Resilient Agriculture for Inclusive and Sustainable Ethiopian Food Systems Baseline Report 2022

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SWRE-RAISE-FS-working paper # 003

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Resilient Agriculture for Inclusive and Sustainable Ethiopian Food Systems (RAISE FS)
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Resilient Agriculture for Inclusive and
Sustainable Ethiopian Food Systems

The RAISE-FS baseline survey conducted to collect data for objectively measuring its impacts and outcomes. The survey is meant to establish a baseline for key indicators of the RAISE-FS project. The survey data collected based on the RAISE-FS outcome areas which include demographic characteristics of households, resource ownership, households' food and nutrition security status, production systems and agricultural practices, gender roles and responsibilities, extension and advisory services, enabling environments.

Keywords: Baseline, food and nutrition security, production systems, RAISE-FS outcome indicators

RAISE-FS working paper #003

Photo cover: Anteneh Mekuria

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Preface

The Resilient Agriculture for Inclusive and Sustainable Ethiopian Food Systems (RAISE-FS) is a four-year programme funded by the Dutch Embassy in Addis Ababa and hosted by Stichting Wageningen Research Ethiopia based in Addis Ababa, to bring about transformation in the Ethiopian food system. RAISE-FS will develop and implement a demand-driven and interdisciplinary approach to Research for Food System Transformation (R4FST) and as such contribute to the Government of Ethiopia's transformational agenda.

RAISE-FS adopts the food system approach as a Theory of Change (ToC), which helps in analysing the drivers and food system activities that contribute to the transformation of the food system by addressing leverage points, resulting in increased productivity, enhanced value chain performance, and improved human nutrition for food security while minimizing environmental impact and ensuring social inclusion.

The programme aims to leverage transformation in Ethiopian food systems, covering the spectrum from food-insecure households and regions, to better-off households that are food-secure and can realize production surpluses, towards commodity commercialization efforts that contribute to rural and urban consumption demands and export.

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List of abbreviations and acronyms

CAPI	Computer Assisted Personal Interview
CSA	Central Statistical Agency
DA	Development Agent
DE	Domain of Empowerment
FANTA	Food and Nutrition Technical Assistant
FHH	Female Headed Households
FI	Food Insecurity
FS	Food System
FCS	Food Consumption Score
GPI	Gender Parity Index
HFIAS	Household Food Insecurity Access Scale
KPI	Key Performance Indicator
MDD-W	Minimum Dietary Diversity for Women
MHH	Male Headed Household
MSc	Master of Science
NGO	Non-Governmental Organization
ODG	Open-source Data Kit
QDD	Quality Dietary Diversity
RAISE-FS	Resilient Agriculture for Inclusive and Sustainable Ethiopian Food Systems
SACCO	Saving and Credit Cooperation?
SNNPR	South Nations, Nationalities and Peoples Region
SWR	Stichting Wageningen Research
TLU	Tropical Livestock Unit
VSLA	Village saving and Lending Association
WCDI	Wageningen Centre for Development Innovation, Wageningen University & Research
WFP	World Food Programme
WUR	Wageningen University & Research
WEAI	Women Empowerment in Agriculture Index

Summary

The baseline survey was designed to collect data from three different food systems namely food insecure, high potential and commercial food systems. The report is organized in different sections in line with the outcome areas of the project. It starts with a section on demographic characteristics of households which includes age and family size distribution of households, marital status, education, and primary occupation of household heads and members. The average age of household head is about 47 years and female headed tends to be slightly older (48 years). Regarding marital status of household heads, the majority of household heads (about 70%) in all food systems are married while 10 to 20% of them are widowed.

The surveyed households have on average five members. Regarding educational status, most household heads doesn't read and write. The percentage is very high for female heads (about 68%) compared to male heads that ranges from 26% to 37%.

Most farmers produce cereals mainly in the main season *Meher* with low experiences of agronomic practices which causes low yield. Farmers have very low experience of intercropping, relay cropping, agroforestry and green manuring. A low proportion of farmers are rotating cereals with pulses, which is recommended for soil fertility maintenance. Among all the plots covered during the survey, the majority were planted with local varieties of crops, except maize and wheat which are relatively more planted with improved varieties. The survey also indicates that the application of fertilizers was low.

Effective extension and advisory services for supporting farmers by development agents have the potential to improve agricultural productivity, net farm income and food security. The data indicates that the frequency of extension agents contact with farmers for their advice was low in the implementation areas with slight differences among the regions. The proportion of farmers visited with low frequency was, 46% in Oromia, 57% in SNNP/Sidama and 66% in Amhara. The result indicates that a large proportion of farmers are visited by DAs only once in more than a month

The baseline survey indicates that decision making of women on production and income generated from different sources was low compared to men. This contributes to low women's empowerment in agriculture. High workload and less access to finance were the main indicators for contributors of women's disempowerment in agriculture.

Most households rely on own production to satisfy their food requirements. Households in food insecure food systems also rely on purchase to satisfy their food requirement, with small proportions relying on food aid. Moreover, the data indicates that an average household faced food shortage for 3.9 months during a year in food insecure food systems, while an average household in both high potential food system and commercial food system didn't satisfy their food requirement from their own production for 1.2 months during a year. The data also indicate that food items consumed by household members were less than half as a diverse as required for a healthy diet. Although the dietary diversity varies among food system typologies with statistically significant differences.

The survey result indicates that access to finance services was limited in all food systems, especially for women and youth. Informal sources like friends, relatives and informal lenders were more accessible than formal financial services like banks, micro finance and village saving and lending associations. Accessibility to formal sources for female headed households was very limited. In all food systems, female headed households have less access to finance compared to male headed households

Introduction

Resilient Agriculture for Inclusive and Sustainable Ethiopian Food System (RAISE-FS) is a four-year program funded by The Netherlands Embassy in Addis Ababa and hosted by Stichting Wageningen Research Ethiopia (SWR Ethiopia) based in Addis Ababa, to bring about transformation in the Ethiopian food system. The RAISE-FS Theory of Change adopts the food system approach analysing the drivers and food system activities that contribute to the transformation of food system by addressing leverage points, resulting in increased productivity, enhanced value chain performance and improved human nutrition for improved food security while minimizing environmental impact ensuring social inclusion.

The programme specifically works to achieve five specific interrelated outcomes that can ensure demonstrated evidence to promote resilient, inclusive and sustainable food system in Ethiopia. The outcomes are;

- Social and economic empowerment of women and youth in food system increased
- Efficient and environmentally sustainable production increased
- Sector performance and value chains enhanced
- Availability of safe and nutritious foods increased
- Enabling environment for food system change enhanced

SWR Ethiopia collects data for objectively measuring its impacts and outcomes. Hence RAISE-FS established a baseline for key indicators of resilient, inclusive and sustainable food system in Ethiopia.

Objective of the baseline study

The general objective of the baseline survey is to collect reliable data that help to estimate the current value of the Key Performance Indicators (KPIs) identified for each of the project outcome areas. Namely, KPIs in relation to social and economic empowerment of women and youth, efficient and environmentally sustainable production, sector performance and value chains, availability and use of safe and nutritious foods, and associated enabling environment at the start of RAISE-FS project implementation.

Specific objectives of the baseline are:
- To estimate the value of the KPIs of the RAISE FS project as basis and reference point for tracking the RAISE-FS's progress; that is, to measure the degree and quality of change during an activity's implementation;
- To provide information to serve as a benchmark for all future activities for measuring RAISE-FS success;
- To generate additional information about the status, challenges and opportunities related with sustainable agricultural production, gender and social inclusion, availability and use of safe and nutritious food, performance of the target value chains, and enabling environment.

Methodology

Study area

The study area for the baseline study has been chosen in line with the RAISE FS implementation *woreda s* and associated *kebeles*.

A sample of three *woreda*s have been selected from each region. In each region *woreda*'s were selected representing three different food system typologies: food insecure, high potential and commercial.

These are:

- Angot (food insecure), Yilmana Densa (high potential), and West Armacho (commercial) from Amhara;
- Boloso Bombe (food insecure), Gumer (high potential) and Hawassa Zuria (commercial) from SNNP and Sidama;
- Babile (food insecure), Wolmera (high potential), and Ada'a (commercial), from Oromia.
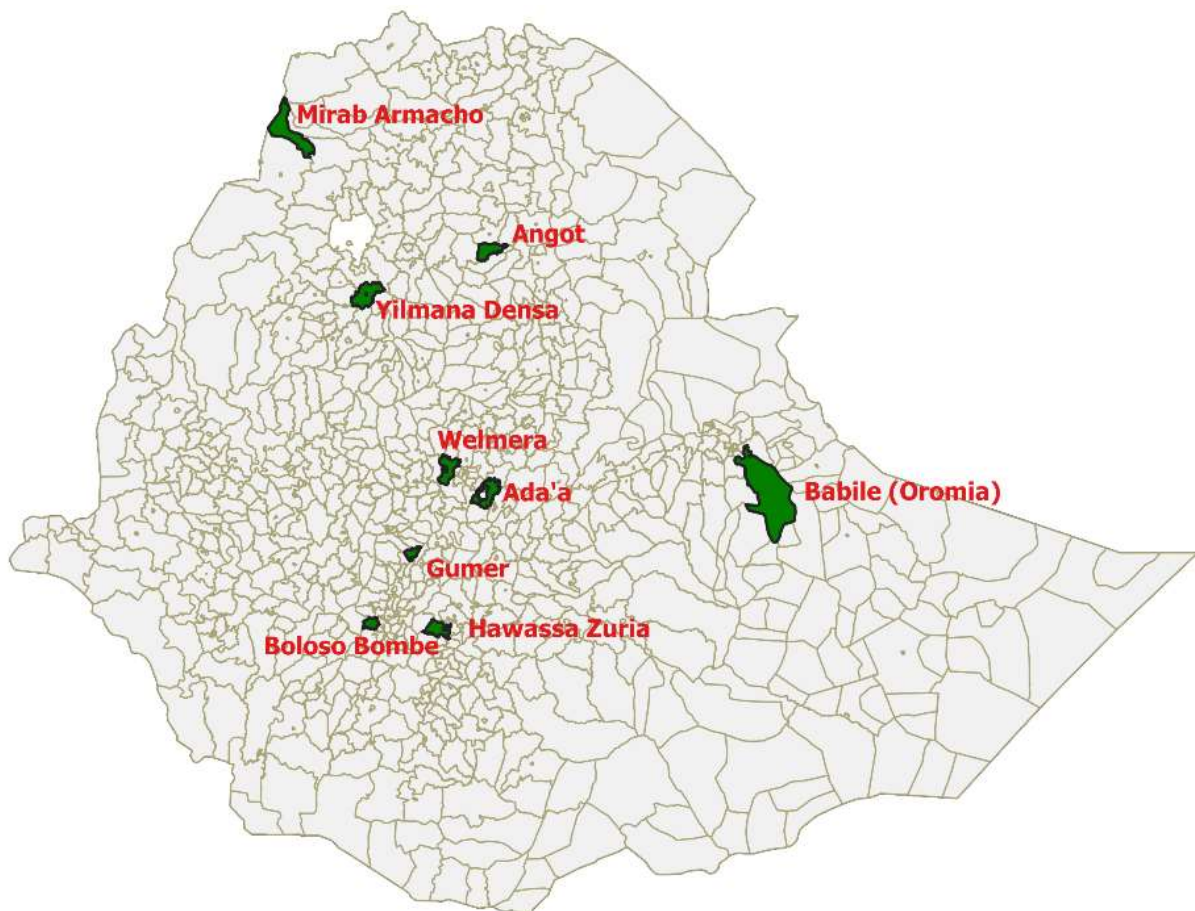
Figure 1: Selected woredas

Sampling design and data collection

Multistage sampling approach was followed to identify sample respondents with probability and non-probability sampling techniques. In the first stage, sample kebeles were selected from the RAISE FS intervention *woreda*s in each region purposively and while in the second stage, sample households were selected randomly from the list of households prepared at *kebele* level.

A total of 18 *kebeles* for all regions, six from three *woreda* s of Amhara, six from three *woreda*s of SNNP and six from three *woreda*s of Oromia were selected. the second stage, sample households were selected randomly from the list of households prepared at *kebele* level. Taking the number of households from ESS Ethiopia population and census report for each kebeles and forecast the number of households in selected kebeles for 2022, 918 respondents were randomly sampled for interview (306 respondents from Amhara, 307 from SNNP, and 306 from Oromia)

Table 1: Sample size per different woredas

Region	*Woreda* / food system	*Kebele* sampling		Household sampling		Data collected	Coverage
		Total no. *Kebeles*	Sampled *Kebeles*	Total no. HHDs	HHDs sampled		
Amhara	Angot / Food insecure	13	2	2460	101	104	103%
	Yilmana Densa /Food secure	35	2	4453	103	102	99%
	West Armacho /Commercial	14	2	2118	101	102	101%
Oromia	Babile /Food insecure	21	2	2565	102	104	102%
	Wolmera /Food secure	23	2	2105	101	106	105%
	Ada'a /Commercial	24	2	3543	103	100	97%
SNNPR /Sidama	Boloso Bombe /Food insecure	19	2	3512	103	104	101%
	Gumer /Food secure	19	2	2711	102	102	100%
	Hawassa Zuria/Commercial	23	2	2755	102	102	100%
Total			18		918	926	

The number of respondents determined for each *woreda* were allocated to each kebeles proportional to the total number of households in the *kebele* to guarantee an equal representation of households in each *kebele*. Among the determined sample size, 75% were adults and 25% were Youth (age 18 to 35 years) respondents in which 50% were female youth and 50% were male youth. Among the 75% adult samples, respectively 30%, 20% and 50% were Female heads (FHH), Females in male headed household (FMHH) and male heads (MHH) respectively.

Data collection

Development of the questionnaires

A Structured questionnaire for baseline data collection was designed for each area of outcomes by M&E staff and respective experts from each area of outcomes. The survey questionnaire was designed into Computer Assisted Personal Interview (CAPI) mode by using KOBO toolbox which uses open-source data kit (ODK).

Training of data collectors and supervisors

Prior to field data collection, all the field teams (data collectors, supervisors and coordinators) were trained on the basics of baseline survey and were extensively exposed to the questionnaires for this baseline survey. A two-day training was given for the data collectors and supervisors on the detailed content of the survey questionnaire, and how to ethically conduct the household survey. Then a one-day practical CAPI training was provided to exercise on data collection by using tablets. This three-day training was followed by a one-

day field exercise in the nearby target kebele that had already been identified for the survey. This helped data collectors and supervisors to internalize the questions and check preciseness (clarity) of the questions for the respondents, besides exercising the application using tablets.

Field data collection

A parallel field data collection for Amhara and SNNP was conducted while it was held in Oromia after the previous two regions completed. Data was collected from 15 June 2022 to 02 august 2022 in all regions. The primary data were collected with a household survey interview, using tablets with the KOBO application installed. In the field, the supervisors took full charge of the administration of the questionnaires and the eventual product of data collection in the field. The supervisors guided and supported the enumerators and were there to help resolve minor field difficulties.

Before actual field data collection started, the tools were piloted by administering it to selected respondents. On the basis of the results obtained from the pilot, necessary modifications were made in the questionnaire. 15 data collectors (Five from each region), holding a minimum of a MSc in the fields of agriculture or related socio-economic area were employed for data collection.

Data analysis, estimates for key indicators

Demographic Characteristics

The demographic characteristics are analysed considering the household type (FHH, MHH, FMHH, and Youth), the respondent's education level, average age, family size, marital status, and type of house the household lives in.

Household heads, women in male headed households and youth
The actual coverage of total sample size was 926 from all nine *woreda*s and 18 *kebeles* which was more than the minimum sample size planned (about 101% coverage). The actual coverage of surveyed households shows that about 75% were male headed and 25% are female headed households. Following the methodology for respondent selection, 191(21%) were female heads of households (FHH), 381(41%) were male heads of households (MHH), 147(16%) were women in male headed household (FMHH) and 207(22%) were youth (age 18 to 35 years) from both male and female headed households. Overall, 52.6% were male respondents while the rest 47.4% were female respondents. Overall, the proportion of respondents are similar in all regions with slight differences.
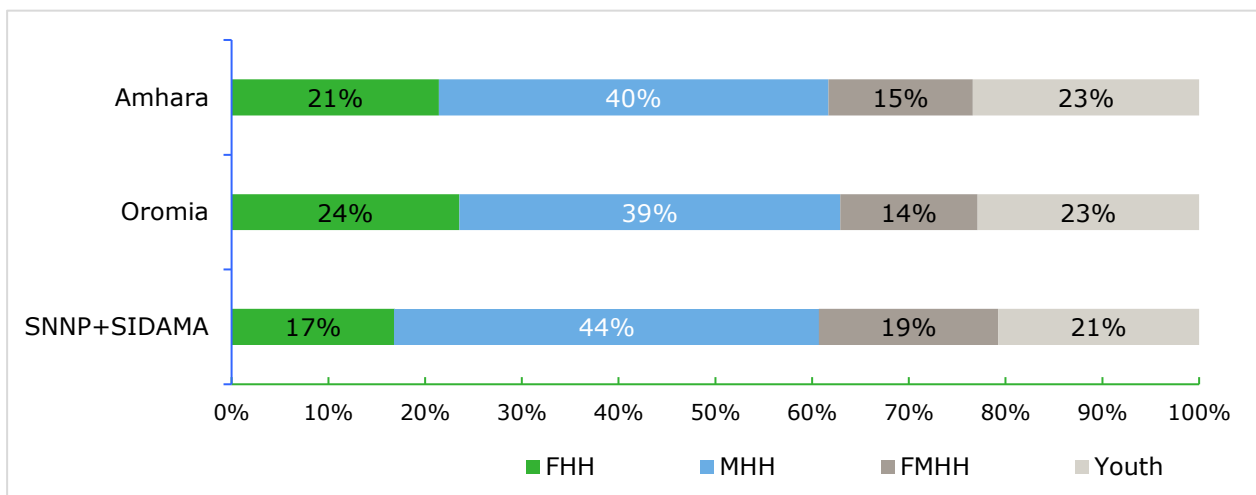
Figure 2: Respondents for baseline survey according to household situation

Education
The baseline survey assessed the educational status of both household head and their spouses by asking the highest level of education completed. From Table 2, about 49% of household heads have not joined formal education, 38% of them completed primary school, 10% of them completed secondary school and only 3% graduated with diploma and above. Level of education differences are also observed for household head between regions separately for gender. A chi-square test at 5% level of significance for the difference show that there is strong evidence (P<0.000) that educational level of household's head is significantly different among regions for male heads while the difference is not significant (P=0.249) for female heads. Another chi-square test also analysed for the differences in level of education of male and female heads separately for each region. There is strong evidence that the level of education for male and female heads are significantly different for all regions.

