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Enset Value Chain, The Case of Dawuro Zone, Southern Nations Nationalities and Peoples Regional State, Ethiopia

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Abstract
The existing Enset value chain of Dawuro zone may affected by the existance of clear demarcation between man and women on Enset planting, production, farm management, processing, storage and marketing activities and the work load division performed by female groups. To these end 315 sample producers, non-producers, local Bulla and kocho collector, local traders, wholesalers and consumers were identified from 30 kebele of Mareka, Tocha and Essara woredas. Based on the findings of the study the role of women on the volume of kocho and bulla production, processing and marketing were found to be affected by family size, education level, source of income, volume of bulla and kocho produced from single Enset, market center, extension access, land size, significantly at 1% and choice of staple food plant at 10% respectively. Based on the study finding, to reduce women work load and to improve the role of Enset plant on household food sustainability it needs appropriate intervention and awareness creation by responsible body.
Keywords: - Enset, bulla and kocho, value chain, value addition, market chain.

1. INTRODUCTION

Enset is one of the most important staple food plants in southern, south eastern and south western Ethiopia. Dawuro zone is one of the zone in which the largest share of the total population depends on Enset plant for their food for the level of consumption in household and for marketing. Enset plant grown in all of the zone at different agro-ecology and the large share is located in high and middle altitude (Dega and Woynadega) and the fewer shares located in low altitude (kola). Enset plant in the zone considered as an indication of individual household's source of wealth and main source of food that secure an individual farmer household family in food self-sufficiency. If an individual farm household has a potential Enset plant (productive and well managed) by using indigenous knowledge, it grants the household income be secured rather expending for food crop purchase. The community in the zone assures that, an individual's specially farmer house hold who has a sufficient Enset plant or at least 0.25 hectare and above holder, is food secured household at family level and if the household head holds two and above cattle including the above introduced level of Enset plant, men shined as food secured at household level and economically strong in the community and even has full right to get couples to be married. Even though the social and economic value of the Enset plant ownrity at household level is too high in the community, while the role of men and women in Enset planting, and farm management has no clear demarcations between man and women for the long period of time with related to indigenous knowledge and regulations, but processing, storage and marketing activities has a clear demarcation between man and women in the community. The work load in the area performed by women groups such as farm management (duping animal dug and west materials between plants) processing, storage, transporting and marketing activities handled by women groups and it is culturally taboo for male group to process, store, and transport to market place and selling the Enset produce, therefore, it creates miserable conditions for women in participation and achievement of education and other public and political issues. In addition to that women use very poor and manual tools to Enset processing and transporting, which consume much working time and face them tedious work load, that affect their efficiency and success in the community with compared to man. Even though, the plant play dominant role in its staple food supply, its production and management activates in the area looks like given week attentions by the responsible body and stockholders. Its agronomy practice is all in all depends on indigenous knowledge and skills and there is poor extension supply in the community, that results less productivities for each specific plant and affecting by disease and it needs special attentions. In the area there is no research and development programs related to Enset plant productivity improvement and its value addition process on one hand and reduction of Enset plant attacking disease and its causes and impacts on anther hands. Resource owning and decision making power varies between man and women in the society and it inclines toward to man and it creates biased resource shear and own right. The area potential and the volume of produce at household level is not known and its economic value and food securing capacity within low production, processing and marketing cost is yet not considered scientifically. Currently food non security and shortage is the main problem of the country, whereas Enset plant can give high quantity and quality produce within small household farm land with least cost of production, technology and less skilled manpower and can reduce the problem of food shortage in the region as well as throughout the country, if its production and processing activities supported by scientific research and development program. Ethiopia has the capacity to produce more from Enset plant to be self-food secured, which can help as one of the best food ingredient to supply for fully

give every person the daily requirement of the balanced diet. The main problem in Enset producer household is the inability to produce at a commercial scale and the loss of its product during processing, the improper storage of the final produce before consumption and lack of knowledge about nutrition (Clark, 2006). Even though there is enough food, the people are not accustomed to vary their meal to fulfill the nit nutritional requirement. This is due to the lack of knowledge of the people on the balanced diet, the lack of income to purchase foods, and to use different raw materials as a source of food. Now day industrialization is growing at a much faster rate and among this, food and beverage processing industries cover most of the percentages (Asres and Omprakashr, 2014). Enset plant is very important to supply industrial row materials as input and the zone has huge potential as compared to others in the regions. The plant naturally resist drought, improve soil fertility and it has wet holding capacity compared to other plants. Therefore, giving due attention on this plant helps to solve food security problem at zonal, regional, country level and can generate reasonable income for producers, local traders, wholesalers and consumers. To perform well and to obtain sufficient processed food row material from Enset plant, it is mandatory that improving its production and processing activities by supporting gender sensitive value chain is very important.

More than 20 percent population of the country, concentrated in the highlands of southern and south eastern Ethiopia, depend upon Enset for human food, fiber, animal forage, construction materials, medicines, means of earning cash income and insurance against hunger. Kocho and bulla processing equipment design is very crucial to upgrade the traditional processing towards modern style where might turn the value added kocho and bulla based on product for domestic as well as export market. The whole plant design focused on transforming the traditional, which is unhygienic and tiresome, too efficient and quality guaranteed industrial level. Using Enset plant as raw material kocho and bulla flour is produced for large scale industry which is easy to handle and use (Asres and Omprakashr, 2014). Therefore Dawuro zone is one of the outstanding Enset plant accommodated Zone in Ethiopia and its resource potential is yet not known in the country. The role of female in Enset processing, marketing, the work load of female yet not studied the area potential with its drought resisting and food security sustaining potential is yet not analyzed scientifically.

1.1. Statement of the Problem

Enset is being the oldest staple food plant in Dawuro zone and its genetic diversity yet not studied and its historical back ground when, the plant was started as source of food vegetal is not yet scientifically identified. In the zone more than 90 % of the total population depends on Enset plant for their home consumption and marketing as main food crop while, the area potentials is yet not studied scientifically. Except indigenous knowledge, Enset affecting disease and factors such as wild animal, more rat and Enset bacterial wilt, and its preventive techniques is not yet studied in the area. The plant play main role in income generating potential for female groups than male and in its production, processing and marketing channel the role of male and female is not scientifically investigated so far. Market channel of the area is not assessed and the role of actors in the chain is not identified. Therefore, current study was address to fill the gap of knowing of Enset potential of the area, its economic value and how the smallholder farmers were sustain their household food self-sufficiency by collectively and individually from Enset production were addressed. In addition, what factors affect the Enset value chain, who acts what or chain actor's role and the intervention mechanism needed in the area to sustain the value addition of Enset produce and its market channel analysis have been addressed to fill the gap.

1.2. General Objective

To analyze the value chain of Enset plant, and the significant role playing capacity of women in the channel

1.3. Specific Objectives

1. To analyze the area potential on Enset plant and amount of Kocho produced (obtained) per single plant
2. To investigate the household food self-sustainability level between Enset producers and non-producers

1.4. Research Questions

1. How much area of cultivable land covered in Enset plant in the zone (Woreda?) per household?
2. How much Kg of processed kocho and bulla obtained from a single matured Enset plant?
3. How many birr does one Kg processed kocho and bulla soled?
4. Is there any government and non-governmental institution which support Enset production and processing chain?

