

Rapid Rural Appraisal (RRA) in Dray Land Area of Central Tigray, Ethiopia

Hints Meresa¹ Elias Weldu² Abel Guesh³

1.Abergelle Agricultural Research Center: P. o. Box 44, Abi-Adi, Ethiopia

2.Farm Radio International- Ethiopia (FRI-E)

3.Dimtsi Weyane Tigray (DWeT)

Abstract

The study was conducted in two drought infected woredas of central zone of tigray, namely tanqua abergalle and qola tembien in 2015. The over all objective of the appraisal to identify the major cause of the drought and coping up strategies in study area .For this study we taking samples two from each woreda . The kebele taking sample from tanqou abergelle and qola tembien are agbe, embarfael , dabano,and simret respectively. The study were critically identified the major cause of the problems with their solution.

1. Background

Farm Radio International- Ethiopia (FRI-E) is to embark on the third phase of a project, entitled “Developing Ongoing Demand-led Interactive Farm Radio Services,” with the funding provided by Irish Aid. The project is mainly aimed at enabling farmers to have access to ongoing farm radio services on nutrition-sensitive, climate-smart and women focused agricultural practices. The first and second phases of the project were implemented in Oromia and Southern Nations, Nationalities and Peoples (SNNP) regions. The third builds on the previous phases, and adds Tigray region.

In Tigray region, the project works on delivery of Interactive/ Effective Farm radio Advisory Service (I/EFRAS). At the initial point, it is required to conduct Rapid Rural Appraisal (RRA) in order to assess the needs and priorities of target farmers. The RRA enables community selection of climate-smart and nutrition-sensitive crops through creating a thorough understanding of the knowledge, perceptions, challenges and responses of target communities on climate change and nutrition. Accordingly, a team of 3 persons has undertaken the RRA, for the I/EFRAS, from March 16-21, 2015.

Districts for the RRA were identified with the support of Tigray Agricultural Research Institute (TARI). The selection was made based on the climate change, nutritional and gender criteria. As a result, Kolla Tembien and Abergele districts in central Tigray were selected.

The RRA team was composed of staffs from Abiy Addi Agricultural Research Center¹ of TARI, Dimtsi Weyane Tigray (DWeT), and FRI-E. The extension officers of the two districts were involved during data collection. Initially, the team has agreed to select two villages in each district, based on the climate and nutritional criteria, with the assistance of the extension officers. Thus, Debano and Simret villages were selected from Kolla Tembien, and Agbe and Embarfael from Abergele.

Venn diagrams, seasonal calendars, and focus Group Discussions (FGDs) were employed to generate data required for the RRA. Observations of the team members were also includes as sources of information. The RRA assessed the community profile, and their understandings, choices, challenges and responses regarding climate change and nutrition. This is, therefore, an exclusive report demonstrates results of the village specific RRA.

2. Debano Kebele

2.1. Community Profile

2.1.1. Physical Features

Debano kebele² is found in Kolla Tembien woreda of Central Tigray zone in Tigray Regional State. Abiy Addi, the capital of Kolla Tembien woreda, is the nearby town with 23 km of distance. It is located 13°46'40.3"N and 38°59'30.6"E. The kebele is bordered with Woinara kebele in the north and east, Workamba kebele in the south, and Wuhdet kebele in the west.

Landform of the kebele is characterized by a mix of gorgy and plain features. The altitude of the area ranges from 1416 to 1624 m.a.s.l. The kebele experiences an average rainfall of 250-500 mm. Woinara, Atsela, Kizelet and Daba Tadios are the rivers flowing in the village. Shrubs, bushes and Acacia are the main vegetations covering the kebele.

¹ Abergelle Agricultural Research Center is the research center specialized in the agro-ecology of the two districts. It is found in Kolla Tembien district.

² Kebele is the smallest administrative unit in Ethiopia. It lies in the fifth tier of the administrative structure which involves federal state, regional states, zones, and woredas, consecutively. Kebeles constitute a woreda.

2.1.2. Settlement Pattern

The kebele is divided into 4 clusters or villages, known as *kushets/ gots*. These are Sagla, Serawit, Deba Paulos, and Deba Tadios. Among these, Sagla is the largest and Deba Tadios is the smallest.

The settlement pattern in these villages is almost similar. It is common to see houses scattered in a wide area. In rare experiences, houses grouped together are perceivable in the kebele.

2.1.3. Social and Institutional Arrangements

The formal and non-formal institutions identified by farmers and based on observations hold political, religious, welfare, and economic base. The kebele administration is the authorized unit for the overall political leadership. Orthodox Church is the primal religious institution. Though operating under the aegis of the church, *Senbetie* and *Mahiber* are non-formal gatherings in which private feasts are organized in Sabbaths and saint days. The non-formal and indigenous mechanisms with welfare component include *Idir* and hamlet earmarking. *Idir* is an association of villagers which raises funds to be used in the case of deaths of the members and their families to effect funerals and associated payments. The villagers also earmark funds to be utilized for assistances during undesirable occurrences on individual members. In the economic aspect, there is a farmers' cooperative operating in the village in order to secure fair prices, for their grains, in the harvest seasons. The farmers also have local means of saving named *equib*. The *equibs* are non-formal associations in which members regularly save in cash/ in kind and get back the sum in a round.

By using a Venn diagram, shown below in fig 1, the community members have reflected the degree of importance these institutions have in their life. The degree of importance is measured by the length of the line connecting a particular institution with the community. The shorter the length, the more important the institution is.

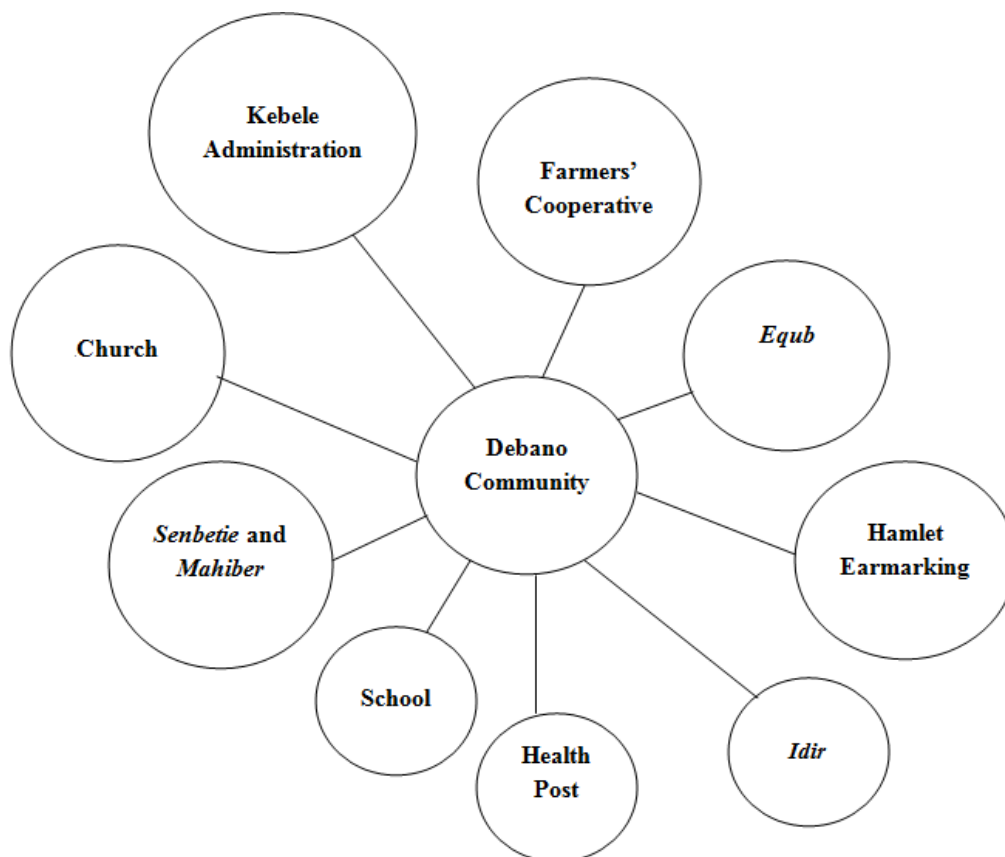


Figure 1: Venn diagram of Social Institutional Arrangements in Debano kebele

Livelihood Patterns

The male and female FGD participants reported that grain production is the cardinal source of income in Debano kebele. The respondents also indicated that dwellers generate income through agricultural activities as poultry, bee hiving, and diary productions. Farmers run these businesses either individually or in association.