Table 2: Educational level of household head

region	sex	Can't read and write %	Religious education %	Adult education %	Primary school 1st cycle %	Primary school 2nd cycle %	Secondary school (Grade 9 to 12) %	Diploma and above %	Chi-square test for difference in education level P-value
Amhara	Male	36.8	6.1	14.9	16.7	16.2	8.8	0.4	
	Female	68.8		15.0	11.3	2.5	2.5		
	Overall	45.1	4.5	14.9	15.3	12.7	7.1	.3	0.001**
Oromia	Male	34.1		3.5	30.6	16.2	11.8	3.9	
	Female	67.5		5.0	16.3	10.0	1.3		
	Overall	42.7		3.9	26.9	14.6	9.1	2.9	0.000**
SNNPR /Sidama	Male	25.7	0.4	1.3	25.3	23.6	15.2	8.4	
	Female	67.6		2.8	19.7	7.0	2.8		
	Overall	35.4	0.3	1.6	24.0	19.8	12.3	6.5	0.000**

Statistical tests using Chi-Square test:

*1.Level of education * Regions: Male-P=0.00, Female-P=0.249*

*2. Level of education * Gender: Amhara-P value= 0.001, Oromia-P value=0.00, SNNPR/Sidama-P value=0.000*

Age

Table 3 shows that, the average age of surveyed household heads was 47 years with the standard deviation of 12.7 and slight differences across regions observed. Similarly for all respondents, the average age was 39 years with standard deviation 15.5 which is smaller than household head since youth of age 18 to 35 also included as respondents. The average age distribution of male and female respondents across the regions were significantly different for Amhara and SNNP while similar for Oromia. In the reverse way, average age distribution for male and female household head were significantly different for Oromia while not for Amhara and SNNP.

Table 3: Average Age (years), 95% t-test for difference of means for household head and respondent

region	sex	Household head				Respondents			
		N	Mean age	Standard Deviation	t-test-Male vs Female	N	Mean age	Standard Deviation	t-test-Male vs Female
Amhara	Male	228	44.6	12.6		162	38.5	14.9	
	Female	80	43.7	11.0		146	34.2	13.3	
	Overall	308	44.4	12.2	0.577	308	36.4	14.3	0.009**
Oromia	Male	230	46.2	13.1		161	39.1	15.9	
	Female	80	50.9	12.1		149	39.4	16.4	
	Overall	310	47.4	13.0	0.005**	310	39.2	16.1	0.855
SNNPR /Sidama	Male	237	49.1	13.2		164	43.5	16.3	
	Female	71	50.6	9.7		144	38.4	14.7	
	Overall	308	49.4	12.5	0.290	308	41.1	15.8	0.005**

*** Evidence to reject equality of means*

Family size and marital status

Household family size is a direct relationship with food insecurity status. The survey results shows that most households (56%) have family size of 4 to 6 in all regions. The average and median value of family sizes for Amhara and Oromia are five with standard deviation of 1.6 and 2 respectively while for SNNP is six with standard deviation of 1.9. Large family sizes are observed in Oromia and SNNP with 12 and 13 respectively. The difference of average family size is statistically significant over regions *(df=2, P=0.000).* Similarly, the

food system has an effect on the difference of average family size and significantly different *(df=2, P=0.000).*
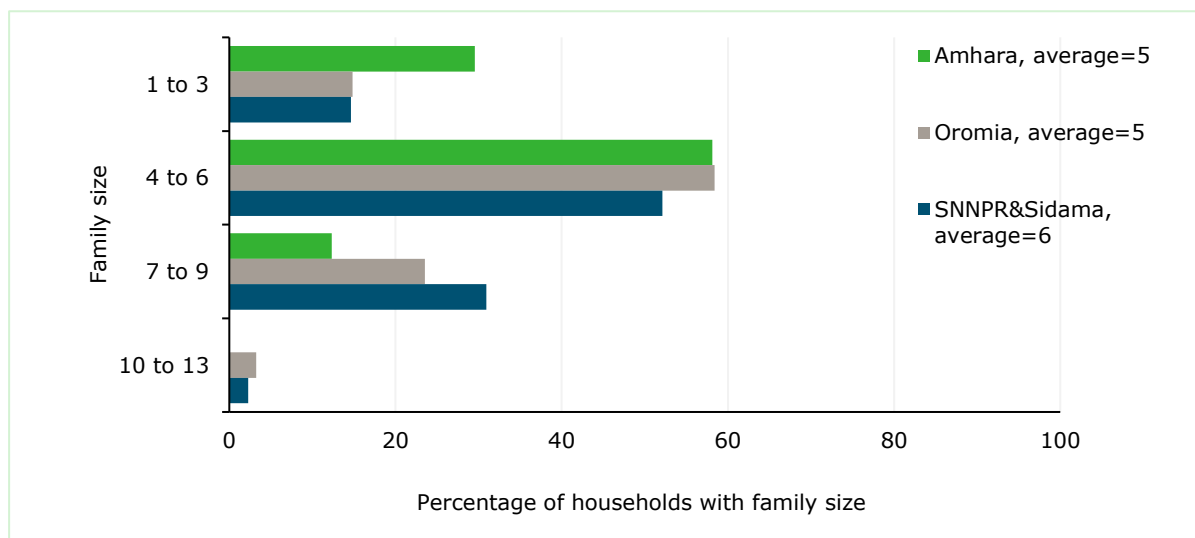
Figure 3: Family Size of household

The result shows the distribution of marital status for household head was similar with slight differences across regions (Figure 4). Over 70% of surveyed household heads were married while few less than 20% were widowed. A larger proportion of divorced house hold head was observed in Amhara. The difference of the distribution was also tested statistically and there is strong evidence that the marital status of household heads was significantly different across regions *(P-value <0.000, Chi-square =59.94 and df=6).*
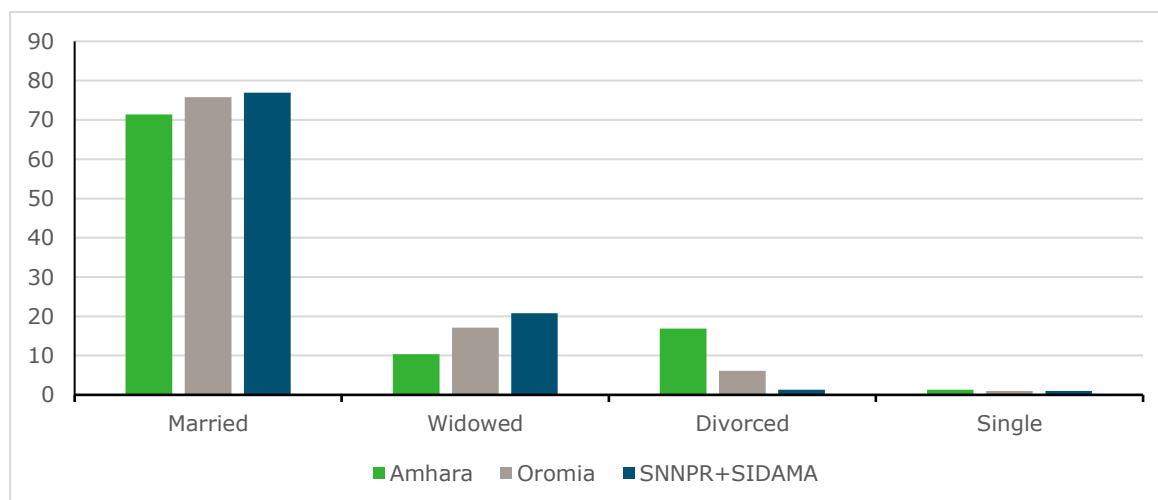
Figure 4: Marital status of household head

Resource ownership
Productive resources are essential to the livelihoods and food security of the households in rural areas. Household's resource ownership in the implementation area was analysed according to the type of house owned, number of livestock owned, along with land owned and rented in.

Dwelling
One of the assets of the surveyed households is their dwelling, the house in which they live. Most households (95%) owned the dwelling permanently while about 3.6% lived in a rented house. The rest households are living in someone other's house for free. The dwelling status of surveyed households significantly different across regions for both female headed and male headed households (P<0.000) while it is not significantly different for male headed and female headed within region at 5% level of significancy.

Table 4: Kind of dwelling in which household lives

region	Sex of HH head	Private owned permanent %	Free of rent %	Rented %	Chi-square test P-value
Amhara	Male	91.2	1.3	7.5	
	Female	81.3	3.8	15.0	
	Overall	88.6	1.9	9.4	*0.049**
Oromia	Male	97.0	2.6	.4	
	Female	96.3	1.3	2.5	
	Overall	96.8	2.3	1.0	*0.212*
SNNPR /Sidama	Male	100.0	0.0	0.0	
	Female	98.6	0.0	1.4	
	Overall	99.7	0.0	.3	*0.067*
Total	Male	*96.1*	*1.3*	*2.6*	*0.000***
	Female	*91.8*	*1.7*	*6.5*	*0.000***
	Overall	*95.0*	*1.4*	*3.6*	*0.000***

** Difference is significant at 1% level

The roof type of the dwelling is one indicator for household's wealth status. About 77% of the households lived in a house with a corrugated iron sheet roof and 22% lived in a thatch roof house. The distribution of roof cover type is significantly different over regions for both male and female headed households but there is no evidence that the roof type is significantly different over gender of household head within region.

Table 5: Roof type of the main house

region	Sex of HH head	Corrugated Iron sheet %	Concrete/ cement %	Thatch %	Chi-square test P-value
Amhara	Male	72.4	1.3	26.3	
	Female	72.5	0.0	27.5	
	Overall	72.4	1.0	26.6	*0.582*
Oromia	Male	98.3	0.0	1.7	
	Female	98.8	0.0	1.3	
	Overall	98.4	0.0	1.6	*0.765*
SNNPR /Sidama	Male	62.9	0.0	37.1	
	Female	54.9	0.0	45.1	
	Overall	61.0	0.0	39.0	*0.229*
Total	Male	77.7	.4	21.9	*0.000***
	Female	76.2	0.0	23.8	*0.000***
	Overall	77.3	.3	22.4	*0.000***

** Difference is significant at 1% level

Land ownership

Figure 5 shows farmers in the *woreda* 's with a commercial food system typology in Amhara and Oromia owned larger land size of cultivated land compared to *woreda* 's with a high potential and food insecure food system typology. But farmers from high potential area of SNNP owned larger land size compared to *woreda* 's with commercial and food insecure food system typologies. The result also reflects that female headed households own smaller land sizes compared to male headed households. Larger farm sizes per household are also found in West Armacho and smaller farm size per household were found in Angot *woreda* s.

	Angot	West Arimachio	Yilmana Densa	Ada'a	Babile	Wolmera	Boloso Bombe	Gumer	Hawassa Zuria
		Amhara			Oromia			SNNPR+SIDAMA	
■ Male	0.61	2.86	0.74	1.51	1.29	1.28	0.81	1.39	0.95
■ Female	0.55	2.23	0.73	1.24	0.88	1.09	0.64	0.99	0.56
■ Total	0.60	2.70	0.74	1.44	1.19	1.23	0.76	1.27	0.90
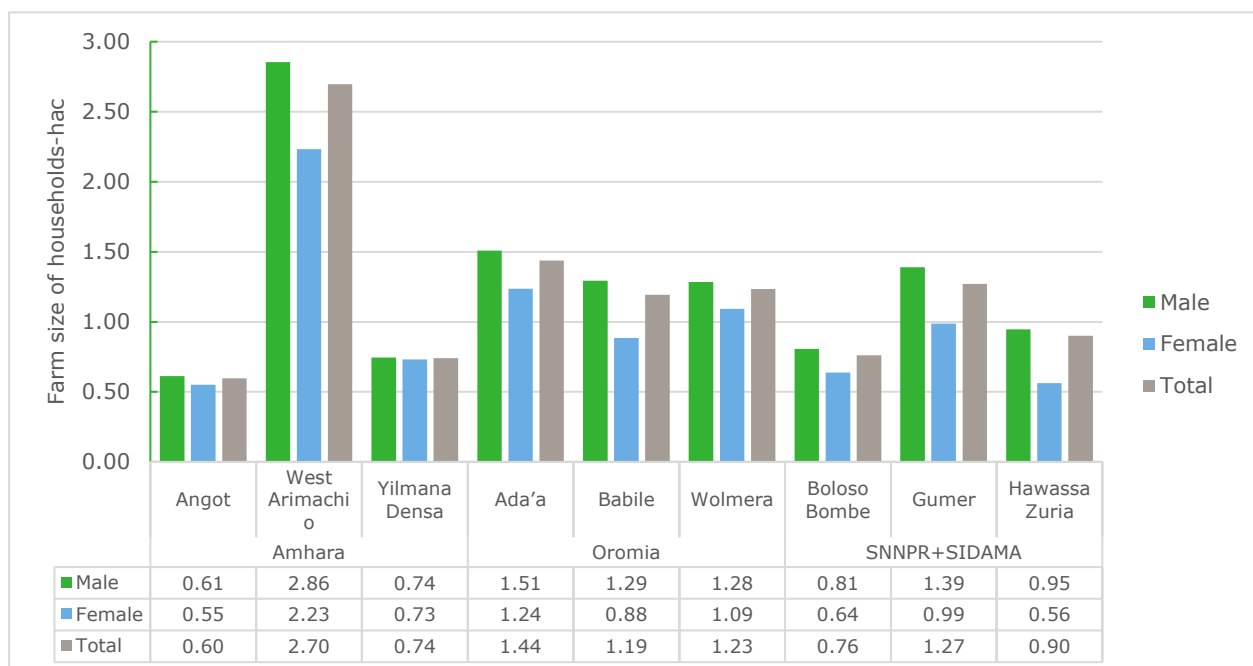
Figure 5: Average land holding of households (includes: own cultivated, rented out, shared out)

Livestock

In Ethiopia, the agricultural sector is a corner stone of the economic and social life of the people. Livestock is an integral part of the agriculture and the contribution of live animals and their products to the agricultural economy accounts for 40%, excluding the values of draught power, manure and transport of people and products. Ethiopia has the largest livestock population in Africa, with 65 million cattle, 40 million sheep, 51 million goats, 8 million camels and 49 million chickens in 2020 (CSA, 2020).

Livestock is a major source of animal protein, power for crop cultivation, means of transportation, export commodities, manure for farmland and household energy, security in times of crop failure, and means of wealth accumulation. The sector contributed up to 40% of agricultural Gross Domestic Product (GDP), nearly 20% of total GDP, and 20% of national foreign exchange earnings in 2017 (World Bank, 2017).

The result of baseline shows more male headed household owned livestock compared to female headed households in all food system typologies. This is an indication that resources ownership is one of the sources for women disempowerment. Cattle were the livestock-type that was most often owned by households in all food systems and owned by most of households in Oromia followed by SNNP.

Table 6: Proportion of households' own livestock

Region	Livestock			Cattle			Horse/donkey/ mule			Sheep/Goat			Poultry		
	Household head *Woreda*	M %	F %	Both %	M %	F %	Both %	M %	F %	Both %	M %	F %	Both %		
Amhara	Angot	76	41	66	76	24	62	55	17	44	52	31	46		
	Yilmana Densa	92	64	85	55	20	46	77	64	74	61	28	53		
	W/Arimachio	63	42	58	62	35	55	14	19	16	57	50	55		
	Total	*77*	*49*	*70*	*64*	*26*	*54*	*49*	*33*	*44*	*57*	*36*	*51*		
Oromia	Babile	88	77	86	21	12	18	65	50	62	42	42	42		
	Wolmera	91	68	85	65	21	54	60	25	51	59	46	56		
	Ada'a	97	77	92	85	62	79	45	31	41	62	46	58		
	Total	*92*	*74*	*87*	*57*	*31*	*50*	*57*	*35*	*51*	*54*	*45*	*52*		
SNNPR/ Sidama	Boloso Bombe	83	66	78	15	0	11	33	14	28	49	21	41		
	Gumer	96	97	96	83	67	78	92	70	85	58	43	54		
	Hawassa Zuria	87	75	85	28	25	27	63	58	63	58	25	54		
	Total	*88*	*80*	*86*	*41*	*32*	*39*	*62*	*45*	*58*	*55*	*31*	*50*		

Tropical Livestock Units are livestock numbers converted to a common unit. An increased number of animals per adult available to support the household, indicates improved food security and household resilience. The average, median and maximum number of animals reared per household presented as tropical livestock units (TLU) varied in relation food systems and household head presented (Table 7).

Generally, the result shows that female headed households owned fewer animals than male headed. Farmers in high potential food systems owned a greater number of TLU compared to others except farmers in commercial food system owned a greater number of TLUs in Amhara.

