Scholarly Journal of Agricultural Science Vol. 4(3), pp. 166-175 March, 2014
Available online at http:// www.scholarly-journals.com/SJAS
ISSN 2276-7118 © 2014 Scholarly-Journals

Full Length Research Paper

Empirical Study on Apple Production, Marketing and its Contribution to Household Income in Chencha District of Southern Ethiopia

Gebrerufael Girmay[1], Mesfin Menza[2], Melkamu Mada[3] and Tora Abebe[4]

[1]Department of Rural Development and Agricultural Extension
[2,3,4]Department of Economics Postal Address 21 Arba Minch University

Accepted 5 March, 2014

Apple is a temperate climate fruit tree. The introduction of apple tree to Ethiopia is traced back to 1950s. However, apple production has been low and concentrated in Chencha district forcing the country to importation to meet the national demand. This study, therefore, intends to analyze the current apple production and marketing chain to enhance household food security in chencha district of southwest Ethiopia. Mixed non-experimental study was conducted in eight randomly selected kebeles using structured pre- tested questionnaire administered on 257 systematically drawn farm households in the district. Series group discussions, key informant interviews, institutional analysis and field observations were also held in the sampled kebeles to extract qualitative data of the study. The study has shown that apple production and productivity was low due to limited cultivation, poor agronomic practices, shortage of grafting and pruning materials, shortage of trained experts and poor research-extension and development linkage. The apple tree population was unevenly distributed among producers where few producers cultivate majority of apple and earn the lion`s share of income. The apple producers earn 272.89 USD on average per year per household. The chain of apple marketing was long passing through producers, consumers, primary cooperatives, retailers and wholesalers. Cooperatives play critical role in apple marketing and protect apple farmers from exploitation by selfish businessmen. However, mismatch between supply and demand, lack of predetermined demand schedule, smuggling which compromises quality products and unfair competition among cooperatives and absence of transparency are affecting apple marketing. The income proxy measurement of the study revealed that over 82% of the households were food insecure. The study calls for all government and non-governmental organizations to work together to expand and improve apple production and establish apple marketing hub.

Key words: Apple production, marketing, cooperative, income proxy, food security.

INTRODUCTION

Apple is widely cultivated temperate climate fruit tree across the world. World apple production has reached over 44 million metric tons in 2006. The leading apple growing country is China, producing about 41 percent of the world's apples, followed by the United States (Jalalabad, 2008). It is also a deciduous fruit (fruit which shed their leaves). The deciduous fruits are divided into pome, soft and stone fruits. The apple is among the pome fruits. Apple is rich in vitamins, calcium, phosphorus, potassium and organic acids. In addition to its dietary value, apple tree can enhance soil conservation in Ethiopian highlands. The introduction of apple tree to the tropical country Ethiopia is traced back to 1950s. The British Protestant Missionaries have first introduced apple seedlings to plant in their home compound in Chencha town in the Gamo Highlands of southwest Ethiopia. However, the apple cultivation has

*Corresponding author. E-mail: ggirmay2000@yahoo.com.

been confined in and around Chencha district until recently. The current apple fruit production in Chencha district is about 15 metric tons per year while the overall country production is estimated to be about 50 metric tons collected from 35, 000 small apple fruit producers in Ethiopia. Since the total production does not meet the demand, the country imports about 350 metric tons of apple fruits mainly from South Africa, Iran, China and Israel. There is therefore an unmet market demand for the Chencha apple (SNV, 2008).

Chencha district is located in the Southwest highlands of Ethiopia at an altitude ranging between 1600- 3200 meters above the sea level. The agro-ecology of the district is suitable for apple production (82% highland) and the mean annual rainfall ranges from 750mm-1000mm. Indeed, the district has tremendous potential for apple production (SNNP Agricultural Bureau). However, poor chilling that prolongs dormancy period of apples leads to poor flowering and low yield in the study area. The poor agronomic practices and unavailability of pruning and grafting materials also exacerbates to the low production and productivity of apple.

Chencha is one of the most populous districts in the southwest of Ethiopia. The major means of livelihood is subsistence rain-fed agriculture followed by traditional weaving. The soil types of the district is generally clay loam, red clay, verity soil and sandy with low productivity due to traditional and fragmented farming, low contents of organic matter and nitrogen. The land holding size of the farm households is highly fragmented and very small averaging to 0.25 hectare. Majority of the farmers plough their starved plot of land manually via hand farm tools.

Apple production is impacting the livelihood of Chencha community in a better way, for its high production on small plot of land and relatively its high marketing price. Nowadays it is the major source of household income (Zonal Economic and Finance Development office). Moreover, the high demand of apple fruit made the apple production an interesting business for both rural and urban dwellers. Chencha Highland Fruit Cooperative Union indicated that the cooperative revenue from apple seedlings sales alone reached over 5 million birr in 2008. In the district, nine rural highland fruit and vegetable producing and marketing multipurpose cooperatives have been established and organized to supply their products to domestic markets. Nevertheless, the number of member farmers in each apple cooperative was by far limited compared to the high apple production potential of the area due to the strong membership criteria to join the business. The existing cooperatives also lack capacity to establish market linkage due to inconsistent supply and quality, absence of cold storage allowing fruit to be available throughout the year.