1.5. Scope and Limitation of the Study

The scope of this study covers three woreda out of five in the Zone and it can creates information foundation for farther analysis for interested scholars. It helps producers, how to increase productivity and self sustain in household food supply, increasing economic value or household income generating capacity improvement

techniques, and awareness creation about Enset produce value addition techniques. Enset plant disease is the main factor to reduce productivity and species in the area and this study may reason out the role of each actor in the chain. Apart from this the local, regional and federal government may benefited by using the study to understand the area potential, the capacity of Enset plant to alleviate drought and its impacts, in the community,regional level and through out the country. The study finding may help for all interestd governmental, non governmental organizations and individual stockholders as information to improve Enset production and productivities in the area and its value addition to benefit the producers, traders and consumers. Market channel analysis of the produce in the study helps producers, local traders, distributers and final consumers as information source by identifying the destination market, because there was no scientific studied conducted in the area yet. Its limitation is related to budget constraints and time limitation, only 30 potentially Enset producing kebeles are included in the study and it does not cover all of the woredas in the zone and as wall as extra woredas from the regions, while, the study is very important if it handled with regional level, because currently food shortage in the country is main problem as result of weather condition disturbance whereas, Enset plant can resist any drought factors not less than two years and within bad weather condition the plant is productive and also without artificial fertilizers (by using household disposal) the plant can increase productivities and soil fertility in advance. Therefore, it needs important attention on the plant productivity improvement through extension communication, area diversification (non Enset producer regions) and awareness creation to its value addition is very important points to this study to alleviate food shortage in the area and in the country.

1.6. Significance of the Study

In the study area more than 90% of the total population of the zone staple food sourced from Enset plant and until today the Enset plant producer household's doesn't starved in the zone as compared to non-producers. They protected from drought and food shortage problem occurrence as result of the Enset plant existence. It generates income for female group by large and also it boosts to supply household head food self-sustain in the community. Its economic value and value addition processing actor's role yet not identified clearly, it may affect the area potential in one hand and the role of gender in anther hand. Therefore, Current study can help as source of information for conducting farther scientific research and can encourage the actors in the channel by supplying sufficient information.

1.7. Organization of the Study

The remaining part of the research thesis organized in to five chapters. The logical foundation of the theoretical and empirical literature of Enset value chain analysis are well discussed in chapter two and chapter three discuses about method of data collection and its methodology design .Then chapter four shows as results and its dissection based on chapter two and three. Chapter five includes conclusion and is the final chapter, it depicts conclusions and policy implications based on the research findings

2. LITERATURE REVIEW

2.1. Theoretical Review

Historically Enset plant is believed in the community that the oldest vegetal in the zone and the ancestors of Dawuro people may be firstly engaged farming system was Enset planting. As result of its originality, the Dawuro ethnic group communally shared and practiced for long period of time that in the family male (son aged above 10 year), traditionally his father give a piece of land for son, order to plant Enset in year based farming system in backyard and the son following his father instruction and practice Enset planting at least 6 and at most 8 years. Hence the boy become owner of sufficient Enset plant together with few cattle, and aged in between 17-20 years, forced by his family to be married because owning sufficient Enset plant with few cattle warrants individual farmer household head recognized to be married in the community. Following this tradition Enset plant used as minimum requirement for marriage and household head status in food self-sustaining level in the community. Enset in Dawuro have been several economic and social functions, such as construction material, source of food and feed, cooking material, local beds, meal dish, roof shelter for time being and permanently constructed housings, income source, criteria of social recognition for farmer household head and cultural acceptances, traditionally one of soil fertility preserving system, and shed for drought season for animal and human being. Therefore, the plant tied with the blood of the community for too long life span. Enset is more productive and drought tolerant perennial crop as compared to annuals, in the zone and "a number of scholars identified its functions as a staple food for about 20 million people in the Southern Ethiopia. According to thematic area research of Dilla University research and dissemination "Enset plant has many farmer varieties that vary in their corm (*hamicho*), *bulla* and *Kocho* qualities, which are disappearing partly by factors like wild animal pests such as porcupine and more rats. Moreover, useful varieties are highly susceptible to diseases such as Enset bacterial wilt, mealy bug as well as global change in climate. The shortage of farmland per household

has reduced livestock size, which in turn has influenced the home garden soil fertility because livestock are sources of organic fertilizer, manure. Therefore, many varieties that are reputed for their *hamicho* and *bulla* qualities as well as fast fermentation (Gama in indigenous knowledge) are disappearing many area of southern region while in Dawuro zone; still more than 80 Enset local Varity cultivars exists by passing the challenges. Furthermore, many young farmers with very small plots of farmland were found planting fast growing annual crops than Enset currently and it may harts the Enset plantation unless managed properly. In order to estimate future genetic erosion as well as to preserve this agro biodiversity, there is a need to conduct the diversity and management of existing Enset indigenous cultivars in terms of local knowledge of Enset producers in the area as well as the genetic investigation based on local knowledge is very important.

2.2. Empirical Review

Enset product as a human food was used in the considered households up to 100% level, regardless of the other values of the plant (Dereje, 2009). This urges us to say that this crop have a great importance in the living and culture of the society who grow it. This is without forgetting the complemented value of the other crops in the farming activities, the annual and perennial crops. The Author concluded that there is a limitation of feed sources in quality as well as quantity during the dry period of a year, which has a negative consequence in the livestock production. In dray season most places of the country the farmer practice is to supplement the animals with the crop residues and hay still which result sub-optimal level of nutrient intake. He considering the chemical composition and its mineral content, the Enset leaf can be used as a supplemental feed resource for cattle growers.

Enset (*Enset ventricosum)* is a multipurpose crop and a staple food for about 15 million people in the southern nation nationalities and peoples region. It produces the highest dry matter yield in space and time as compared to other crops in the country (Admasu Tsegaye&Struik, 2001) sited by Tesfaye, 2013.

Enset Produced in Amaro woreda mainly for household consumption and a small proportion for sale 10 to 20 bigger Enset plants per year consumed/HH. *Enset* covers 61% (8331 ha) out of the total allocated for perennial crops 13,629 ha. The estimated output obtained from Enset production, in the woreda is 42,000 qt of "*kocho*", 16,500 qt of *bulla* 4100 qt of fiber per year. Owning a large plantation of *Enset* is a criterion for a woman getting engaged/married (Demekech, 2008).

The function of Enset plant is *Hamicho* the boiled *Enset* corm of usually a younger plant, *Kocho* bulla of fermented starch obtained from the scraped leaf sheaths and grated corm (underground stem) the *s*craped leaf sheaths, peduncle and grated corm provide *bulla,* which is the white-colored starch concentrate obtained from Enset plant (Demekech,2008).

Enset is very important for food security, especially for women and children who rely heavily on it. The plant can keep producing during long droughts, provides animal fodder in the dry season and protects the soil. That is why cultivation of Enset is an essential element in local households' resilience towards degradation and climatic extremes. Besides, Enset is a very effective crop in storing carbon. Enset is an indigenous multipurpose plant on which more than 15 million people from South-western Ethiopia rely for subsistence. However, the Enset-based farming system severely threatened by bacterial wilt (Xanthomonas). Moreover, income from Enset is low for lack of optimized post-harvest treatments (Feleke, 2015).

