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Assessment on Challenges and Prospects of the Community Livelihood in Upper Blue Nile, Chira Watershed, Northwest Ethiopia

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ABSTRACT

The systematic assessment of community livelihood assets, strategies and economic and social conditions are essential for improving the living standards of the existing community and sustaining the resource development of the future generation. The main aim of this study is to identify the community development needs and potentials by assessing the challenges and prospects of the community under Chira watershed. Cross-sectional research design was employed. The data were analyzed by using frequency, percentage, mean, standard deviation, cross-tabulation along with inferential statistics like t-test; Chi-square test. The survey result indicated that only 17.5% of this land is conserved and covered by improved soil and water conservation measures. Only 17% of the respondents have used irrigation for crop production purpose and all of them were used traditional irrigation activities. Regardless of production increase, high price of fertilizer (50%), land shortage (25%), soil degradation (16.7%), lack of money (3.3%), lack of oxen (3.3%) and natural disaster (1.7 %) were mentioned as the current problems regarding crop production activities. Generally, infrastructure development in the area is weak and, therefore, much improvement is in need like developing roads, well developed farmer training center and demonstration sites, saving and credit institutions, electricity and mobile networks.

Keywords: Assessment, Livelihood, Chira watershed, Ethiopia

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Background

The rural community livelihood in Ethiopia faces many challenges such as endemic poverty, food security crises, environmental degradation, and unemployment. The country is one of the most environmentally degraded and the challenge of environmental degradation remains the big problem. Deforestation, overgrazing, soil erosion and desertification are wide spread [1].

A number of factors such as farming techniques, population increase, and insecure land tenure system contribute to this. Land degradation and loss of biodiversity become a big threat in the conservation of the environment and to ensure sustainability in the production process. It has also huge implications in bringing the idea of sustainable development, to meet the desire of the current generation without compromising the need of the future generation. The economy of the District like that of the country is mainly relying on agriculture and this sector is the principal source of livelihood for the majority of the community. However, nowadays land degradation severely constrains agricultural production and productivity (Etsay, 2019) [2].

In the District, Chira watershed is among the watersheds that are severely affected by land degradation and in response to the problem, mitigation measures were taken to enhance the production potential of agricultural land through the practice of planned watershed management activities. This paper mainly emphasizes the assessment of the main socioeconomic status of the community which is closely linked with environmental aspects in the Chira watershed management and closely observed the welfare indicators in the undergoing scrupulous study of severely degraded lands in the community. It aims to generate data base of the socio-economic status in the study area by identifying and characterization of the major farming systems and their social, economic, and bio-physical environments. This is important to design appropriate interventions for helping farmers to improve their livelihood and rural development. The systematic assessment of resource potential, economic and social conditions is essential to understand the condition under which farmers are operating which is the principal aim of the present research project. Chira watershed is purposely selected due to the nature of sloppy land and easily exposed to land degradation and brings a big impact on the life of the local people who live under the given watershed.

Therefore, this study is conducted to assess the challenges and prospects of community livelihood under this watershed. This is because; the survey can give the benchmark information for further intervention programs in advance.

Materials and Methods

Study area and design

Besides good insight in practical and knowledge gaps, a suitable study area is important to conduct a field work for studying the already identified gaps. Hence, Sinan is a district in the North West of Ethiopia. The district is located at 327 km from Addis Ababa in Northwest and 303 km from Bahir Dar in Southeast. The estimated total population of the district is about 114,475. Cross-sectional study design was employed.

Sampling procedure and sample size

Firstly, Chira watershed was selected by simple random sampling among many watersheds in the Sinan district; secondly, 110 households were selected from the watershed members by systematic random sampling techniques. The sample size for collecting quantitative data for this research was determined based on the formula proposed by Cochran (1977).

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

Where n= the sample size

N = total number of households

e = marginal error or degree of accuracy 8% (given by researcher)

1=designates the probability of the occurrence of event

Accordingly, a total of 110 sample respondents were selected from a total of households.

Data collection methods and sources of data

Data was obtained from primary and secondary sources. Primary data were collected through-semi-structured questioner, focus group discussion and direct field observation. These primary data were supplemented by secondary data mainly from books, journals, and official reports.

Methods of data analysis

The data were analyzed by using descriptive statistics like frequency, percentage, mean, standard deviation, cross-tabulation along with inferential statistics like t-test; Chi-square test. Tables and diagrams were also used to present the data and SPSS Version 20 software was employed as a tool to analyze the data.

