all cases. WEAI index uses the mean GPI value of dual-adult households. Households without a primary adult male are excluded from the measure. The GPI shows the percentage of women who have achieved parity with respect to their male counterparts. In cases of gender disparity, the GPI reflects the relative empowerment gap between the woman's 5DE score with respect to the man's. The GPI score can thus be improved by increasing the percentage of women who have gender parity or, for those women who are less empowered than men, by reducing the empowerment gap between the male and female of the same household (Alkire et al. 2013).

Unfortunately, we cannot conduct a similar impact assessment as done in the previous two chapters. This is because WEIA is essentially an index calculated using a number of different variables. Therefore, the probability distribution of this index is not a conventional one (e.g. normal or χ^2). As a result, we cannot test the statistical significance when comparing two WEIA numbers. We therefore settle for updating the WEIA results presented in the baseline report (Bachewe et al. 2014) with our midline estimates.

7.2 WEIA results

Table 7.1 shows the aggregate index and its sub-components for FtF and non-FtF woredas. The WEAI for the ZOI (0.729) is higher than the non-FtF woredas (0.713) though the gap is small. The five domains of empowerment is 0.712 for the FtF ZOI while it is 0.696 for the non-FtF woredas. These numbers indicate that there is still widespread disempowerment of women both in the FtF ZOI and the control areas. As expected, based on the five domains of empowerment, the level of disempowerment is higher among women compared to men. The proportion of women whose empowerment is below that of their male counterparts within a household is about 53.3 percent with average empowerment gap of 22.9 percent. Women who are disempowered have acquired adequacy in 60.8 percent of the domains. A woman is considered to be empowered in the five empowered if achieved in at least 80 percent of the five domains (Alkire et al. 2013).