Enset is cultivated in subsistence farming systems with little connection of the Producer with the market, low prices, and production mainly for personal use. Due to intense soil tillage Enset has a positive impact on soil fertility and microclimate, and shows soil preserving capabilities. Systems with Enset are integrated production systems, whose different production lines correspond with each other. These systems respond much better to ecological or structural changes than systems which have only one or very few production lines.

3. METHODOLOGY OF THE STUDY

3.1. Description of the Study Area

3.1.1. Dawuro Zone

Dawuro lies in between 60 36' to 70 21' north latitudes and 360 68' to 370 52' east longitudes. The Gojeb and Omo rivers circumscribe and demarcate Dawuro from northwest to southwest in a clockwise direction. Dawuro shares boundaries with Konta Special Wereda in west, Jimma zone (Oromiya Region) in northwest, Hadiya and Kambata-Tambaro zones in northeast, Wolayta zone in east and Gamo-Gofa zone in southeast. Dawuro has an area of 4,436 km square it has five Woredas, and one Town administration namely Essara, Tocha, Maraka, Genabosa, Loma and Tarcha Town Administration.

The landscape of Dawuro is mostly mountains, plateaus, deep gorges and low land plains. Some of the mountains are Essara, Shasho, Sharo, Gugi, Gazo, Gumati, Hayo, Athso saddle mountains, Hathsinga and Gulo. The plateau cover areas extend from Gora upland in Loma Wereda to the border of Konta Special Wereda in east-west direction and from Waka town to the confluence of Zigna, Mansa and Omo rivers in north-south direction of Essara and Tocha Woreda. The altitude of Dawuro ranges, from 500 meter around the confluence of

Mansa and Omo rivers in special area Bona-balala of Adabacho kebele in Essara Woreda to 3,000 meters above sea level (a.s.l.) at Tuta in Tocha Wereda. Thus, Dawuro exhibits climatic variations from lowland to highland.

Dawuro enriched with a variety of trees and plant species and natural vegetation/forest. For instance, Chabara-Churichura National Park, natural forests along Gojeb and Omo rivers valleys and other bigger rivers in the zone such as Mansa, Zigna and Gelo revisers in Essara and Tocha Woreda contain a large number of natural vegetation that is important for bio diversity farther investigations. Dawuro also endowed with perennial rivers whose springs are the highlands aforementioned. Some of the bigger rivers include Buk'a, Shata, Wuni and Zayiri in Mareka Woreda, Wogayi, Zigna, Dibisa, Yarda, Chawa, Shepa in Tocha Woreda Zo'a, Kotoro, Panta, Koma, in Genabosa Woreda, Karethsa hatsa, Mawula, in Loma Woreda, and Mansa, Dalta, Gelo, Sumbursa, Dema, Chawa, Solantya, Banja, and Chofere small lake in Bubayilga, which is found in research conducting Woredas of the zone. All these rivers and others of Dawuro are tributaries of Gojeb and Omo rivers.

Dawuro people belong to Omotic family. The language of Dawuro people is Dawurotsuwa (in Latin orthography). Since 2016, Dawurotsuwa has been serving as a medium of instruction in school from grade1 through 10 grades as a subject and oral communication in the Zone's different government offices. In 2014, the population of Dawuro nationality estimated to be 600,121 according to annual statistical abstract of CSA and reported by BoFED of SNNPRS and its population density is 135.28 people per square kilometer. While, Dawuro were been not well known by most Ethiopian and western scholars until now while, the nation endowed in its remarkable history and fascinating culture and their heritages. Among the heritages, two amazing ones are the king Dawuro (kawo Hlala) Great defensive Walls and the longest woodwind musical instrument in the world locally called "Dinka" (4 to 5 meters long, and four in number) are the main one.

Dawuro had been a highly centralized powerful independent Kingdom, until Emperor Menelik incorporated it into Modern Ethiopia in 1891. The area under cultivation estimated to be 100,395 ha of the total 446, 082 ha area of the Zone according to the zonal agricultural department unpublished data. The dominant crops growing around the study area are Enset (Enset ventricosum) maize (Zea Mays) coffee (Coffea arebica) wheat (Triticum aestivma) barley (Hordeum vulgare), pea (Pisum sativum), bean (Phaseous vugaris), potato (Solanum tuberosum), Tomato (Lycopersicum esculentum L.), onion (Allium Cepa .L) and different fruits and root and tuber crops as well as spices and herbs according to Dawuro zone agricultural department socioeconomic data and own survey interview and practical observation in research conducting zone.

In Dawuro zone Enset plant is produced in all of the Woreda while its production potential varies based on the topography and size of land holding level of producer farmers. Except the mentioned points, all production, processing, postharvest management system, topography and culture of Dawuro people are almost all similar throughout the zone. The similarity of people in all activities leads to conclude that the research conducting Woredas results and outcome can represent other woredas in the zone. While the resource potential and utilization varies from Woreda to woreda due to different reasons. This research focused on Essara Maraka and Tocha Woreda, which is representative of the remaining woredas in the zone, because it covers the large share of Enset plant production processing and marketing in the zone.

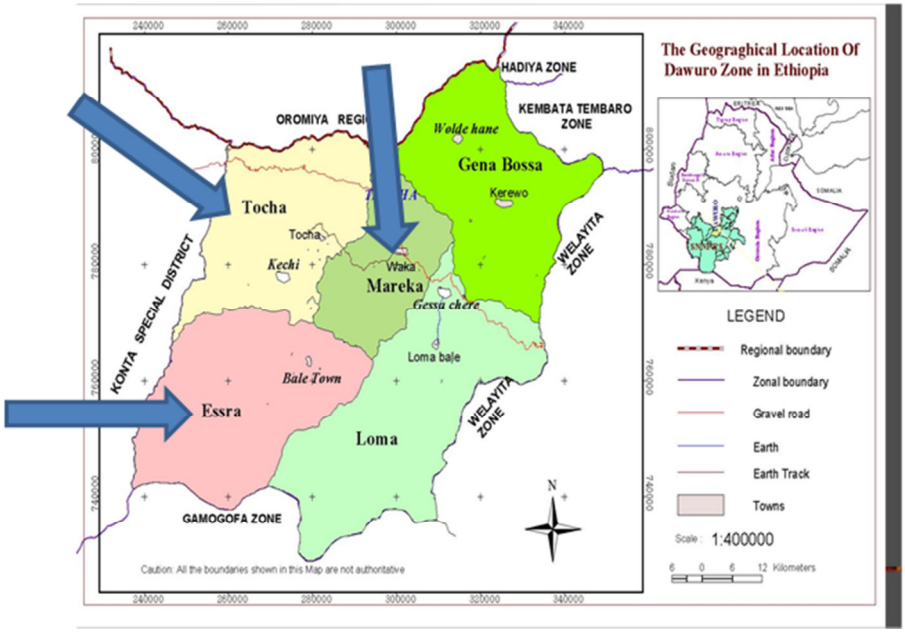

Figure 1 Map of Dawuro zone and the study area, Essara, Tocha and Maraka Woreda
Source: Dawuro Zone planning and finance department

3.1.2. Mareka Tocha and Essara woreda

Maraka, Tocha and Essara woreda is located 17 km, 37 km and 79km from Dawuro zone capital Tarcha town. Both three woreda has three agro-ecology named as Dag (high altitude), Woynadega (middle altitude) and kola (low altitude). Enset grown in both of the agro-ecology and the potential level varies based on agro ecology in the woreda. All the woredas share boundary and similar Enset culture each other. Enset were produced in the zone each of 184 kebele and 141,188 household as main food source plant. Enset produced both urban and rural area of Dawuro zone intensively. Refer table 1.