Result and Discussion

Demographic characteristics of the farmers

The survey result indicated that among the total sample household heads, 95% were male and only 5% of them were female (see table 1). And the mean age of sample household heads was 46 with a standard deviation of 9.14. The family numbers of the sample households range from 2 to 10 persons, with a mean of 5 persons and a standard deviation of 1.62. About 85 percent of the total sample households have a family size of 4 and above persons per household head. The survey result also showed that almost 95% of the respondents were married. Concerning the educational level of sample household heads, the survey results indicated that about 45% of the total respondents were illiterates, while the rest 55% of the respondents can read and write; and no one has attended either primary school or secondary and above.

Table 1- Demographic characteristics of the farmers

Household characteristics		**Percentage**	**Mean**	**St. deviation**
Age		-	46	9.14
Family size		-	5	1.63
Sex	Male	95		
	Female	5		
Marital status	Married	95		
	Unmarried	1.7		
	Divorced	0		
	Widowed	3.3		
Religion	Orthodox	100		
	Muslim	0		
	Protestant	0		
Educational status	illiterate	45		
	Read and write	55		

Landholding and its characteristics

The survey results showed that the landholding size of total sample households ranges from 0 to 2.5 ha with a mean of 1.14 ha and a standard deviation of 0.39. Farm size of most farmers (78.6%) falls between 0 and 1.25 ha which indicates that the majority of farmers' land size is less than one hectare and it was found that only about 5% of the sample households have a farmland of two and above hectares. As indicated in table 2, the trend of landholding size among farmers is decreased from time to time. The result also indicated that only 17.5% of this land is conserved and covered by improved soil and water conservation practice (SWC) i.e. on average 0.2 hectares of land is covered by improved SWC structures by each farmer in the study area.

Slope is one of the physical characteristics of farm plots used as a proxy measure for the degree of erosion, which in turn may affect the use of SWC measures. For instance, those farmers whose land was steeply sloping were more likely to be decided to use and maintaining conservation structures than farmers whose land is less level and flat land. Based on this baseline survey, the majorities of sample households (70.2%) have and cultivated sloppy lands (6-15%), whereas 24.6% of the households have flat and level (0-6%) landscapes. So, this sloppy and fragmented landscape of the watershed is highly susceptible to soil erosion and land degradation.

The soil fertility level of the chira watershed is very poor; based on the baseline survey no one farmer has fertile land rather the majority of the respondents' (95%) land is semi-fertile. Therefore, this result tells us as there is a need for great efforts to enhance the fertility of soils to increase crop productivity and then ensuring the food security of the community.

Table 2. Landholding and general land characteristics in the study area

land characteristics		**%**	**Mean**	**Sd.**
Total land size			1.14	0.39
Land size covered with SWC structure			0.2	0.24
Land owned	Yes	96.7		
	No	3.3		
Soil fertility status	Infertile	5.2		
	Semi-fertile	94.8		
	Fertile	-		
	Very fertile	-		
Slop of land	Level (0-6%)	24.6		
	Sloppy (6-15%)	70.2		
	Sloppy and mountainous (>15%)	5.3		
Soil type	Black	6.9		
	Red	84.5		
	Neither black nor red	8.6		
Trend of landholding size	Increase	3.4		
	Decrease	55.9		
	No change	40.7		

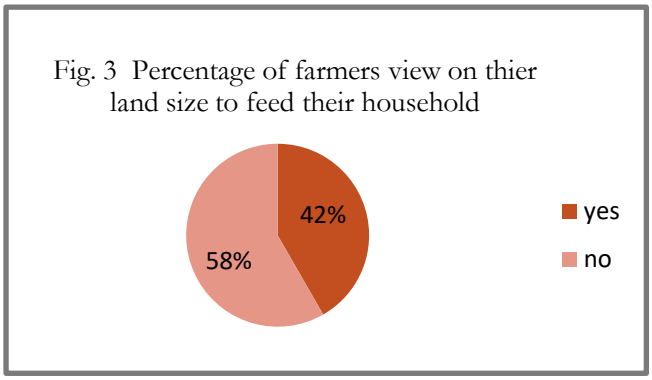
Causes of land degradation

Land degradation may occur due to different reasons either by human-induced or natural causes. As shown in the figure below, there are different human-induced causes of land degradation and the sampled households were asked to identify the main causes of degradation in their lands.