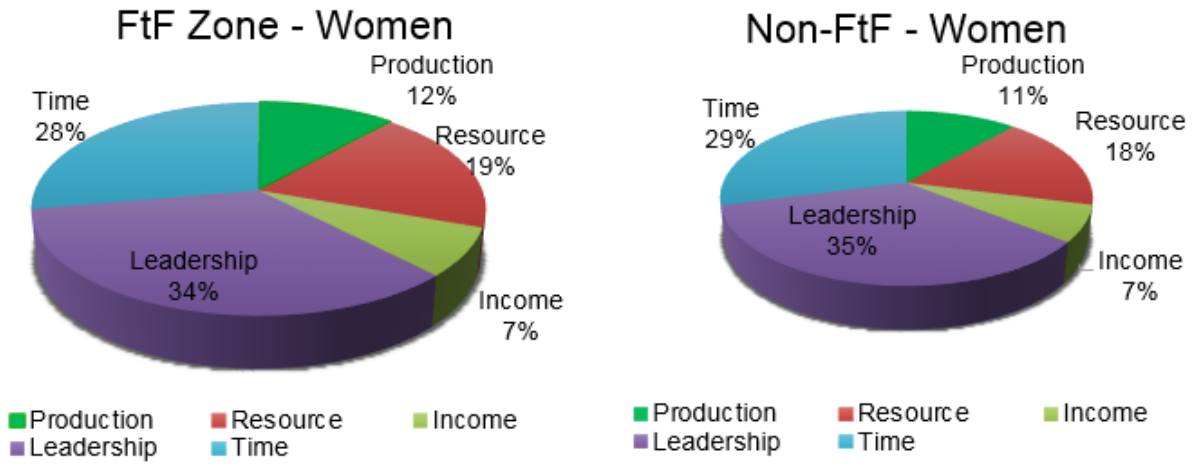
Table 7.1 – WEAI Results

Indices	Non-FtF				FtF			
	Baseline		Midline		Baseline		Midline	
	Female	Male	Female	Male	Female	Male	Female	Male
Disempowered Headcount	82.70%	67.30%	75.10%	47.40%	78.10%	59.30%	73.30%	46.50%
Average Inadequacy Score	41.20%	36.00%	40.40%	34.30%	41.00%	35.00%	39.20%	34.40%
Disempowerment Index	0.34	0.242	0.304	0.163	0.321	0.208	0.288	0.16
5DE Index	**0.66**	**0.758**	**0.696**	**0.837**	**0.679**	**0.792**	**0.712**	**0.84**
% of women with no gender parity	54.90%		56.70%		56.00%		53.30%	
Average Empowerment Gap	25.40%		23.40%		23.50%		22.90%	
GPI	**0.861**		**0.868**		**0.869**		**0.878**	
WEAI	**0.68**		**0.713**		**0.698**		**0.729**	

Source: Author's calculation using midline FtF midline survey (2015).

Next we study the WEAI domains.[13] Figure 7.1 below depicts the contribution of the five domains to the disempowerment of women. We see that leadership and time domains are the largest contributors to the disempowerment in both areas followed by the resource domain.

Figure 7.1 – Contribution of each of the 5 domains to disempowerment of women



Source: Author's calculation based on FtF midline survey (2015)

We then zoom into the sub-domains. As seen in Table 7.2, under the leadership domain, speaking in public emerges as an important constraint. Under the time domain, lack of leisure is an important factor in contributing to the disempowerment among women. Finally, under resources domain, lack of access to and decision on credit are major contributors.

[13] Appendix E provides detailed tables of the contribution of the 10 Domain Indicators to the Disempowerment Index for both FtF and non-FtF woredas.

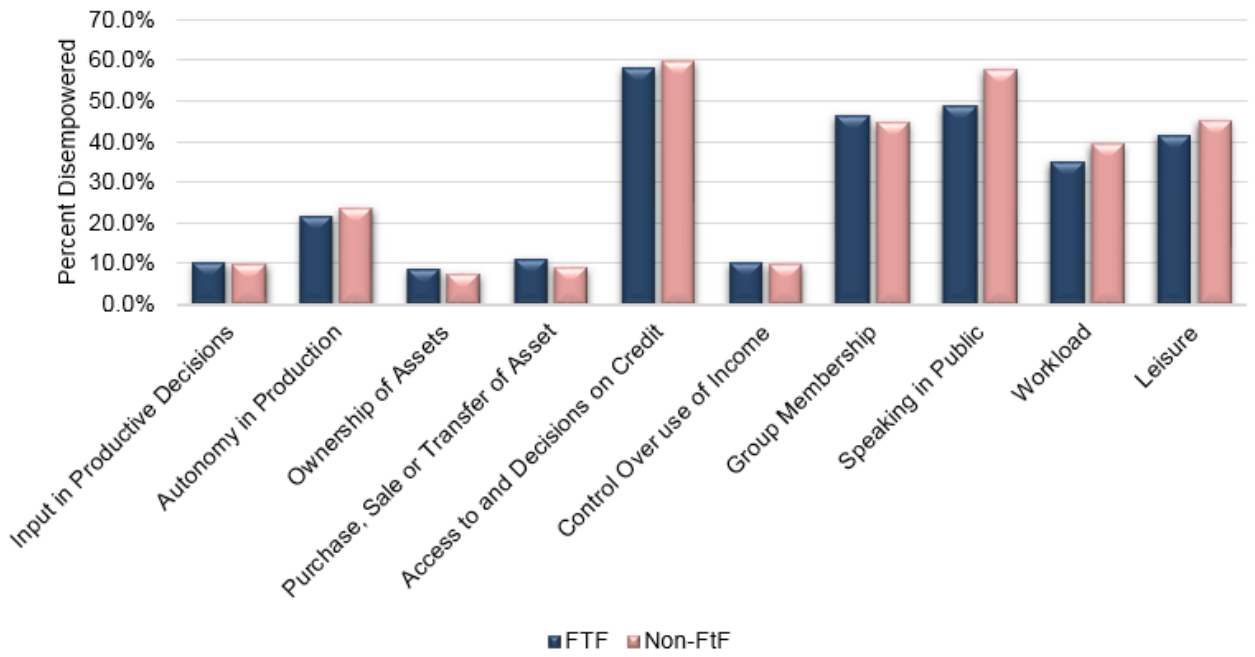
Table 7.2 – Contribution of the 10 sub-domains to the disempowerment of women