Table 1 Enset producer household head in Dawuro zone distinguished by woreda level

Name of woreda	No of Kebele			Household head by			population			Potential Coverage/ha
	R	U	total	M	F	Total	M	F	Total	
Tocha	35	3	38	23,873	4,828	28,701	56,437	53,221	109,658	8,400
Mareka	35	4	39	27,538	4,384	31,922	61,317	21,236	82,553	9,000
Loma	36	4	40	24,812	3,553	28,405	54,032	51,317	105,349	15,000
Genabosa	34	3	37	23,666	3,841	27,507	55,113	51,809	106922	1,357
Essara	28	2	30	21,544	3,109	24,653	39,283	36,864	76,147	8,437
total	168	16	184	121,473	19,715	141,188	266,182	214,447	488,629	42,194

Source: Dawuro zone agriculture and natural resource department socio economy data, 2016

Note: *the research conducted zone produce annually 843,904, 05 quintal kocho and bulla on average from 42,194 ha of Enset farming land of the zone. R and U in the table indicate rural and urban kebele in the zone. The average volume of kocho and bulla produced per ha is* $\frac{843,904,05}{42,194} = 2000.06$ *quintal.*

Table 2 Enset in Dawuro zone eminent by local naming, its benefit and disease susceptibility

No	Local name	Tenacity of utilization	Grouped locally		susceptibility nature on disease
			M	F	
1	Maziaya	Kocho and fiber	✓		Wilt resistant
2	Yesha maziaya	Kocho and fiber	✓		Wilt resistant
3	Shododinya	Kocho, bulla and fiber	✓		Wilt resistant
4	Badadiya	Kocho, bulla and fiber	✓		Partial wilt resistant
5	Boza	Kocho, bulla and fiber	✓		Highly susceptible
6	Shucha	Kocho, bulla and fiber	✓		Highly susceptible
7	Aregama	Kocho, bulla and fiber	✓		Highly susceptible
8	Agina	Kocho, bulla and fiber	✓		Highly susceptible
9	Shasha	Kocho, bulla and fiber	✓		Highly susceptible
10	Lochingia	Kocho, bulla and fiber	✓		Highly susceptible
11	Nakaka	Kocho, bulla and fiber	✓		Highly susceptible
12	Gena	Kocho, bulla and fiber	✓		Highly susceptible
13	kotinia	Kocho, bulla and fiber	✓		Highly susceptible
14	Aguntha	Kocho, bulla and fiber	✓		Highly susceptible
15	Amiya	Kocho, bulla and fiber	✓		Highly susceptible
16	Shamara	Kocho, bulla and fiber	✓		Highly susceptible
17	Komeniya	Kocho, bulla and fiber	✓		Highly susceptible
18	Ganaqa	Kocho, bulla and fiber	✓		Highly susceptible
19	Budunthowa	Kocho, bulla and fiber	✓		Highly susceptible
20	Gudareta	Kocho, bulla and fiber	✓		Highly susceptible
21	Mataka	Kocho, bulla and fiber	✓		Highly susceptible
22	Hoendiya	Kocho, bulla and fiber	✓		Highly susceptible
23	Thexla	Kocho, bulla and fiber	✓		Highly susceptible
24	Sanga	Kocho, bulla and fiber	✓		Highly susceptible
25	Tuzuma	Kocho, bulla and fiber	✓		Highly susceptible
26	Ocha	Kocho, bulla and fiber	✓		Highly susceptible
27	Barejeya	Kocho, bulla and fiber	✓		Highly susceptible
28	Wolbakuwa	Kocho, bulla and fiber	✓		Highly susceptible
29	Bossa	Kocho, bulla and fiber	✓		Highly susceptible
30	Gia	Kocho, bulla and fiber	✓		Highly susceptible
31	Hala'maziya	Kocho, bulla and fiber	✓		Highly susceptible
32	kartiya	Kocho, bulla and fiber	✓		Highly susceptible
33	Gomaraboza	Kocho, bulla and fiber	✓		Highly susceptible
34	Shushaliya	Kocho, bulla and fiber	✓		Highly susceptible
35	Yoyowa	Kocho, bulla and fiber	✓		Highly susceptible
36	Garjimachiya	Kocho, bulla and fiber	✓		Highly susceptible
37	Kuruwa	Kocho, bulla and fiber	✓		Highly susceptible
38	Okasheboza	Kocho, bulla and fiber	✓		Highly susceptible
39	Bukura	Kocho, bulla and fiber	✓		Highly susceptible
40	Shemiya	Kocho, bulla and fiber	✓		Highly susceptible
41	Goshatiya	Kocho, bulla and fiber	✓		Highly susceptible
42	Sedeba	Kocho, bulla and fiber	✓		Highly susceptible
43	Sessa	Kocho, bulla and fiber	✓		Highly susceptible
44	Okashiya	Kocho, bulla and fiber	✓		Highly susceptible

Source: own survey results on Essara, Tocha and Mareka woreda, 2016.

NOTE: - susceptibility nature on disease is identified by locally by indigenous knowledge during current research survey period by local respondents 2016.

Table 3 Enset in Dawuro zone eminent by local naming, its benefit and disease susceptibility

No	Local name	Tenacity of utilization	Grouped locally		susceptibility nature on disease
			M	F	
1	Arkiya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
2	Agina	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
3	Yaka	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
4	Bukunia	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
5	Suitya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
6	Pusiya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
7	Adinona	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
8	Nakaka	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
9	Sanqa	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
10	Musuwa	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
11	Musoarkia	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
12	Balla arkia	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
13	Chicha	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
14	Kataniya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
15	Utula	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
16	Sirara	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
17	Qordiya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
18	Goshindiya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
19	Borgodiya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
20	Gusuriya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
21	Kirchantiya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
22	Koziya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
23	Madiya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
24	Tiriya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
25	Tuluwa	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
26	Shema	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
27	Shelkuma	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
28	Kekeriya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
29	Shuchamaziya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
30	Yilga arkia	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
31	Yilga	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
32	Machagena	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
33	Utulaarkiya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
34	Akacha	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
35	Gomara	Kocho, bulla, hamicho and fiber		✓	Highly susceptible
36	Kartiya	Kocho, bulla, hamicho and fiber		✓	Highly susceptible

Source: own survey results 2016.