Though meager, non-agricultural economic activities also serve as sources of income for the farmers. Some are engaged in petty trade activities as tea and coffee service, selling *suwa* (a local beer), and retailing household commodities. In addition, some villagers, residing near the rivers, make their living through traditional gold mining.

The above mentioned means of livelihood stagger with various impediments. Inaccessibility of agricultural land, and shortage of working space among the bottlenecks mentioned. Farmers also identified unproductively of land as a threat to their livelihood. Poor access to market is another factor affecting income the villages. Words of Keshi Mikias, a male FGD participant, confirm this. He said, “Our area is potential to sesame production. When some of us tested it, we experienced market problems”.

2.2. Crop Production

2.2.1. Criteria to Determine Crops

The study participant farmers mentioned various criteria, pertinent to niche, drought tolerance, early maturity, yield, and market demand, to determine the type of crop to raise. The agro-ecological criteria are the key decision factors. These are concomitant to climatic condition, resistance to drought, and suitability of land. Early maturity affects farmers’ decision factor as households are more likely to get rid of food shortage if they can harvest in a shorter time span. Ability to meet household consumption also determines what to crop. Furthermore, tradability of a crop, in some instances, shapes farmers’ crop choice.

2.2.2. Major Crops Grown

Both the male and female FGD participants indicated that maize is predominantly a staple crop in Debano kebele. Next to maize, the farmers, orderly, prioritized sorghum, *teff* and barley. As the female FGD participants revealed, pearl millet is produced in the incidences they experience early rainfall.

According to the informants, the agricultural practices, in Debano kebele, are characterized by subsistence farming. This is evidenced by the fact that the proportion of grain sold is awfully minimal. The chunk of food production is consumed at household level. Farmers sell out miniature of agricultural produce which is adequate enough to purchase some basic ingredients such as salt, red pepper, local spices, etc.

2.2.3. Emerging Changes and Challenges in the Agricultural System

Farmers conferred that agricultural production is in dire condition. They speak grain production is alarmingly plummeting. As Gebrehawaria Mesfin, a male FGD participant, said, “The farmers here purchase grain as regularly as civil servants do. We are eating maize brought from Wollega.” The situation is replicated in the fertility of livestock. Wolday Hiluf, another male FGD participant, stated, “I haven’t seen calf for the past 8 years.”

A plethora of factors are attributable to the worsening situation of agricultural production in Debano Kebele. The village, recurrently, encountered offset rainfall. As relief of the village is apt to get flooded, the quality of soil is reducing due to erosion. The reducing moisture conservation of soil is the other factor. Farmers also pointed that some of the new agricultural practices promoted through the extension system are not applicable to the geographical context of their village. Farmers believe that new agricultural practices as planting in raw and application of fertilizer exacerbated soil erosion and loss of soil moisture. The amalgamation of all these factors is effecting undesirable change in the agricultural system of the village.

2.2.4. Cropping Seasons

FGD participants told that they produce all types of crops during *meher*¹ season. Farmers begin to produce maize and sorghum, the two causal crops, between May and September. On the other hand, the production of *teff* and barley goes along June to October. Harvesting, for all crops, ends by December and January.

Table 1: Crop Calendar of Debano Kebele

Activity	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
1. Cultivating	M S	M	T B	T								
2. Planting		M S	M	T B								
3. Crop Management (weeding and hoeing)			M S	M S	T B M S	T B						
4. Reaping					M	M S	T B					
5. Threshing						M S		T B				
6. Drying and winnowing						M	S	T B				

M: Maize; S: Sorghum; T: Teff; and B: Barley

¹ *Meher* is a crop season which runs from June to September.

2.2.5. Food Shortage and Coping Strategies

Findings divulged that the situation of food shortage is a frequent incidence in Debano kebele. Both male and female FGD pointed that they have encountered food shortage in a shorter time interval, and its earnestness is rising from time to time. The main causes for this are concomitant to climate change. These include drought, stormy rainfall and flooding. Shortage and intensive use of land were also reported to reduce production, and, in turn, exacerbate food shortage.

The table below ranks availability of food and water in each month a year. It is figured out by the community members. Food is highly available between November and March, which fall in or near the harvest period. Availability of water peaks in June to September, the months in which food availability plunges. In these months, the food from the preceding harvest runs out, and land preparation starts for ensuing harvest period. A focus group discussant told that, in this season, it might be too difficult to have even a meal per day.

Table 2: Composite Calendar of food and water availability in Debano Kebele

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Food availability	12	6	3	1	2	3	5	7	8	9	10	11
Water availability	4	5	6	9	11	12	6	10	8	3	1	2

In order to survive in the month having severe food shortage, farmers usually apply the following coping mechanisms:

- **Strategy 1:** Doing casual labor in small mining
- **Strategy 2:** Joining Safety Net Program
- **Strategy 3:** Borrowing money from merchants and civil servants
- **Strategy 4:** Selling household assets
- **Strategy 5:** Migrating to Wolkaite and Humera (commercial sesame producing areas proximate to the village) to do casual labor

2.3. Climate Change

2.3.1. Climate Change Incidences and Effects

The FGD participants are very loud in speaking about the changing climate. They listed the changes in climate as outlined below:

- High rainfall variation
- Erratic and torrential rainfall
- Uneven distribution of rainfall
- Increasing flooding
- Increasing storm
- Prevalence of dangerous weeds
- Recurrent drought incidences

These changes in climate affected the agricultural practices of Debano village in the ways delineated as follows:

- ☞ **Declining soil fertility:** FGD participants told that the soil is losing its productivity due to moisture stress. They mentioned that the frequent flooding aggravated depletion of the soil from time to time. The participants also mentioned that the soil is getting hard to cultivate. They added that loss of soil fertility is a contributory factor for the declining production of cereal crops.
- ☞ **Food shortage:** Drought has become a frequent incidence in the area. Extension workers of the kebele told that drought occurs in every 2 or 3 years interval. This and other factors resulted failure of major food crops.
Frequent failure of food crops as well as miserable amount of food production triggered frequent food shortage in Debano village. Study participants reported that the food shortage is increasing from time to time. They added that their households fall short of food for 5-6 months in a year.
- ☞ **Reduction of agricultural yields:** The FGD participants argued that both crop and livestock production are tumbling. According to the participants, the decline of agricultural production pertains to the frequent natural hazards, drought and soil erosion. They have experienced a decline in the quantity of food crops they produce. On the side of livestock, cattle are getting infertile due to unavailability of adequate pasture. Dairy production is also severely declined.

2.3.2. Knowledge of Adaptation and Mitigation Mechanisms

Farmers were asked if they know mechanisms to adapt with, and mitigate the changing climate. Though they described that they are not familiar with diversified techniques, they mentioned terracing, moisture conservation, and afforestation as the means to cope up with soil erosion, and moisture stress. Accordingly, farmers in the village are engaged in terracing terrain lands, and are working on increasing forest coverage through afforestation and re-forestation.

2.3.3. Knowledge Support Requirements

Responding to the knowledge and informational requirements to cope up with and mitigate the changing climate, the study participant farmers identified various areas of knowledge support. They stated to require the support on planting time, planting methods, soil and moisture conservation techniques, and drought resistant varieties of crops. Even though the farmers indicated to get trainings in some of these areas of knowledge, they witnessed that they have not understood the practices well.

2.4. Knowledge and Practices on Nutrition

The study target farmers are well aware of balanced diet. The farmers indicated that they have got nutritional education provided by health extension workers. The female farmers also told that they have attended short-term trainings, on dietary practices, provided by nutrition focused organizations. According to the farmers' definition, "balanced diet is having meals consisting varieties of crops, vegetables and fruits."