		Non-FtF woredas	FtF woredas
Production			
	Input in productive decisions	3.4%	3.7%
	Autonomy in production	8.1%	7.9%
Resources			
	Ownership of assets	1.7%	2.1%
	Purchase, sale or transfer of assets	2.1%	2.7%
	Access to and decisions on credit	13.7%	14.1%
Income			
	Control over use of income	6.7%	7.3%
Leadership			
	Group membership	15.4%	16.8%
	Speaking in public	19.8%	17.6%
Time			
	Workload	13.6%	12.7%
	Leisure	15.5%	15.1%

Source: Author's calculation based on midline FtF survey (2015).

Figure 7.2 shows the proportion of disempowered women in the different sub-components of the five domains. Close to 60 percent of women are disempowered in lack of access to and decisions on credit in both FtF and non-FtF zones. The percentage of disempowered women is also almost 60 percent for speaking in public domain in non-FtF zone while the percentage is 9 percent lower in the FtF zones. The proportion of disempowered women inadequate in group membership domain is above 40 percent in the zone of influence and the control zones

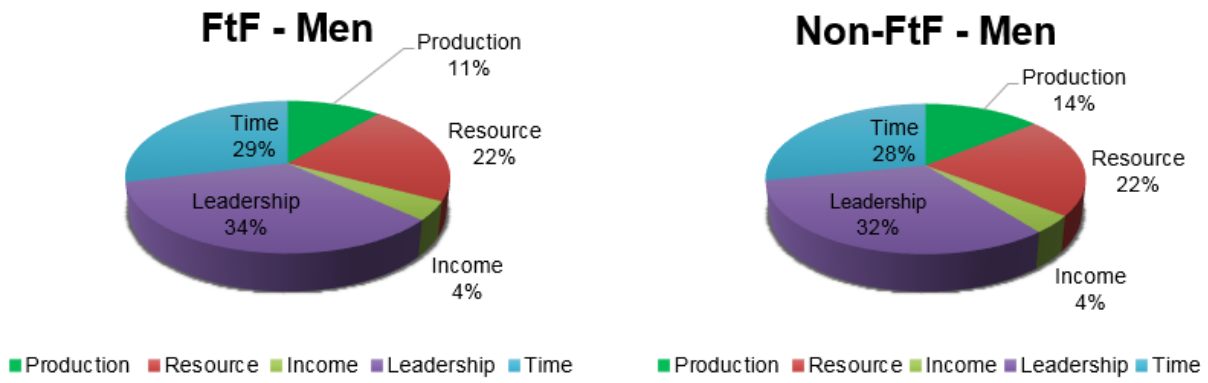
Figure 7.2 – Proportion of disempowered women by the sub-domains



Source: Author's calculation based on FtF midline survey (2015).

Finally, we provide the same analysis using the data on men. As Figure 7.3 shows, the contribution of the five domains have similar pattern as that of women.

Figure 7.3 – Contribution of each of the 5 domains to disempowerment of men



Source: Author's calculation based on FtF midline survey (2015).

Table 7.3 provides the contribution of the ten sub- domains to the disempowerment of men. Under the leadership domain, lack of group memberships (when groups are available) is an important contributor to the disempowerment of men. The domains – access to and decision on credit, speaking in public and leisure also contribute to the disempowerment of men.