NOTE: - susceptibility nature on disease is identified by locally by indigenous knowledge during current research survey period

3.2. Methods of Data Collection

The data was collected by conducting survey on each of three woredas and during the survey period each producers and traders were contacted to obtain appropriate information about Enset plant production, processing and marketing techniques of producers, local bulla and kocho collectors, local trades, wholesalers and consumers

3.2.1. Informal Survey

The purpose of this survey is to get firsthand information and better insight about the area to plan effectively and to conduct the subsequent formal survey. In this survey, the relevant institutions and their experts who work on as an expert on root and tuber crop consulted using procedural checklist. In addition free informant interview on focus group discussion have been also undertaken to gather relevant information that can be used for appropriate site selection and designing of relevant questionnaire for the subsequent formal survey. Focus key informant organizations experts used in free discussion at this point are, Dawuro zone agriculture and natural resource department, Mareka, Tocha, and Essara woreda agriculture and natural resource office experts, and randomly selected 4 individual Enset producer households from each kebele are interviewed for free information

3.2.2. Formal Survey

After completing the informal survey and getting all of the relevant data inputs, the formal survey was commenced by purposive selection of 30 kebeles (28%) out of the 107 kebele in the three Woreda based on the Enset grown potential of the area. For actual survey data collection, 10 enumerators who have direct relation to the community, with batter working experience in the kebele and first degree holders in field of agriculture and natural resource, selected by researcher and has been trained on the content of the questionnaire and the type of data required to be collected. After creating clear understanding for the enumerators, the questionnaire was pre-tested using a pilot survey in 4 kebele before the actual work started under the supervision of the researcher for three days. Then necessary readjustment were made and the field survey conducted by the enumerators under the supervision and practical survey performing of the researcher.

Table 4 Purposive and simple random Sample selection design

woreda	No of kebele	Total producers	sample	Non producers	Sample	less producers	Total sample	Sampling method
Essara	10	28,825	50	15,256	50	46,538	100	SRS
Maraka	10	28,026	50	15,000	50	45,000	100	SRS
Tocha	10	28,425	50	15,512	50	45,769	100	SRS
Total	30	85,276	150	45,777	150	137,307	300	

*Source: own survey finding, 2016. * SRS indicates simple random sampling *total produce, less producers and non-producers household average number is based on Dawuro zone agriculture and natural resource department socioeconomic data.*

Purposively identified potential Enset producers kebele from three woreda are 30 and the potential Enset producer households in those three woreda are 85,276 and 183,076 are less potential and non-producers. Out of this, 1,200 household producers and non-producers were selected equal proportion (600) each and 300 sample selected by simple random sampling techniques and interviewed from 30 kebeles by using a semi structured and structured questionnaires 15 traders (local collectors at village level, local traders at woreda level and whole sellers at regional retailers) are selected purposively by traders proportion in area based, because the total population of kocho and bulla traders is not identified as legally traders level and it makes the data clarity bias un less taken purposively. Therefore, 5 respondents selected from each group in currant research.

3.2.3. Secondary Data Collection Methods

Secondary data was collected from different sources such as annual reports, research thesis, books and magazines of different organizations.

3.2.4. Sampling Methods

In addition, to find sample size criteria, for specifying a sample size of the study area and to determine the appropriate sample size, the level of precision (sampling error is ±5) and confidence is 95% confidence level that is, 95 out of 100 samples will have the true population value within the range of precision specified.

Therefore in this research the sampling technique is used Yamane, (1967:886) provides a simplified formula to calculate sample sizes. The formula used to calculate the sample sizes is A 95% confidence level and P = 0 .05 assumed. Then the formula used is

$$\mathrm{n} = \frac{N}{1 + N(e)2}$$

Where n is the sample size, N is the population size of Enset producers and non- producers, and *e* is the level of precision. When this formula applied to the above sample of Essara, Tocha and Maraka woreda purposively selected 1,200 Enset producers and non-producers or 600 each, we get:

$$\mathrm{n} = \frac{N}{1 + N(e)2} = \frac{1{,}200}{1 + 1{,}200(0.05)2} = 300$$

Therefore, in the current research, 150 household Enset producer farmers and 150 non-producers have been interviewed from 30 kebele of three woredas to identify the volume of kocho and bulla produced per household to consumption, market supply (to sale) and to know family level food security level between backyard product consumers and those of purchasers with in comparison of annual expenditures on kocho and bulla.

3.3. Method of Data Analysis

Qualitative and Quantitative descriptions by using frequency and percentage were employed to describe the Enset production processing and marketing and actors along the chain. Descriptive statistics was used to explain that the socio demographic characteristics of the actors, mean, standard deviation and percent etc. in the channel. Market concentration was calculated by C4 (the first four markets) the regression analysis takes place OLS (leaner regression) by using STATA and SPSS software version 12 and 20 respectively.

3.3.1. Model Specification for Analysis

Linear regression analysis and Heckman sample selection (tow-step) was used in the research to assess the

association between two or more independent variables and a three continuous dependent variable. Because the independent variables are three and the dependent variables are more than three as the survey data.

The independent variable was used in this research was volume or potential of Enset produced and marketed per household in quintal or 100 kg, Enset used as steeple food and gender role. The produced amount of kocho and bulla in house hold is consumed and partially sold**.** The objective of producer is to sustain household food demand supply and to generate income as one of main source. The independent variables are more than tow and the appropriate model is liner regression and Heckman simple selection model. The linear regression equation for analysis used is that:

$$yi = \beta o + \beta 1X1 + \epsilon 1$$

yi = is the dependent variable that is the volume or potential Enset plant produce of kocho, bulla and fiber produced in the area per each household level and it measured by 100 kg and *xi* = is the independent variables. The coefficient β is the intercept while, β1 is the slop coefficient that is *yi* changes by $\beta 1$ units for every unit change in *xi*

$$\frac{dy_i}{dx_i} = \beta_1$$

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots \beta_n x_{in+} \varepsilon_i$$

Where (i = 1, 2, 3…17)

yi = the total volume of kocho, bulla and fiber produced in the area
xi1 = is the land size of households own in the area
xi2 = is the annual increase on Enset plantation per household farmer
xi3 = is a single Enset plant produces or output of kocho
xi4 = is a single Enset plant produces output of bulla
xi5 = is the amount of fiver from single Enset plant produced obtained
xi6 = is the Age of farm household participating on Enset production and marketing
xi7 = is the family size of Enset producer household head
xi8 = is the education level of Enset producer household head
xi9 = is the Number one ranking staple food crop in Dawuro zone
xi10 = is the annual average consumption of Enset produce per household
xi11 = is the parches price of kocho and bulla for non Enset producers
xi12 = is the more actors in planting Enset in producer farm household
xi13 = is chopping Enset to processes kocho, bulla and fiber
xi14 = is the kocho and bulla quality identification locally
xi15 = is the amount of kocho and bulla supplied to market to sell per household
xi16 = is processing kocho and bulla by household
xi17 = is brad benders from kocho

3.3.2. Definition of Variables

The independent variable was used in this research was volume or potential of Enset produced and marketed per household in quintal or 100 kg per single plant, Enset used as steeple food and gender role. The independent variable independently defines about Enset potential of the area. The produced amount of kocho and bulla in house hold is consumed and partially sold**.**

3.3.3. Dependent Variables

Land size of households (LAND): it is continuous dependent variable and measured by number of ha farm land owned by farmer household head. It was hypostasized to know the farm land size impact on annual increase on Enset plantation per household Level.

Annual increase on Enset plantation per household farmer (Planting): it was continuous dependent variable and measured by number of Ha Enset planted per household and it was hypothesized to know how much ha farm land covered by Enset plantation per year per household and the level of plantation progress in the area.