Furthermore, apple production in the study area is characterized by poor agronomic practices resulting in poor yields and quality, shortage of pruning and grafting materials (pruning shears, grafting knife and scissors) at local market as well as their high cost in international market, and poor research-extension and development linkage. Despite the ample literature about apple tree in the world, it seems hard to get research findings on apple tree in Ethiopia which could make this study difficult. This paper, therefore, intends to analyze the current apple production and marketing and its contribution to household income in the study area.

RESEARCH METHODOLOGY

Apple production is the main cash crop in Gamo highlands and hence the income of majority of the community relies on what happens in apple production. Therefore, it is important to explore the current apple production and marketing and its contribution to household income in the study area. To achieve this objective, the study adopted non-experimental mixed research approach where quantitative and qualitative data were collected and analyzed using appropriate test statistics.

Sampling Techniques and Sample Size

Probability and non-probability sampling techniques were employed to delineate the study population and draw household respondents. Purposive sampling, simple random sampling and systematic random sampling with proportionate to household head techniques were applied to select the district, the sample kebeles and draw household respondents, respectively. Apple was first introduced to Chencha and it is cultivated almost in all the 50 kebele administrations of the district. And the district was purposively selected for this study. The population of the district is homogeneous in agro-ecology, socio-economic condition and share common culture and hence simple random sampling technique was used to select sample kebele administrations. Consequently, 8 kebeles namely Chencha 03, Mafona Zolo, Doko Losha, Mesho, Dambo, Shaye, Otae and Ezo Tulla were drawn as sample kebeles.

The sample kebeles has different household size. The sample households were drawn using systematic random sampling proportionate to household head techniques. The household head list in each kebele was used as sampling frame to select sample households. Literatures on research as well as the rule of thumb in statistics suggest that 10 per cent of the accessible population for the sample is statistically significant to represent the target population. Lastly, a total of 257 household respondents were included in the study.

Data and methods of data collection

Primary and secondary data that comprise quantitative and qualitative data sets were used for the study. For

data acquisition, structured pre-tested questionnaires was administrated to 257 randomly selected household respondents. The surveyed respondents were composed of apple producing and non-producer farmers, development agents, model farmers; institutional heads and experts in the district. From gender perspective, the sample was composed of male (79.7%) and female (20.3%) household respondents. A series of focus group discussions, key informant interviews, institutional analysis and repetitive field observations were held across the sample kebeles to extract qualitative data of the study. Two separate focus group discussions were conducted in two focal centers: Doko Masho and Chencha centers. These centers were selected based on the mutual interest of the participants and their accessibility for all. In each discussion centers, representatives of four kebeles were screened to participate on the discussion. That means all sampled kebeles were addressed. The group discussants were selected purposively from female household heads, model farmers, youth farmers and government agents. Thus, a total of 16 participants were involved in each center. The main criteria for focus group discussants selection is their versatile knowledge and experience on apple history, production and marketing. In addition, governmental and non-governmental organizations that work on directly or indirectly in apple production and extension activities were participated in the discussion. Key informants were also selected purposively among major stakeholders and important figures or expertise of stakeholders responded to questions crafted to suit each stakeholder's role and contribution in apple expansion, marketing and management.

Secondary data were collected from published and unpublished zonal and district government offices such as Chencha Woreda Agriculture Office, Cooperatives and Marketing Office, Non-Governmental Organizations such as Kale Hiwot Church Development Program, World Vision Ethiopia, Chench High land Fruits Cooperatives; Central Statistics Authority, Microfinance institutions like Omo and Wisdom and other pertinent sources. Desk review has been exhaustively done from these sources. Eleven enumerators and one field coordinator with some previous experience were recruited on merit bases and trained on code of conduct for data collection, survey objectives, interview approaches and survey data collection techniques by the research team. Before staring the actual data collection, the questionnaires were pre-tested using the trained enumerators and subsequently, modified based on the feedback of the enumerators to suit the intended purpose. The field data were collected under strict supervisions of the research team.

Method of Data Analysis

Data collected from different sources was first being triangulated and organized into thematic areas. Then, the data obtained from household survey through structured questionnaire were edited, coded and entered into SPSS (version 16) for analysis. Descriptive statistics such as percentage, frequency, mean, maximum, minimum and cross-tabs were used to analyze the data. Besides, some statistical tests such as chi-square were used to test some interest variables where necessary. Finally, qualitative data extracted through PRA tools was analyzed, interpreted and narrated.