Table 7: Average number of TLU per region, FS typology and sex of household head

Region	*Woreda* / HH head	Average			Median			Maximum			SD	SD	SD
		M	F	T	M	F	T	M	F	T	M	F	T
Amhara	Angot	3.0	1.0	2.4	3.0	0.7	2.7	9.4	4.6	9.4	1.9	1.3	2.0
	Yilmana Densa	3.1	1.8	2.8	2.9	1.3	2.8	8.3	7.8	8.3	1.7	1.9	1.8
	West Arimachio	3.3	2.1	3.0	2.8	0.7	2.2	24.3	11.0	24.3	4.0	2.9	3.8
	Overall	*3.1*	*1.6*	*2.7*	*2.9*	*0.9*	*2.7*	*24.3*	*11.0*	*24.3*	*2.7*	*2.1*	*2.7*
Oromia	Babile	3.7	2.2	3.3	2.9	1.8	2.4	22.8	8.2	22.8	3.4	2.0	3.2
	Wolmera	7.8	3.4	6.7	6.5	2.3	5.2	31.3	11.8	31.3	6.6	3.6	6.3
	Ada'a	6.0	3.5	5.4	5.5	3.3	4.8	16.0	16.6	16.6	3.3	3.5	3.5
	Overall	*5.8*	*3.0*	*5.1*	*4.5*	*2.1*	*3.9*	*31.3*	*16.6*	*31.3*	*5.0*	*3.1*	*4.8*
SNNPR/ Sidama	Boloso Bombe	1.9	0.9	1.6	1.7	1.0	1.1	9.4	2.6	9.4	1.7	0.7	1.5
	Gumer	5.0	4.3	4.8	4.8	3.8	4.5	11.4	11.9	11.9	2.2	2.7	2.4
	Hawassa Zuria	3.3	3.0	3.2	2.9	2.9	2.9	12.7	7.4	12.7	2.5	2.5	2.5
	Overall	*3.3*	*2.7*	*3.2*	*2.9*	*1.9*	*2.8*	*12.7*	*11.9*	*12.7*	*2.5*	*2.6*	*2.5*
Overall		*4.1*	*2.4*	*3.7*	*3.4*	*1.8*	*3.0*	*31.3*	*16.6*	*31.3*	*3.8*	*2.7*	*3.6*

The variability of average number of TLUs shows that there was higher variability between male headed and female headed households in all food systems. The difference of the average number of TLUs between food systems in Amhara is not significant(P=0.3199) while it was significantly different in Oromia and SNNP/Sidama (P<0.000). In all food systems for intervention areas, the difference of average number of TLUs for male and female headed households was significant(P<0.0000)

Table 8: Average difference of TLU

Region	FS typology /Hh head	Mean	df	F	P-value, α=5%
Amhara	Angot	2.4			
	Yilmana Densa	2.8			
	West Arimachio	3.0	2	1.144	0.3199
	Male	3.1			
	Female	1.6	1	20.148	0.000**
Oromia	Babile	3.3			
	Wolmera	6.7			
	Ada'a	5.4	2	14.545	0.000**
	Male	5.8			
	Female	3.0	1	22.291	0.000**
SNNP/ Sidama	Boloso Bombe	1.6			
	Gumer	4.8			
	Hawassa Zuria	3.2	2	55.305	0.000**
	Male	3.3			
	Female	2.7	1	3.896	0.0493*

Information Communication Technologies (ICT)

Information is a key component in improving smallholder agricultural production and linkages to remunerative markets, thus improve rural livelihoods, food security and national economies. Improvement of agricultural productivity will be realized when farmers are linked to market information. However, one major problem in many rural areas is that farmers and small entrepreneurs generally have no way of knowing the prices before they travel to the market due to poor communication facilities. The dynamics of owning and using mobile phones for the intervention areas was assessed for all food systems. A smaller proportion of farmers in food insecure *woreda* of SNNP owned and used mobile phones while a bigger proportion of farmers owning and using mobile phones was found in the high potential *woreda* of Oromia. Among those farmers who owned mobile phone, the proportion of farmers that owned smart phone which can support internet access is ranging from 8% in food insecure *woreda* of Amhara to 51% in high potential *woreda* of Oromia.
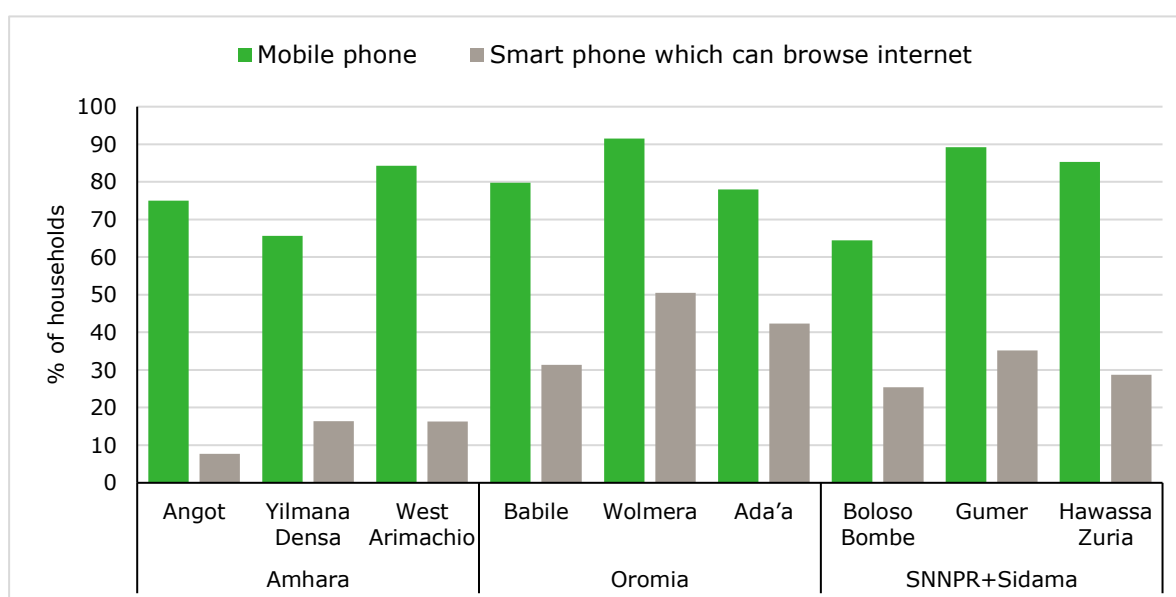
Figure 6: Proportion of households owned mobile phone

Main livelihood of households

Livelihood strategies in the survey area are a combination of activities that people undertake to survive and fulfil their livelihood requirements. The main livelihood basis of the households surveyed is crop production, livestock production and off farm activities. Off-farm activity in this study is defined as those activities which helps the household to receive cash money from agricultural wage employment, non-agricultural wage employment or self-employment and remittances.

The result of the survey (Table 9 and Table 10) indicates that crop production is the first livelihood option for 94% of the households while it is the second source of livelihood for only 5% of households. Similarly, livestock production is the first livelihood activity for 2% and second livelihood for 57% of the households surveyed. Off-farm activity is the first livelihood option for only 5% of the households surveyed and second source of livelihood for 16% of households

Generally, the source of livelihood is similar in all food systems with slightly non-significant change in proportions. A relatively high proportion of Female headed households (24% in Angot, 15% in west Armacho and 7% in Boloso Bombe) engaged in non-agriculture or off-farm activities as their primary source of livelihood.

Table 9: Primary sources of livelihood

		Sex of Household Head								
		Male			Female			Total		
Region	*Woreda*	Crop farming (%)	Lives-tock (%)	Non/Off-farm activities (%)	Crop farming (%)	Lives-tock (%)	Non/Off-farm activities (%)	Crop farming (%)	Lives-tock (%)	Non/Off-farm activities (%)
Amhara	Angot	79	7	15	72	3	24	77	6	17
	Yilmana Densa	99	0	1	100	0	0	99	0	1
	West Arimachio	93	3	4	85	0	15	91	2	7
	Total	90	3	7	85	1	14	89	3	8
Oromia	Babile	99	1	0	100	0	0	99	1	0
	Wolmera	88	8	4	89	7	4	89	8	4
	Ada'a	100	0	0	96	4	0	99	1	0
	Total	96	3	1	95	4	1	95	3	1
SNNPR/ Sidama	Boloso Bombe	97	0	3	93	0	7	96	0	4
	Gumer	100	0	0	100	0	0	100	0	0
	Hawassa Zuria	91	0	9	100	0	0	92	0	8
	Total	96	0	4	97	0	3	96	0	4
Overall		94	2	4	92	2	6	94	2	5

Table 10: Secondary source of livelihood

Region	Woreda	Male				Female				Total			
		Crop (%)	Lives-tock (%)	Non/ Off-farm (%)	No 2[ndary] source (%)	Crop (%)	Lives-tock (%)	Non/ Off-farm (%)	No 2[ndary] source (%)	Crop (%)	Lives-tock (%)	Non/ Off-farm (%)	No 2[ndary] source (%)
Amhara	Angot	11	69	5	15	21	45	10	24	13	63	7	17
	Yilmana Densa	0	78	12	10	0	60	12	28	0	74	12	15
	West Arimachio	5	68	12	14	4	58	12	27	5	66	12	18
	Total	5	72	10	13	9	54	11	26	6	67	10	17
Oromia	Babile	1	73	12	14	0	65	19	15	1	71	13	14
	Wolmera	10	68	15	6	11	64	11	14	10	67	14	8
	Ada'a	0	85	9	5	4	50	19	27	1	76	12	11
	Total	4	75	12	9	5	60	16	19	4	71	13	11
SNNPR/ Sidama	Boloso Bombe	3	29	33	35	7	24	17	52	4	28	29	39
	Gumer	0	44	21	35	0	30	37	33	0	40	25	34
	Hawassa Zuria	9	30	22	39	0	33	25	42	8	30	23	39
	Total	4	34	25	36	3	28	27	42	4	33	26	38
Overall		4	60	16	20	6	48	18	29	5	57	16	22

Outcome Area and Indicators

Social and economic empowerment of women and youth

> OUTCOME 1.1: Increased Women's and Youth's Decision-Making in Agriculture
> OUTCOME 1.2: Increased Income for Women & Youth in the Food System

Women's empowerment and closing the gender gap should take priority not only to increase the lives and quality of living for these women but would also positively impact the agricultural output and the general state of their economy. Furthermore, this could also create more stability for the children growing up in rural communities. With the knowledge that mothers gain, this knowledge can then be passed down to their children and the rise in income can be invested in the children's future. (Hazel J. et al, 2014).

Women play a vital role in advancing agricultural development and food security. They participate in all aspects of rural life in paid employment, trade, and marketing, as well as tend to crops and animals, collect water and wood for fuel, and care for family members. But women face many constraints in the multiple activities they pursue that limit their contributions and productivity; relative to men, women tend to own less land, have limited ability to hire labour, and have impeded access to credit, extension, and other training services.

The main cause of this persistent gap is established traditional gender roles which continue to negatively impact women across Africa (https://borgenproject.org/empowering-women-in-agriculture)

Women empowerment in agriculture was measured by the Women empowerment in agriculture index (Esha S., 2013). It was developed by researchers to track the change in women's empowerment levels that occurs as a direct or indirect result of interventions under the project. WEAI is composed of two sub-indexes which measure the five domains of empowerment in agriculture, 5DE and gender parity in empowerment within the household (GPI). The 5DE considered are:

Production: This dimension concerns decisions over agricultural production, and refers to sole or joint decision making over food and cash-crop farming, livestock, and fisheries as well as autonomy in agricultural production.

Resources: This dimension concerns ownership, access to, and decision-making power over productive resources such as land, livestock, agricultural equipment, consumer durables, and credit.

Income: This dimension concerns sole or joint control over the use of income and expenditures.

Leadership: This dimension concerns leadership in the community, here measured by membership in economic or social groups and comfort in speaking in public.

Time: This dimension concerns the allocation of time to productive and domestic tasks and satisfaction with the available time for leisure activities.

Empowerment
To measure the empowerment of women in agriculture we use the individual level computed 5DE. The index further identifies the domains in which women are disempowered. This helps to identify empowerment indicators that contribute substantially to the degree of disempowerment. The domains that contribute the most to the disempowerment of women are then chosen as empowerment indicators. Once these domains are selected, a continuous measure of empowerment is developed for the selected indicators.

Table 11: The five domains of empowerment in the Women's Empowerment in Agriculture Index

Domain (each weighted 1/5 of 5DE sub-index	Indicator	Definition of indicator	Weight
Production	Input in productive decisions	Sole or joint decision making over food and cash-crop farming, livestock, and fisheries	1/5
Resources	Ownership of assets	Sole or joint ownership and decisions of major household assets	2/15
	Access to and decisions on credit	Access to and participation in decision making concerning credit	1/15
Income	Control over use of income	Sole or joint control over income and expenditures	1/5
Leadership	Group member	Whether the respondent is an active member in at least one economic or social group, for example, agricultural marketing, credit, water users' groups.	1/10
	Speaking in public	Whether the respondent is comfortable speaking in public concerning various issues, such as intervening in a family dispute, ensuring proper payment of wages for public work programs, and so on.	1/10
Time	Workload	Allocation of time to productive and domestic tasks	1/10
	Leisure	Satisfaction with the available time for leisure activities	1/10

The 5DE for study areas shows that 18 percent of women are empowered. Among the 82 percent of women who are not yet empowered, on average, they have inadequate achievements in 27.5 percent of indicators in the domains and still adequate achievements in 72.5 percent of indicators in the domains. Thus, the women's disempowerment index (M0) is 82 percent × 27.5 percent = 0.225 and 5DE is 1 − 0.225 = 0.775.

Similarly, 17.4 percent of youth are empowered. among 82.6 percent of youth who are not yet empowered, on average, the inadequacy score among these youth is also 41.3 percent. So, the youth disempowerment index (M0) is 82.6 percent ×41.3 percent =0.341 and men's 5DE is 1 – 0.341= 0.659

From the results of our dataset (figure 7), the domain that contributes the most to the disempowerment of women is Time (37 percent) followed by leadership (30 percent) and resources (24 percent). Similarly, from Figure 8, the domains that most contribute for youth disempowerment is leadership (28%) followed by resources (23%). Control over use of income also higher share for youth disempowerment compared to women.
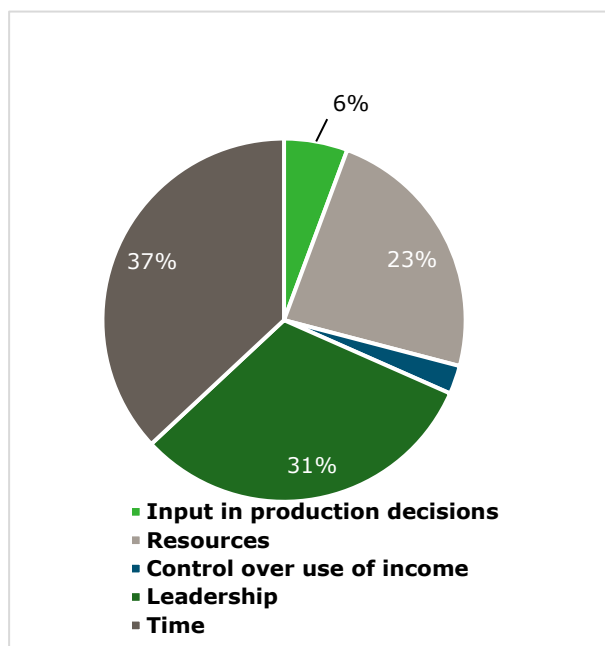
Figure 7: Contribution of each of the 5 domains to disempowerment of women
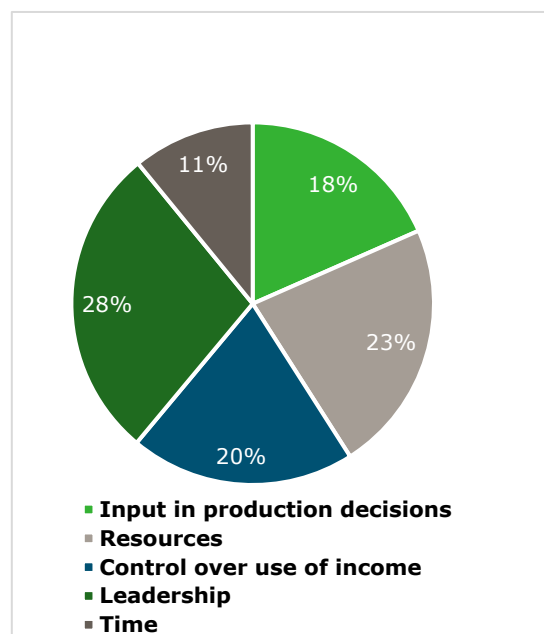
Figure 8: Contribution of each of the 5 domains to disempowerment of youth

Figure 9 shows that indicators of domains that contribute most to women's disempowerment in the study areas are access to and decision on credit (22 percent), high workload and less leisure time (21 percent and 16 percent, respectively), weak leadership and influence in the community (12 percent and 18 percent respectively). Similarly, indicators of domains that contribute most to youth disempowerment in the study areas are weak decisions on control over use of income (20 percent), have less inputs on production decisions (19 percent), weak leadership and influence in the community (18 percent and 10 percent respectively).
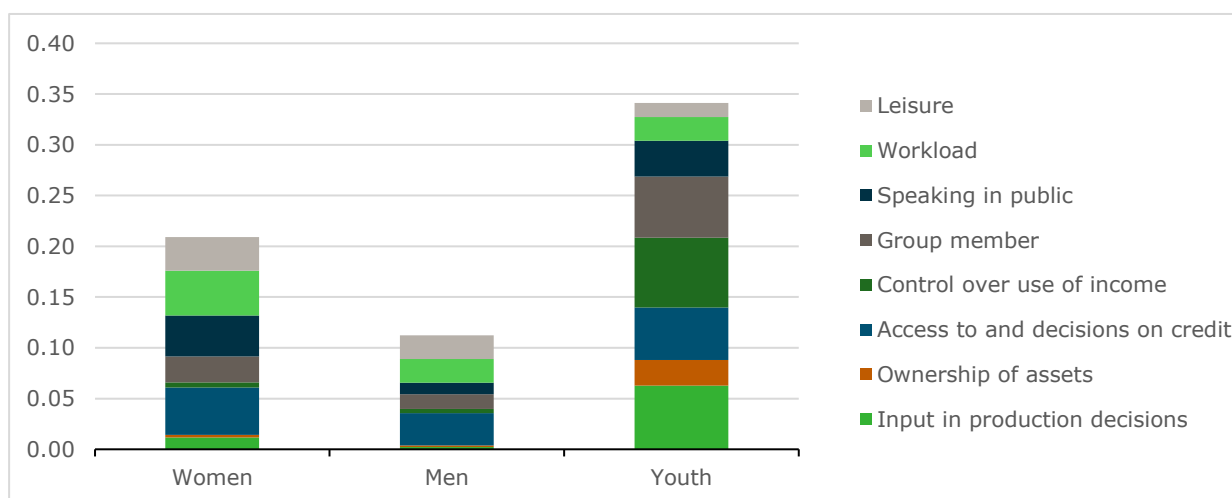
Figure 9: Contribution to disempowerment for women, men and youth

Women's, men's and youth workload

The survey assessed the workload of respondents by asking the total time spent in paid and unpaid activities, including domestic chores and caring for children and the elderly within 24 hours (1 day) previous to the interview day during the rainy season when the survey conducted. A respondent achieves adequacy (acceptable workload hours per day) for the workload indicator if she/he works less than 10.5 hours per day. respondent who worked more than 10.5 hours per day do not achieve adequacy for the workload indicator

Table 12 shows the workload for domestic works was far higher for women than men and youth while workload for agricultural activities was higher for men than women and youth. Leisure time was better for men than women which clearly shows that women have more workload compared to men and youth and contributes more for women disempowerment. The average number of working hours for women, men and youth also tested for their equality separately for income generating activities (agricultural and non-farm activities), domestic activities and leisure time activities.