When it comes to the daily meals, decisions are usually made by women. They are responsible for determining what a meal should include as they are the one who know what types of food stuffs are available. Preparation of meals for the entire household is left to housewives and adult daughters. Furthermore, they are responsible to determine the frequency of meals as they are the one who know how much food is available for family members.

According to the female FGD participants, they found it hard to provide meals consisting varieties of food stuffs. A female farmer said, "I usually try not to serve a bare *Injera*¹." This implies that the situations of agricultural productivity are not permissive for them to provide balanced diet to their family members. Farmers also identified some of the difficulties faced in providing balanced diets. These include:

- Shortage of food supply
- Inability to afford varieties of food in the market
- Limited access to irrigation to produce vegetables

Farmers were also asked if they have special dietary practices for different groups as U-5 children, pregnant and lactating women, heavy duty workers, and elderly. They responded that they do not apply these practices for all groups other than U-5 children. The female FGD participants told that they try to feed children from varieties of cereal crops, vegetables and sometimes milk.

2.5. Radio Accessibility, Listenership and Preferences

The results show that almost the farmers have access to radio. Handful of farmers has radio devices at home. Some of them told to use mobile phones to listen to radio. Those who do not have radio at home listen in gatherings with those who have radio devices. In Debrano village, listenership among female farmers is very poor even if they have radio devices at home. Only men have control over the radio devices. Thus, females listen to radio in the only in the presence of their husbands.

DWeT is the favorite radio station among farmers in Debrano kebele. The target farmers can be said loyal listeners to the radio station as they have developed the habit of listening to its programs every day.

Both male and female farmers prefer to listen to radio programs on the evenings after 7 PM. In Saturdays, male farmers can listen for the whole day. They can also listen in Sunday, beginning from 10 AM, when they get back from church. Regarding program duration, farmers told that they are convenient to listen to a radio program which runs for not over an hour.

Simret Kebele

2.6. Community Profile

2.6.1. Physical Features

Simret kebele is found in Kolla Tembien woreda of Central Tigray zone in Tigray Regional State. Abiy Addi, the capital of Kolla Tembien woreda, is the nearby town with 21 km of distance. It is located 13°36'54.5"N and 38°51'03"E. The kebele is bordered with Abergele woreda in the north, Menji kebele in the south, Guya kebele in the east, and Begashereb kebele in the west.

Landform of the kebele is characterized by a mix of gorgy and terrain features. The altitude of the area ranges from 1,521 to 1,732 m.a.s.l. Ambersom is the well known gorge. The kebele experiences an average rainfall of 500-700 mm. Chini, Tsetsa and Bekles are the rivers flowing in the village. Shrubs, bushes and Acacia are the main vegetations covering the kebele.

2.6.2. Settlement Pattern

The kebele is divided into 3 clusters or villages or *kushets*. These are Chuka, Addi Chiro and Ambersom. Among these, Ambersom is the largest and Addis Chiro is the smallest.

The settlement pattern, in these clusters, has different features. In Chunka, it is common to see houses scattered

¹ *Injera* is a flat bread made of *teff* which is usually eaten with a sauce

in a wide area. However, Ambersom and Addi Chiro tend to have more population pressure with the houses placed densely.

2.6.3. Social and Institutional Arrangements

The formal and non-formal institutions identified by farmers and based on observations hold political, religious, welfare, and economic base. The kebele administration is the authorized unit for the overall political leadership. Orthodox Church is the primal religious institution. Though operating under the aegis of the church, *Senbetie* and *Mahiber* are non-formal gatherings in which private feasts are organized in Sabbaths and saint days. The non-formal and indigenous mechanisms with welfare component include *Idir* and hamlet earmarking. *Idir* is an association of villagers which raises funds to be used in the case of deaths of the members and their families to effect funerals and associated payments. The villagers also earmark funds to be utilized for assistances during undesirable occurrences on individual members. In the economic aspect, there is a farmers’ cooperative operating in the village in order to secure fair prices, for their grains, in the harvest seasons. The farmers also have local means of saving named *equib*. The *equibs* are non-formal associations in which members regularly save in cash/ in kind and get back the sum in a round.

By using a Venn diagram, shown below in fig 1, the community members have reflected the degree of importance these institutions have in their life. The degree of importance is measured by the length of the line connecting a particular institution with the community. The shorter the length, the more important the institution is.

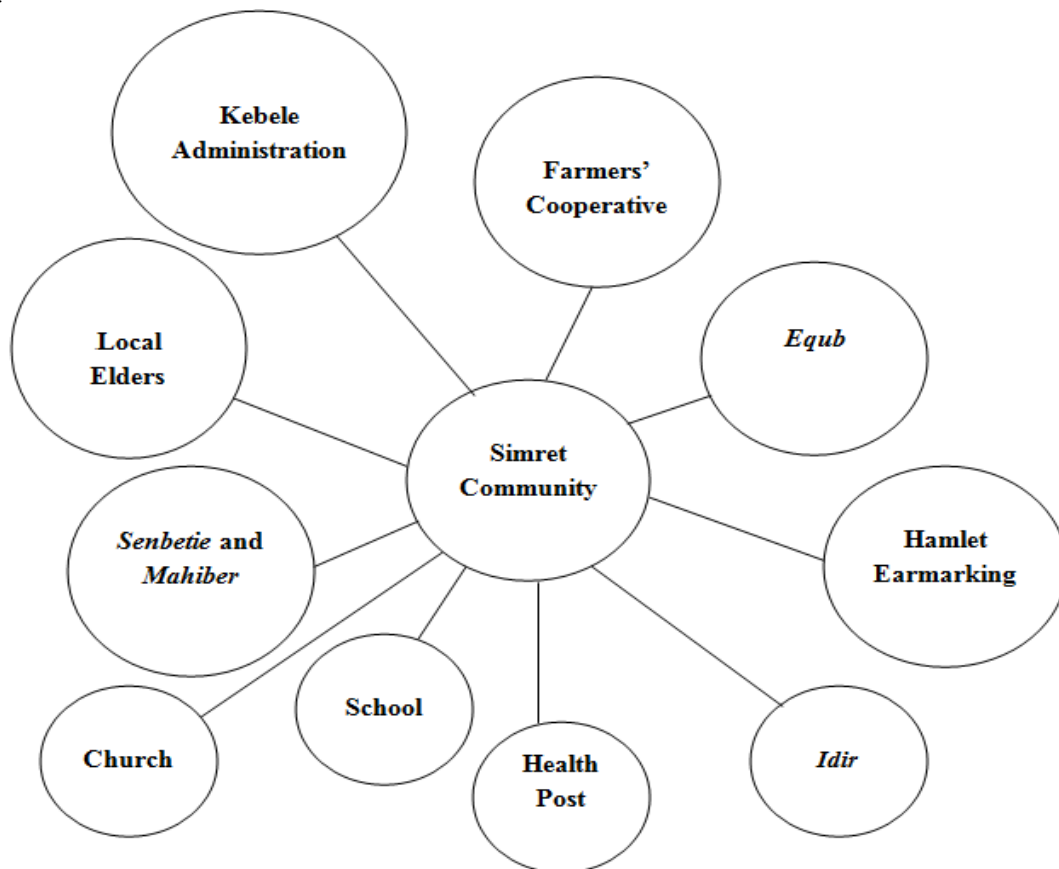


Figure 2: Venn diagram of Social Institutional Arrangements in Simret kebele

2.6.4. Livelihood Patterns

The male and female FGD participants reported that grain production is the major source of income in Simret kebele. The respondents also indicated that dwellers generate income through agricultural activities as poultry, bee hiving, livestock rearing, and dairy productions. Farmers run these businesses either individually or in association.

Though meager, non-agricultural economic activities also serve as sources of income for the farmers. Some are engaged in petty trade activities as tea and coffee service, and retailing basic household commodities. In addition, some villagers, residing near the river deltas, make their living through traditional gold mining.

The above mentioned means of livelihood stagger with various impediments. Inaccessibility of agricultural land and shortage of working space among the bottlenecks mentioned. Farmers also identified poor access to improved variety seeds, frequent drought incidences, and natural hazards as threats to their livelihood.

