



Analysis of Farmers' Perception on the Contribution of Vegetable Farming to their Livelihood in Yola North Local Government Area, Adamawa State, Nigeria

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ABSTRACT

This study analyzes farmers' perception on the contribution of vegetable farming to their livelihood in Yola North Local Government Area of Adamawa State, Nigeria. Purposive and simple random sampling techniques were employed in selecting 172 farmers for the study. Descriptive statistics, Likert scale and logistic regression were used to analyze the data. The result revealed that majority (67%) of the respondents were male with mean age of 33 years, and mean farming experience of 7 years. The mean monthly income of the respondents was ₦79,971. Furthermore, the major types of vegetable cultivated were Tomato (71.51%), Okra (61.63%) and Amaranthus (55.23%). Vegetable farming was perceived to provide substantial livelihood benefits, with a high grand mean score of 4.43, indicating overall agreement among respondents. Financial (Mean = 4.58) and physical capital (Mean = 4.66) benefits were most pronounced, particularly in providing reliable income and ready market access. Human (Mean = 4.42) and natural capital (Mean = 4.42) benefits also significantly enhanced food security, nutrition, and efficient land use, while social capital (Mean = 4.03) improved household decision-making and community cooperation. The logistic regression results indicate that farm size ($p = 0.002$), access to credit ($p = 0.010$), access to inputs ($p < 0.01$), and income ($p < 0.01$) significantly increase the likelihood of farmers perceiving vegetable farming as contributing positively to their livelihood. The model was statistically significant ($LR = 22.729$) with strong explanatory power (McFadden $R^2 = 0.696$). These findings underscore the importance of productive assets and financial access in shaping livelihood perception. It is concluded that vegetable farming is a viable and sustainable livelihood strategy in Yola North. However, its full potential is limited by restricted access to productive resources, credit facilities, and effective institutional support systems. The study recommends that access to credit, Input Supply Systems, Agricultural Extension Services, and irrigation and dry-season agriculture should be improved.

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INTRODUCTION

Agriculture remains an important sector in the Nigerian economy, contributing about 40% to its GDP and employing 60% of its workforce (David & Musa, 2024), making it a crucial source

of livelihood to millions of people in the country. Among its various branches, vegetable farming plays an increasingly important role in promoting food security, nutritional diversity, and household income in Nigeria. As demand for fresh produce

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grows due to population increase and urbanization, vegetable farming offers not only a pathway to income generation but also a critical strategy for improving the livelihoods of households (Asadu et al., 2018; Olowo, et al., 2022; Mukaila et al., 2022).

Despite the economic and social relevance of vegetable farming, there is limited empirical evidence on how vegetable farmers themselves perceive the contributions of this farming activity to their overall livelihoods. Notably, perception studies are crucial due to the fact that farmers' beliefs and experiences influence their level of commitment, investment decisions, and receptiveness to innovations and support interventions. Understanding farmers' perceptions can help policymakers and development practitioners tailor more effective agricultural programs and improve livelihood outcomes.

This study aims to assess vegetable farmers' perceptions on the contributions of vegetable farming to their livelihoods in Nigeria. Specifically, it explores the socio-economic characteristics of the vegetable farmers; identify the major types of vegetables grown; assess vegetable farmers' perception of the contributions of the vegetable farming to their livelihood; and determine factors influencing their perception on the contributions of vegetable farming to their livelihood. Insights from this research can inform policy interventions and guide future development strategies in the agricultural sector.

METHODOLOGY

The study was carried out in Yola North Local Government Area of Adamawa State. The area has tropical climate marked by distinct rainy and dry seasons. It has a mean temperature of 34°C with maximum temperature of 40°C and the mean annual rainfall is less than 1,000 mm (Adamawa State Government Diary, 2013). Yola North has a land area of 67.30km² and a total population of 307,900 (Wikipedia, 2025). Agriculture is the dominant occupation of the major inhabitant of the area. Some of the crops produced in the area include Groundnuts, Maize, Beans and Rice. Also, a large quantity of

vegetables is being produced in the area (Adamawa State Government Diary, 2013).

Multistage sampling technique was employed in the selection of the respondents. Yola north has eleven wards: Ajiya, Alkalawa, Doubeli, Gwadabawa, Jambutu, Karena, Limawa, Luggere, Nassarawo, Rumde and Yelwa. In the first stage, Doubeli, Jambutu and Luggere wards were purposively selected due to their prominence in vegetable production. In the second stage, vegetable-producing clusters within each ward were identified with the assistance of extension agents and community leaders. A rapid listing of active vegetable farmers was then conducted to generate a temporary sampling frame. The listing became necessary because there is no comprehensive register of vegetable farmers in the selected wards and therefore probability sampling based on a complete sampling frame is not feasible. In the final stage, vegetable farmers were selected using systematic random sampling proportional to the number of farmers listed in each ward. This process yielded a sample size of 172 respondents.

Data collected were analyzed using descriptive statistics, Likert scale and logistic regression model. Likert scale was used to capture the vegetable farmers' perception on the contributions of vegetable farming to their livelihood. Statements were developed in the questionnaire and a five-point rating scale were provided for each statement: Strongly-Agree = 5 points, Agree = 4 points, Neutral = 3, Disagree = 2 points, Strongly-Disagree = 1 point. Respondents were asked to indicate the extent to which they agreed or otherwise with a given statement.