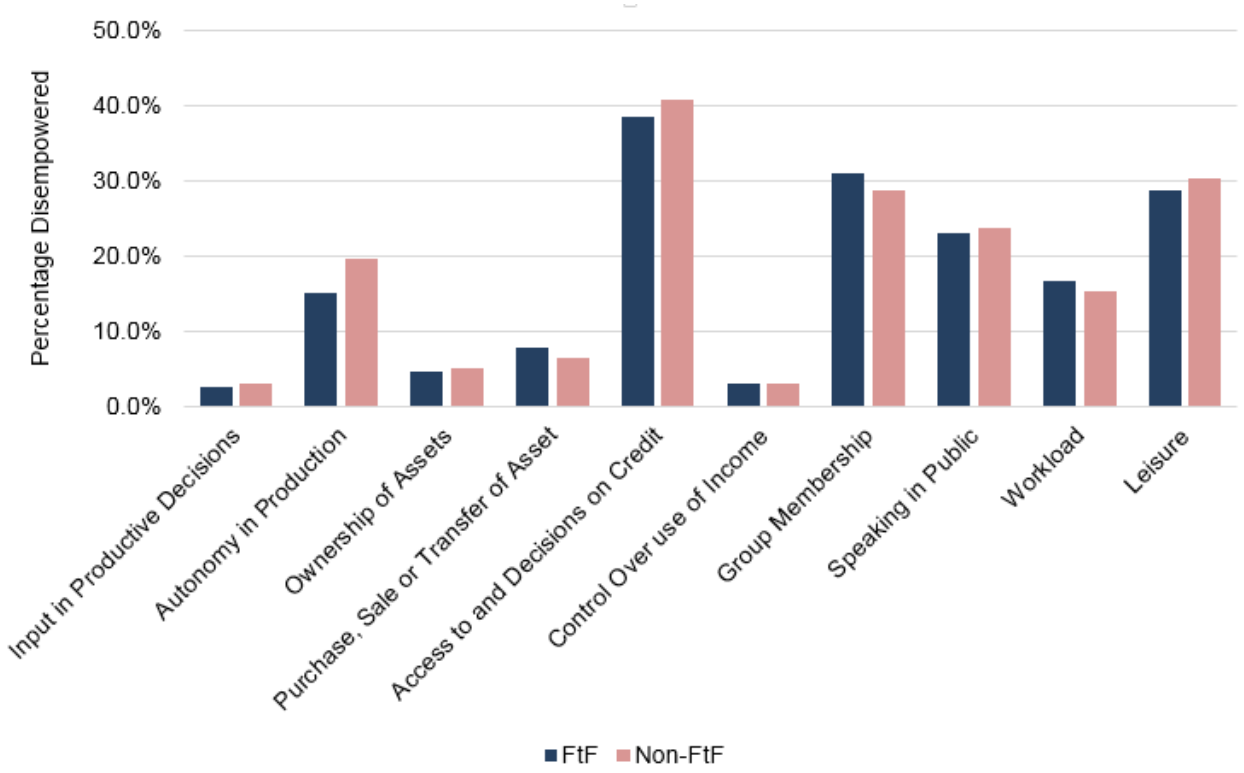
Table 7.3 – Contribution of the 10 sub-domains to the disempowerment of men

		Non-FtF woredas	FtF woredas
Production			
	Input in productive decisions	1.9%	1.6%
	Autonomy in production	12.1%	9.6%
Resources			
	Ownership of assets	2.1%	2.0%
	Purchase, sale or transfer of assets	2.7%	3.3%
	Access to and decisions on credit	16.8%	16.3%
Income			
	Control over use of income	3.8%	4.0%
Leadership			
	Group membership	17.7%	19.7%
	Speaking in public	14.7%	14.6%
Time			
	Workload	9.4%	10.7%
	Leisure	18.8%	18.2%

Source: Author's calculation based on FtF midline survey (2015).

Figure 7.4 then presents the proportion of disempowered men by the 10 sub domains. Access to and decision on credit emerges as a major contributor to the disempowerment among men. This was also an important concern among women though the percentage here is some 20 percentage points lower. Lack of group memberships and leisure times are other important constraints.