2.7. Crop Production

2.7.1. Criteria to Determine Crops

The study participant farmers mentioned various criteria, pertinent to niche, adaptability, early maturity, yield, labor intensiveness, and ability to meet animal feed, to determine the type of crop to raise. The agro-ecological criteria are the key decision factors. These are concomitant to rainfall pattern, tolerance to weed and drought, and suitability of land. Early maturity affects farmers' decision factor as households are more likely to get rid of food shortage if they can harvest in a shorter time span. Ability to meet household consumption also determines what to crop. Low level of human labor requirement is another factor to select the type of crop. Furthermore, tradability of a crop, in some instances, shapes farmers' crop choice.

2.7.2. Major Crops Grown and Livestock

Both the male and female FGD participants indicated that sorghum is predominantly a staple crop in Simret kebele. Next to sorghum, the farmers, orderly, prioritized maize, *teff*, pearl-millet and barley.

Livestock resources are minimal, both in variety and population, in Simret kebele. These include cattle and goats. According to the informants, the agricultural practices, in Simret kebele, are characterized by subsistence farming. This is evidenced by the fact that the proportion of grain sold is awfully minimal. The chunk of food production is consumed at household level. Farmers sell out miniature of agricultural produce which is adequate enough to purchase some basic ingredients such as salt, red pepper, local spices, etc.

2.7.3. Emerging Changes and Challenges in the Agricultural System

Farmers conferred that agricultural production is in dire condition. They speak grain production is alarmingly plummeting. As Meressa Gebremedhin, a male FGD participant, said, "The situation of agriculture is getting worse. The quantity of sorghum we produce is reducing from time to time." The situation is replicated in the production of livestock. Livestock resources are getting depleted due to scarcity of pasture for animal feed.

Spates of factors are attributable to the worsening situation of agricultural production in Simret kebele. The village, recurrently, encountered offset rainfall. As relief of the village is apt to get flooded, the quality of soil is reducing due to erosion. The reducing moisture conservation of soil is the other factor. Farmers also mentioned the prevalence of plant infections, as blotch and striga, as threats for agricultural productivity. The amalgamation of all these factors is effecting undesirable change in the agricultural system of the village.

2.7.4. Cropping Seasons

FGD participants told that they produce all types of crops during *meher* season. Farmers begin to produce sorghum, the priority crop, between June and November. In the case of early rainfall, farmers start to grow sorghum on May. On the other hand, the production of maize, *teff* and pearl millet goes between June and October. For barley, cropping period runs from July to November. Harvesting, for all crops, ends by December.

Table 3: Crop Calendar of Simret Kebele

Activity	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
1. Cultivating	S	S M	T PM B									
2. Planting		S	S M	T PM B								
3. Crop Management (weeding and hoeing)			S	S M	T PM B S M	B						
4. Reaping					M	T S PM MB	S					
5. Threshing						M	S T M B PM	S				
6. Drying and winnowing						M	S M T	S PM B				

S: Sorghum; M: Maize; T: Teff; PM: Pearl Millet and B: Barley

2.7.5. Food Shortage and Coping Strategies

Findings divulged that the situation of food shortage is a frequent incidence in Simret kebele. Both male and female FGD pointed that they have encountered food shortage in a shorter time interval, and its earnestness is

rising from time to time. The main causes for this are concomitant to climate change. These include drought, stormy rainfall and flooding. Shortage and intensive use of land were also reported to reduce production, and, in turn, exacerbate food shortage.

The table below ranks availability of food and water in each month a year. It is figured out by the community members. Food is highly available between November and March, which fall in or near the harvest period. Availability of water peaks in June to September, the months in which food availability plunges. In these months, the food from the preceding harvest runs out, and land preparation starts for ensuing harvest period

Table 4: Composite Calendar of food and water availability in Simret kebele

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Food availability	12	8	1	2	3	4	5	6	7	9	10	11
Water availability	4	6	9	10	11	12	8	7	5	3	2	1

In order to survive in the month having severe food shortage, farmers usually apply the following coping mechanisms:

- **Strategy 1:** Doing casual labor in small mining
- **Strategy 2:** Borrowing grain/ money from neighbors
- **Strategy 3:** Borrowing better cattle varieties, from governmental offices, in long-term repayment.
- **Strategy 4:** Using the reserve money saved, at community level, for periods with food shortage
- **Strategy 5:** Sale of livestock
- **Strategy 6:** Joining Safety Net Program

2.8. Climate Change

2.8.1. Climate Change Incidences and Effects

The FGD participants are very loud in speaking about the changing climate. They listed the changes in climate as outlined below:

- Erratic and torrential rainfall
- Uneven distribution of rainfall
- Increasing flooding
- Increasing stormy rainfall
- Prevalence of dangerous weeds
- Recurrent drought incidences

These changes in climate affected the agricultural practices of Simret village in the ways delineated as follows:

- ☞ **Declining soil fertility:** FGD participants told that the soil is losing its productivity due to moisture stress. They mentioned that the frequent flooding aggravated depletion of the soil from time to time. The participants also mentioned that the soil is getting hard to cultivate. They added that loss of soil fertility is a contributory factor for the declining production of cereal crops.
- ☞ **Food shortage:** Drought has become a frequent incidence in the area. Extension workers of the kebele told that drought occurs in every 2 or 3 years interval. This and other factors resulted failure of major food crops.
 Frequent failure of food crops as well as miserable amount of food production triggered frequent food shortage in Simret village. Study participants reported that the food shortage is increasing from time to time. They added that their households fall short of food for 5-6 months in a year. A focus group discussant told that, "It is a miracle if we are able to eat [what we produce] until Easter [April]."
- ☞ **Reduction of agricultural yields:** The FGD participants argued that both crop and livestock production are declining. According to the participants, the decline of agricultural production pertains to the frequent natural hazards, drought and soil erosion. They have experienced a decline in the quantity of food crops they produce. On the side of livestock, cattle are getting infertile due to unavailability of adequate pasture. Dairy production is also severely declined.

2.8.2. Knowledge of Adaptation and Mitigation Mechanisms

It is also assessed if farmers know mechanisms to adapt with, and mitigate the changing climate. Though they described that they are not familiar with diversified techniques, they mentioned terracing and land closure as the means to cope up with soil erosion, and moisture stress. Hence, farmers in the village are engaged in terracing terrain lands.

2.8.3. Knowledge Support Requirements

Responding to the knowledge and informational requirements to cope up with and mitigate the changing climate, the study participant farmers identified various areas of knowledge support. They stated to require the support on planting time, planting methods, and soil and moisture conservation techniques. Among the moisture conservation techniques, farmers are interested to know about tie rigger and BBM technologies.

2.9. Knowledge and Practices on Nutrition

The FGD participant farmers were asked if they know about balanced. According to the Lete-Yohannes Gebre-Kidan, a female FGD participant, “balanced diet is eating from all types of grains, legumes, crops and vegetables.”

When it comes to the daily meals, decisions are usually made by women. They are responsible for determining what a meal should include as they are the one who know what types of food stuffs are available. Preparation of meals for the entire household is left to housewives and adult daughters. Furthermore, they are responsible to determine the frequency of meals as they are the one who know how much food is available for family members.

According to the FGD participants, they make various efforts to increase the varieties of food stuffs. Farmers, residing near rivers, produce vegetables and fruits through irrigation. Production honey is the other way. Some farmers also try to have access to food varieties through purchasing from market. Farmers also identified some of the difficulties faced in providing balanced diets. These include:

- Shortage of food supply
- Limited access to irrigation land
- Inability to afford varieties of food in the market
- Limited varieties of food stuffs in the market

Farmers were also asked if they have special dietary practices for different groups as U-5 children, pregnant and lactating women, heavy duty workers, and elderly. They responded that they do not apply these practices for all groups other than U-5 children. The female FGD participants told that they try to feed children from varieties of cereal crops, vegetables and sometimes milk. A female FGD participant explained, “We prepare our children foods that can be swallowed easily.”

2.10. Radio Accessibility, Listenership and Preferences

The results show that almost the farmers have access to radio. Most of the farmers have radio devices at home. The male farmers who do not have radio at home listen in gatherings with those who have radio devices. There is no means for female farmers, who do not have radio at home, to listen to radio. The female farmers, who do not have radio at home, share what they have listen with those who do not have.