Figure 1 – Severely degraded land in the study area (photo taken at the field)

Farmers have also different perceptions regarding the causes of soil erosion problems. Deforestation, overgrazing, over-cultivation, poor agricultural practices and poor SWC installation were some of the major causes of soil erosion problems explained by the respondents. Of which deforestation, over-cultivation, poor agricultural and SWC practices and overgrazing were took a great percentage of respondent's rankings, respectively.

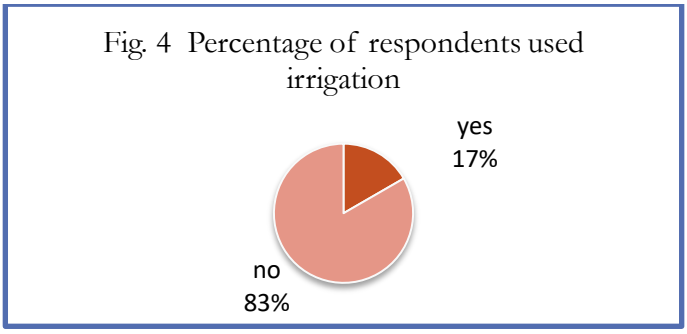
Farmers' view on crop production and their land size



Majority of respondents (58%) reported that their current size of land is not sufficient enough to feed their growing family number in the households and to cope up with shortage of land and subsequent reduction of crop production they used different strategies like buying of food for household consumption during the peak months in which the stored foods are already finished particularly starting from June up to October.

Use of irrigation for crop production

As in figure 4, only 17% of the respondents have used irrigation for crop production purpose and from this proportion of farmers, all of them were used traditional irrigation activities. It is obvious that irrigation activity needs enough water but still it is possible to use modern irrigation like drip irrigation for home garden vegetables and fruits even with scarce availability of water since their water consumption is very minimal and economical. As we have seen in figure-4, it is a hundred percent traditional irrigation types, however, farmers in this watershed are interested in any kind of agricultural technology including irrigation technology if they are accessed easily.



Farmers responses in the trend of crop productivity

Table 3. Farmer's responses in the trend of crop productivity

Crop Productivity status		**percentage**
	Increased	91.7
	Decreased	6.7
	No change	1.7
	Total	100.0

As can be seen from Table 3, the survey indicated that 91.7% of the respondents reported that the crop production or yield is increased when compared with the previous ones regardless of the size of land they cultivated.

The farmers were also pointed out their reasons for the increment of their production, and a majority of them (81%) were responded that the application of improved seed, fertilizer, and chemical pesticides were taking the greater share for the increment of their yield. However, they pointed out the price of fertilizer is very high and cannot afford on their own and it is one of the great treats of their future livelihood if it is continued by this trend. In addition to the above-aforementioned reasons, almost all farmers are used crop rotation by the sequence of potato-bean- wheat- engido cropping pattern and also they used mono-cropping and mixed cropping simultaneously and in different cropping season which may increase their yield.

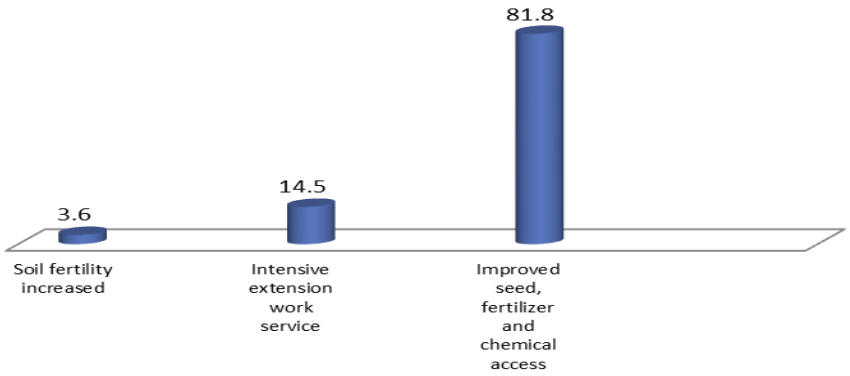


Fig 5: The main reasons for increment of production by farmers view

Main constraints in crop production in Chira watershed

Regardless of the increment of crop productivity by farmers' view, still many farmers have faced many problems in agricultural production. As shown in figure 6 below, farmers mentioned different current problems regarding crop production activities. As a result, about high price of fertilizer (50%), land shortage (25%), soil degradation (16.7%), lack of money (3.3%), lack of oxen (3.3%) and natural disaster (1.7 %) stated that as the main constraints identified by farmers.