RESULT AND DISCUSSION

The characteristics of household respondents

To draw a clear concluding remarks, it is important to describe the socio-demographic features of the farm households who affect and/or being affected by apple production and marketing in the district. Population age structure of a particular district helps to differentiate the productive and non-productive age group. Many studies have shown that rapid population growth in developing countries is closely associated with very young population structure and high age dependency ratio. Further, age of a farm household head in the district indicates his experience in farming, land ownership, cropping calendar and adoption of new technologies that in turn determines food security status of the household. The study revealed that the mean age of the surveyed households in the woreda is 46.69 while the minimum & maximum age found to be 22 and 90, respectively. Similarly, it is important to assess the dependency ratio in the households in order to determine the burden on the productive age group. The dependency ratio is the ratio of the number of dependents (age groups between 0-14 and 65 and above) divide by the productive age group (15-64). It is normally expressed as a percentage (Todaro and Smith, 2012). It contributes to the intra household economic dependency and causes economic variation across households. As the ratio increases there may be an increased burden on the productive part of the population to maintain the upbringing and pensions of the economically dependent. This results in direct impacts on financial expenditures on things like social security as well as many indirect consequences. It is believed that households with higher dependency ratio expend more on consumption than their counterparts while their per capita income is low. In line with this, over 73 % (188) of the sampled households had dependent members in their family. The mean age dependency ratio of the sampled households was equivalent to 0.8107(81.07%). This shows that on average more than 80% of these household members are unproductive and their livelihood depends on the productive age groups.

Literacy determines the decision power of a farm household to accept or reject modern agricultural technologies that can boost production and productivity. It also influences how a farmer behaves and manages resources. However, over 57% of the sampled households

were illiterate which might influence the modern agronomic practices. On the other hand, family size determines the food security status of the household and the quality of life of the individuals. Two households with the same income but different family size are expected to have different ways of living (USAID, 2000). The study revealed that the average family size of the studied households was 6.88. This average family size of the study area is higher than the national and regional average family sizes which are 4.7 and 4.9, respectively (CSA, 2007).

Land is the basic asset of rural communities without which farming is impossible. So all rural households whose livelihood depends on agriculture needs to have a proportionate farm land that can support their life. There should also be a direct correlation between land size and family size of the households. However, unlike Tigray and Amara Regional States where farm land was distributed on the basis of family size under the current regime, family size in the study area has nothing to do with landholding size of a household. The population pressure on land is also increasing from time to time causing depletion on other natural resources too. The information gathered from community leaders and key informants of the Woreda supports the diminishment and fragmented nature of the farmlands in the area. The participants of the discussion invariably disclosed that their landholding is very small and decreasing year after year. The average land holding of the sample respondents was about 0.5178 ha. This starved average plot in the study area is far below the national average 1.18 hectare (CAS, 2011). Holding such fragmented plot is difficult for households to become food secured.

Apple Production in the District

Apple is widely cultivated temperate climate cash fruit tree. In addition to its dietary value, apple tree is a source of household income and enhances soil conservation. Chencha district; located in the Gamo highlands; has especial history in apple cultivation in Ethiopia. Apple tree has introduced to the district in the early 1950s through the protestant missionaries. Whatsoever the progress recorded, the district has become the pillar source of apple plantation in the country and the Ethiopian Kalehiwot Church and World Vision took the lion share in the expansion.

Over 70% of the Ethiopian population resides in highlands where farm land to farmer ratio is very low. Hence, it is wise strategy to divert to cash crops cultivation that yields high production per unit area. In line with this, the study tried to estimate the current apple tree plantation (area coverage), number of farmers who cultivate apple and the total apple production in the district. The study revealed that the cultivation of apple has been confined in and around Chencha town especially in “Tollela" village where apple was supposed to first be introduced. According to the district agricultural office report, the current apple plantation coverage was only about 156 hectare whereas the surveyed apple plantation coverage was about 2 hectare though the district has untapped potential to be exploited. The basic reasons behind the limited expansion and cultivation of apple tree in the district were found to be the strong attachment of apple cultivation to the protestant religion and the unorganized effort of the governmental and non-governmental organizations since its introduction. According to the District Agricultural Office, apple is cultivated in almost all kebele administrations regardless of its amount. Having any single apple tree as a benchmark to classify farmers as apple producer and non-producer, the study revealed that over 80 % (207) of the sampled farmers cultivate apple during the survey time. This single apple plant might be rootstock, grafted seedling or mother tree. The current apple fruit production in Chencha district is about 15 metric tons per year while the overall country production is estimated to be about 50 metric tons harvested from about 35, 000 small apple fruit producers in Ethiopia (SNV, 2008).

To increase apple production, farmers can either expand or intensify apple cultivation. Agricultural expansion which refers to increasing agricultural production through bringing more marginal land under cultivation is impossible in the area while intensification which requires technological backup is non- existent in the area. So the only feasible option farmers have to increase apple production is to proportionally allocate their starved plot of lands to various crops. Hence, the study attempted to calculate the size of land farmers allocated to apple cultivation in the cropping season. The survey result indicated that the average land allocated to apple production per household was 0.013254 hectare in the study area. This shows that farmers allocate only 2.6% of their plot to apple cultivation. This small allocation indicates that farmers are not giving due attention to apple production and expansion which calls for immediate intervention based on the available potential in the study area. Keeping all factors constant, apple productivity is directly related with age where old age apple plant gives high yield and young apple tree gives low yield. Moreover, the aged the apple tree the tastier and flavor the fruit is (Yetneberk, 2013). The survey has tried to estimate the productivity of individual apple tree based on farmers" information irrespective of age, variety, agronomic management and other factors related to yield. Accordingly, the result shows that the average product per apple tree during the survey year was 24 Kilograms in one harvesting season which is far below the historic „Bartlett Pear" tree in Tololla" village in chencha which gives 200 Kg after 62 years.