DWeT is the favorite radio station among farmers in Simret kebele. The target farmers can be said loyal listeners to the radio station as they have developed the habit of listening to its programs every day. Their reason to prefer the station is that it uses local language and its focus on rural issues.

Both male and female farmers prefer to listen to radio programs on the evenings after 7 PM. The male farmers explained that they listen to radio after 7 PM from Monday to Saturday. They can also listen in Sunday, beginning from 10 AM, when they get back from church. The females, on the other hand, can only listen on the evenings after 7 PM. Regarding program duration, farmers told that they are convenient to listen to a radio program which runs for not over an hour.

3. Agbe Kebele

3.1. Community Profile

3.1.1. Physical Features

Agbe kebele is found in Abergele woreda of Central Tigray zone in Tigray Regional State. Yichilay, the capital of Abergele woreda, lies in 34 km of distance from Agbe. It is located 13°33'43.1"N and 39°03'10"E. The kebele is bordered with Degua Tembien woreda in the north, Samara kebele of Abergele woreda in the south, southwest and west, and Shatula kebele of Abergele woreda in the east.

Landform of the kebele is characterized by a mix of plain land, gorgy and terrain features. The altitude of the area lies in the gamut of 1,350- 1,678 m.a.s.l. Menewa and Ilala are the peaks of the Agbe kebele. The kebele experiences an average rainfall of 450-500 mm. Giba, Hitsra and Sele are the rivers crossing the village. Shrubs cover most parts of Agbe. The other vegetation resources of Agbe include olive, acacia, shagla, dero, aye, giba and chea.

3.1.2. Settlement Pattern

The kebele is divided into 4 clusters or villages or *kushets*. These are Agbe, Klatsba, Seyem- Turba, and Zolie. Among these, Agbe is the largest, and Seyem-Turba is the smallest.

The settlement pattern, in these clusters, has different features. In Klatsba, Seyem- Turba, and Zolie, it is common to see houses scattered in a wide area. However, Agbe tends to show more population pressure with the houses placed densely. This is due to its proximity to Abiy Addi town, the capital of Kolla Tembien woreda, with 15 km distance.

3.1.3. Social and Institutional Arrangements

The formal and non-formal institutions identified by farmers, and based on observations hold political, religious, welfare, and economic base. The kebele administration is the authorized unit for the overall political leadership.

Alia gontsi has informal, but socially recognized, influence in the community. It is a team of elected community elders to resolve conflicts in the village. Orthodox Church is the primal religious institution. Though operating under the auspicious of the church, *Senbetie* and *Mahiber* are non-formal gatherings in which private feasts are organized in Sabbaths and saint days. The non-formal and indigenous mechanisms with welfare component include *Idir* and hamlet earmarking. *Idir* is an association of villagers which raises funds to be used in the case of deaths of the members and their families to effect funerals and associated payments. The villagers also earmark funds to be utilized for assistances during undesirable occurrences on individual members. In the economic aspect, there is a farmers' cooperative operating in the village in order to secure fair prices, for their grains, in the harvest seasons.

There is strong linkage among farmers and non-formal institutions as *Alia Gontsi*, *Idir* and *Senbetie*. As Wolde-Hawaria Gebre-Selassie said, "...our relationship with the institutions [informal] is like husband and wife." This is due to the strong base of the institutions.

By using a Venn diagram, shown below in fig 1, the community members have reflected the degree of importance these institutions have in their life. The degree of importance is measured by the length of the line connecting a particular institution with the community. The shorter the length, the more important the institution is.

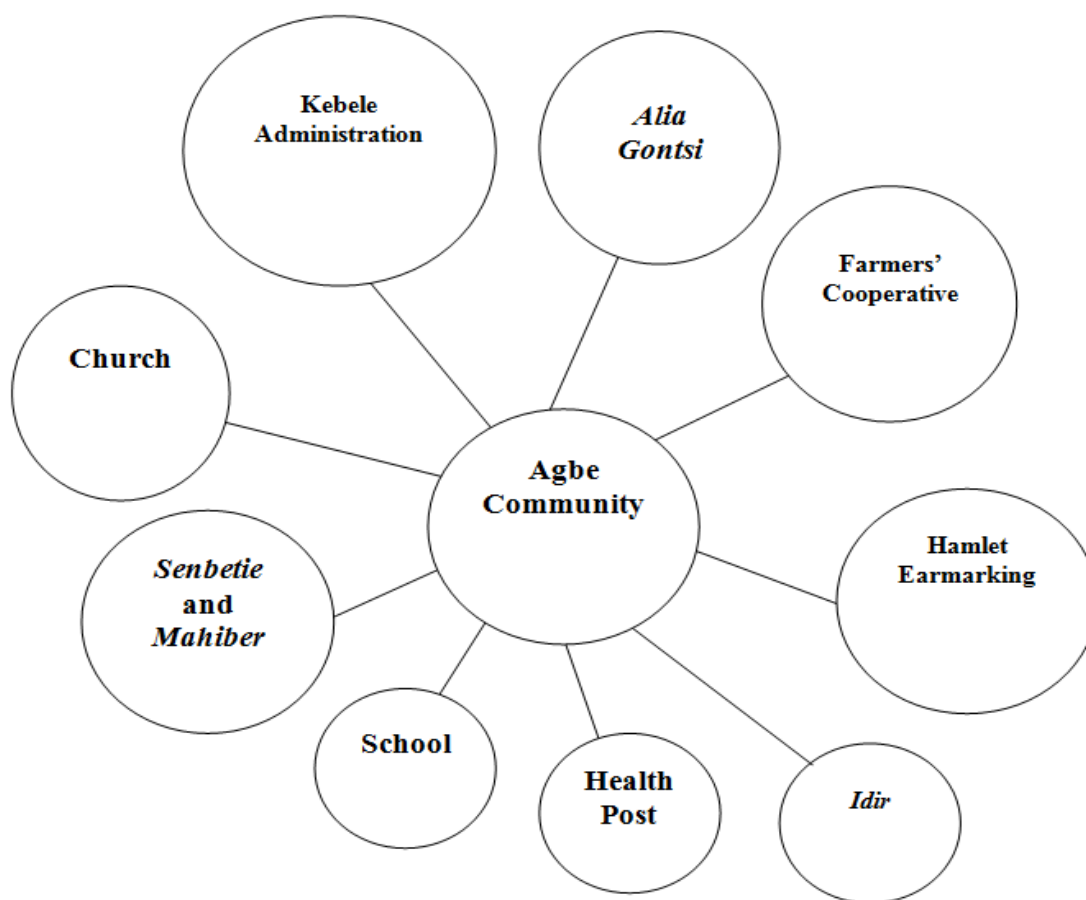


Figure 3: Venn diagram of Social Institutional Arrangements in Agbe kebele

3.1.4. Livelihood Patterns

Grain production is indicated, as the outstanding source of income, by the study participants in Agbe kebele. The respondents also indicated that villagers generate income through agricultural activities as oil seed farming, livestock rearing, and dairy productions. Farmers run these businesses individually.

Farmers have no access to non-agricultural economic opportunities. This is purported in farmers' explanation that the only source of income, other than farming activities, is doing casual labor in governmental and non-governmental construction sites.

Farmers explained that the above mentioned means of livelihood are challenged with various bottlenecks. Drought, endemic diseases (like malaria), and limited job opportunities were mentioned as key factors threatening the income sources. Insufficiency of animal feeds and shortage of working space were also among the blockages mentioned. Specific to sesame production, farmers raised unavailability of market opportunities.

3.2. Crop Production

3.2.1. Criteria to Determine Crops

The study participant farmers mentioned various criteria, pertinent to niche, adaptability, early maturity, and ability to meet animal feed, to determine the type of crop to raise. The agro-ecological criteria are the key decision factors. These are concomitant to rainfall pattern, tolerance to drought, and suitability of land. Early maturity affects farmers' decision factor as households are more likely to get rid of food shortage if they can harvest in a shorter time span.. Furthermore, ability of byproducts to meet animal feeds shapes farmers' crop choice.