Figure 7.4 – Percentage of disempowered men in the 10 sub-domains



Source: Author's calculation based on FtF midline survey (2015)

7.3 Summary

The WEAI has improved in the FtF ZOI from 0.698 at the baseline (2013) to 0.729 at the midline (2015). However, the index also showed similar improvements in the control areas. The analysis of the different WEAI domains reveal that access to and decision on credit and leadership are major contributor to the disempowerment among women. Interestingly, the same factors are the main contributors also to the disempowerment among men.

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Appendices

Appendix A: Woreda level FtF activities

1. **Institutional Strengthening and Development**:
   - 1.1. carry out workshops and meetings for the establishment and strengthening of ARDPLACS
   - 1.2. undertake demonstration of proven technologies at FTCs
   - 1.3. furnishing FTCs with training facilities and equipment
   - 1.4. Furnishing woreda offices with computers and training facilities
   - 1.5. Establishment of women, youth and common interest groups
   - 1.6. Strengthening primary, multipurpose, RUSACCOs and cooperative unions and recommending improvement measures,
   - 1.7. Strengthening of existing kebele and sub kebele level AGP planning and implementing units,
   - 1.8. Strengthening of national and regional soil testing laboratories
   - 1.9. Strengthening animal health clinics
   - 1.10. Strengthening of lime production and establishment of bio-fertilizer production
   - 1.11. Strengthening and establishing of formal and informal farmers organization

2. **Scaling up of best practices**
   - 2.1. Training of development committees on preparation of kebele and sub kebele development plans
   - 2.2. Preparation kebele and sub kebele development plans and group sub projects
   - 2.3. Assessment and Identification of agricultural best practices
   - 2.4. Skill training on best practices
   - 2.5. Scaling up of best practices
     - 2.5.1. Activities aimed at Improving farm Productivity/Profitability
     - 2.5.2. Activities aimed at Processing and/or Value Addition
     - 2.5.3. Post-harvest Activities
   - 2.6. Promotion of community level crop and forage seed production
   - 2.7. Promotion of farm implement and equipment
   - 2.8. On farm processing and value addition
   - 2.9. Amelioration of acidic soils through strengthening of lime production centers

3. **Market and Agribusiness Development**
   - **3.1. Innovation Fund**
     - 3.1.1. Technology acquisition and transfer, including agricultural, processing, and marketing equipment, productivity techniques, plant/animal improvements
     - 3.1.2. Support and capacity building for identification of new markets and market segments, through improved access to information, research and studies
     - 3.1.3. Capacity building through BDS such as business management and development, best business practices, product promotion, and acquisition of technical and market information
   - **3.2. Demonstration Fund**
     - 3.2.1. Identification of technology
     - 3.2.2. Demonstration of technology

3.2.3. Promotion

3.3. Private Sector Capacity and Technical Assistance

3.3.1. Identification of capacity gaps

3.3.2. Providing training

3.3.3. Technical Assistance

3.4. Public Sector Capacity Development

3.4.1. Sensitization and experience sharing workshops for value chain and agribusiness development

3.4.2. Training on agribusiness development

3.4.3. Participation in value chain platforms and value chain analytics

3.4.4. Potential direct support in value chain specific constraints in public sector institutions, such as product specific tests

3.4.5. Upgrading the office facilities and skills of human resources of institutions and agencies in areas specific to the key value chains

3.5. Sectoral Analysis of Constraints and Facilitation of Sector (Value Chain) Development

3.5.1. Organizing Multi-stakeholder, public-private fora

3.6. Linkage to Credit

3.6.1. capacity building

4. Small Scale Agricultural Water Development and Management

4.1. Small-scale Irrigation Infrastructure Development:

4.1.1. Upgrading of traditional schemes

4.1.2. Rehabilitation and/or expansion of malfunctioning and partially functioning of existing SSI schemes

4.1.3. Study, design and construction of new SSI schemes such as micro-dams, gravity and pump diversions, and groundwater development (such as shallow wells)