The difference in average working hours for income generating, domestic and leisure time activities are statistically significant for women and men(P-value=0.000) while the average working hours of domestic work activities are not significantly different for women and youth (P-value=0.497). Similarly, the average working hours of leisure time activities are not statistically significant for men and youth (P-value=0.345).

Table 12: Average time (in hours) allocated to activities

Activities		Women	Men	Young
Agricultural activities	Farming (Crop, livestock and fisheries)	2.9	6.0	3.7
Non-farm activities	Work as employed/wage work	0.1	0.3	0.1
	Own business work	0.6	0.4	0.5
	Weaving / sewing / textile care	0.2	0.0	0.0
Domestic works	School (also homework)	0.0	0.0	0.6
	Shopping / getting service (incl. health services)	0.3	0.3	0.3
	Food preparation/Cooking	2.8	0.1	1.4
	Other domestic work (incl. Cleaning, fetching water and fuel)	2.1	0.2	1.3
	Caring for others (children, elderly, sick)	0.7	0.1	0.1
Average time spent on income generating and domestic activities		**9.7**	**7.4**	**7.9**
Leisure activities	Sleeping and resting	11.4	11.5	11.6
	Eating and drinking	2.2	2.3	2.2
	Personal care	0.6	0.6	0.7
	Traveling and commuting	0.4	0.8	0.7
	Watching TV/movies/listening to radio	0.1	0.3	0.6
	Exercising	0.0	0.0	0.0
	Community/Social activities	0.4	0.6	0.1
	Religious activities	0.4	0.5	0.4
Total time spent on leisure activities		15.5	16.7	16.3

Efficient and Environmentally Sustainable Production

Outcome 2.1: Sustainable agricultural practices increased
Outcome 2.2: Improved functioning of input (incl. seed) supply chains
Outcome 2.3: Strategic planning for agricultural development improved

Agronomic Practices overview
Conventional farming and monocropping systems in addition to depletion the natural resource, is caused land degradation. Intercropping can be defined as a multiple cropping system that two or more crops planted in a field during a growing season. Intercropping is a way to increase diversity in an agricultural ecosystem. Ecological balance, more efficient utilization of resources, increases the quantity and quality of products and reduction of damage by pests, diseases and weeds will increases with use of intercropping systems. Row-intercropping, mixed- intercropping, strip-intercropping and relay intercropping are most important types of intercropping (Ali N. and Atee M, 2016).

Agronomic practices on which baseline data was collected from households were intercropping, relay cropping, crop rotation, agroforestry and green manuring. From the result of Table 13, most of farmers from Yilmana Densa of Amhara have an experience of crop rotation and intercropping compared to other farmers in the region. Farmers from Angot *woreda* lack experience in good agricultural practices with less than 1/3 percent have only experience on crop rotation whereas farmers in Boloso Bombe experience highest percentage of most practices. The difference of experiences of agronomic practices among food systems in each region was analysed using chi-square test and the result shows that except green manuring, other practices were significantly different (P-value 0.000 to 0.020) between food systems within a region.

Table 13: Agronomic practices being employed/done/applied by respondent farmers

Region	Woreda	Intercropping		Crop rotation		Relay cropping		Agroforestry		Green manuring	
		%	P-value	%	P-value	%	P-value	%	P-value	%	P-value
	Angot	5		32		2		3		0	
Amhara	Yilmana Densa	66		95		33		3		4	
	West Arimachio	21		90		21		20		3	
	Total	30	.000*	72	.000*	19	.000*	8	.000*	2	0.144
	Babile	53		61		0		15		1	
Oromia	Wolmera	0		92		4		27		1	
	Ada'a	1		78		0		1		0	
	Total	18	.000*	77	.000*	1	.020*	15	.000*	1	0.619
	Boloso Bombe	81		75		53		61		1	
SNNPR/ Sidama	Gumer	2		83		5		11		1	
	Hawassa Zuria	90		31		13		8		1	
	Total	58	.000*	63	.000*	24	.000*	27	.000*	1	1

*-evidence for statistically significant at 5% level

Intercropping is an improved farming practice. It was mainly found with farmers from Babile, Boloso Bombe and Hawassa Zuria while farmers from Boloso Bombe and Yilmana Densa have more experience in relay cropping than others practices. For most agronomic practices, the % of female farmers employing the agronomic practice is less than the % of men farmers employing the practice.

Table 14 shows that farmers living in the surveyed kebeles of each *woreda* have different experience of cultivation by mixing cereals and pulses, cereals with vegetables and in minimum cases of cereals with cereals. From kebeles of Amhara, mainly maize and potatoes, maize and faba-beans /field peas are the common intercropping practice in Yilmana Densa while sorghum and sesame are intercropped in west Armacho.

In Babile *woreda* of Oromia, intercropping is mainly of sorghum and maize, sorghum and haricot beans, khat and sorghum and maize with chat. Farmers from SNNP have the experience of intercropping maize with haricot beans or Ethiopian kale. While Maize and haricot bean grown by intercropping in Hawassa Zuria.

*Table 14: Major crops grown by intercropping*

Region	*Woreda* / food system	Crop 1	Crop 2	farmers practicing the combination
Amhara	Angot	Food Barley/ oats	Potatoes	2
	Yilmana Densa	Maize	Potatoes	43
		Maize	Faba beans	25
		maize	Haricot beans	7
	West Armacho	Sorghum	Sesame	21
Oromia	Babile	Sorghum	Maize	18
		Maize	Chat	13
		Sorghum	Chat	12
		Sorghum	Haricot beans	12
		Sorghum	Groundnuts	8
		Maize	Haricot beans	7
	Wolmera Ada'a			
SNNPR / Sidama	Boloso Bombe	Maize	Haricot beans	77
	Gumer	Faba beans/ Field peas	Potatoes	3
	Hawassa Zuria	Maize	Haricot beans	85
		Maize	Ethiopian kale	32

Crop rotation is the practice of growing a series of different types of crops in the same area across a sequence of growing seasons. It reduces reliance on one set of nutrients, pest and weed pressure, and the probability of developing resistant pests and weeds.

Growing the same crop in the same place for many years in a row, known as monocropping, gradually depletes the soil of certain nutrients and selects for a highly competitive pest and weed community. Without balancing nutrient use and diversifying pest and weed communities, the productivity of monocultures is highly dependent on external inputs. Conversely, a well-designed crop rotation can reduce the need for synthetic fertilizers and herbicides by better using ecosystem services from a diverse set of crops. Additionally, crop rotations can improve soil structure and organic matter, which reduces erosion and increases farm system resilience.

Figure 10 shows that 82% and 89% of farmers practicing crop rotation in Angot and Yilmana Densa rotated cereal after cereal, which is not recommended as best agricultural practices. Similarly, 60%, 92% and 77% of respondent farmers from Babile, Wolmera and Ada'a of Oromia region respectively practiced crop ration of cereal with cereal. However, cereals rotated with pulses is recommended for soil nutrient improvement. About 95% of respondent farmers from West Armacho rotated cereal with oil crops. On the other hand, 68% of respondent farmers practicing crop rotation in Ada'a, 57% in Boloso Bombe, 49% in Babile and 38% in Gumer rotated cereal with pulses.

Figure 10: Percentage of farmers practicing rotation (per rotation type)
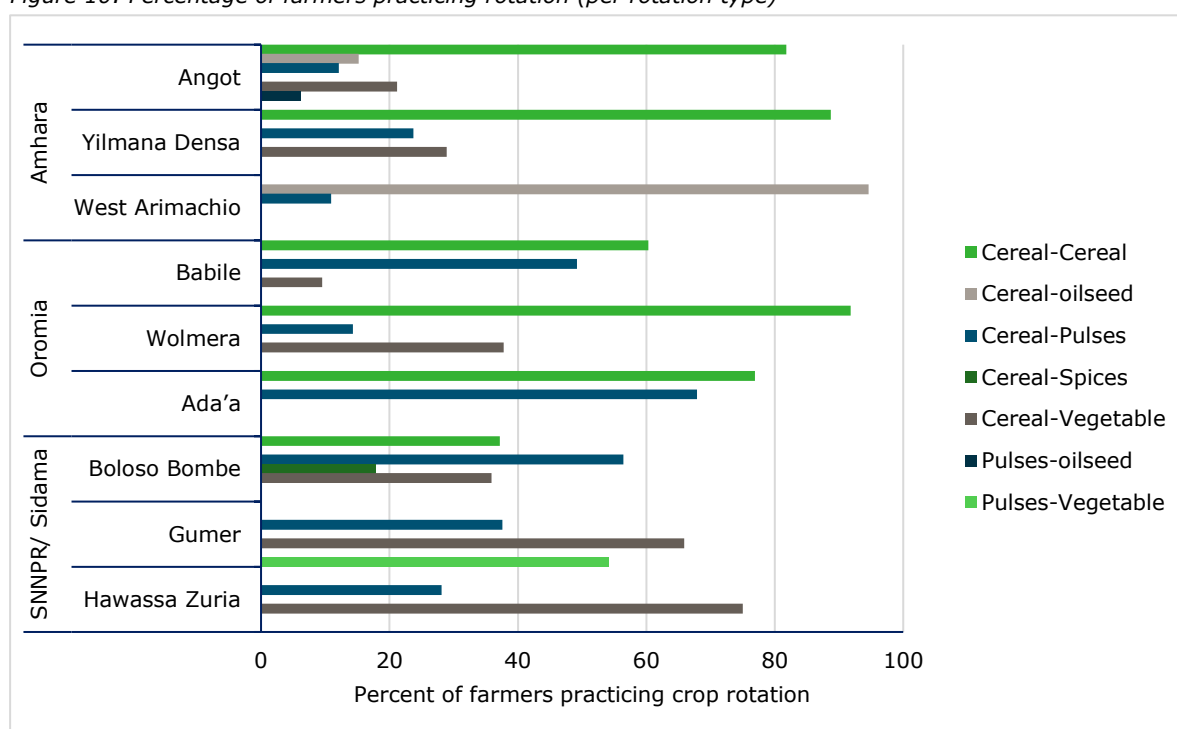
Meher season production and use of improved varieties, fertilizer and pesticides

The two crop seasons in Ethiopia are the *Meher* and *Belg* seasons. *Meher* is the main crop season. It encompasses crops harvested between Meskerem (September) and Yeaktit (February). Crops harvested between Megabit (March) and Nehase (August) are considered part of the *Belg* season crop. The *Meher* crop produces 90-95 percent of the nation's total cereals output, and the *Belg* harvest provides the remaining 5-10 percent of cereal output (ESS, 2020)

The results of the baseline survey in *Table 15* show that limited crops were produced in Angot (barley and oats/sinar) with a very low percentage of households using improved varieties and fertilizer, and no one using pesticide for the last *Meher* season. The result also indicate that nutrition-dense crops were not produced in this food insecure *woreda* .

Similarly, the percentage of farmers in West Armacho using improved inputs was also limited, the only exception being that most farmers used pesticide for sorghum. Farmers in Yilmana Densa were better in using improved varieties and urea compared to other *woreda* s in Amhara.

In Oromia, almost all armers from Ade'a and Wolmera used fertilizer and pesticides for teff, wheat and barley. Between 40 and 60% of the potato, wheat, sorghum and maize growing farmers in Oromia used improved varieties. For other crops the data show a limited use of improved varieties.

Similarly, almost all farmers from surveyed *woreda* s of SNNP used fertilizer for their crops. More than 50% of the farmers used improved varieties for maize, barley, faba beans and teff.

Table 15: Major crops produce during Meher season

Region	Woreda	Crop	HHs growing	HHs used Improved variety	HHs used urea	HHs used NPS	HHs used pesticide	Average productivity (Qt/ha)	Produce sold market
			%	%	%	%	%		%
Amhara	Angot	Food Barley	87.5	6.6	2.2	2.2		8	3
		Oats/Sinar	33.7	5.7				10.6	11
		Potatoes	6.7	42.9				16.3	12
	Yilmana Densa	Maize	87.3	98.9	98.9	100	33.7	25.5	17
		Teff	72.5	10.8	94.6	95.9	85.1	10.5	39
		Barley	71.6	1.4	58.9	93.2	60	14.5	22
		Wheat	26.5	14.8	59.3	96.3	59.3	13.3	12
		Potatoes	15.7	31.3	87.5	93.8	31.3	63.2	47
	West Arimachio	Sorghum	89.2	2.2	11	12.1	80.6	6.1	22
		Sesame	69.6	1.4	9.9	8.5	38.7	3.2	90
		Soya beans	9.8	10			40	10	78
		Mung bean	7.8				12.5	5.1	76
		Maize	6.9	57.1			14.3	19.3	
Oromia	Ada'a	Teff	94	20.2	98.9	98.9	92.6	11	40
		Bread wheat	88	39.8	98.9	100	93.2	21.7	36
		Chick-peas	46	8.7			71.7	15.3	53
		Faba beans	8				25	17.2	23
		Maize	6	16.7	16.7	16.7		26.6	8
	Babile	Sorghum	95.2	45.5	58.6	64.6	8.1	13.1	9
		Maize	62.5	49.2	58.5	61.5	16.9	19.5	11
		Chat	34.6		11.1	13.9	27.8	53.3	77
		Groundnuts	16.3		29.4	23.5	5.9	12.6	54
		Haricot beans	4.8	20	20	20	20	8	40
	Wolmera	Barley	71.7	15.8	97.4	98.7	89.5	14	9
		Wheat	71.7	60.5	100	100	94.7	12.7	10
		Teff	70.8	5.3	98.7	98.7	92	9	7
		Potatoes	36.8	64.1	97.4	97.4	87.2	70.3	65
		Faba beans	19.8	14.3	38.1	52.4	42.9	8.4	2
SNNPR/ Sidama	Boloso Bombe	Maize	76	78.5	70.9	98.7	1.3	17.3	2
		Teff	55.8	27.6	46.6	91.4		7	46
		Haricot beans	46.2	4.2	20.8	95.8		9.9	7
		Taro/'Godere	22.1		69.6	21.7		58.3	5
		Ginger	16.3		100	94.1	52.9	27.2	88
	Gumer	Food Barley	97.1	36.4	93.9	99	1	17.8	43
		Faba beans	89.2	4.4	14.3	30.8	1.1	13.5	31
		Field peas	44.1	2.2	53.3	86.7		14.6	33
		Enset	21.6					*	6
	Hawassa Zuria	Maize	99	99	99	96	10.9	27.5	30
		Haricot beans	50	13.7	66.7	66.7	2	8.8	28
		Enset	14.7					39.4	13
		Ethiopian kale	14.7		33.3	33.3	6.7	26.9	28
		Red peppers	12.7	53.8	92.3	100		12.9	93

***Belg* season production**

Some RAISE-FS implementation areas didn't have *Belg* season production since farmers depend on rainfall for crop production. *Belg* season production was observed in food insecure and high potential *woreda* s of Amhara and in all food system *woreda* s of SNNP/Sidama with limited extent of practice. Smallholder farmers cultivate crops during the *Belg* season, as large farms concentrate their production entirely on the more productive *Meher* season since crop yields were always smaller in the *Belg* season than in the *Meher* season. Among cereal crops, the most important contribution of the *Belg* season to total production is found to be for the maize crop: 22.0 percent of total maize area was cultivated in the *Belg* season and this resulted in 9.5 percent of total maize production (ESS, 2020)

The survey result (Figure 11) shows that *Belg* season production is common in SNNP and some *woreda* s of Amhara but not common in the three-food system *woreda* s of Oromia. Food barley is the only main crop produced both in *Meher* and *Belg* season in Angot *woreda* . Some farmers from Yilmana Densa in Amhara also produce potato in the *Belg* season. Around 40 % of farmers from Hawassa Zuria and 80 percent of farmers from Boloso bombe produce haricot beans. Almost all farmers in Gumer cultivate potato in Gumer *woreda* . Taro/Godere and ginger are produced in Boloso Bombe while maize to less extent produced in Hawassa Zuria and Boloso Bombe.
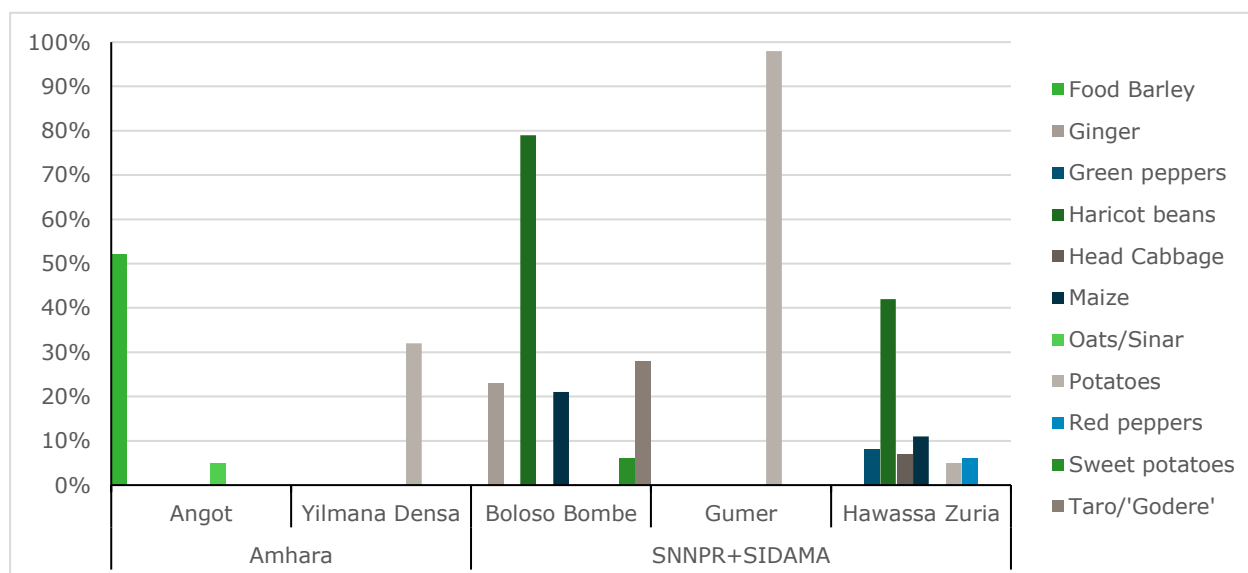

Figure 11: Major crops produced in the Belg season

Irrigation

The survey results in Figure 12 show that limited households in implementation kebeles have access to water for irrigation. Farmers in food insecure *woreda* s of Amhara and high potential of SNNP do not have access to water to produce crops by irrigation.