A single Enset plant produces or output (Kocho): it was continuous dependent variable measured by kg and it was hypothesized to know how much kg kocho a single Enset plant produce has been obtained and to measure the quantity of kocho, bulla and fiber per Enset plant.

A single Enset plant produces output (Bulla): it was continuous dependent variable measured by kg and it was hypothesized to measure the volume of bulla produced from a single Enset plant

Amount of fiber from a single Enset produced or obtained (Fiber): it was continuous dependent variable and measured by kg and it was hypothesized to know the volume of fiber obtained from a single Enset plant

Age of farm household participating on Enset production and marketing (age): It is a continuous variable and measured in years. Aged farmer household has better experience than the younger one on Enset production

and marketing. Adugna (2009) who found that age of the household head have negative effect on the elasticity of onion supply to the market.

Family size of Enset producer household head (family): it was continuous dependent variable and measured by number of each family holds. It was hypothesized to know the positive link of family size on Enset producer farmer household because as family size increased the number of labour force in the family increased to produce Enset plant. According to Dereje Fekadu (2009), labour was an essential farm input that influences every farm activity. The labour that was available in the household can be categorised into children and adult labour. On average 46.7%, 47% and 63.6% of the labour was that of children, where the rest being adult labour, in the lowlands, mid-altitude and highland areas of Enset producers respectively.

Education level of Enset producer household head (Educ): it is dummy variable measured by in terms of whether the Enset producer house hold was educated formal education or not and measured by taking the value one for formal educated household head and zero for non-educated household head. Formal education enhances the information acquisition and adjustment abilities of the farmer, thereby improving the quality of decision making (Fakoya *et al*., 2007). Therefore, this variable is hypothesized to influence volume of kocho, bulla and fiber produced per household, consumed and supplied to the market positively.

Number one ranking staple food crop in Dawuro zone (Staple): it is dummy variable measured by level of consumption chooses in the community ranking and it takes one if Enset is number one staple food plant and zero otherwise

Annual average consumption of Enset produce per household (Consume): it is continues variable measured by kilogram and hypostasized to know the amount of kocho and bulla consumed per household of producers and non-producers.

Parches price of kocho and bulla for non Enset producers (Parches): it is continuous variable measured by number of Birr expended to purchase a kg kocho and bulla for house hold consumption per year on average and market information. Muhammed (2011) who found that if wheat producer gets market information, the amount of wheat supplied to the market increases. It is also hypothesized that market information is related to wholesale marketing outlet and those kocho and bulla purchasers obtain market information they shift the market demand to chipper one.

More actors in Planting Enset in producer farm household (Plant): it is dummy variable measured by participant's level and it takes one for male participants and zero for female participants in Enset production.

Chopping Enset to processes kocho, bulla and fiber (Chop): it is dummy variable measured by taking value one for female participants and zero for male participants in Enset stem chopping.

Kocho and bulla quality (Quality): it is continues variable measured by high, middle low, and poor quality level and it takes number value of one up to four. If it is 1, high quality 2, middle quality, 3 low quality and 4, it is poor quality

Kocho and bulla supplied to the market to sell per household (market): it is continuous variable measured by kg and hypostasized to know the positive link of kocho and bulla supplied to the market per household producers with obtained income.

Processing kocho and bulla by household (processing): it is dummy variable and measured by level of participants and it takes one for female participants and zero for male in kocho, bulla and fiber processing. That was hypostasized to know the role of male and female in kocho, bulla and fiber processing work load share in the community.

Kocho brad benders (Brad): it was dummy variable and measured by level of participants and it takes the value one if the brad vender is female and it takes zero if it was male.

4. RESULTS AND DISCUSSION

This chapter presents the area potential in Enset production, volume of kocho, bulla and fiber produced per households, gender role in the area and it presents the findings from the descriptive, statistics and econometric analysis of the current study. The descriptive analysis made use of tools such as mean, percentage, and frequency distribution.

Econometric analysis was used to identify the determinants of the volume of kocho, bulla and fiber produced in the area from single plant particular and area potential level as general.

4.1. The Area Potential on Enset Plant and Amount of Kocho Produced (Obtained) Per Single Plant in Dawuro zone

The socio-demographic and econometric analysis of the current research conducted area indicate that, the Enset plant productivity and amount of kocho bulla and fiber production from a single plant is influenced by the land size of the household head owns, annual increase of the individual household Enset plantation capacity based on land size, age of the Enset producers, family size and the education level of the locality farmers

Table 5 the main influencing factors to obtaining kocho, bulla and fiber from single Enset plant
Reg POT Land planting Kocho Bulla Fiber Age Family Education

Source	SS	df	MS	Number of obs	=	300
				F(8, 291)	=	55.54
Model	43.2551537	8	5.40689422	Prob > F	=	0.0000
Residual	28.3315129	291	.097359151	R-squared	=	0.6042
				Adj R-squared	=	0.5934
Total	71.5866667	299	.23942029	Root MSE	=	.31202

POT	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
Land	.2540019	.0332891	7.63	0.000	.1884839	.3195199
planting	-.0867635	.0364871	-2.38	0.018	-.1585755	-.0149514
Kocho	-.2135928	.0469286	-4.55	0.000	-.3059554	-.1212303
Bulla	-.4108203	.0914288	-4.49	0.000	-.5907658	-.2308747
Fiber	-.1912956	.1136817	-1.68	0.093	-.4150381	.0324469
Age	.1452514	.0680829	2.13	0.034	.0112542	.2792487
Family	.3253527	.0520675	6.25	0.000	.2228761	.4278294
Educ	.1030202	.0294474	3.50	0.001	.0450633	.160977
_cons	.790017	.1848479	4.27	0.000	.4262088	1.153825

Source: own survey finding, 2016

4.1.1. Land Size of Household Head Owns

Enset plant is perennial crop it needs a piece of land at least 3 at most 5 years to be planted until the farmer harvest kocho and bulla from matured plant, while the land size owned by each farmer show as a great variation between farmers to farmers. Because, during the survey period of current research 300 household Enset producer non producer farmers responded that the large size or farmers who own more than 2 ha of land cultivate not less than 0.5ha Enset at their backyard and those farmers who owns less than 2ha covers their farm land blow 0.025ha. Therefore, the survey results in econometric analysis of table 4 show as the land size reduction significantly affect the amount of kocho and bulla obtained from a single plant per household at 1% significant level. The reason is that as land size small and small farmers planting Enset plant on the backyard become reduced and farmers give prioritization for annul crop than perianal crops, due to this reasons the volume of kocho and bulla production per household become reduced in the zone.

4.1.2 Annual Increase in Enset Planting per Household

In Dawuro zone even though the land size owned by individual household varies, the annual plantation was indicates reduction as the current research survey conducted respondents view. The main reason is individual farmers considers Enset is females crop and the income generated from the crop more benefiters are female. Therefore, farmers or male group demands to produce annual crop than planting Enset in their farm land. The farmers giving more attention on annual crop production rather than Enset plantation in the area because income generated from annual crops owned by male and male group give more emphasize on annual crop production than Enset planting in the zone. The current research survey data analysis in table 4 indicates the volume of kocho and bulla produce obtaining from single plant and as area potential is significantly affected by 1% level of annual Enset plantation reduction. While, Enset is the main food crop and it is very important perianal crop to resist drought and food shortage in the area and even throughout the country. Therefore, the responsible body may take a measure on appropriate extension approach on Enset plantation improvement in the zone. According to Tesfaye Abebe2013, Farm size is an indicator of wealth status of farmers and it has significant effect on area share of the dominant crops, Enset and coffee and there was a direct negative relationship between decreases in the share of Enset with farm land reduction. This finding related current research.