4.1.4. Establishing and/or strengthening Irrigation Water Users Group/Association (IWUA) to allow them to actively participate in planning, designing, implementing, and O&M of SSI schemes

4.1.5. Institutional capacity building including training of farmers and experts

4.2. Water Harvesting and Micro-Irrigation Technologies

4.2.1. Community ponds, household ponds and tanks, and hand dug wells

4.2.2. Supply of portable diesel irrigation pumps, mechanical pumps, family drip systems and the like.

4.2.3. Groundwater recharges structures; and

4.2.4. Institutional capacity building in terms of training including training of farmers and experts.

4.3. Irrigation Water Use and Management

4.3.1. Introduction of improved irrigation water management technologies and production practices through on-farm demonstrations;

4.3.2. Strengthening of Irrigation Water Users Group/ Association (IWUA) to enable the communities to effectively implement improved method of managing the available water resource, settle disputes over the water use conflicts, and proper record keeping;

4.3.3. Provision of simple technologies and techniques to measure soil moisture and evaporation at field level in order to optimize crop yields through appropriate irrigation application; and

4.3.4. Provide capacity building through training of farmers and DAs in effective irrigation water management and agronomic practices.

4.4. Watershed Management

4.4.1. Farmland and homestead development

4.4.2. Communal land development:

4.4.3. Gully rehabilitation, area closure, plantation of multipurpose trees

4.4.4. Training of farmers and experts.

5. Small Scale Market Infrastructure Development and Management

5.1. Feeder Roads and Transport

5.1.1. Construction/rehabilitation of kebele to woreda center roads, kebele to kebele roads, village to kebele center roads, footbridges, and road side drainage

5.1.2. Establishing and training of road maintenance groups of the local people for the repair and maintenance of community-owned transport infrastructure;

5.1.3. Provision of critical startup spare parts and tools to the community for use under O&M; and

5.1.4. Linking interested individuals and groups who are willing to own/rent intermediate transport methods (ITM) with micro-finance institutions

5.2. Market Center Development

5.2.1. Upgrading the infrastructure of market centers located in rural, peri-urban and urban (zonal, district towns, and/or kebele towns) areas

5.2.2. Preparation of land use plan

5.2.3. Paving the market site; constructing market shed, community warehouses and access roads

5.2.4. Mobilizing community participation for infrastructure upgrading and Establishing Market Center Management Committee (MCMC);

5.2.5. Training of Market Center Management Committee on market infrastructure management and marketing, leadership and communication, bank account management, maintenance of the market infrastructure, gender issues, and social conflict management in marketing activities.

5.2.6. Development of Market center infrastructure management strategy.

Appendix B: Community level FtF activities

1. **Related with Agricultural activities**

    - Supply of improved seed variety
    - Provide improved variety of animals and importing exotic or Friesian animals
    - Introducing/giving training on new methods of farming
    - Provide fertilizer with low price
    - Training on the application of improved seed
    - Training on the application of fertilizer
    - Other

2. **Related with infrastructural development**

    - Construction/expansion of roads
    - Ground water development
    - Construction of new schools
    - Construction of new health center
    - Construction of new small scale irrigation and dump diversion
    - Maintenance of existing roads
    - Rehabilitation of ground water
    - Maintenance of school
    - Rehabilitation of health center
    - Other

3. **Related with food**

    - Distribution of foods through different stations
    - Distribution of Vitamins capsule
    - Distribution of foods
    - Training on feeding
    - Having food for work program
    - Give money
    - Other

4. **Related with protection of the environment**

    - Undertaking soil conservation activities
    - Provide information on safe guarding of the environment
    - Planting local drought resistance tree
    - Other

5. **Related with market linkage**

    - Provide information about price of production
    - Provide inputs with lower price
    - Preparing market place for crop production
    - Preparing market places for cooked foods

- Preparing animal market places
- Preparing market places for animal products
- Other

6. Institution related with credit and saving

- Opening new institution of credit and saving
- Opening new branches of credit and saving institution
- Introducing new way of credit and saving (lower interest, convenient collateral system
- Other