Vegetables like garlic, onion and head cabbage are the major crop produced by irrigation with 58%, 43%, 94% of farmers practicing in Yilmana Densa, Babile and Hawassa Zuria respectively. Female farmers heading households have less experience of producing crops by irrigation compared to male heads of households in most *woreda* s. However, Yilmana Densa experiences similar proportion on men and women whereas Hawassa Zuria is uniquely characterized by a higher proportion of female headed households involved in irrigation. In high potential and commercial *woreda* s of Oromia, female farmers heading households did not produce any crops with irrigation, while a high proportion of female farmers heading households in high potential and commercial *woreda* s of Amhara and commercial *woreda* of SNNP/Sidama produced crops with irrigation.
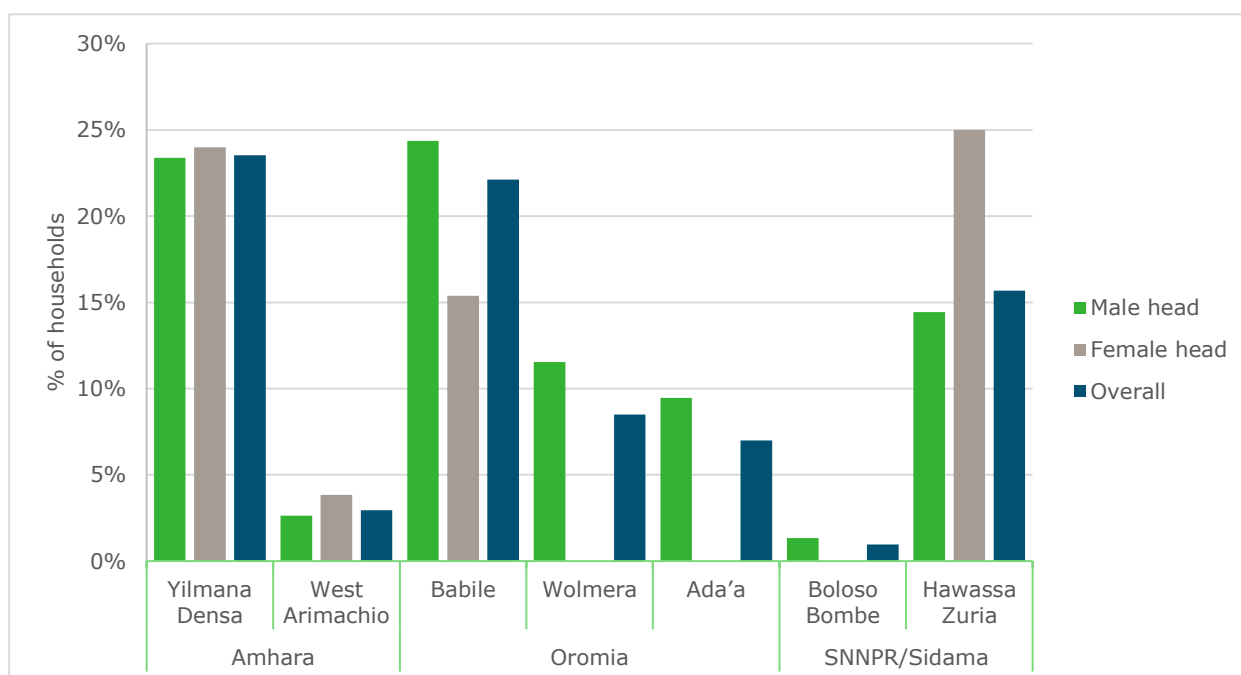
Figure 12: Percentage of households producing crops under irrigation

Home Garden

The most fundamental benefit of home gardens is their direct contribution to household food and nutrition security by increasing availability, accessibility, and utilization of nutrient dense food products. Additionally, households can have better access to a diversity of vegetables and fruits that leads to an overall increase in dietary intake and boost the bioavailability and absorption of essential nutrients through home gardening.

Production of home garden also depend on the accessibility of water, seed, land, and knowledge. The survey result (Table 16) shows that experience of farmers for home garden production was very low. Farmers in the high potential *woreda* of SNNP have better experience on home garden production (78%) compared to others and followed by Wolmera (57%).

Female headed households have less experience compared to male headed households except those in West Armacho and Yilmana Densa. Among all crops produced, 54% of farmers who have home garden produce Ethiopian kale as dominant home garden crop. Maize is also produced in small area around home stead in Ada'a to support family food before other crops harvested (Eaten as "*Eshet*") and accounted as home garden crop in limited areas.

Table 16: Percentage of households who had a home garden in the last 12 months

Region	Woreda	MaleHeaded		FemaleHeaded		Total		Total
		n		n		n		
Amhara	Angot	18	24	3	10	21		20
	Yilmana Densa	23	30	9	35	32		31
	West Arimachio	23	30	9	35	32		31
Oromia	Babile	12	15	1	4	13		13
	Wolmera	47	60	13	46	60		57
	Ada'a	14	19	1	4	15		15
SNNPR	Boloso Bombe	33	44	8	28	41		39
Sidama	Gumer	60	83	20	67	80		78
	Hawassa Zuria	36	40	3	25	39		38

Source of water for home garden

Water availability is very important for sustainability and successful of home garden production. Access to reliable supplemental water should be at the top of the list when establishing a community home garden and produce healthy and safe crop since water has to come either from rain or supplemental watering. The survey assessed the source of water for home garden production either rainfall or irrigation used. Table 17 shows that the majority of home garden producers, respectively 82%, 89% and 96% from Oromia, Amhara and SNNP, used rainfall as main source of water. Only few farmers from Oromia and Gumer of SNNP experienced irrigation for home garden production. This shows that means of water availability is very important for sustainability of year-round production of home garden and diversification of food consumption.

Table 17: Irrigated and rainfed home garden production

region	woreda	Male HH head Rainfed	Irrigated	Both	Female HH head Rainfed	Irrigated	Both	Total Rainfed	Irrigated	Both
Amhara	Angot	94		6	100			95		5
	Yilmana Densa	77		23	100			83		17
	West Arimachio	91		9	100			94		6
	Total	89		11	100			92		9
Oromia	Babile	67	17	17			100	62	15	23
	Wolmera	83	4	13	77	8	15	82	5	13
	Ada'a	93	7		100			93	7	
	Total	82	7	11	73	7	20	81	7	13
SNNPR /Sidama	Boloso Bombe	100			100			100		
	Gumer	93		7	80	10	10	90	3	8
	Hawassa Zuria	97		3	100			97		3
	Total	96		4	87	7	7	94	1	4

Challenges for home gardens

Figure 13 shows four important challenges for home gardening: high costs of inputs (seed fertilizers, pesticides, etc); too much time required in terms of planting, weeding, harvesting; effort of fetching water and; required labour to prepare the bed, planting, weeding, harvesting were mentioned as additional burden for surveyed farmers. Labour is the main challenge in Amhara and SNNP because of most youngsters migrate to town from these rural areas. Babile faced no labour shortage for home gardening. The rapid food system appraisal conducted in Babile also confirmed that most young are jobless and found in the *woreda* town. High proportion of farmers in Oromia mentioned home garden as time taking activity causing additional burden for the household relative to other regions. Access to irrigation, labour and time saving technologies, shared work (others helping) was mentioned by most farmers as a coping mechanism for burden they faced. Few farmers replied home garden inputs (water can, cultivator/dibber) supported them to produce more and raised their interest in home gardening.
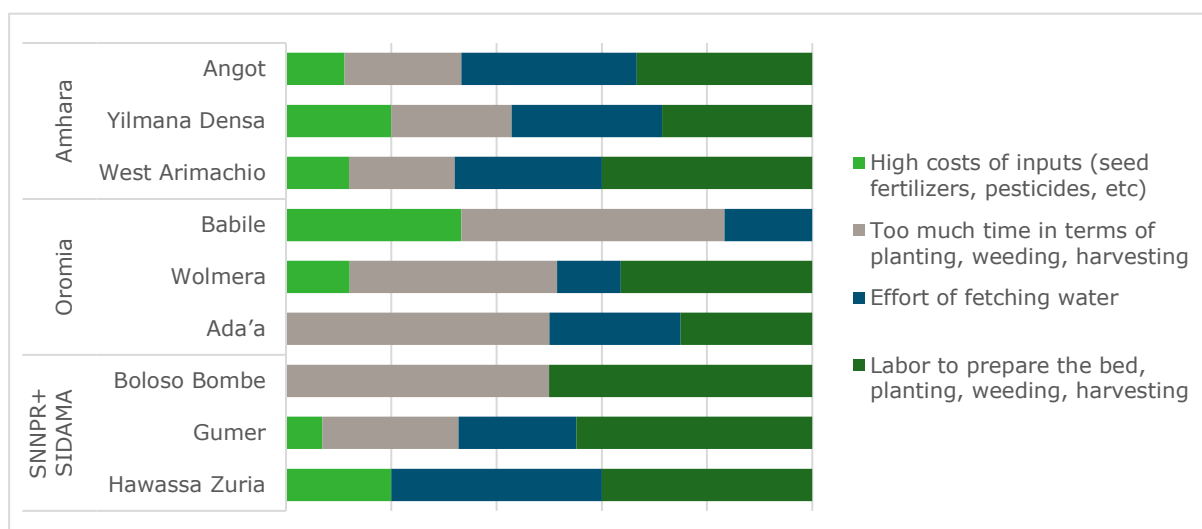
Figure 13: Challenges in home gardening

Agricultural Extension

Agricultural extension is the primary mechanism to disseminate innovations that enhances agricultural production. The evaluation of various studies showed that agricultural extension contributes to improving farming, improving commercialization, educating farmers, conserving natural resources, promoting new technologies, promoting sustainable agricultural practices, and disseminating information across various settings. The extension system in Ethiopia has great potential to help farmers throughout the country with development agents (DAs).

The survey result (*Table 18*) shows that relatively high proportion of male headed farmers had contact/visited by agricultural development agents (DAs) in all food systems but in Gumer where the overall proportion of farmers visited by DAs is highest. The proportion of female headed households visited (87%) is a bit higher than male headed (75%), although the difference is not significant. Farmers in SNNP/Sidama were more visited by development agents followed by Oromia and Amhara (66%, 59%, 37% respectively). The difference in percentage of farmers who visited by DAs for male headed and female headed farmers was statistically significant for food insecure and high potential food system of Amhara, high potential *woreda* s of Oromia, and food insecure and commercial of SNNP/Sidama.

Table 18: Percentage of farmers visited by development agents for the main season

Region	*Woreda*	farmers had contact/visited by DAs in the main season			Chi-square test for the difference- **Male VS Female**
		Male HH head	Female HH head	Overall	*P-Value*
Amhara	Angot	49	28	43	0.045*
	Yilmana Densa	39	8	31	0.004*
	West Arimachio	38	27	35	0.301
	Overall	42	21	37	0.001**
Oromia	Babile	72	58	68	0.181
	Wolmera	63	39	57	0.031*
	Ada'a	54	42	51	0.303
	Overall	63	46	59	0.009**
SNNPR/ Sidama	Boloso Bombe	61	38	55	0.032*
	Gumer	75	87	78	0.192
	Hawassa Zuria	68	42	65	0.075*
	Overall	68	59	66	0.171

**-significant at 1, *-significant at 5

Effective extension and advisory services for supporting farmers by development agents have the potential to improve agricultural productivity, net farm income and food security. Farmers were asked on the number of visits made by the various development agents and the type of messages they passed over and the number of visits were categorized as high (at least once within less than 2 weeks in cropping season), medium (within 2 to 4 weeks in cropping season) and low (within more than a month in cropping season).

Table 19 shows the frequency at which development agents were visiting farmers. It is quite clear that the frequency of extension agents in contact with farmers was low in the implementation areas with slight differences among regions. The proportion of farmers under low frequency of visit ranges from 43% to 46% in Oromia, 47% to 74% in SNNP/Sidama and 55% to 75% in Amhara with average, 46%, 57% and 66% respectively indicating that large proportion of farmers are visited by DAs only once in more than a month.

Table 19: Frequency of farmers visited by DAs for the main cropping season

		Male HH head			Female HH head			Overall		
		High	Medium	Low	High	Medium	Low	High	Medium	Low
Amhara	Angot	5	32	62	0	13	88	4	29	67
	Yilmana Densa	7	20	73	0	0	100	6	19	75
	West Arimachio	7	35	59	14	43	43	8	36	56
	Overall	6	29	65	6	24	71	6	28	66
Oromia	Babile	20	34	46	33	27	40	23	32	45
	Wolmera	20	37	43	0	55	46	17	40	43
	Ada'a	18	38	45	18	18	64	18	33	49
	Overall	19	36	45	19	32	49	19	35	46
SNNPR/ Sidama	Boloso Bombe	9	15	76	0	36	64	7	19	74
	Gumer	26	26	48	4	35	62	19	29	53
	Hawassa Zuria	25	30	46	20	20	60	24	29	47
	Overall	21	24	55	5	33	62	17	26	57

NB: High = less than two weeks, Medium = 2 to 4 weeks, Low = More than a month

Sector performance and value chains enhanced

Outcome 3.1 Access to finance enhanced (inclusive to youth and women)

Outcome 3.2 Market linkages created and access to market information improved

Access to finance and type of financial institutions
Access to credit can open up economic opportunities for women and youth which can help reduce poverty because they strengthen the ability of people to grow assets and smooth out their consumption, which, in turn, can help protect against unexpected financial shocks (Dunford, 2012). Financial inclusion connotes all initiatives that make formal financial services accessible and affordable, primarily to low-income people.

The baseline survey collects data on the accessibility of finance institution available in the survey areas by asking whether any member from the household borrowed either cash, in-kind or cash and in-kind from different sources. Table 20 shows most of the household members are able to get and borrow cash or in kind from friends and relatives. Different formal financial institutions were not accessible for farmers to borrow money. Relatively more household members in the food insecure *woreda* of Amhara are able to get loan from formal lenders (bank/financial institution) compared to other *woreda* 's. Group based micro-finance including VSLAs/ SACCOs were more accessible to household members from high potential SNNP *woreda* and the commercial *woreda* of Amhara.

Table 20: Percentage of households that accessed loan from different sources

Region	*Woreda* / food system	Non-governmental organization (NGO)	Formal lender (bank /financial institution)	Informal lender	Friends or relatives	Group based micro-finance or lending including VSLAs/ SACCOs	Informal credit/ savings groups (e.g tontines, etc.)
Amhara	Angot	13	22	17	26	17	5
	Yilmana Densa	2	6	8	33	4	3
	West Armacho	2	6	11	31	21	9
Oromia	Babile	2	7	11	21	10	22
	Wolmera	7	1	8	43	2	1
	Ada'a	5	9	7	27	11	7
SNNPR /Sidama	Boloso Bombe	0	0	4	36	4	4
	Gumer	1	1	5	26	21	2
	Hawassa Zuria	2	4	10	38	5	4

Table 20 also shows that formal sources (non-governmental organization, bank/financial institution) and Group based micro-finance or lending including VSLAs/ SACCOs were less accessible than informal lending sources (informal lender, friends or relatives, and informal credit/ savings groups (e.g. merry-go-rounds (*Ekub*), funeral societies, etc.)
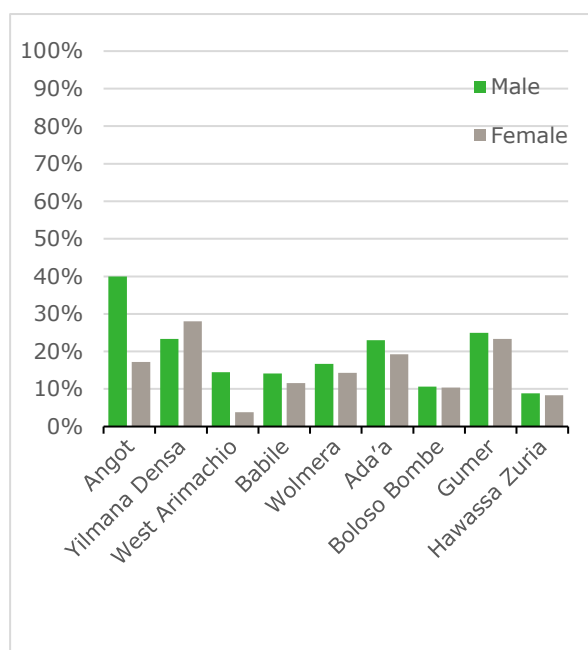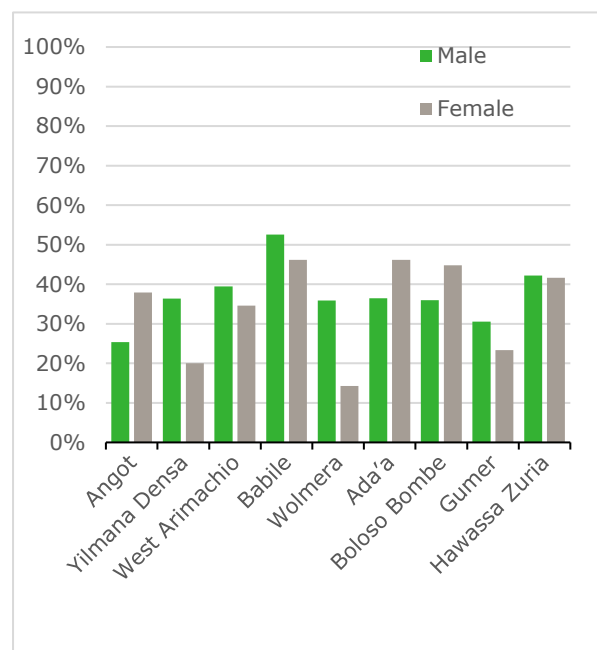
Figure 15: Access of credit from formal sources

Figure 14: Access of credit from in-formal sources

In general, table 20, figure 14 and figure 15 show that a low proportion of household members from female headed households in all food systems (except high potential *woreda* of Amhara) have access to borrow from formal sources compared to household members from male headed. But a higher proportion of female headed households in Angot, Ada'a, and Boloso Bombe have access to borrow from informal sources. About 40% and 17% of household members from male headed and female headed households respectively are able to get credit from formal source. Household members in commercial *woreda* of SNNP/Sidama form male headed and female headed (9% and 8% respectively) were the least in accessing credit from formal sources.