4.1.3. Amount of Kocho, bulla and fiber from a single Enset Plant Produced

The survey data analysis in current research in table 5 inducts out of the total respondents 80.7% agree that 120-150 kg kocho obtained from single Enset plant and 14% and 5.3% agree 60 -100 and 25 -50 kg respectively. The survey data finding indicates that Enset plant can supply sufficient food from single plant and within very few farm land producers (farmers) can sustain their food demand and even they can supply surplus produce for market sufficiently. While, the amount of kocho bulla and fiber produced from a single plant is significantly affected by 1% level in producers or area potential that means due to agro ecology variation and producer farmer production and management potential the amount of kocho, bulla and fiber obtained varies from plant to plant and from area to area (high, medium and low altitude) respectively. In the some way 93.7% and 94.7of the respondents agreed that 5-10 kg bulla and 0.25 kg fiber produced from single plant. Refer table 6. Based upon the morphology and the type of use, farmers in North Omo tend to put Enset plants into two categories, “male-

and "female". Usually all the Enset plants within a particular variety (as classified by farmers) are put into a single "sex" category, i.e. a variety is either male or female Alemue *et.al* 1991.

Table 6 A single plant produced kocho, bulla and fiber in Kg

variable	Measurement	Frequency	%	Valid %	Cumulative %
Kocho	25-50 kg	16	5.3	5.3	5.3
	60-100 kg	42	14	14.	19.3
	120-150 kg	242	80.71	80.7	100.0
	Total	300	100.0	100.0	
Bulla	5 kg	9	3	3	3
	5-10 kg	281	93.7	93.7	96.7
	> 10 kg	10	3.3	3.3	100
	total	300	100	100	
Fiber	0.5 kg	16	5.3	5.3	5.3
	0.25 kg	284	94.7	94.7	100
	total	300	100	100	

Source: own survey finding, 2016

4.1.4. Age of Enset Producer household Head

The survey data of current study analysis indicates that age level of Enset producers who Participates on Enset production ranges between 18-25 years old covers 1%, 25-30 years 21% and more than 40 years age covers 78% of the respondents. Due to the current study finding in Dawuro zone Enset plantation and obtaining kocho, bulla and fiber produce was reducing as age become younger and it depends on elder age groups. The reason is based on land ownrity level, most of the younger groups of people in the community have land less and some of them own very small plot of land. Therefore, the younger group emphasize on cultivating annual crops than the perennial crops in one hand they may not even plant Enset plant due to land shortage and they may depends on off farming activities for their livelihood. The age variation significantly affects at 5% the potential volume of kocho, bulla and fiber obtaining from single plant and as area potential level. These may result food shortage in the area unless managed properly by the responsible body because younger group of the population now a day out of the Enset plantation and land shortage is also crucial problem for youth group. Refer table 4 and 7 respectively.

Table 7 age of farmer HH head more participate on Enset production

Age of respondents	Frequency	%	Valid %	Cumulative%
18- 25 years old	3	1	1	1.0
25-30 years old	63	21	21	22.0
> 40 years old	234	78	78	100
Total	300	100	100	

Source: own survey finding, 2016

4.1.5. Family Size of Enset Producer Household

According to current research, family size of Enset producers household determine the amount of kocho, bulla and fiber produced from Enset plant in several ways because Enset farming and processing needs more labour force and all of the activities depends on family labour in the community. The econometric data analysis and the descriptive statistics in table 4 and 8 indicates potential kocho, bulla and fiber producer household was that holds large size family can obtain more than small sized family. Fore stance those family who holds >5 family size covers 63% and > = 3-5 family member holder covers 35.3% less than 3 family members holders account only 1.7%. The survey results show as the large family holder household can participate in Enset production and processing in better performance and they obtain high volume of kocho, bulla and fiber. Because the activities performed in Enset planting, farm management like diffusing animal dung and house residuals through plant to plant, processing needs sufficient labour and in most rural household family labor plays significant role. Therefore, the number of family size increment significantly affects the volume of kocho, bulla and fiber production processing and marketing at 1% significant level. Therefore, it needs appropriate intervention for family labour replacing by improved technologically improved equipment's. Refer table 4 and 8 respectively.

Table 8 family size of Enset producers HH in Dawuro zone

Number of family size	Frequency	%	Valid%	Cumulative%
2-3 family members	5	1.7	1.7	1.7
3-5 family members	106	35.3	35.3	37.0
> 5 family members	189	63.0	63.0	100.0
Total	300	100.0	100.0	

4.1.6. Education Level of Enset Producer

Education is the main factor to participate in any productive activities as general however, in Dawuro zone Enset producer farmers was affected significantly by the level of education that means educated household head is

active enough to understand about the value of Enset and its output properly as compared to non-educated farmers. Therefore, education level of individual farmers significantly affects the volume of kocho, bulla and fiber production and marketing at 1% level. That means non educated household participate more Enset production, kocho, bulla and fiber production as compared to educated farmers. The reason is educated farmers in the community give more emphasis on annul crop production and marketing rather than Enset producing. More of educated farmers in the community are younger people and those individuals currently face either shortage of farm land or denying to plant Enset in their backyard due to annul crop seasonality and short period income generating capacity, and this leads in the area Enset resource currently exist only on the hands of older group peoples than the younger one. Therefore, unless managed properly may be in near future the Enset potential in the area reduced highly and the amount of kocho, bulla and fiber production, processing and marketing will be face serious problem and may result food shortage in the area.

4.2. Food Selfsustainability Level between Enset Producers and Non Producer Household

The food self-sustainability level between Enset producers and non-producers in Dawuro zone by current research was measured by the intensity of income the respondents obtained and amount of expenditure on kocho and bulla purchase for annual consumption per household. Therefore, the amount of expenditure on kocho and bulla in each household depends on either the consumer obtain annual consumable amount of kocho and bulla from backyard farm or purchasing from local markets. Thus the econometric analysis of the survey data show that there were leaner relation between food self-sustainability level of consumers who purchase kocho and bulla from markets and who produce it on their backyard for consumption and sell. Thus the amount of money that the consumer who perches kocho and bulla from the producers is significantly affected by the income they obtain from off farming as compared to producers. Hence, Enset producer farmers are food secured at family level as compared to non-producers, because the Enset producers can supply sufficient kocho and bulla for household consumption and even they can supply surpluses produce for market and generate additional income for family livelihood as compared to non-producers.