Apple Population and Distribution

Farm land is scarce in Gamo highlands. Unlike cereal

Table 1: Apple population and distribution.

Apple number classification	Mother tree population				Grafted apple population				Rootstock population			
	N	%	Mother Tree	%	N	%	Grafted Seedling	%	N	%	Rootstock	%
1-10	123	63.4	656	17.6	37	33.6	225	1.5	26	26.8	205	0.8
11-20	37	19.1	628	16.9	17	15.5	291	2	12	12.4	202	0.8
21-30	10	5.1	276	7.4	8	7.3	220	1.4	10	10.3	295	1.2
31-100	18	9.3	860	23.1	21	19.1	1249	8.1	23	23.7	1434	6
>100	6	3.1	1300	35	27	24.5	13390	87	26	26.8	22,225	91.2
Total	194	100	3,720	100	110	100	15,375	100	97	100	24361	100

Source: Survey data, 2013.

crop production which requires large farmland, cultivation of apple requires small plot of land and can grow around homestead. Therefore, it is wise strategy to promote apple production in such starved farm plots. Apple is also the major cash crop in the highlands. The income of apple producer farmers has direct relationship with apple population on their farm.

Accordingly, the paper has investigated the total number of rootstock, grafted seedling and mother tree population of the sampled farmers. The study revealed that in addition to the limited cultivation, apple plant population is unevenly distributed across the social system where few number of apple producer farmers own the lion share of apple population in the study area. As indicated in table-1 below, only top 6 apple producer farmers have 35 % ownership share of mother tree and merely 27 farmers cultivate 87% share of grafted apple. Similarly, only 26 farmers produce over 91 % of rootstock in the study area. On the other hand, over 63% and 33 % farmers have only 1 to 10 mother tree and grafted seedling, respectively. This result shows the presence of two extreme producers which calls for intervention to curve the apple cultivation gap. The survey result further magnifies that the dominant producers are concentrated in and around Chencha town where apple crop is assumed to be introduced initially. World vision and other organizations long-term intervention in the same area also enhanced the concentration of the crop in specific area. This concentration has brought about income, skill, pruning and grafting equipment and market disparity among apple producer farmers. The possible reasons for the concentrated apple cultivation in and around Chencha town, specifically „Tololla" sub-Kebele might be due to the extension communication gap, the availability of demonstration and nursery sites, training and marketing centers in the area, and so on.

Apple Agronomic Practices in the area

Agronomic practices are steps farmers incorporate into their farm management system to improve soil quality, enhance water use, manage crop residual and improve the farming system through optimum application and management of agricultural inputs and technologies. The common agronomic practices on apple production are application of organic fertilizer (manure), grafting and pruning using appropriate equipment, spacing, intercropping and disease control.

The survey tested whether farmers apply these important agronomic practices or not. Accordingly, the study shows that all producers intercrop vegetables, beans and peas and Enset with apple plant. Similarly, all of them apply organic fertilizer (manure) without recommended dosage and use traditional treatment to control apple disease like apple scab and powdery mildew. Apple production in the district is organic and hence livestock ownership which is the main source of organic fertilizer in the area is important. Corresponding to this fact, the survey has shown that majority (94%) of the producers own livestock regardless of their number. The aggregate livestock possession can be explained in terms of Tropical Livestock Unit (TLU) (Storck, etal, 1991). Accordingly, the average livestock possession of sampled households was 2.8 per household (one TLU is equivalent to 250kgs, which is similar to one mature cow/ox).

Pruning enhances apple fruit production and quality through increased efficiency of light utilization, ease of air circulation through the canopy and decrease incidence of fungal disease. In light with this, the enquiry on whether the producers prune their apple tree or not revealed that majority (78.7%) of them producers did not prune and graft their apple tree for they had no appropriate pruning and grafting equipment. The sampled farmers responded that absence of the pruning and grafting materials at local market and its inflated price in international market and the lack of technical know-how made them not to do it. Non-governmental organizations like Kalehiwot Church and World Vision were supplying the materials until recently. However, Kalehiwot Church; the main supplier of the materials has ceased the supply due to the inflated import taxation. As a result, farmers were forced to use risky traditional materials to prune and graft their apple.