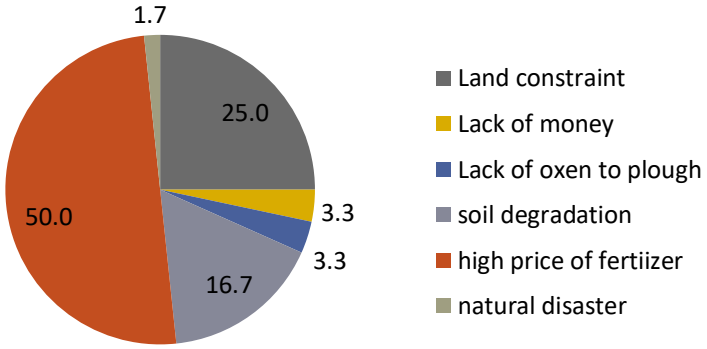


Fig.6. Main constraints in crop production in Chira watershed

Income sources

Income-generating via on-farm and off-farm helps farmers in diversifying their income and able to cope with any hardships persist in the different production periods especially in off-production periods. Along with this, they can manage different expenses expected to be cover in a different point in time associated with input prices and any other fixed costs like land rent, land tax, and depreciation that is attached to the production season. Thus, among the given household, they are generating income by providing different varieties of product to the market. It is both from on-farm and off-farm activities. The highest proportion of income as indicated in fig 7, is form crop enterprise and followed by forest and forest products mainly from by selling eucalyptus tree. The community uses also to generate income from off-farm activities where a member of the household supports their family relatives by generating income from off-farm practice like by working in jewelry, handcrafting, and other hand working arts by deviating from their regular work periods also doing in the leisure time.

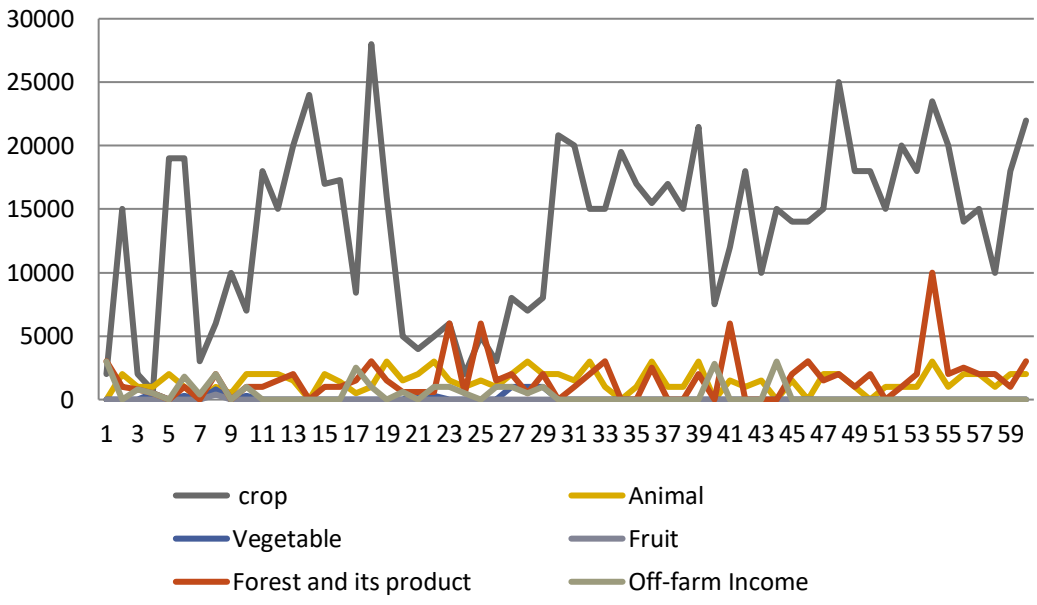


Fig 7: Income source from different enterprises

Thus, income from crop enterprise which deviates around 200 to 29,000 birr takes the highest proportion of income they generate and they cover the highest expense via selling crop enterprises.

Energy sources and consumption

As can be seen from Table 4, the energy source and consumption to sustain their life is from wood which covers 98%, and from crop residue is almost null (2%), and other from charcoal and animal residue is used as energy consumption. The energy source they used obtained from the communal forest, private forest, and natural trees grown from their field and sometimes they also purchased from other neighbors who have an excess of it.

Table 4. Energy source for consumption

Energy source	Percent
Wood products	98
Crop residues	2
Total	100.0

Among the given respondent 93.3% of the household have used energy-saving cooking materials and only 6.7% didn't use saving materials due to lack of awareness and deficiency of income to owned for it.