3.2.2. Major Crops Grown and Livestock

Both the male and female FGD participants identified crop and livestock resources in Agbe kebele. According to the farmers, sorghum is predominantly a staple crop in the kebele. Next to sorghum, the farmers, orderly, prioritized maize, *teff*, linseed, sesame and cowpea. On the other hand, the livestock resources include cattle, sheep and goats.

According to the informants, the agricultural practices, in Agbe kebele, are characterized by subsistence farming. This is evidenced by the fact that the proportion of grain sold is awfully minimal. The chunk of food production is consumed at household level. Despite the small quantity as well as the market problems, sesame and linseed are primarily produced for sale. However, the quantities of agricultural produce are only adequate enough to purchase some basic ingredients such as salt, red pepper, local spices, etc.

3.2.3. Emerging Changes and Challenges in the Agricultural System

According to the farmers, agricultural production is showing a decline through time. Production of sorghum, the predominant crop, is alarmingly plummeting. The situation is replicated in the production of livestock. Livestock resources are getting depleted due to scarcity of pasture for animal feed.

Various factors are attributable to the worsening situation of agricultural production in Agbekebele. The village, recurrently, encountered offset rainfall and drought. An extension worker of the kebele told that the kebele experienced drought occurs in every 3 years. As relief of the village is apt to get flooded, the quality of soil is reducing due to erosion. The reducing moisture conservation of soil is the other factor. Farmers also mentioned the prevalence of plant infections, as stack-borer, as threats for sorghum production. Price hikes in the agricultural inputs as fertilizer is also challenging farmers. Teka Gessesew, a male focus group discussant, said, "The price of fertilizer has risen from 200 to 800 br/ qt. Hence, we opt not to buy." Gravity of the situation becomes starker when one considers limited market opportunities for their sesame production. Gebray Gezahegn, another male FGD participant, said, "We used to save sorghum with the sale of oil seeds. In the current year, all farmers harvested sesame. And, we could not get market." Amalgamation of all these factors is effecting undesirable change in the agricultural system of the village.

3.2.4. Cropping Seasons

The cropping period for all types of crops goes from June to November. Farmers undertake the production of sorghum and maize, the first two priority crops, between June and November. *Teff*, linseed and sesame are produced in July to October. On the other hand, the production of cowpea goes between the late June and September. Harvesting, for all crops, ends by December.

Table 5: Crop Calendar of Agbe Kebele

Activity	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
1. Cultivating	S	M	T									
2. Planting		M S CP	T SE LS									
3. Crop Management (weeding and hoeing)			M S CP	SE LS T								
4. Reaping					M CP	SE LS T	S	S				
5. Threshing					CP	SE LS M	S	S				
6. Drying and winnowing					CP	SE LS M	S T	S				

CP: Cowpea; LS: Linseed; M: Maize; S: Sorghum; SE: Sesame; and T: Teff

3.2.5. Food Shortage and Coping Strategies

Results revealed that the situation of food shortage is a frequent incidence in Simret kebele. Both male and

female FGD pointed that they have encountered food shortage in a shorter time interval, and its earnestness is rising from time to time. The main causes for this are concomitant to climate change. These include shortage of rainfall, and drought. Overpopulation and over-cultivation of land were also reported to propel decline in production, and, in turn, exacerbate food shortage.

The table below ranks availability of food and water in each month a year. It is figured out by the community members. Food is highly available between October and February, which fall in or near the harvest period. Availability of water peaks in June to September, the months in which food availability plunges. In these months, the food from the preceding harvest runs out, and land preparation starts for ensuing harvest period

Table 6: Composite Calendar of Food and Water Availability in Agbe Kebele

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Food availability	12	4	3	2	1	5	6	7	8	9	10	11
Water availability	4	5	6	7	12	11	10	9	8	3	1	2

In order to survive in the month having severe food shortage, farmers usually apply the following coping mechanisms:

- **Strategy 1:** Doing casual labor in small mining
- **Strategy 2:** Borrowing grain/ money from neighbors
- **Strategy 3:** Sale of livestock
- **Strategy 4:** Joining Safety Net Program

3.3. Climate Change

3.3.1. Climate Change Incidences and Effects

The FGD participants mentioned their experiences on the changes in the climatic conditions. They listed the changes in climate as outlined below:

- Increasing stormy rainfall
- Uneven distribution of rainfall
- Increasing flooding
- Prevalence of dangerous weeds
- Recurrent drought incidences

These changes in climate affected the agricultural practices of Agbe village in the ways delineated as follows:

- ☞ **Decline of agricultural productivity:** The FGD participants argued that both crop and livestock production are declining. According to the participants, the decline of agricultural production pertains to the stormy rainfalls, drought and flooding. They have experienced a decline in the quantity of food crops they produce. On the side of livestock, cattle are getting infertile due to shortage of animal feeds. Dairy production is also severely declined.
- ☞ **Shortage of animal feed:** It is pointed that pasture lands are getting dried. The decline in crop production also have reflections on animal feeds as the quantity of crop byproducts (as hey and husk) also reduces during yield falls. This is severely affecting the livestock resources in the village.
- ☞ **Food shortage:** Drought has become a frequent incidence in the area. Extension workers of the kebele told that drought occurs in every 3 years interval. The area is also vulnerable to pests as striga and stack-borer. These and other factors resulted in failure of major food crops.

Frequent failure of food crops as well as miserable amount of food production triggered frequent food shortage in Agbe village. Study participants reported that the food shortage is increasing from time to time. Based on the food availability calendar, shown above (in table 6), households of the village fall short of food for 5-6 months in a year. A focus group discussant told that, "We eat [what we produce] only up to March."

3.3.2. Knowledge of Adaptation and Mitigation Mechanisms

It is also assessed if farmers know mechanisms to adapt with, and mitigate the changing climate. They mentioned terracing, afforestation and reforestation as the mechanisms to cope up with soil erosion, and moisture stress. The farmers also stated to know use of improved agricultural inputs as better seed varieties and fertilizer as adaptation mechanisms.

3.3.3. Knowledge Support Requirements

The study participant farmers said to get technical support from local government through kebele extension workers. Regarding the knowledge and informational requirements to cope up with and mitigate the changing climate, they identified various areas of knowledge support. They stated to require the support on early maturing, drought tolerant, and improved varieties of major crops, particularly sorghum, *teff* and maize.

3.4. Knowledge and Practices on Nutrition

The FGD participant farmers were asked if they know about balanced. According to the Molach Belay, a female FGD participant, "balanced diet is getting fed with different varieties of crops, pulses and animal products."

When it comes to the daily meals, decisions are usually made by women. They are responsible for

determining what a meal should include as they are the one who know what types of food stuffs are available. Preparation of meals for the entire household is left to housewives and adult daughters. Furthermore, they are responsible to determine the frequency of meals as they are the one who know how much food is available for family members.

According to the FGD participants, they make various efforts to increase the varieties of food stuffs. Farmers produce different kinds of crops as a means to have balanced diet. Setting up poultry is the other way. Some farmers also try to have access to food varieties through purchasing from market. Farmers also identified some of the difficulties faced in providing balanced diets. These include:

- Shortage of food supply
- Limited access to irrigation land
- Inability to afford varieties of food in the market

Farmers were also asked if they have special dietary practices for different groups as U-5 children, pregnant and lactating women, heavy duty workers, and elderly. They responded that they apply these practices for U-5 children, and pregnant and lactating women. The female FGD participants told that they try to feed children oats and milk. Pregnant and lactating women are fed with porridge.

3.5. Radio Accessibility, Listenership and Preferences

The results show that almost the farmers have access to radio. Most of the farmers have radio devices at home. The villagers who do not have radio at home listen in their neighbors' house during common coffee hours.

DWeT is the favorite radio station among farmers in Agbe kebele. The target farmers can be said loyal listeners to the radio station as they have developed the habit of listening to its programs every day. Farmers told that they listen to the agricultural programs of DWeT attentively. According to Teka Gessesew, "there is an endured habit of listening to DWeT. It uses our language and creates the spirit of cohesion in the region [Tigray]."

Both male and female farmers prefer to listen to radio programs on the evenings after 7 PM. In the days of Monday to Saturday, the male farmers are convenient to listen to radio after 7 PM in the evening, and sometimes before 8 AM in the morning. They can also listen in Sunday, beginning from 10 AM, when they get back from church. The females, on the other hand, can only listen on the evenings after 7 PM. Regarding program duration, farmers told that they are convenient to listen to a radio program which runs for not over an hour.