7. Related with mothers and children

- Training for mothers about feeding of children
- Training on birth giving
- Other

8. Related with health

- Giving medical tablets for free
- Distribution of mosquito net for free
- Free medication of HIV
- Other

Appendix C: Nominal and real average expenditure by household category and FtF household categories for the FtF baseline and midline surveys

Household categories	Statistics	Nominal expenditure per adult equivalent units		Nominal expenditure per capita in ETB		Nominal expenditure per adult equivalent (USD)		Nominal expenditure per capita (USD)		Real expenditure per adult equivalent (PPP)		Real expenditure per capita in ETB	
		Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline
All households	Mean	20.08	24.50	16.31	19.89	1.08	1.18	0.87	0.96	1.71	1.80	12.97	13.62
	Median	14.78	19.15	12.02	15.34	0.79	0.92	0.64	0.74	1.26	1.40	9.57	10.51
	SD	24.73	20.63	20.59	17.05	1.33	0.99	1.10	0.82	2.10	1.51	16.38	11.68
Non-FtF households	Mean	17.92	22.66	14.68	18.37	0.96	1.09	0.79	0.88	1.53	1.66	11.68	12.58
	Median	12.93	17.62	10.39	14.29	0.69	0.85	0.56	0.69	1.10	1.29	8.27	9.79
	SD	16.86	19.51	13.96	15.99	0.90	0.94	0.75	0.77	1.44	1.43	11.11	10.96
FtF households	Mean	21.57	25.79	17.44	20.96	1.16	1.24	0.94	1.01	1.84	1.89	13.87	14.35
	Median	16.08	20.21	13.01	16.17	0.86	0.97	0.70	0.78	1.37	1.48	10.35	11.07
	SD	28.87	21.29	24.09	17.68	1.55	1.02	1.29	0.85	2.46	1.56	19.16	12.11

Appendix D: Constructing minimum acceptable diet (MAD) of children 6-23 months old

Background

The FtF baseline and midline surveys did not do a good job in collecting data on children's meal frequency. Caregivers did not understand what is meant by soft, semi-solid or solid foods; when asked whether the child ate soft, semi-solid or solid foods in the previous day the typical response was 'no', despite the fact that the according to the dietary diversity questions the response should have been 'yes'. As a result, the MAD prevalences reported in the baseline reported were below 1 percent. Meanwhile, according to the 2011 DHS report, the MAD number for rural Ethiopia is 3.4 percent for breastfed children and 1.6 for non-breastfed children (CSA & ICFI, 2012).

Solution

The DHS-2010/11 data contains data on children's dietary diversity and meal frequency. We can use these data to build a simple regression model and use the variable coefficients from this model to predict meal frequency in the FtF data. To ensure comparability with the FtF data, we constrain the DHS data to rural areas in the 5 regions (Tigray, Amhara, Oromia, Somale and SNNP). In addition, we use a sample of children who are 6-23 months old.

Equation below describes the model:

$$mf_i = \alpha + \beta_1 a_i + FG_i{}'\beta_2 + R_i'\beta_3 + \varepsilon_i \ ,$$

where mf_i refers to meal frequency of child i, α is the intercept, a_i is child age in months, FG_i is a vector of dummies for the 7 food groups reported above that obtain a value of 1 if the child consumed from the food group, R_i is a vector of region dummies and ε_i is the error term.

Table D1 below reports the results. The R^2 statistic gives 0.45 implying that our model is able to explain 45 percent of the variation in children's meal frequency. This is encouraging as it means that our model performs reasonably well in predicting children's meal frequency.