Table 5. Do you use Energy-saving cooking material?

Use energy saving material?	Percent
Yes	93.3
No	6.7
Total	100.0

This implies that there is an improvement towards using energy-saving cooking services and has many opportunities in conserving the environment through saving materials to be consumed at the time of cooking. Thus, it has a significant variation between users and non-users in the community within the given sample of respondents.

Marketing Information

As can be seen from figure 8, one of the major challenges from the study area is market distance from the potential market which is on average 2.64 hours with standard deviation 1.19 hours from the total sample of 60 household respondents. It consumes much more time, energy and money and along with the problems of lack of equipped infrastructure, aggravates the problem of wellbeing of the society in the watershed community.

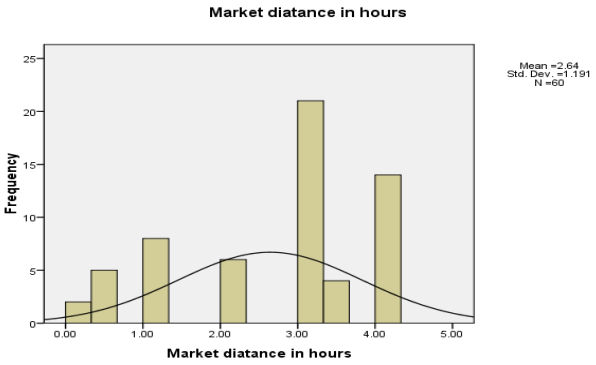


Fig: 8. Market distance in hours

Types of product to the market:

The community provides a different variety of commodities to the market. This is explicitly indicated in table 6 below; among the given households 6.7% of respondents provide crop products to the market and cover their expense accordingly also 6.7% of the respondents use animal and animal products to the market. Likewise, both crop and animal products to market provided by 45% of the respondents. Among the surveyed households of only 3.3% uses forest and its product to the market. Furthermore, 38.3% of the respondent uses all types of product to the market as such they have thought higher expenses from big family members and cover different expenses, like input prices (fertilizer, improved varieties), land tax, children's school expenses, and other miscellaneous expenses and even can cope up with different hardships periods in off- production season and natural disasters.

Table: 6 Types of crop you provide to the market

Types of commodity to market	Percent
1. Crop product	6.7
2. Animal and its product	6.7
3. Both crop and animal	45.0
4. Forest product	3.3
5. All type of product	38.3
Total	100.0

Market channel:

One of the big treats in the agricultural production side is having access to the potential market and gets affordable prices to their product. Most of the product is primary goods and easily perishable, getting a suitable market for their product is immensely vital. As can be seen from the table, 55% of the respondent claims that there is no suitable market link for their product and there is poor potential linkage in accessing suitable market for their products. From among the respondent, 45% of the respondents think that they have access to a suitable market for their product. Ironically speaking, the market distance takes 2.64 hours on average; it indicates there is a big treat in timely delivering their product to the market and it is further encircled by different brokers and traders in the middle who block price benefits to be delivered by primary producers (farmers). These lower the profit margin of farmers given high input cost of production and the wellbeing of the producer disfavor in the given institutional arrangements.

Table 7: Is there a suitable market link or channel for your product

Response var.	Frequency	Percent
Yes	50	45.45
No	60	54.55
Total	110	100.0

Institutions and Infrastructure development

Regarding institutions and infrastructure development, a lot has been noticed in the community. There are different types of institutions like farmers' cooperative union in which 88.3% of the respondents are a member and only 11.7% are not a member of the cooperative unions in the community. Among the given respondents 61.7% have experience in borrowing money from an individual or institutions and only 38.3% didn't borrow any kind of money either from individuals or institutions and they can cover all the expenses and difficult times by their financial capacity. Table 8 below indicates the frequency and percentage of people who borrowed money from different finance providers. From 61.7% of the respondent who borrowed money, of which 51.7% get financial access from Amhara credit and saving institutions (ACSI), from which it

charges a very high-interest rate ranges from 13-18% with different installment periods to repay the money. It provides a different option to organize the borrowers and use different collaterals to get back the money they disbursed among the borrowers.

Table 8 from which institution do you borrow money?