4. Embarfael Kebele

4.1. Community Profile

4.1.1. Physical Features

Embarfael kebele is found in Abergele woreda of Central Tigray zone in Tigray Regional State. Yichilay, the capital of Abergele woreda, is the proximate town with 8 km distance. It is located 13°21'07.7"N and 38°59'53.9"E. The kebele is bordered with Seharti Samber woreda in the north, Negede-Berhan kebele of Abergele woreda in the south, Gera kebele of Abergele woreda in the west, and Shatula kebele of Abergele woreda in the east.

Landform of the kebele is characterized by a mix of gorgy and terrain features. The altitude of the area is estimated to be 1200 m. Embawork, Mishig, Merahigdani and Burza are the peaks of the Embarfael kebele. The kebele experiences an average annual rainfall of 450. The average temperature of the kebele reaches 38°C. The other vegetation resources of Embarfael include shrub, serho, sibkana, mazuwa, giba and chea.

4.1.2. Settlement Pattern

The kebele is divided into 3 clusters or villages or *kushets*. These are Agora, Limat and Shegalo. Among these, Limat is the largest, and Agora is the smallest.

The settlement pattern, in these clusters, has similar features. In all the clusters, it is common to see houses placed densely. This is due to its proximity to Yichilay town, the principal urban center of Abergele woreda, with 8 km distance.

4.1.3. Social and Institutional Arrangements

The formal and non-formal institutions identified by farmers, and based on observations hold political, religious, welfare, and economic base. The kebele administration is the authorized unit for the overall political leadership. *Areti* has informal, but socially recognized, influence in the community. It is a team of respected community elders to resolve conflicts in the village. Orthodox Church is the longstanding religious institution. Though operating under the auspicious of the church, *Senbetie* and *Mahiber* are non-formal gatherings in which private feasts are organized in Sabbaths and saint days. The non-formal and indigenous mechanism with welfare component is hamlet earmarking. The villagers earmark funds to be utilized for assistances during undesirable occurrences on individual members. In the economic aspect, there is a farmers' cooperative operating in the village in order to secure fair prices, for their grains, in the harvest seasons.

The community is strongly bonded with the non-formal institutions as *Areti*. The farmers do not prefer to take quarrels to local governmental bodies. They, rather, want their conflicts to be resolved by the elders.

By using a Venn diagram, shown below in fig 1, the community members have reflected the degree of importance these institutions have in their life. The degree of importance is measured by the length of the line connecting a particular institution with the community. The shorter the length, the more important the institution is.

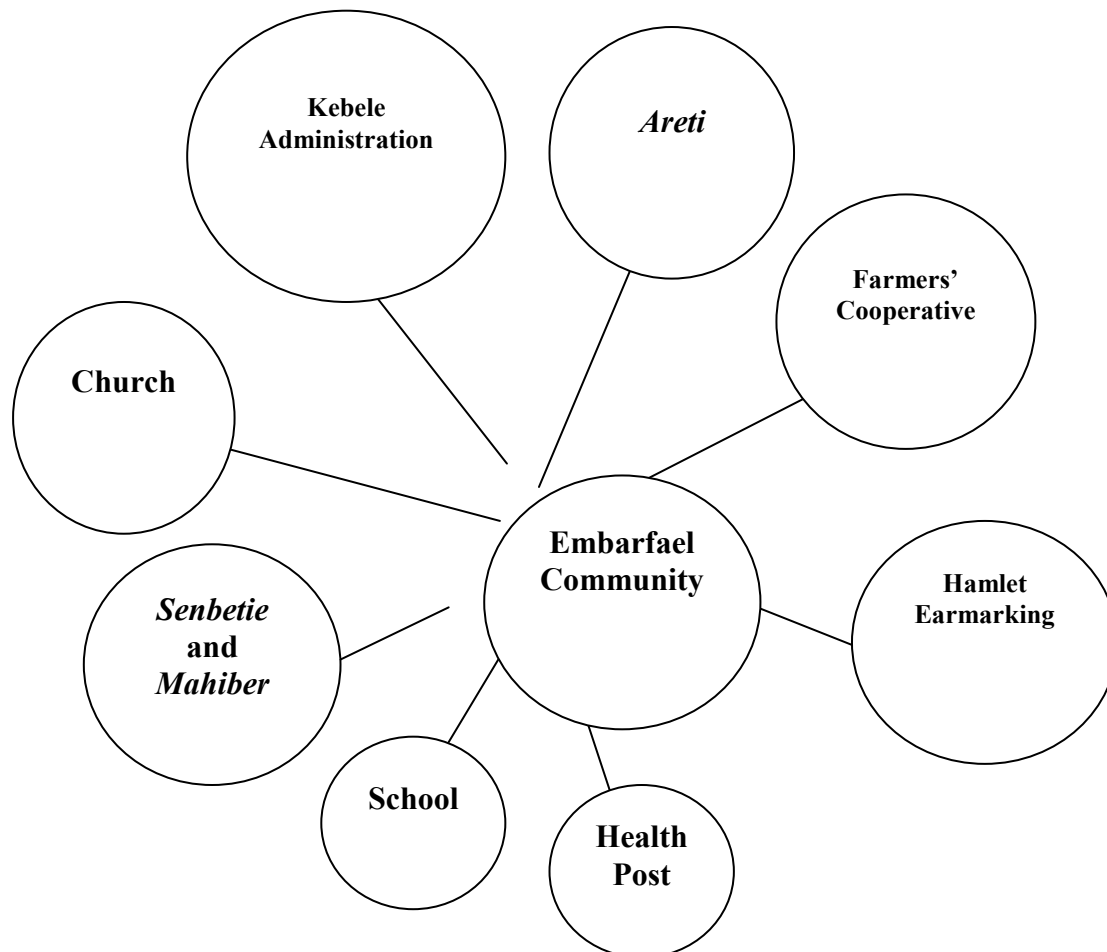


Figure 4: Venn diagram of Social Institutional Arrangements in Embarfael kebele

4.1.4. Livelihood Patterns

Grain production is indicated, as the leading source of income, by the study participants in Agbe kebele. The respondents also indicated that villagers generate income through agricultural activities as sesame production, poultry, livestock rearing, and bee-hiving. Farmers run these businesses individually.

Farmers also mentioned non-agricultural means they earn income. Some farmers make money through traditional gold mining that are informal and small scale. Others raise income by doing casual labor in governmental and nongovernmental construction sites

As stated by the study participant farmers, there above mentioned means of livelihood are threatened with various pitfalls. They mentioned inaccessibility of land, due to bureaucratic unresponsiveness, as a key factor engendering shortage of farmland. Specific to sesame production, farmers pointed unavailability of market opportunities.

4.2. Crop Production

4.2.1. Criteria to Determine Crops

With respect to crop selection, distinct criteria were identified by farmers. These are linked to niche, adaptability, early maturity, land management and ability to meet animal feed, to determine the type of crop to raise. The agro-ecological criteria are the key decision factors. These are concomitant to adequacy of rainfall pattern, and tolerance to drought. Early maturity affects farmers' decision factor as households are more likely to get rid of food shortage if they can harvest in a shorter time span. Farmers also consider maintenance of crop rotation in selection of crops that can retain soil fertility. Furthermore, ability of byproducts to meet animal feeds shapes

farmers' crop choice.

4.2.2. Major Crops Grown and Livestock

Study participants mentioned crop and livestock resources in Embarfael kebele. According to the farmers, sorghum is predominantly a staple crop in the kebele. Next to sorghum, the farmers, orderly, prioritized maize, *teff* and sesame. On the other hand, the livestock resources include cattle, sheep and goats.

The agricultural practices, in Agbe kebele, are characterized by subsistence farming. This is evidenced by the fact that the proportion of grain sold is extremely minimal. The chunk of food production is consumed at household level. Despite the small quantity as well as the market problems, sesame is primarily produced for sale. However, the quantities of agricultural produce are only adequate enough to purchase some basic household commodities.