Households' income from apple production

In the contemporary uncertain world agricultural specialization is risky. Hence, it is wise strategy to

Table 2: Farmers income from apple production

Income Interval	N	Percent	Income in birr	Percent
20-100	19	13.5	1174	0.2
101-500	37	26.2	10186	1.4
501-1000	131	22	24246	3.3
1001-10,000	48	34	143390	19.5
>10,000	6	4.3	554000	75.6
Total	141	100	732996	100

Source: Survey data, 2013

diversify income sources to get out of poverty trap. In Ethiopian highlands where majority of the population lives, the cumulative effect of land scarcity and low productivity limits the sources of income of farmers which holds true in the study area. The absence of cash crops in Gamo highlands exacerbates the situation more. Since recently, however, the expansion of apple cultivation in the district shows a signal to break the silence; and it is common to see farmers who have got promising income from apple production. As a result, apple cultivation is attracting many farmers in the survey area. Indeed, the survey has investigated the amount of income farmers reap from apple production. As stated in the preceding pages, majority (80.5%) of the surveyed farmers cultivate apple in the study area. Out of these producers, over 68.1% (141) farmers generate income from apple production. The remaining 31.9% (66) producers did not reap income from the production. However, as indicated in table 2 below, there is a high income disparity among the producer farmers where the top six (4.3%) farmers earn the lion share of income from apple in the area. On the other hand, large (61.7%) producers earn less than 52.5 USD.

The average income of producer farmers who earn income from apple production is about 5198.55 birr while the minimum and maximum was 1.05 USD and 20734.9 USD, respectively. The average family size of the farmers who earn income from apple production is 7.11 while their per capita income generated from apple cultivation becomes 38.38 USD annually.

Challenges of Apple Production

Although apple production started in the early 1950s in Chencha due to its suitable agro-ecology, the coverage is still far below from the available potential; hence, the average income earned from its production is low. A number of government and non-governmental organizations have been exerting unilateral efforts to enhance apple production and productivity as well to improve its market for the last two decades. They trained a number of farmers across the country starting from layering seedlings up to post harvest management. However, the sector has yet facing a number of challenges. According to focus group discussion participants and key informants, the main challenges of apple production in the study area include among others;

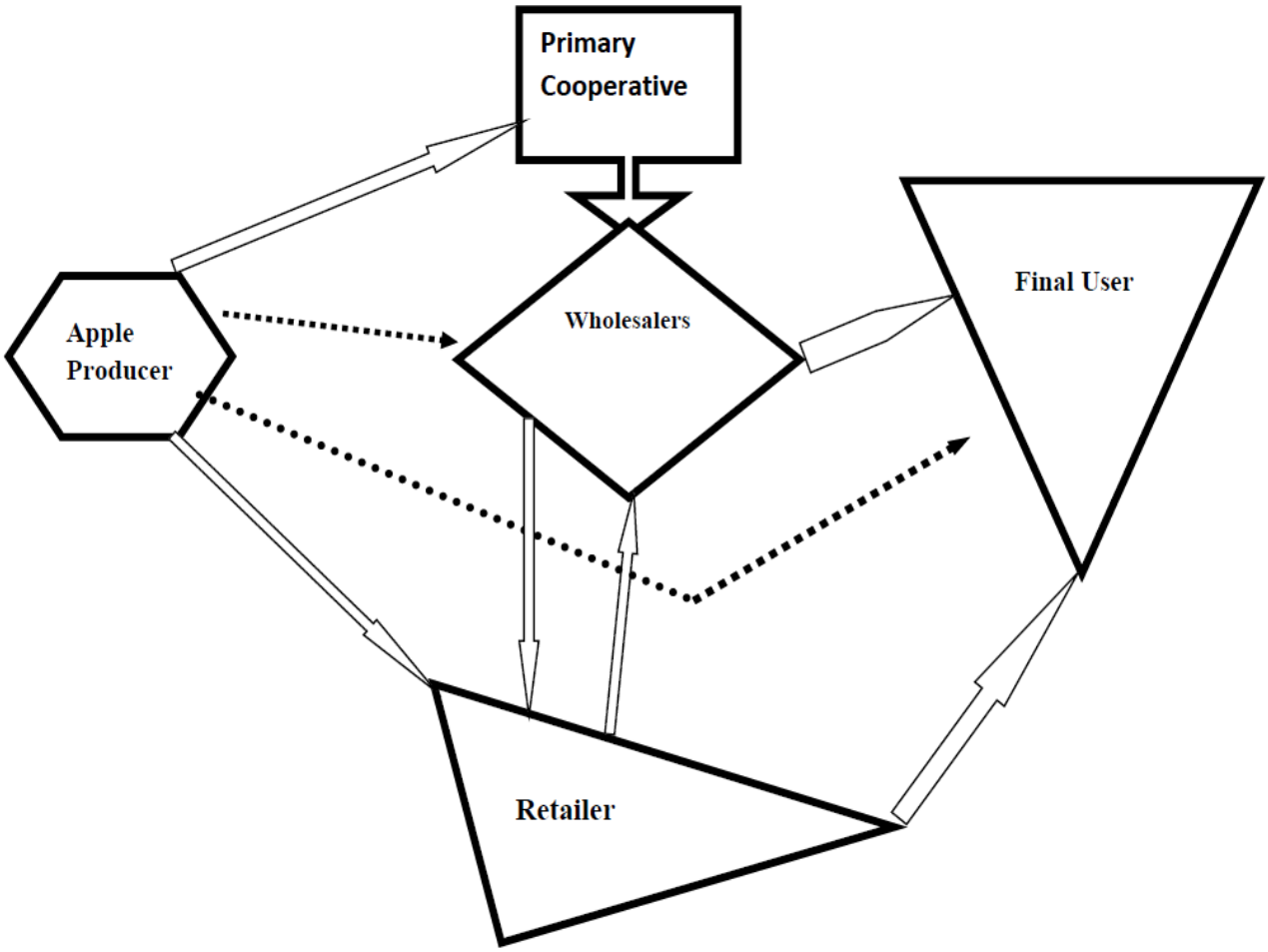
- Shortage of grafting and pruning equipment's and lack of storage
- Poor agronomic practices and poor awareness
- Shortage of trained manpower on apple production and management techniques
- Focusing on immediate income from apple seedlings rather than mother tree plantation
- Shortage of seed capital and poor farmer-research and development linkage
- Diseases such as apple scab, powdery mildew, leaf curl and insect pest, and
- Poor marketing channels (prevalence smugglers and lack of perfect market)