Table D1: Modelling children's meal frequency using DHS data

	OLS
child's age in months	0.043***
	(0.008)
Food group dummies:	
1. Grains, roots and tubers	1.902***
	(0.090)
2. Legumes and nuts	0.484***
	(0.101)
3. Dairy products (milk, yogurt, cheese)	0.373***
	(0.081)
4. Meat products	0.467***
	(0.167)
5. Eggs	0.788***
	(0.146)
6. Vitamin-A rich fruits and vegetables	0.749***
	(0.114)
7. Other fruits and vegetables	0.318

	(0.236)
Region dummies:	
Tigray	-0.036
	(0.119)
Amhara	(base)
Oromiya	-0.103
	(0.109)
Somale	-0.652***
	(0.149)
SNNP	-0.282**
	(0.117)
intercept	0.162
	(0.133)
Number of observations	1,504
R^2	0.450

Note: dependent variable is number of times child ate solid, semi-solid or soft foods yesterday. *** p<0.01, ** p<0.05, * p<0.1.

We can then apply these model parameter values to the FtF data to get a predicted meal frequency. Table D2 reports the values.

Table D2: percent of children 6-23 months receiving a MAD

	baseline		midline	
	original	**predicted**	**original**	**predicted**
breastfed children	0.8	3.3	3.1	4.0
non-breastfed children	1.0	1.7	1.9	2.5

The predicted values seem more truthful and close to the ones reported in DHS 2010/11 for rural Ethiopia (3.4 percent for breastfed children and 1.6 for non-breastfed children).

Appendix E: WEIA: Contribution of the 10 Domain Indicators to Disempowerment Index

Table E1: Contribution of the 10 domain indicators to Disempowerment Index in FTF Woredas (Midline)

	Production		Resources			Income	Leadership		Time	
Statistics	**Input in productive decisions**	**Autonomy in production**	**Ownership of assets**	**Purchase, sale or transfer of assets**	**Access to and decisions on credit**	**Control over use of income**	**Group membership**	**Speaking in public**	**Workload**	**Leisure**
WOMEN										
censored headcount	0.106	0.210	0.094	0.123	0.612	0.114	0.492	0.508	0.370	0.426
%contribution	3.7%	7.3%	2.2%	2.8%	14.1%	7.9%	17.0%	17.6%	12.8%	14.7%
contribution	0.011	0.021	0.006	0.008	0.041	0.023	0.049	0.051	0.037	0.043
% contribution by dimension	10.9%			19.1%		7.9%	34.6%		27.5%	
Men										
censored headcount	0.032	0.144	0.057	0.092	0.409	0.042	0.331	0.247	0.175	0.293
%contribution	1.9%	8.6%	2.3%	3.7%	16.3%	5.0%	19.7%	14.7%	10.4%	17.5%
contribution	0.003	0.014	0.004	0.006	0.027	0.008	0.033	0.025	0.017	0.029
% contribution by dimension	10.5%			22.2%		5.0%	34.4%		27.9%	

Table E2: Contribution of the 10 domain indicators to Disempowerment Index in Non-FTF Woredas (Midline)

Statistics	Production		Resources			Income	Leadership		Time	
	Input in productive decisions	Autonomy in production	Ownership of assets	Purchase, sale or transfer of assets	Access to and decisions on credit	Control over use of income	Group membership	Speaking in public	Workload	Leisure
WOMEN										
censored headcount	0.108	0.264	0.086	0.104	0.640	0.107	0.490	0.618	0.426	0.483
%contribution	3.4%	8.4%	1.8%	2.2%	13.5%	6.8%	15.5%	19.6%	13.5%	15.3%
contribution	0.011	0.026	0.006	0.007	0.043	0.021	0.049	0.062	0.043	0.048
% contribution by dimension	11.8%			17.5%		6.8%	35.1%		28.8%	
Men										
censored headcount	0.035	0.209	0.058	0.072	0.430	0.037	0.299	0.261	0.157	0.320
%contribution	2.0%	12.1%	2.2%	2.8%	16.6%	4.2%	17.3%	15.1%	9.1%	18.5%
contribution	0.004	0.021	0.004	0.005	0.029	0.007	0.030	0.026	0.016	0.032
% contribution by dimension	14.2%			21.6%		4.2%	32.4%		27.6%	