4.2.3. Emerging Changes and Challenges in the Agricultural System

According to the farmers, agricultural production is showing a decline through time. Production of sorghum, the predominant crop, is alarmingly plummeting. The situation is replicated in the production of livestock. Livestock resources are getting depleted due to scarcity of pasture for animal feed.

Various factors are attributable to the worsening situation of agricultural production in Embarfael kebele. The village, recurrently, encountered offset rainfall and drought. An extension worker of the kebele told that the kebele experienced drought occurs in every 2 years interval. Loss of soil fertility is the other factor. Farmers also mentioned the prevalence of plant infections, as stack-borer striga, as threats for sorghum production. Amalgamation of all these factors is effecting undesirable change in the agricultural system of the village.

The study participants did not neglect some recent positive changes in crop production. These are associated with the discovery of early maturing crop varieties. These varieties include bino and wofrey for *teff*, arkib for maize; and gobye for sorghum. These varieties can mature within 2 months period.

4.2.4. Cropping Seasons

The table below is a crop calendar of Embarfael kebele which is developed by the villagers. As shown in the table, the cropping period for all types of crops goes from May to December. Farmers carry out the production of sorghum and maize, the first two priority crops, between May and December. On the other hand, *Teff* and sesame are produced in June to October.

Table 7: Crop Calendar of Embarfael Kebele

Activity	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
1. Cultivating	M S	S	T									
2. Planting		M S T SE	T SE S									
3. Crop Management (weeding and hoeing)			M S	SE T								
4. Reaping					M	SE T	S	S				
5. Threshing						SE M	S	S				
6. Drying and winnowing						SE M	S T	S				

CP: Cowpea; LS: Linseed; M: Maize; S: Sorghum; SE: Sesame; and T: Teff

4.2.5. Food Shortage and Coping Strategies

Results revealed that the situation of food shortage is a frequent incidence in Embarfael kebele. Both male and female FGD pointed that they have encountered food shortage in a shorter time interval, and its earnestness is rising from time to time. As to Gebre-Medhin Asres, a male focus group discussant, "It is in 1981 [1989/9 GC] and 2004 [2011/12 GC] that we were able produce sufficient food."

Different causes of food shortage were listed by the farmers. Scarcity of water, poor soil fertility (due to over-cultivation of land), prevalence of pests, and unavailability of irrigation scheme were the key factors reported to propel food shortage in Embarfael kebele, which in turn, exacerbate food shortage.

The table below ranks availability of food and water in each month a year. It is figured out by the community members. Food is highly available between November and March, which fall in or near the harvest period. Availability of water peaks in May to September, the months in which food availability plunges. In these months, the food from the preceding harvest runs out, and land preparation starts for ensuing harvest period

Table 8: Composite Calendar of Food and Water Availability in Embarfael Kebele

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Food availability	12	3	1	2	4	5	6	7	8	9	10	11
Water availability	5	7	9	10	11	12	6	8	4	3	1	2

In order to survive in the month having severe food shortage, farmers usually apply the following coping mechanisms:

- **Strategy 1:** Austerity, reducing the quantity and frequency of meal
- **Strategy 2:** Borrowing grain/ money from neighbors
- **Strategy 3:** Doing casual labor in small mining
- **Strategy 4:** Eating non-edible green leaf plants growing between June to September
- **Strategy 5:** Sale of livestock
- **Strategy 6:** Joining Safety Net Program
- **Strategy 7:** Migration to do casual labor in Humera. In this connection, Gebre-Medhin said, “In the current year alone, 26 farmers of our village were migrated to Humera.”

4.3. Climate Change

4.3.1. Climate Change Incidences and Effects

The FGD participants mentioned their experiences on the changes in the climatic conditions. They listed the changes in climate as outlined below:

- Increasing offset and stormy rainfall
- Increasing flooding
- Prevalence of dangerous weeds
- Recurrent drought incidences

These changes in climate affected the agricultural practices of Agbe village in the ways delineated as follows:

- ☞ **Decline of agricultural productivity:** The FGD participants argued that both crop and livestock production are declining. According to the participants, the decline of agricultural production pertains to the stormy rainfalls, drought and flooding. They have experienced a decline in the quantity of food crops they produce. On the side of livestock, cattle are getting infertile due to shortage of animal feeds. Dairy production is also severely declined.
- ☞ **Scarcity of water:** This is associated with inadequacy of rainfall and frequent drought occurrences. Water bodies are dried due to reducing level of rainfall. The moisture content of the soil is also declining. This is detrimental to both crop production and livestock resources.
- ☞ **Food shortage:** Drought has become a frequent incidence in the area. Extension workers of the kebele told that drought occurs in every 2 years interval. The area is also vulnerable to pests as striga, weevil and stack-borer. These and other factors resulted in failure of major food crops. Frequent failure of food crops as well as miserable amount of food production triggered frequent food shortage in Agbe village. Study participants reported that the food shortage is increasing from time to time. Based on the food availability calendar, shown above (in table 6), households of the village fall short of food for 5-6 months in a year.

4.3.2. Knowledge of Adaptation and Mitigation Mechanisms

It is also assessed if farmers know mechanisms to adapt with, and mitigate the changing climate. They mentioned terracing, afforestation and reforestation as the mechanisms to cope up with soil erosion, and moisture stress. The farmers also stated to know treating land with animal manure, land imposture, crop rotation, and early preparation of land as adaptation mechanisms.

4.3.3. Knowledge Support Requirements

Responding to the knowledge and informational requirements to cope up with and mitigate the changing climate, the study participant farmers identified various areas of knowledge support. They stated to require the support on the agronomic practices of improved, drought tolerant, and early maturing crop varieties. They also added that they are interested to know about recent agricultural innovations related to crop infection and pest management.

4.4. Knowledge and Practices on Nutrition

The FGD participant farmers were asked if they know about balanced. According to the Tiblets Haile-Michael, a female FGD participant, “balanced diet is eating different varieties of food.”

When it comes to the daily meals, decisions are usually made by women. They are responsible for determining what a meal should include as they are the one who know what types of food stuffs are available. Preparation of meals for the entire household is left to housewives and adult daughters. Furthermore, they are responsible to determine the frequency of meals as they are the one who know how much food is available for family members.

According to the FGD participants, they make various efforts to increase the varieties of food stuffs. Some farmers produce vegetables through irrigation. Others try to have access to food varieties through purchasing from market. Farmers also identified some of the difficulties faced in providing balanced diets. These include:

- Availability of few food varieties
- Decline in agricultural productivity
- Scarcity of water
- Inability to afford varieties of food in the market

Farmers were also asked if they have special dietary practices for different groups as U-5 children, pregnant and lactating women, heavy duty workers, and elderly. They responded that they apply these practices for U-5 children, pregnant and lactating women, and heavy duty workers. The female FGD participants told that they try to feed children porridge made of a mix of crops and butter. Pregnant and lactating women are fed with oats and milk. For heavy duty workers, they serve *sigawot*, a sauce made of meat, pepper and other ingredients.

4.5. Radio Accessibility, Listenership and Preferences

The results show that almost the farmers have access to radio. Most of the farmers have radio devices at home. The villagers who do not have radio at home have no means of accessing radio programs. The radio holding farmers have developed the habit of listening to radio everyday in the evening. However, they may not consistently listen during frantic seasons.

DWeT is the favorite radio station among farmers in Embarfael kebele. The target farmers can be said loyal listeners to the radio station as they have built the habit of listening to its programs every day. Farmers told that they attentively listen to the agricultural programs of DWeT, particularly the market information programs.

Both male and female farmers prefer to listen to radio programs on the evenings after 7 PM. In the days of Monday to Saturday, the male farmers are convenient to listen to radio after 7 PM in the evening. They can also listen in Sunday, beginning from 11 AM, when they get back from church. The females, on the other hand, can only listen on the evenings after 7 PM. Regarding program duration, farmers told that they are convenient to listen to a radio program which runs for 30 to 60 minutes.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:

<http://www.iiste.org>

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: <http://www.iiste.org/journals/> All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: <http://www.iiste.org/book/>

Academic conference: <http://www.iiste.org/conference/upcoming-conferences-call-for-paper/>

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digital Library, NewJour, Google Scholar