Apple marketing chain analysis and cooperatives

Marketing balances surplus and shortfalls of products and services in the local and international market. Hence access to perfect market that does not compromise the profit of the apple farmers is important to sale apple products. If there is no such market, farmers will either dump the perishable apple products or compromise the profit they reap which pushes them out of the business. Rootstock, Grafted seedlings and Fruits are the major apple products supplied to different market segments in the area. However, the past apple marketing trend shows us grafted apple seedling marketing is dominant source of income which will not long last due its diminishing marketing behavior. In the near future all parts of the country can have and develop their own grafted seedling source. The future is bright only for apple fruits. Early warning for farmers who heavily depend on production and marketing of grafted seedling is important at this junction.

As illustrated in the figure 1 below, the marketing process of apple products passes through different chains like what happens in marketing process of other agricultural products. The main market segments for the products include Primary Cooperatives, Wholesalers, Retailers and Final users (other farmers/consumers. There were nine (9) active apple producer farmers"

Figure 1: Core Marketing System Map for an Apple Producer



Source: Own Survey, 2013.
Note:
Arrows show direction of transaction of products
Segmented arrows show occasional transactions.

cooperatives in the area; among them the oldest and organizationally strongest is Chencha Highland Fruits Cooperative. This cooperative commands locational advantage for the business as its head quarter is located just in the heart of Chencha town. Among these market segments Primary Cooperatives are designated to purchase all the three apple product categories from Cooperative members at bulk at reasonable prices and market them when market is favorable or at different places where there is demand for the same. This is so because those apple producers" primary cooperatives are primarily established to stabilize market for members in the sense that to supply inputs at reasonable market prices to members and to sell members products at optimum prices, hence to insulate members from exploitation by selfish businesses. In this market segment prices are higher, quality is considered, effort is made to optimize the quantity a member can sell (by quota/norm) so that to give equal opportunity to members to realize their products. The problem with this market segment today is that it is narrow market with limited access only to cooperative members on one hand and it cannot clear the available supply even in their members" possession. For instance in August 2013, in the major rootstock and grafted seedling apples selling season the largest apple cooperative in the district (Chencha Highland Fruits Cooperative) scheduled only four (4) pieces of grafted seedling sell for its member while farmers have brought plenty of them (some in hundreds). On top of market size problem there is allegation that Cooperative executives abuse their positions to realize their products beyond the norm allowed for other members. Focus group discussants also allege cooperatives for unfair competition and sabotage among themselves; key informants like cooperative office vindicate the case. Wholesalers market is a market segment where transact-

-ion takes place mainly in between Primary Cooperatives and whole buyers. Whole buyers are mainly businessmen in the metropolitans (national/regional capitals) engaged in apple fruit business or government agents and non-governmental organizations engaged in apple promotion. However, few affluent apple farmers manage to sell their fruits in metropolitans to wholesalers. For individual producer to realize in wholesalers market it requires large quantity, additional transport cost, market information and reputation. This was so because wholesale market segments buy bigger quantity, pay better prices; quality consideration is eminent particularly for fruits. When some wholesalers/smugglers buy grafted seedlings from illegal retailers at throwaway prices they fully ignore quality consideration. The problems with this market segment are the market size and demand schedule cannot be anticipated as government or non-governmental organizations buyers demand products with very short notice. With fruit markets as farmers pick unripe fruits to overcome financial shortages and theft early there is no sufficient supply to quality sensitive buyers. The primary cooperatives remain the sole suppliers of apple fruits to wholesalers in the metropolitans. Quite few apple producers reported they sometimes sell their fruits in the central markets. The problems in this market segment are: lack of predetermined demand schedule to estimate current demand, smuggling wholesalers, improper competition among Primary Cooperatives in the district to win government and non- governmental auctions, irregular demand for seedlings and grafts.