The accessibility of formal sources for male headed members of households and female headed members of households was also tested statistically for its difference. It was significantly different for male headed and female headed in Angot only (P-value 0.028) at 5% level of significance while no significantly different for male headed and female headed households in other *woreda* s.

Similarly, accessibility of informal financial sources is not statistically different for male headed and female headed households except in Wolmera *woreda* (P-value 0.033)

Table 21: Statistical tests for difference of accessibility

Region	Woreda	Chi-Square test	
		P-value	
		Formal source	**Informal source**
Amhara	Angot	0.028*	0.204
	Yilmana Densa	0.641	0.129
	West Arimachio	0.147	0.66
Oromia	Babile	0.74	0.571
	Wolmera	0.768	0.033*
	Ada'a	0.692	0.385
SNNP/ Sidama	Boloso Bombe	0.962	0.407
	Gumer	0.858	0.461
	Hawassa Zuria	0.949	0.971

Access to Market information

The provision of basic market information is a service that aims to increase the efficiency of agricultural markets and contribute towards overcoming issues of market failure based on asymmetric access to basic market information. According to Shepherd (1997), public dissemination of prevailing market prices and conditions is one of the formats whereby farming households obtain market information. Public provision of market information aims to reduce asymmetry of information in the marketplace. The data obtained from the baseline shows that about 70%, 78% and 79% farming households from food insecure, high potential and commercial areas respectively have access to market information before taking their produce to market. They obtain the information through a variety of sources.
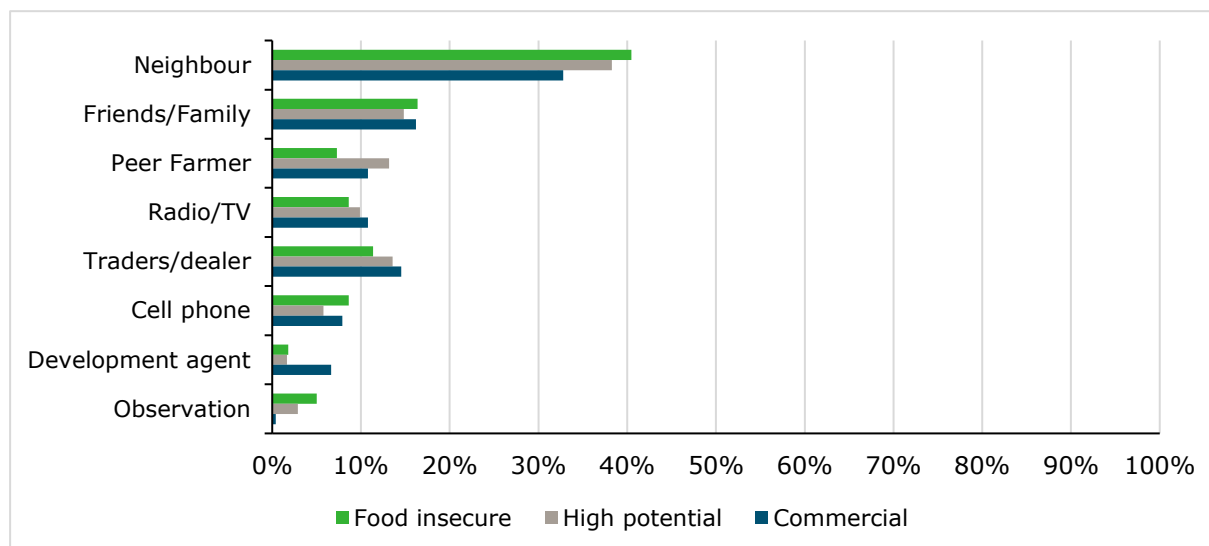

Figure 16: Source of market information

Figure 16 shows that most farming households (33% to 40%) from all food systems access information from their neighbours. A larger proportion of farmers in commercial areas access market information from radio/TV, traders/dealer, development agent and used cell phones compared to those from other food systems, but generally very small proportions of farmers obtain market information from these sources. Friends or family are the second source of importance, chosen by 16% of farmers as main source of market information followed by traders/dealers (10.8%). The difference of market information sources among food systems was tested statistically for its significancy. There is no evidence that the difference is significant (P-value 0.503) at 5% level of significance.

Availability of Safe and Nutritious Foods

Outcome 3.1 Increased availability of nutrient-dense food
Outcome 3.2 Increased utilization of safe and nutrient-dense foods
Outcome 3.3 Develop and/or strengthen national food safety system

Sources of food consumption
Figure 17, 18 and 19 report the main sources of foods consumed by the household in the last 12 months preceding the survey days which was either from own production, purchase, gift/transfer or food aid. The proportion of households that reported 'own production' as the main source of food consumption was higher than other sources of food reported. A smaller proportion of female headed households managed to meet their food consumption from their own production in all regions. The differences of source of food for male and female headed households was statistically significant for West Armacho and Babile (P-value of chi square 0.023 and 0.004 respectively). A higher percentage of respondents from high potential areas of Amhara and SNNP were more able to meet their families need from what they produced compared to respondents in food insecure and commercial areas, but in a high percentage of farmers in Oromia commercial *woreda* able to meet their food consumption need from what they produced. As expected, food aid was observed in food insecure *woreda* s in all regions. The difference in main source of food between food system typologies was statistically tested within regions and the result shows that there was strong evidence that the difference in main source of food in the last 12 months previous to interview date was significant at 5% level (chi-square P-value 0.000). Among all food system typologies, purchasing food from the market either from their saved money or selling livestock was the second source of food for their family except high potential of SNNP.
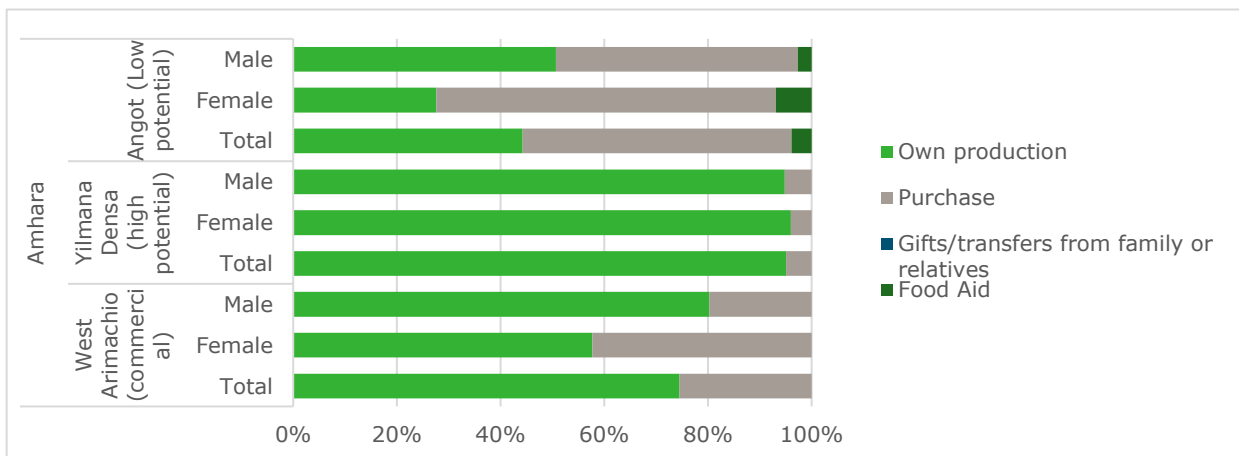

Figure 18: Source of food consumption for 12 months previous to study time in Amhara
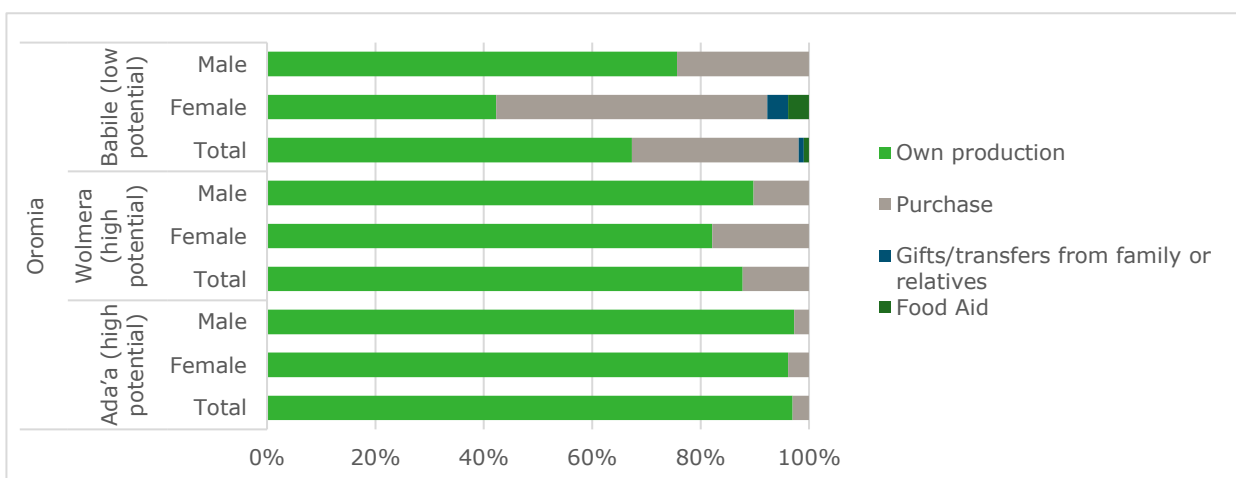

Figure 17; Source of food consumption for 12 months previous to study time in Oromia
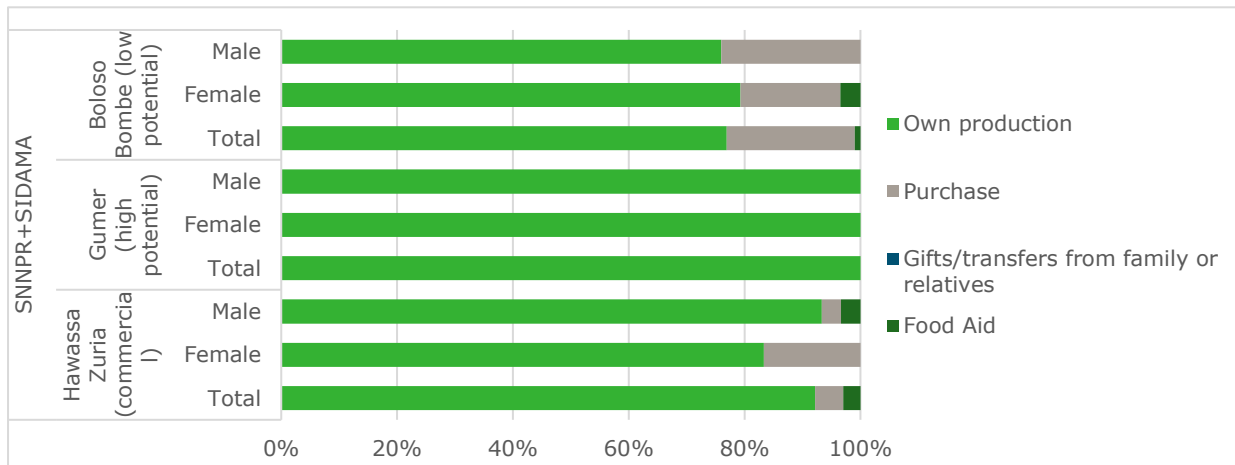
Figure 19: Source of food consumption for 12 months previous to study time in SNNP

Generally, conclusions from the above figures on sources of food consumption include:
- Only respondents from high potential of SNNP fulfil their annual consumption from their own production
- Female headed household has less to satisfy their annual food
- Food insecure *woredas* used different sources for their annual food consumption like aid,
- Transfer/gifts observed in food insecure *woreda*s
- Purchase of food from market was the second source while higher in food insecure *woreda* s of Amhara and Oromia

Months With Food Gap

Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO et al, 2022). It can be measured using a subjective indicator called food gap. The number of months that the household was not able to satisfy their food needs in the last 12 months preceding the survey date was assessed by asking "Is there a time of year when there was less food/food shortage compared to other times?"

The results on revealed that most of the households in in food insecure *woreda* s respectively 93% from Angot, 79% from Babile and 92% from Boloso Bombe faced a food shortage compared to high potential and commercial *woreda*s. A high proportion of female headed households faced food shortage compared to male headed households. From SNNP, female headed households found in commercial *woreda* (Hawassa Zuria) were more food insecure than high potential *woreda*s. In Amhara and Oromia households in commercial *woreda*s were more food insecure than high potential *woreda* s.

The difference of food insecurity level between female headed and male headed households, food system typologies and regions were tested using chi square test and the result reveals that the difference food insecurity level for Yilmana Densa and Ada'a *woreda* s was significant at 5% level and for those of commercial from Amhara and Hawassa Zuria significant, significant at 10% level of significance. Similarly, there is strong evidence that the difference of food security level among regions and between food system typologies was statistically significant at 5% level with P-value 0.000.

Table 22: Percentage of households facing food shortage

Region	Woreda	Male head HH no	Male head HH yes	Female head HH no	Female head HH yes	Total no	Total yes	Between Male, female Head	Between FS typologies	Between regions
Amhara	Angot	8	92	3	97	7	93	0.406		
	Yilmana Densa	97	3	68	32	90	10	0.000**		
	West Arimachio	86	15	69	31	81	19	0.065*		
	Total	64	36	45	55	59	41	0.003**	0.000**	
Oromia	Babile	24	76	12	89	21	79	0.166		
	Wolmera	67	33	61	39	65	35	0.571		
	Ada'a	66	34	39	62	59	41	0.013**		
	Total	52	48	38	63	48	52	0.024**	0.000**	
SNNP/ Sidama	Boloso Bombe	8	92	7	93	8	92	0.85		
	Gumer	39	61	30	70	36	64	0.395		
	Hawassa Zuria	43	57	17	83	40	60	0.077*		
	Total	31	69	18	82	28	72	0.040**	0.000**	
Overall		**49**	**51**	**34**	**66**	**45**	**55**	**0.000**		**0.000**

The header for the Chi-square columns reads: "Chi-square test for difference of facing food shortage P-value"

**-significant at 5% level, * significant at 10% level

From the results of Table 23 most of the households (62%) from Angot faced a food gap for 4 to 6 months (average 4.8 months) in a year but households in west Armacho and Yilmana Densa faced food shortage for less than 3 months in a year. On average 0.7 and 0.3 months respectively in West Armacho and Yilmana Densa were found food shortage months.

Similarly, 60% of households from Boloso Bombe of SNNP faced a food gap for 4 to 6 months (average 3.9) in a year while each 42% of Gumer and Hawassa Zuriya faced food gap for less than 3 months in a year with average of 2 and 1.8 months respectively. Most households from implementation *woreda* s of Oromia faced food shortage months for less than or equal to 3 months in a year.

Table 23: Percentage of households facing food gap in the last 12 months

region	Woreda	Male Headed HH 0	<= 3	4 - 6	> 6	Female Headed HH 0	<= 3	4 - 6	> 6	Total 0	<= 3	4 - 6	> 6
Amhara	Angot	8	17	67	8	3	28	48	21	7	20	62	12
	Yilmana Densa	97	1	1	0	68	16	16	0	90	5	5	0
	West- Arimachio	86	11	4	0	69	15	8	8	81	12	5	2
	Total	64	10	24	3	45	20	25	10	59	12	24	5
Oromia	Babile	24	47	27	1	12	31	42	15	21	43	31	5
	Wolmera	67	24	9	0	61	25	14	0	65	25	10	0
	Ada'a	66	28	5	0	38	46	15	0	59	33	8	0
	Total	52	33	14	0	38	34	24	5	48	34	16	2
SNNP Sidema	Boloso- Bombe	8	32	59	1	7	21	62	10	8	29	60	4
	Gumer	39	38	21	3	30	53	17	0	36	42	20	2
	Hawassa Zuria	43	41	14	1	17	50	33	0	40	42	17	1
	Total	31	37	30	2	18	39	38	4	28	38	32	2

The column group header reads "# Of Months with Food gap" for each of Male Headed HH, Female Headed HH, and Total.