Table 9 Regression analysis of Enset data

Source	SS	df	MS	Number of obs	= 300
				F (4,295)	= 129.77
Model	47.8219604	4	11.9554901	Prob > F	=0.0000
Residual	27.1780396	295	.092128948	R-squared	=0.6376
				Adj R-squared	=0.6327
Total	75	299	.25083612	Root MSE	=.30353

Food	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
staple	.0507831	.0516369	0.98	0.326	-.0508402	.1524064
consume	.9355717	.0507216	18.45	0.000	.8357496	1.035394
purchase	-.1957803	.0292865	-6.68	0.000	-.2534173	-.1381433
Bulla	-.3169766	.04176	-7.59	0.000	-.3991618	-.2347913
_cons	1.009576	.1467333	6.88	0.000	.7207994	1.298353

Source: own survey data analysis, 2016

4.2.1 Enset consumption as staple food crop in Dawuro zone

Enset production, processing, consumption and marketing in the zone is considered as naturally gift activity in the community, because the total population has similar idea about the Enset plant importance on food self-sustainability supporting capacity and its economic value. The current research survey data analysis beta coefficient indicate as 93% of the produce is consumed as staple food and this consumption rate show as it affects significantly at blow 1% level the volume of kocho and bulla produced and consumed per household positively. Therefore, the survey data analysis finding implies that Enset is the number one staple food plant in Dawuro zone as compared to other food crop and 67% of individual household consume 500kg kocho on average and 61% of the population expend on average 12.50 birr per kg. Therefore, as the current research finding the consumers who preaches kocho and bulla from local market face challenge due to price increase and they does not supply sufficient food for their family as compared to who obtain from their back yard. For simplicity if the consumer consumes annually 500kg, the amount birr needed to parches it at local village market is 500*12.50 = 6,250 birr expenditure was mandatory for household head. Whereas individual farmer household to generate sufficient revenue from off farm is too difficult and may cannot parches the required amount of kocho and bulla for their family, therefore, they face food in security problem at family level. Therefore, it may needs extension intervention by local and regional government. Refer table 9 and 10.

Table10Annually consumption level of kocho, bulla per HH and its

Value		Frequency	%	Valid %	Cl. %
Annual consumed per HH on average	360 -480 kg	97	32.3	32.3	32.3
	480 - 500 kg	203	67.7	67.7	100.0
	Total	300	100.0	100.0	
Price of kocho	5-10 birr	24	8.0	8.0	8.0
	10-15 birr	184	61.3	61.3	69.3
	15-20 birr	89	29.7	29.7	99.0
	> 20 birr	3	1.0	1.0	100.0
	Total	300	100.0	100.0	
Price of bulla	15-20 birr	11	3.7	3.7	3.7
	20- 25 birr	172	57.3	57.3	61.0
	25- 30 birr	117	39.0	39.0	100.0
	Total	300	100.0	100.0	

Source: own survey result, 2016

4.2.2. Price and pricing effect on Kocho and Bulla purchasers

The current study data analysis indicate that the price of kocho and bulla rapidly increasing in the study area and it results significant influence at 1% level on non Enset producers, because the income or the amount of money expended on kocho and bulla purchase was too much as compared to those Enset producer household and that results the non-producers household food security at family level become worth as compared to Enset producers. The pricing system in the area has no rule and regulation that means every kocho and bulla supplier to the market can decide the market price sole and the consumer has no right to set the market price or to bargain the marketing system rather than purchase it at village market. The pricing system and the rapid increasing price hinders the non Enset producers food security at family level and it needs pricing regulation at one hand and Enset productivity increasing at other hand in the community. In addition to this in local village market local kocho and bulla collectors (local traders) also aggravate the price increase and it results for local consumer miserable life, even though the producers exploited by traders price decision. Therefore, it needs important intervention by responsible body.

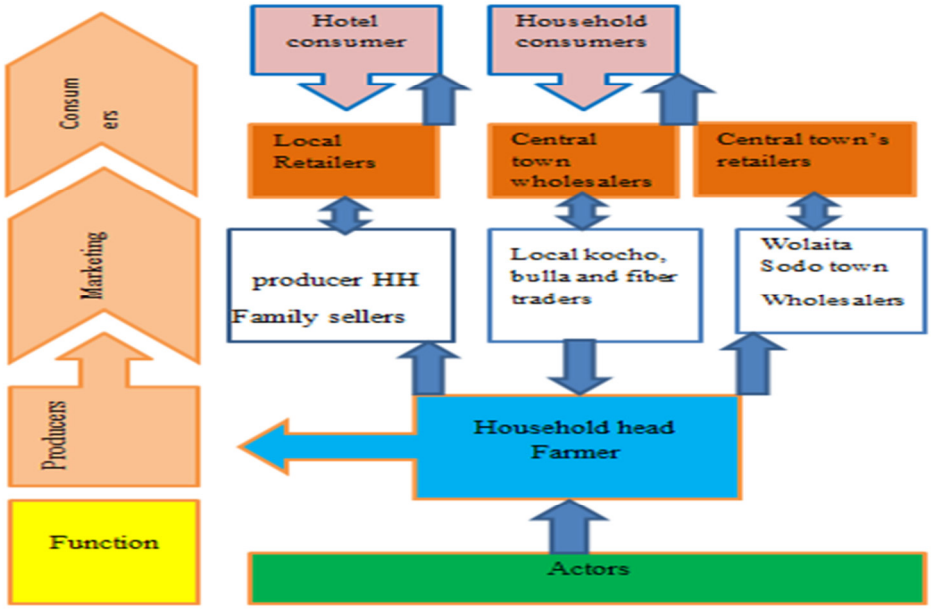

Figure 2 Enset value chain in Dawuro zone
Source: own survey result 2016

Conclusion and recommendation

In Dawuro zone Enset were produced in 184 kebele and 141,188 household consume as main food source. Annually 843,904, 05 quintal kocho and bulla on average from 42,194 ha of Enset farming land produced and the average volume of kocho and bulla produced per ha is estimated 2000.06 quintal. In zone 80 varieties of local Enset cultivars and out of this 44 cultivars grouped in to male Enset type and 36 are female Enset type based on their maturity, kocho, bulla and fiber productivity and quality. While the area potential is not known it may needs intervention on Enset varieties classification on its kocho bulla and fiber qualities and its importance

on family food self-sustainability level related with short period harvesting

Due to small land size owned farmers, planting Enset on the backyard become reduced and farmers give prioritization for annul crop than perianal crops, due to this reasons the volume of kocho and bulla production per household become reduced in the zone. The extension service delivery in the zone related to Enset was/is very poor or almost few, no specialized development agents on Enset in the survey conducted kebele and as well as other kebeles in the zone. While, food security sustaining capacity of the plant at family level and guaranty household food shortage protecting capacity of the crop is more than any other crop type in the community. Therefore it needs intervention like proper farm land management and extension supply is advisable in the area. The government and any responsible body was not given attention for the crop as compared to other crops may need government attention related to extension communication improvements and allocating skilled mane power in each kebele level to improve Enset productivity level.

The current study finding in Dawuro zone indicates that Enset plantation, obtaining kocho, bulla and fiber produce was reducing as age become younger and it depends on elder age groups. The reason is based on land ownrity level, most of the younger groups of people in the community have land less and some of them own very small plot of land. The age variation significantly affects at 5% the potential volume of kocho, bulla and fiber obtaining from single plant and as area potential level and may result food shortage in younger farmers at household level. It may recommend that solving farm land shortage problem for youth and appropriate extension intervention by government is crucial. The youth prefer perianal crop production rather than planting Enset in their small plot of lands because a person considers Enset as female benefiting crop. Therefore, it may recommend that awareness creation for male group in the community.

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