Retailers also buy all product types. Advantage of retailers is that they buy products from Cooperative and non-cooperative members, therefore, easily accessible, prices can be bargained directly in between buyer and seller, and sales are actualized at farm gate with no transaction and time cost for the farmer. The main shortfalls of retailers market segment are – prices are below Cooperative prices and below production cost, quality compromised, smuggling distorts the market price, theft gets easy outlet, erodes final users trust on the producers as poor quality grafted seedlings may fail to sustain in their final destinations. Irrespective their difference in capacity, all apple cooperative organizations are responsible to actively engage in the following activities:

- Promote cooperative membership, accumulate capital through selling shares, collecting membership fees, and retaining profits
- Promote apple production by intensifying production on members‟ farms and recruiting new apple farmers in to cooperatives.
- Consolidate bargaining and marketing power by collectively deciding on prices and quantities
- Undermine smuggling and other forms of illegal business in apple products by individually and collectively condemning that sort of business.
- Explore new markets, intensify established markets and optimize collective benefits

However, the study revealed that the Cooperatives in the district had the following shortfalls for apple producers in the marketing spheres.

- Buy mostly members products, non-members are compelled to sell to smugglers at much lower prices without considering quality aspects.
- Sales are affected by some sort of quota given to individual members to supply. For instance in August 2013 (when this survey was underway) a member was allowed to supply only 4 grafted apples at Chencha Highland Fruits primary cooperative, no matter how much she/he had and willing to supply.
- The previous case above exhibits that neither existing markets are intensified nor new markets explored sufficiently for apple products. Hence, lack of effective demand for apple products as seedlings or fruits devastatingly demoralizes individual farmer efforts.
- Cooperative membership not extended to kebeles at distant from Chencha center sufficiently, for instance among survey respondents much lesser apple cooperative member households are observed in Ezo area; and of course apple producers are also much thinner in this area.
- According to focus group discussants more than anything, engagement of apple cooperatives in unfair competition to capture market worries members. The point is that each cooperative endeavors to sell at lower price to persuade some group of buyers.
- Only few apple cooperatives are economically self-sufficient to accomplish their objectives.

Another critical problem with the apple cooperatives is that a farmer needs to own 20 apple mother trees to join to the cooperatives which are beyond stretch of most farmers. Our survey result indicates more than 80% of farmers in the area at best own less than 10 mother trees. Here it is vivid this criteria precludes poor farmers from apple cooperative membership even though it seems essential to recruit members on purpose for a specialized cooperative like this. The survey result also shows majority (63%) of the households are not members of any cooperatives while only 37 % are affiliated to it. This might be so because the membership criteria are difficult to meet.

Household income and expenditure

In Ethiopia, majority of rural households derive their income from agriculture. This shows that food security of the majority of the population heavily rely on what happens in the sector. For the ease of this study, the sources of income are categorized as agricultural and non-agricultural. Unlike other parts of the country, non-agricultural income sources equally contribute for the livelihood of the study area. Agricultural income includes

Table 3: Household income and expenditure category

Income and expenditure category	Household income (in birr)				Household expenditure (in birr)			
	N	Percent	Total Income	Percent	N	Percent	Total Expenditure	Percent
100-1000	25	9.7	15420	0.7	10	3.8	6401	0.5
1001-5000	98	38	293428	13	169	65.7	455700	35.6
5001-10,000	75	29	539799	24	55	21.3	370410	29
10,000-30,000	55	21.5	859494	38.1	20	7.7	292763	22.9
>30,000	4	1.7	546000	24.2	3	1.6	117706	9.2
Total	257	100	2254141	100	257	100	1279586	100

Source: Survey data, 2013

crop, livestock and livestock byproduct sale. All other sources of income including weaving, petty trade, sale of firewood and charcoal and so on are categorized under non- agricultural income. The share of agricultural income and non-agricultural income in the study area is almost equal. However, the average income from agriculture which equals to 5517.00 Ethiopian birr per annum is slightly greater than non-agricultural average income (5,061.00 Ethiopian birr). This average income difference clearly indicates the dominance of the sector over other income sources still. The total average income of the surveyed farmers is Ethiopian birr 10536 per year. This average figure is equivalent with USD 553.07 (converted in current exchange rate of 19.05). Furthermore, the per capita income was about birr 1274.2 per year. This means on average, each family member earns around 67.05 USD per annum.

Thus, the per capita income per day is much less than internationally accepted level (one dollar per day). So this per capita income signifies us most farmers in the study area are poor and food insecure. Paradoxically, the lion share (73.4%) of the household income goes to consumption expenditure.

The above table shows that 59 (23.2%) of the surveyed households earn over 62 % of the total income whereas 123 (48%) households reap less than birr 5000 per year in the study area. This indicates the existence of high income disparity among farmers. It is may be due to the presence of few farmers who specialize in apple production and income diversification.

Households expenditure depends on their income where the higher the income the higher they expend. This survey focused on the major expenditure types like consumption, production and social. The surveyed households‟ total income which equals to 2254141.00 Ethiopian birr is by far greater than their total expenditure (1279586.00 Ethiopian birr). This data shows that the total income of the studied households is 43.3% higher than their expenditure. This higher income over expenditure might be due to the low investment behavior of farmers on agricultural sector. Similarly, out of all their expenditure, farmers allocate 73.4% to consumption while 14.6% and 12% spent on social and production expenditures, respectively. This figure shows households in the study area expend more for social occasions than production. In other words, the surveyed farmers are allocating limited amount of money to purchase modern agricultural inputs like improved seeds, fertilizer and farming tools that can improve production and productivity.