Critical months for food shortage
The results (Figure 20) show that most of the households from Amhara and Oromia faced food gap in July, August, September and October while those from SNNP faced food gap in months of March to June since the *Belg* season crops widely harvested after June. The pick month for food shortage in food insecure *woreda* s were respectively April, July and August for Boloso bombe, Babile and Angot *woreda* s respectively. About 84% of households in food insecure *woreda* of SNNP faced food shortage in April while 67% and 76% of households from food insecure *woreda* s of Oromia and Amhara faced food shortage in July and August respectively.
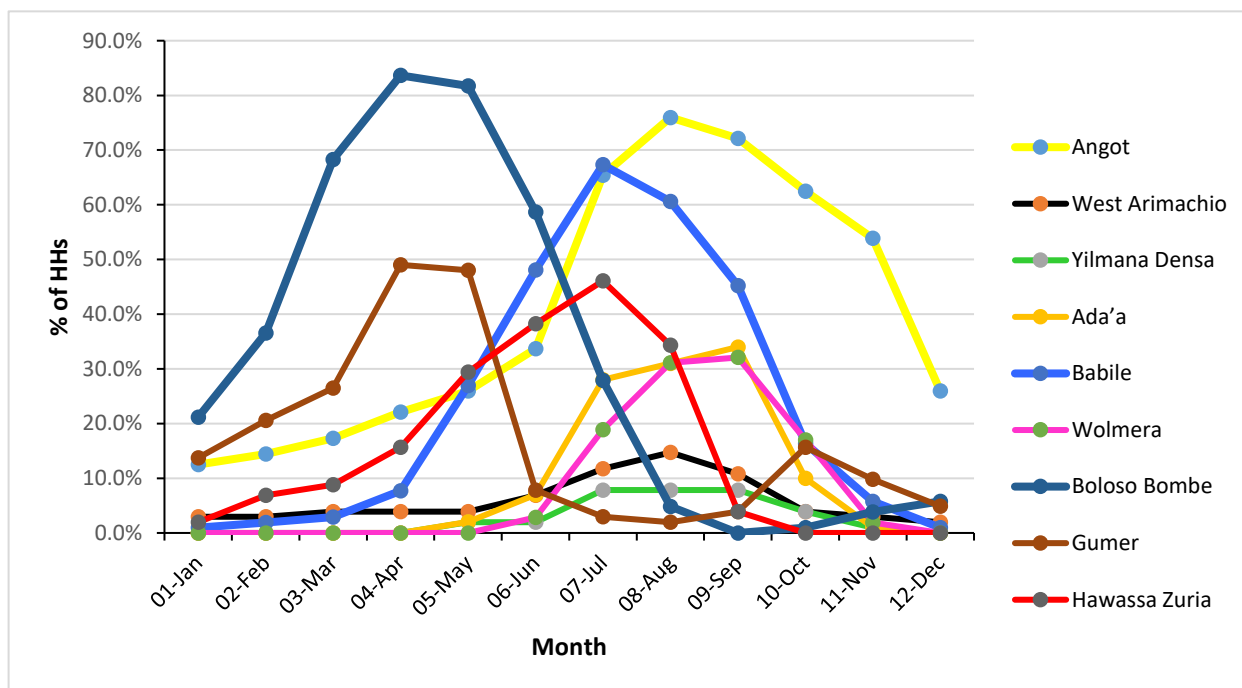
Figure 20: Months with food gap of surveyed woredas in a year

Dietary Diversity - Food consumption score
The dietary diversity & food frequency approach aims to estimate whether the household manages to access items from the basic food groups in their habitual diet. Number of days of consumption out of the reference last 7 days (week) is intended to track potential regularities in the consumption habit (WFP).

The food consumption score is calculated to assess the food consumption behaviour of surveyed households within 7 days of previous to interview day based on eight categorized food groups namely cereals and tubers (includes: rice, wheat, sorghum, millet, teff, maize, potato, yam, cassava, sweet potato, taro and / or other tubers, plantain) : pulses (includes: faba beans, field pea, chickpea, grass pea, cowpeas, peanuts, lentils, nut, soy, pigeon pea): any vegetables and leaves: any fruits: meat/fish (include: Beef, goat, sheep, poultry, eggs and fish): milk and dairy (includes: fresh milk / sour, yogurt, cheese, other dairy products (excluding margarine/butter or small amounts of milk for tea / coffee): sugar and sugarcane (sugar, honey, jam, cakes, candy, cookies, pastries, cakes and other sweets (sugary drinks)) and oil, fat and butter (includes: vegetable oil, palm oil, sunflower oil, butter, margarine, other fats / oil). Based on the guideline of WFP/FAO, the total calculated FCS is 0-21 is poor food consumption behaviour, 21.5-35 is borderline food consumption and FCS>35 is acceptable food consumption behaviour.

A further disaggregation of Figure 21 by regions show that cereals were consumed 6 to 7 days in a week for all regions with average number of days about 7 days in Amhara and Oromia while 6.4 days in SNNP. Pulses were less consumed in SNNP compared to Amhara and Oromia with the most households in Amhara consumed pulses. Vegetables and fruits were more consumed in SNNP with average 4.4 days in a week than others. Dairy products were more consumed in Oromia with average of about 2 days in a week. For meat and dairy products, it may be affected by the time of survey since it was a fasting period specially for Amhara region.

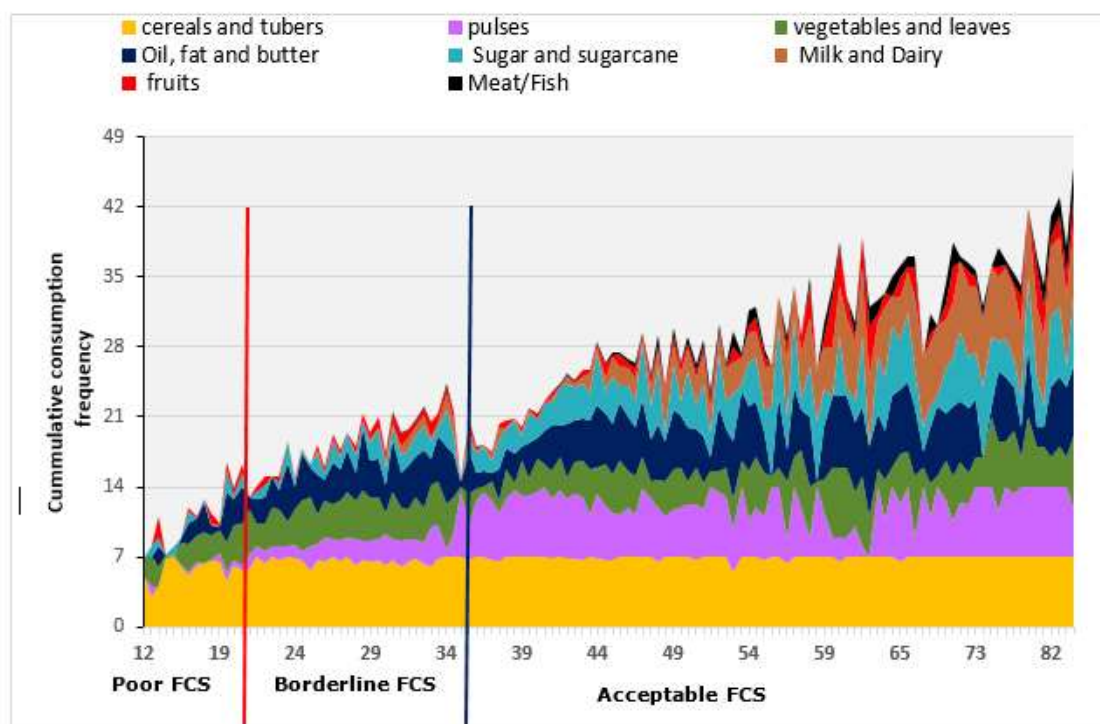**Food Consumption frequency**

Figure 21: Food consumption frequency of different food crops

The food consumption score of surveyed households were also analysed and categorized as poor, borderline and acceptable food consumption behaviour. The result shows that poor food consumption behaviour was observed in food insecure *woreda*s of Amhara, Oromia and SNNP, and also in high potential and commercial *woreda*s of SNNP. About 41% of female headed and 35% of male headed households in Boloso Bombe had poor food consumption score. In all food insecure *woreda* s, female headed households had poor food consumption score compared to male headed households. Households in Ada'a *woreda* of Oromia had more recommended food consumption score than other *woreda*s.

The differences of FCS also statistically tested and it is significant among female headed and male headed for Oromia while not Signiant for male and female headed households in Amhara and SNNP/Sidama (P-value 0.181, 0.180 respectively) at 5% level of significancy. The difference of food consumption score among food system typologies were significant in Amhara, Oromia, and SNNP/Sidama with P-value 0.002, 0.003, and 0.000 respectively. Households in Ada'a *woreda* of Oromia had more recommended food consumption score than other *woreda* s.
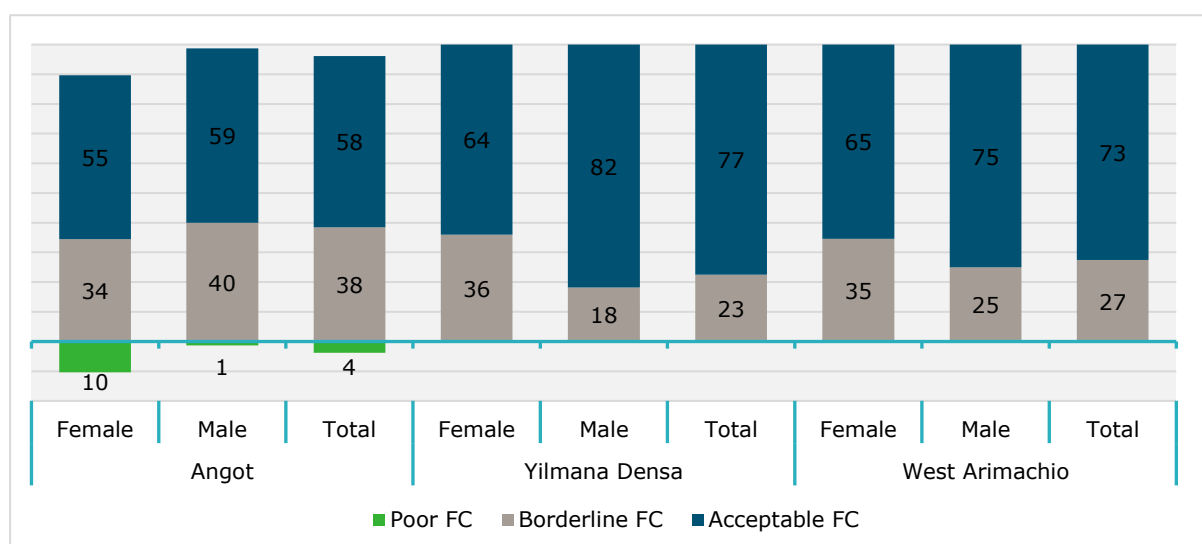

Figure 22: % of households under each Food Consumption Score of Amhara woreda

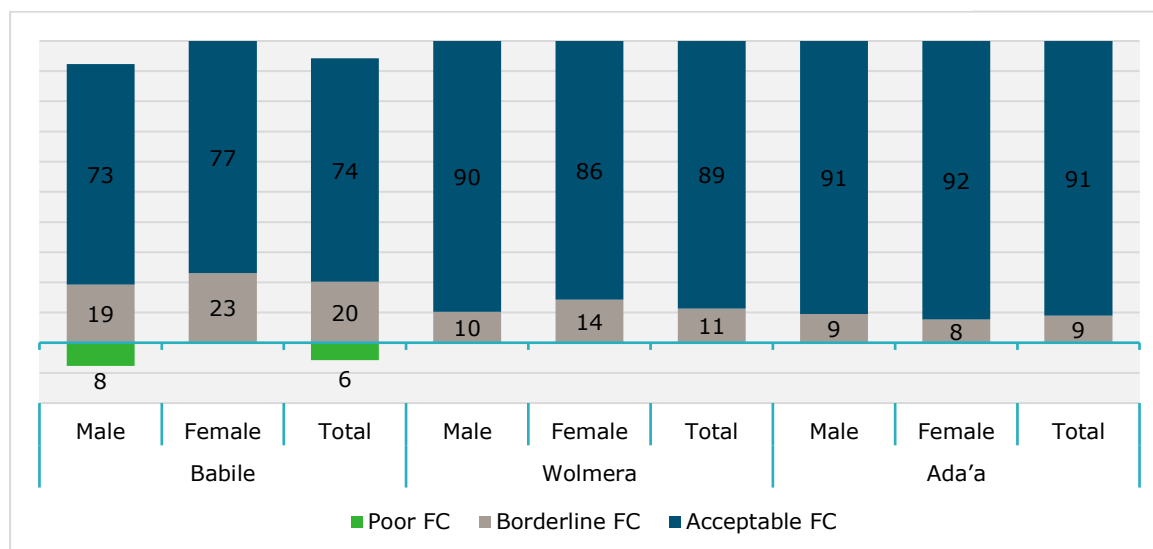*Figure 232: % of households under each Food Consumption Score of Amhara woreda*

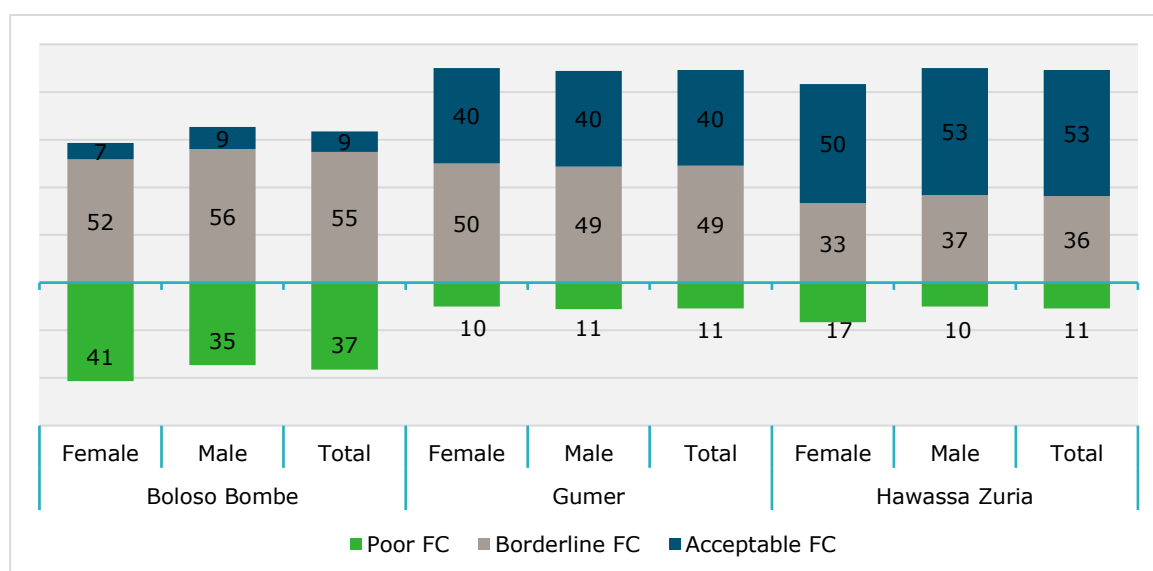*Figure 24: % of households under each Food Consumption Score of Oromia woreda*

Figure 25: % of households under each Food Consumption Score CS of SNNP / Sidama woredas

The Individual Quality Dietary Diversity (QDDS) was measured on men and women by asking them about their individual food consumption in the 24 hours prior to the interview. The questions were based on 10 food group categories: grain, white roots and tubers, and plantains; pulses (beans, peas and lentils); nuts and seeds; dairy; meat, poultry and fish; eggs; dark green leafy vegetables; other vitamin a-rich vegetables and fruits; other vegetables; and other fruits.

There were minimal differences in dietary diversity scores between regions. Table 24 shows that among all respondents, those from Hawassa Zuriya consumed more diversified food items with about 24% consumed at least 5 food groups. Respondents from Yilmanana Densa which is high potential food system consumed the least diversified food with almost no one consumed the minimum recommended food diversity.

There were also regional differences in the percentage of women under reproductive age who were achieving minimum dietary diversity (MDD-W). Women under reproductive age from SNNP/Sidama had the highest percentage of meeting the minimum diet diversity (18.9%) followed by Babile and Wolmera *woreda*s of Oromia region (each 16.7%). Amhara had the lowest percentage of women meeting minimum dietary diversity with 5.7% of women in Angot and 2.1% of women in West Armacho. This may be due to the time

of data collection was a fasting time specially for Amhara respondents and needs further investigation by assessing dietary diversity out of this time.

The average number of food groups consumed by respondents in each region was slightly different and statistically tested for their significant difference. The mean difference test among food system typologies for Oromia and SNNP/Sidama shows that there is strong evidence that the difference was significant at 5% level (P-value 0.000) but not significant for Amhara food system typologies (P-value 0.368). Similarly, the difference was not significant between men and women or reproductive age women (age 15 to 49) and other age group women respondents among food system typologies in all regions.

Table 24: Dietary diversity of surveyed respondents (Minimum of 5 food items)

Dietary Diversity score		Amhara			Oromia			SNNPR/Sidema		
		Angot	Yilmana Densa	West Armachio	Babile	Wolmera	Ada'a	Boloso Bombe	Gumer	Hawassa Zuria	Total
Overall	n	104	102	102	104	106	100	104	102	102	926
	ave	2.4	2.3	2.4	3.7	3.1	2.9	2.6	3.0	3.8	2.9
	%	1.9	0.0	2.9	24.0	14.2	6.0	5.8	8.8	24.5	9.8
Men	n	55	54	53	54	53	54	53	50	61	487
	ave	2.5	2.3	2.5	3.9	3.1	3.0	2.7	3.0	3.9	3.0
	%	0.0	0.0	3.8	29.6	11.3	7.4	3.8	8.0	29.5	10.7
women	n	49	48	49	50	53	46	51	52	41	439
	ave	2.4	2.3	2.3	3.4	3.1	2.7	2.5	3.0	3.6	2.8
	%	4.1	0.0	2.0	18.0	17.0	4.3	7.8	9.6	17.1	8.9
Women (15–49)	n	35	42	47	42	36	27	34	33	37	333
	ave	2.5	2.3	2.3	3.3	3.1	2.8	2.7	3.1	3.7	2.9
	%	5.7	0.0	2.1	16.7	16.7	3.7	11.8	9.1	18.9	9.3

n-number of respondents, ave-average number of food items/groups, %-percent of individuals consumed at least 5 food items/group per day

Table 25 shows the number of food groups consumed within 24 hours of preceding the survey date varied from region to region. Most individual respondents, more than 50%, consumed at least three food groups while 10% and 25% of households consumed at least five food groups and four food groups respectively. The difference in number of households consumed either five, four or three food groups between food system typologies within regions statistically tested using chi-square test and the result shows that there is significant difference among food system typologies in Oromia and SNNP/Sidama (P-value 0.001-0.003, P-value 0.000 respectively). But the difference in number of households consumed either five, four or three food groups between food system typologies in Amhara was not significant (P-value 0.240-0.884)

Table 25: Proportion of individuals who consumed at least 5/4/3 food items

Respondent	Food groups	Amhara			Oromia			SNNP/Sidama			Total
		Angot	Yilmana Densa	West Armachio	Babile	Wolmera	Ada'a	Boloso Bombe	Gumer	Hawassa Zuria	
Overall	5 FGs	2	0	3	24	14	6	6	9	25	10
	4 FGs	14	3	11	52	32	22	16	26	48	25
	3 FGs	29	26	29	78	60	57	51	68	86	54
Men	5 FGs	0	0	4	30	11	7	4	8	30	11
	4 FGs	15	4	13	59	32	26	19	26	53	28
	3 FGs	35	24	32	80	66	61	53	70	85	57
Women	5 FGs	4	0	2	18	17	4	8	10	17	9
	4 FGs	14	2	8	44	32	17	14	25	42	22
	3 FGs	22	29	27	76	55	52	49	65	88	51
Women (15-49)	5 FGs	6	0	2	17	17	4	12	9	19	9
	4 FGs	20	2	9	43	36	19	18	27	46	24
	3 FGs	29	31	28	74	53	59	56	70	89	53

FGs is Food groups/items

In Amhara, starchy staple foods and pulses (beans, peas and lentils), were the most frequently reported foods groups consumed by most people followed by respondents in Oromia. Pulses were not mostly consumed in SNNP/Sidama compared to other regions. But dark green leafy vegetables were mostly consumed by people in SNNP/Sidama. while dairy products were most frequently consumed by 48%, 38.5% and 28.4% of respondents in Hawassa Zuria, Babile and Gumer respectively (Table 26).