	Types of institutions	Percent
Valid	Small micro finance institutions (ACSI)	51.7
	Farmers' cooperative union	1.7
	Individual	8.3
	Bank	0
	Total	61.7
Missing	System	38.3
Total		100.0

Access to information

As can be seen from table 9 explicitly the area is fully supported by the agricultural extension workers but the frequency of contact of the development workers in the area differs across the place to place and home to home. Among the respondent, 82% of the household replied that the frequency contact of the extension workers is at least once in a week and get different advice in the production and conservation methods of agricultural lands. Only (13.3%) of the respondent households replied that the frequency contact of the agricultural extension workers extends to once in two weeks and the rest 4.7% of the respondents have no contact with extension agents yet.

Table 9. What is the frequency contact of extension workers in your area?

		Percent
Valid	**Once a week**	82
	Once in two weeks	13.3
	Not at all	4.7
	Total	100.0

Information source: The frequency and reliability of information in the agricultural production process are much more important in getting timely information and accessible in the time if needed. Especially, the volatility of agricultural output price and as well as input price determines the overall agricultural practice and even the wellbeing of the rural households through getting relevant information and getting minimize the middle brokers in the production process. In the area where there is electricity, 96.7% of the respondent didn't use electricity and only 1.7% of the respondents use electricity. Moreover, the used phone for regular conversation is barely noticed and 80% of the respondent didn't use cell phones or land phones for accessing information. In these regards, only 16.7 % use the phone with 3.3% missing data at the time of conducting this survey. Furthermore, 11% the respondent use radio as media of getting information which released from mainstream media and 81.4% have access to information through extension workers the rest 27.5% get information from their neighbors.

Table 10.Where do you get information from?

	Information sources	**Frequency**	**Percent**
Valid	Radio	10	11
	TV	1	0.9
	DA (extension workers)	74	81.4
	Neighbors	25	27.5
	Total	110	100.0

Conclusion and Recommendation

The rural community in Chira watershed generates income from different sources like both on-farm and off-farm income activities. The highest proportion of income they generate is from selling crop enterprises to the local market. They also get financial income from other products to the market like an animal and its by-products, forest and its products to the local market. Hence, they can cover all costs associated with farming and non-farming activities by providing different products to the market. Unlikely, they have faced asymmetry marketing information problems and improper marketing channels for their products. Since most of the product is primary goods and easily perishable in the prolonged periods, these lower their profit margin and discourage them in the production process. Along with this, long market distance aggravates the problem, which takes

on average 2.64 hrs to reach in the central market which provides a fair price to their products. Even if there are different types of farmers' cooperative unions in the community, their service is limited to satisfy farmers and stakeholders in transforming agricultural production to the next level. There are like inclusive cooperative union, saving and credit institutions, input supply provides and other output marketing types cooperative unions. Especially, the farmers and stakeholders can get financial access from Amhara credit and saving institutions (ACSI). However, charging a very high-interest rate refrain farmers to borrow finance to their agricultural production process. Along with this, lack of different institutions and lack of adequate and improved infrastructure development keeps the poorest farmers live under their level of poverty and perpetuate the vicious circle of poverty.

Since the area remote in access to different services like electricity, phone, and pure water, is another challenge in addressing them through mainstream media like Television broadcasting and other Media. The information they get from the extension workers is the ultimate source and vital for them in the agricultural production process. The frequency contact of the extension workers provide them in keeping up-to-date and help them to be productive enough through getting what to produce, how to produce in the production techniques.

Along with all the given and stated information, there are a lot of things that need to be improved to lift the deprived society who live under relative and absolute poverty mainly those who experienced routine agricultural practice and subsistence level of living. All the inclusive measures should be implemented via improving different institutions and basic infrastructures and will be able to improve income sources and easily outshine if the following conditions full filled. Market distance is very high and improvement needs in developing different institutions that overcome these problems. Input price (fertilizer) is very high and lowers the gross margin and profit and it measures should be taken either lowering this price or develop other organic fertilizer to apply in their crops.

Since infrastructure development is weak in the study area, much investments are needed like developing road, animal health clinic, well developed FTC and demonstration sites, saving and fair credit institutions, electricity and mobile networks are much needed to keeps the interest of the people and meet up their own needs. Similarly, sustainable watershed management should be designed to tackle soil erosion problems.

Abbreviations

FTC	Farmer Training Center
SWC	Soil and Water Conservation
FAO	Food and Agriculture Organization

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Availability of data and material

The datasets used during the current study is available from the corresponding author on reasonable request.

Consent to publication

Not applicable.

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Authors' contributions

BYW participated in the design, data collection, data analysis, and interpretation. TK and BA also participated in the analysis, interpretation, and drafting of the manuscript. All authors read and approved the final manuscript.

Competing interests

The authors declare that there are no competing interests.

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