Household food security status

According to FAO (1980) cited in USDA (Guide 2000), food security is defined as access by all people at all times to enough food for an active, healthy life. Food security requires “physical and economic access to adequate food for all household members, without undue risk of losing such access”. Access to food is a measure of entitlement to food from own production, income, gathering of wild foods, community support, and assets. Food security includes at a minimum:

(1). the ready availability of nutritionally adequate and safe foods
(2). an assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing, or other coping strategies).”

On the other hand, food insecurity is defined as limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways (USDA, Guide 2000). This survey used income proxy to measure food security status of households rather than consumption based measurement. The entire household income might be from any source and assumed to be enough to purchase adequate food. Exactly 6935.00 Ethiopian birr per year which is equivalent with 365 USA Dollar at the time of study exchange rate estimation was used as a benchmark to categorize households in to food secured and food insecure. The survey further assumed 6935.00 Birr is enough to purchase adequate food from the market. Based on this benchmark, only 45 (17.5%) households were found to be food secured whereas the majority (82.5%) of the surveyed households was food insecure. The possible reason for this high level of food insecurity might be due to poor performance of agricultural sector and limited income diversification in

Table 4: Source of income and types of expenditure

Source of Income	Income	Percent	Type of Expenditure	Amount of Expenditure	Percent
Agriculture	1131143	50.2	Production	152452	12
Non-Agriculture	1123618	49.8	Consumption	938768	73.4
Total	2254141	100	Social	188367	14.6
			Total	1279586	100

Source: Survey data, 2013

the area.

To substantiate the above data, sampled household heads were asked whether the annual production was enough to feed their family throughout the year or not. Consequently, about 97% of them reported that their annual production is not enough to feed their family for the whole year. On average, the annual production of the sampled household heads feed their family for about 7 months. This implies that there is five months food gap in the study area. Participants of focus group discussion and key informants mentioned that the community faces food shortage mainly in May, October, September, November and June in order of their severity. The participants underlined that October and May are the most critical months that challenge even the haves while others having nothing to eat during these months.

Concluding Remarks

Despite the long lasted cultivation, apple production and productivity is very low and concentrated in and around Chencha town in the Woreda. Apple population and income generated from it was also unevenly distributed across the district where very few farmers dominate apple cultivation and earn the lion`s share from it in the study area.

Apple is the major cash crop in the study area. Hence, almost all producers sell rootstock, grafted seedling and apple fruit in the local market but rootstock and grafted seedling marketing will not long last due to its diminishing market demand. Early warning for farmers who heavily depend on production and marketing of rootstock and grafted seedling is important at this junction. The actors of apple marketing are enormous. They include producers, consumers, primary cooperatives, retailers and wholesalers. Cooperatives play critical role in apple marketing and protect members from exploitation by selfish businessmen. However, mismatch between supply and demand, lack of predetermined demand schedule, smuggling which compromises quality products and unfair competition among cooperatives and lack of transparency of cooperative leaders are affecting apple marketing. Cooperative membership is also important to producers to sell their products at reasonable prices but membership criteria are very tight which precludes poor and non-apple producer farmers. The main challenges of apple production and marketing in the study area include among others; shortage of grafting and pruning equipment, poor agronomic practice, shortage of trained experts on apple production and management, limited mother tree plantation, prevalence of illegal buyers, poor research-extension and farmer and/or development linkage and prevalence of apple diseases such as apple scab, powdery mildew & insect pest. The study calls for all government and non-governmental organizations to work together to expand and improve apple production and establish apple marketing hub.

ACKNOWLEDGEMENT

We acknowledge the financial support of World Vision Ethiopia and the coordination of Arba Minch University to undertake this research study at field level. Our special acknowledgement also goes to our sample household respondents and the district administrators who provided us with the necessary information.

REFERENCES

Bickel, G., Nord, M., Price, C., Hamilton, W. and Cook, J. (2000). Guide to measuring household food security revised, January 2000. Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service; 2000

Central Statistical Authority (CSA), (2007). Agriculture: statistical survey. Addis Ababa, Ethiopia.

Central Statistical Authority (CSA), (2011). Annual agricultural household survey. Addis Ababa, Ethiopia

Jalalabad (2008). Apple Production: perennial crop support series. Publication no. 2008-004- AFG, Afghanistan.

Kothari, C.R. (2004). Research Methodology: methods and techniques. Second revised edition, new age international limited publisher.

Michael, P.T. and Stephen, C.S. (2012). Economic Development. 11th edition, Addison- Wesley Press.

SNV Netherlands Development Organization (2008). Apple production in Chencha: case studies, Ethiopia.

Storck, et al (1991). Tropical Livestock production and management

USAID (2000). Strengthening emergency response abilities: vulnerability profile of Ahferom Woreda, Tigray Regional State, Ethiopia.

USDA (__). National Agricultural Statistics Service: United States Apple Association. Http//www.urban next illnious.edu/apples/facts.cfm

Yetneberk, T. (2013). Fortune staff writer. 13(677)

Wikipedia, the free Encyclopedia. Http//www org/wiki/apple_inc.