Table 26: Percentage of households consumed each food groups

Food groups	Amhara			Oromia			SNNPR Sidema			Total
	Angot	Yilmana Densa	West Armachio	Babile	Wolmera	Ada'a	Boloso Bombe	Gumer	Hawassa Zuria	
G1-Grain, white roots and tubers, plantain	100	100	99	100	100	99	99	100	97	99
G2-Pulses (beans, peas and lentils)	92	96	98	82	90	93	45	52	34	76
G3-Nuts and seeds	1	0	2	22	10	6	0	0	1	5
G4-Dairy	4	0	1	39	19	12	7	28	48	18
G5-Meat, Poultry, and fish	0	0	0	2	6	9	0	1	9	3
G6-Eggs	0	0	0	1	9	9	0	3	8	3
G7-Dark green leafy vegetables	19	27	18	28	23	1	62	76	75	36
G8-Other vitamin A-rich fruits and vegetables	2	1	4	9	9	8	14	6	9	7
G9-Other vegetables	19	5	20	71	40	48	27	27	79	37
G10-Fruits	4	0	0	16	5	5	6	4	19	7

Household food insecurity access scale (HFIAS)

Food security is defined as a state in which "all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life" (USAID, 1992). Food insecurity (FI) is defined as the limited or uncertain availability of nutritionally adequate and innocuous foods or the limited or uncertain capacity for acquiring adequate foods by socially acceptable means (Castell, G et.

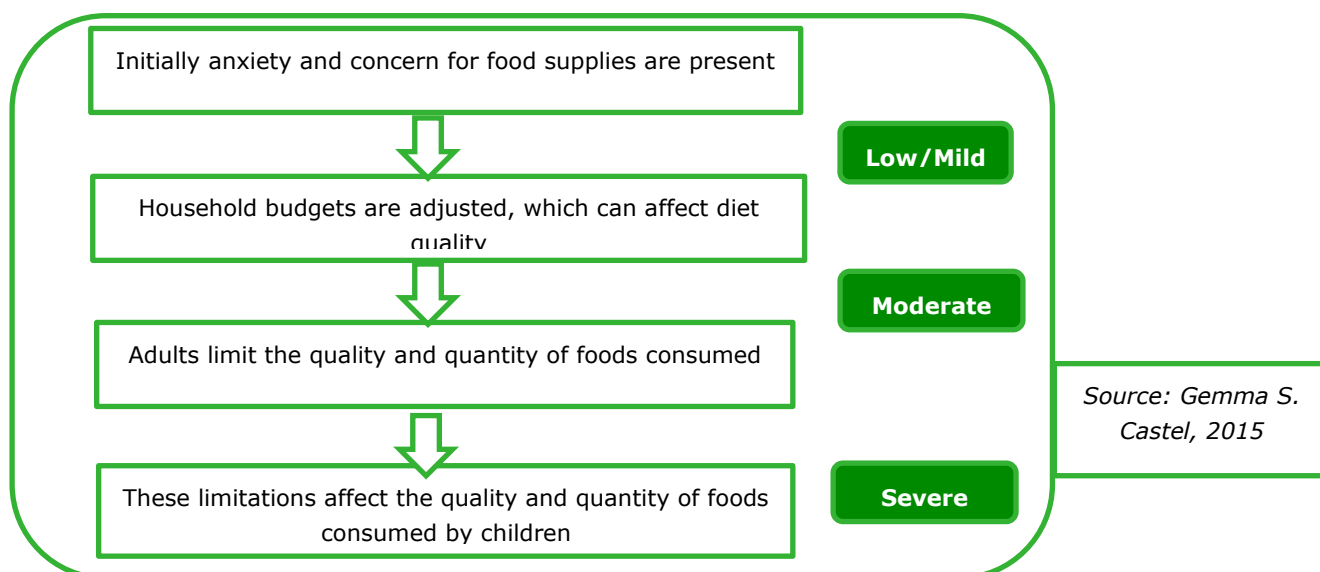Al, 2015). Figure 26 depicts a conceptual framework about the onset and process of household food insecurity

Figure 26: Onset and process of household food insecurity

It is known that the household food in/ security can be measured in different way depending on the purpose of the study. This study employed commonly known measure of food security status tools (HFIAS). The tool consists of nine occurrence questions and nine frequency-of-occurrence questions. The HFIAS occurrence questions ask whether or not a specific condition associated with the experience of food insecurity ever occurred during the previous 4 weeks (30 days).

There are three response options representing a range of frequencies (1 =Rarely (once or twice in the past four weeks), 2 = Sometimes (three to ten times in the past four weeks), 3 = Often (more than ten times in the past four weeks). HFIAS score variable is calculated for each household by summing the codes for each frequency-of-occurrence question and ranges from 0 to 27. The lower the score, the less food insecurity a household experienced.
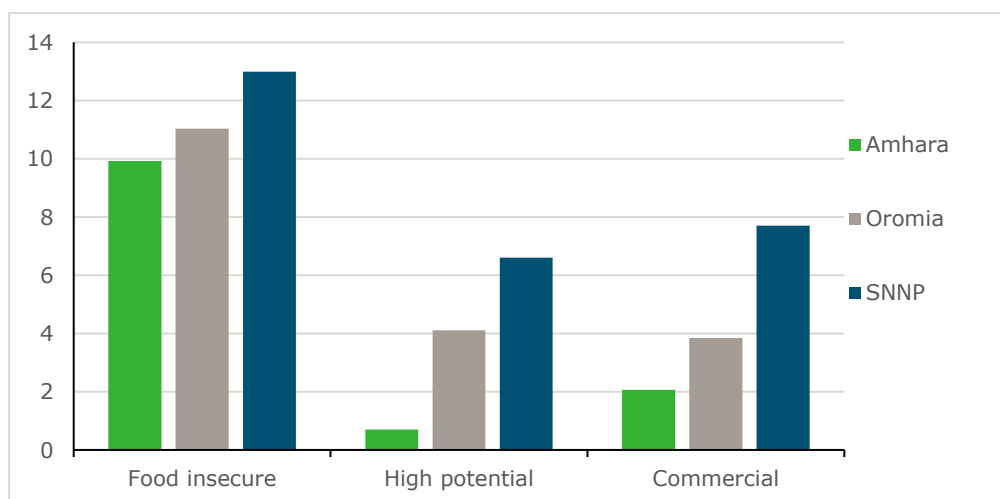
Figure 27: Average household food insecurity access score

The survey result (Figure 27) show that the average HFIAS was high in the food insecure *woreda* s respectively 10, 11 and 13 for Angot, Babile and Boloso Bombe. The score was also relatively high for commercial compared to high potential in Amhara, Oromia and SNNP/Sidama. The lowest HFIAS was observed in High potential of Amhara.

A food secure household experiences were none of the food insecurity conditions, or just experiences worry, but rarely.

A mildly food insecure household worries about not having enough food sometimes or often, and/or is unable to eat preferred foods, and/or eats a more monotonous diet than desired and/or some foods considered undesirable, but only rarely. But it does not cut back on quantity nor experience any of three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating).

A moderately food insecure household sacrifices quality more frequently, by eating a monotonous diet or undesirable foods sometimes or often, and/or has started to cut back on quantity by reducing the size of meals or number of meals, rarely or sometimes. But it does not experience any of the three most severe conditions.

A severely food insecure household has graduated to cutting back on meal size or number of meals often, and/or experiences any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating), even as infrequently as rarely. In other words, any household that experiences one of these three conditions even once in the last four weeks (30 days) is considered severely food insecure (*Jennifer C., and Swindale P., 2007*).
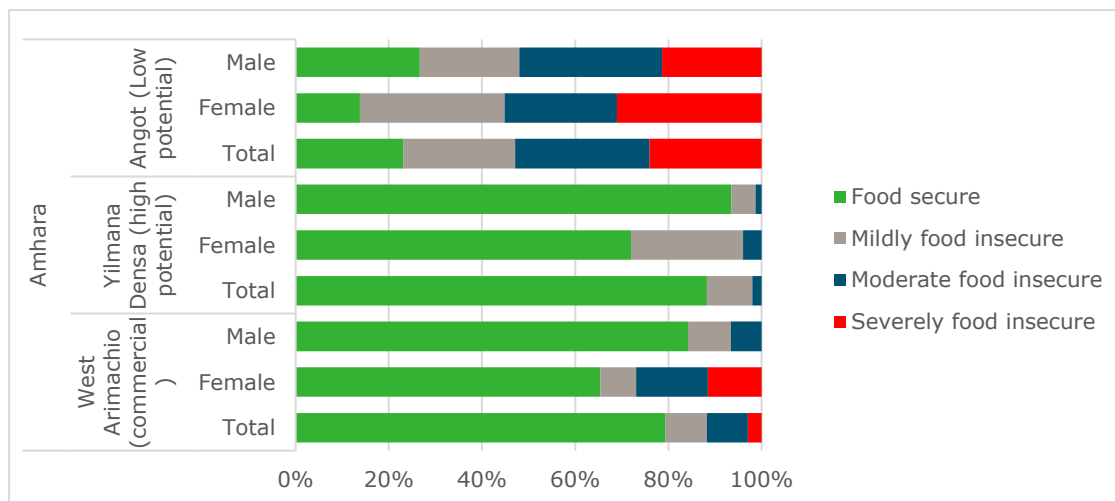

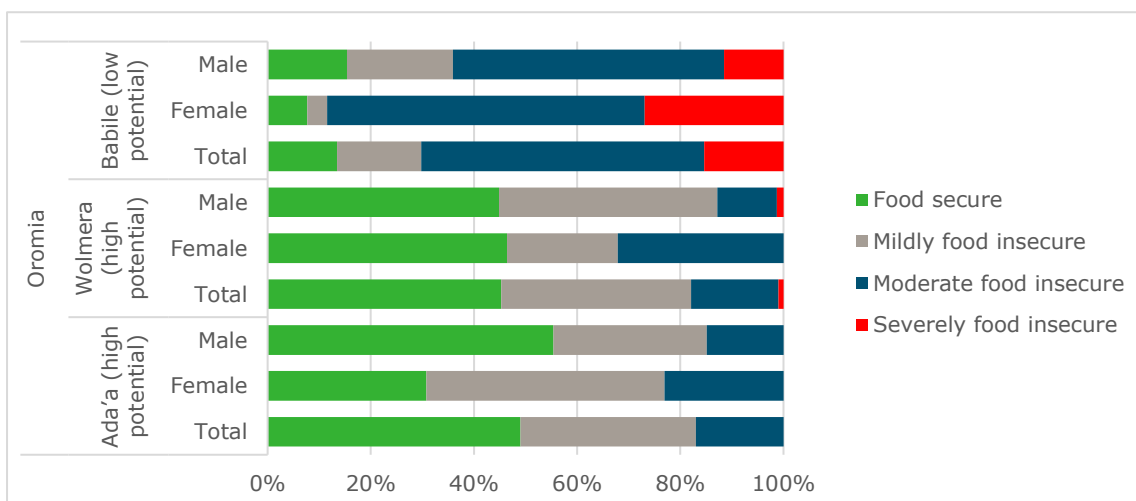*Figure 28: Household food insecurity score Amhara*

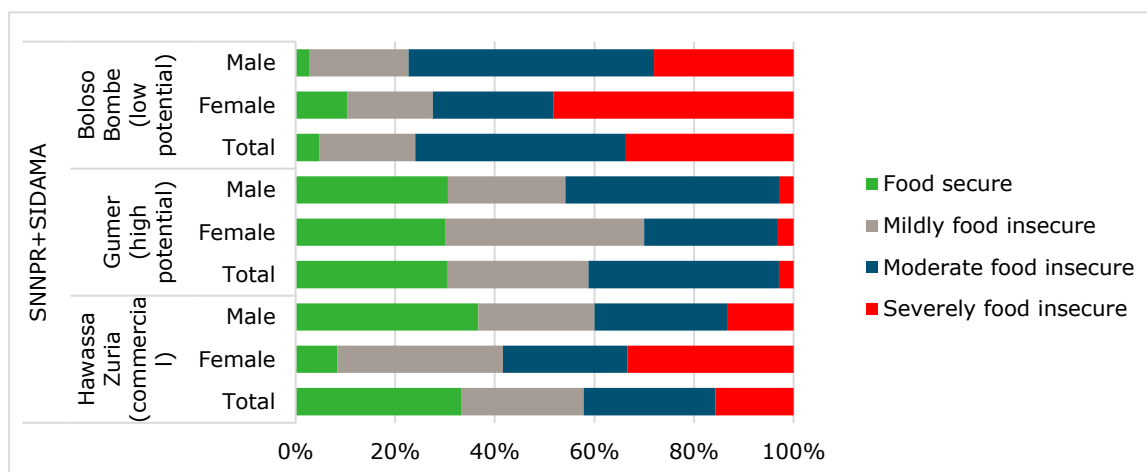*Figure 29: Household food insecurity score Oromia*

Figure 30: Household food insecurity score SNNPR/Sidema

The result of Figure 29 shows that among food system typologies, high percentage of households (34%) in food insecure *woreda* of SNNP had experienced a severely food insecurity followed by food insecure *woreda* of Amhara (24%). Female headed households were more a severe food insecure than male headed households with the proportion of 48%, 31% and 27% in Boloso Bombe, Angot and Babile. Generally female headed households were more food insecure than male headed households in all food systems. A small proportion of sever food insecure households also observed in commercial area of Amhara and SNNP/Sidama but moderate food insecure households in high potential *woreda* of Oromia. About 17% of households from commercial area of south region experienced severely food insecure while it is 3% in Amhara. About 2% and 15% of households from high potential of Amhara and Oromia respectively were moderate food insecure but no one was a severely food insecure.

High potential *woreda* s were better in food security than commercial area of Amhara and SNNP/Sidama but similar in Oromia. About 58%, 83% and 88% of households in commercial area of SNNP/Sidama, Oromia and Amhara respectively were food secure or mild food insecure. Similarly, 59%, 82% and 98% of households from high potential of SNNP/Sidama, Oromia and Amhara were food secure or mild food insecure.

Conclusions

The survey provided an in-depth understanding of the baseline information and baseline data was established for project indicators.

The study has utilized the five domains of empowerment, which is one part of WEAI, to demonstrate degrees of empowerment and degree of WEAI's indicator contribution for women and youth disempowerment. Among the five domains of empowerment(5DE), women were empowered with 77.5% of WEAI's indicators and still disempowered with 22.5%. Similarly, youth were empowered with only 66% of indicators while disempowered with 34% of WEAI's indicators.

Time use counts the largest share (37%) for women's disempowerment with 21% high workload and 16% less leisure time. Leadership (30%) is the second stage for its contribution of women's disempowerment with 18% face difficulties of speaking in public and 12% lack member of group membership. Access to finance and decisions on credit had high contribution (22%) for women disempowerment among indicators for resource domain. Hence efforts should made toward improving women's workload, increase women involvement in economic activities to enhancing leadership, and improving access to finance.

Similarly for youth empowerment, weak leadership and influence in the community is the major contributor for youth disempowerment (28%) with 18% lack of group membership and 10% difficulties of speaking in public. Lack of inputs for decisions on control over use of income and lack of resources also high contribution for youth disempowerment.

An indicator of dietary diversity is particularly designed to capture the quality dietary diversity (QDDs) of individuals that used as a proxy for household QDDs. There were minimal differences in dietary diversity scores between regions and also between male and female in the implementation area. Few women achieved the recommended minimum dietary diversity per day that ranges from 2% to 15% in all regions. In general, the dietary diversity was very low in all food systems. Respectively in Amhara, Oromia and SNNP/Sidama the average number of food items were 2.4, 3.7, and 2.6 for food insecure *woreda* s, 2.3 3.1 and 3.0 for high potential while 2.4, 2.9, and 3.8 for commercial *woreda* s. Overall, about 54%, 25% and 10% of individuals consumed at least three food items, four food items and five food items respectively.

Access to finance for rural households were limited in the implementation area specially for women and youth. informal lending sources like friends/ relatives, informal credit/saving groups like merry-go-rounds, funeral societies were more accessible than formal sources like bank/financial institution, micro-finance including VSLAs/ SACCOs. In all food systems, female headed households have less access to finance compared to male headed households. Improving access to finance for women and youth was the major efforts to be made for improving livelihood.

Experience of farmers with agronomic practices like intercropping, relay cropping, crop rotation, agroforestry and green manuring was assessed the survey. Most farmers had less experience with intercropping, relay cropping, agroforestry and green manuring. Intercropping is more practiced by households from SNNP and less practiced in Amhara. A large percentage of farmers from Oromia (77%) practiced crop rotation followed by Amhara (71% respectively). Most of these farmers rotated their crops with similar category of crops like cereal with cereal, which is not recommended as good agricultural practice as this doesn't contribute increasing crop productivity (contrary to cereals pulses rotation). The survey results also shown that productivity of most crops was very low. Female farmers head heading households practice these good agricultural practices less than men heading households. These low practice of improved farming practices leads farmers to low productivity. Relay cropping, agroforestry and green manuring were less experienced by farmers (14%, 17% and 1% respectively).

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Annex I