A mean was calculated for each item. The grand mean score for each selected items was also calculated by summing up the mean ratings of all items in the group divided by the total number of items in the group. A cut off point was determined by adding up all the nominal values assigned to the response codes and dividing by the number of response categories as follows:

$$\frac{\text{Total nominal value assigned}}{\text{Number of response categories}} = \frac{5+4+3+2+1}{5} = \frac{15}{5} = 3 \dots\dots\dots (1)$$

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The 3 above was considered as a cut-off point. Thus, mean values equals or greater than 3 imply high perception while those less than 3 imply low perception.

Logistic regression is a binary logistic regression model that allows for two categories of the dependent or outcome variable. It uses maximum likelihood estimation to evaluate the probability of categorical membership. In this study, the model was used to determine factors influencing the respondent's perception which was categorized into either low or high. Thus, the model is specified as:

$$\text{Log} \left(\frac{y}{1-y} \right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_6 X_6 + e_i \dots \dots \dots (2)$$

Where:

Y= Farmer's perception (Dummy variable: low=0; High=1)

X₁ = Years of experience (numbers of years into vegetable production)

X₂ = Farm Size (measured in Ha)

X₃ = Access to credit (Dummy variable: No=0; Yes=1)

X₄ = Extension Contact (Dummy variable: No= 0; Yes=1)

X₅ =Access to input (Dummy variable: No= 0; Yes= 1)

X₆ = Monthly income (N)

RESULTS AND DISCUSSION

Socio-economic Characteristics of Vegetable Farmers

The results (Table 1) show that 71.5% of vegetable farmers are men and 28.5% are women. The male predominance in the vegetable production indicates that vegetable farming in the Yola North is predominantly led by men. This male predominance is explained in particular by socio-cultural norms, unequal access to essential agricultural resources, and gender-related barriers to accessing information and technology. Social and religious restrictions limit women's participation in public life, confining them to domestic tasks. In many societies, men own more land than women. Men also have advantages in seed use, access to information, and mechanization, which allow them to improve agricultural efficiency and yields. This result corroborates with the findings of many researchers (Sadiq et al., 2022; Thakur, 2023; & Fasakin et al., 2023) who established that male-dominated households have easier access to agricultural inputs and mechanized equipment than female-dominated households.

Table 1: Socio-economic Characteristics of Vegetable Farmers

Variable	Frequency	Percentage
(a) Sex		
Male	123	71.51
Female	49	28.49
(b) Age (Years)		
< 20	9	5.23
20 -39	79	45.93
40 - 59	66	38.37
60 and above	18	10.47
Mean	33	
(c) Farming Experience (years)		
< 5	12	6.98
5 - 10	43	25.00
11 - 15	99	57.56
> 15	18	10.46

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Variable	Frequency	Percentage
Mean	11.36	
(d) Level of Education		
No formal education	86	50.00
Primary school	54	31.40
Secondary school and above	32	18.60
(e) Monthly income (N)		
10,000 – 50,000	51	29.65
50,001 – 100,000	79	45.93
> 100,000	42	24.42
mean	79, 971	
(f) Farm size (ha)		
< 1	121	70.35
1 -2	34	19.77
2.1 – 5	17	9.88
mean	0.90	

Source: Author's field survey, 2025

Table 1 shows that 41.3% of vegetable producers are between 20 and 39 years old, and 38.4% are between 40 and 59 years old, with an average age of 33. The result indicates that most vegetable producers belong to an active and productive age group. They readily master new agricultural technologies and have easy access to market information. The participation of this age group in vegetable production is a guarantee of development and sustainability for the sector, as these pioneers are dynamic and possess excellent production capacities. However, this finding is in variance with that of Mukaila et al., (2022) who reported that majority of the vegetable farmers were adults with mean age of 54 years and that there was low youth participation in vegetable farming in Oyo and Kwara States.

Approximately 57.56% of respondents have between 11 and 15 years of agricultural experience. Respondents have an average of 11.4 years of experience in vegetable farming, demonstrating their extensive experience and indicating that, in the study area, vegetable farming is considered a stable source of income, not a temporary activity. Experienced farmers are more likely to improve their productivity because they have a better understanding of seasonal variations and price fluctuations, allowing them to

rationally plan their production and sales strategies. Similar studies (Mukaila et al., 2022; Osuji et al., 2024) also report that vegetable farmers have more than 18 years of experience, confirming the long history of vegetable farming in Nigeria.

Regarding the education level of vegetable farmers (Table 1), 50% have received no formal education, 31% have a primary education, and approximately 19% have a secondary or higher education. Education level has been shown to be an important factor influencing farmers' productivity, as it helps them understand how agricultural businesses operate (Olowo, 2022). Education level also enables participants to better adopt new local fruit and vegetable cultivation technologies in the study area.

In terms of monthly income, 29.65% of the vegetable farmers earn between N10,000 – N50,000 monthly, 45.93% earn between N50,000 – N100,000, while 24.42% earn more than N100,000. The mean monthly income earned by the farmers is N79, 971. Thus, the income distribution shows that vegetable farming constitutes a viable livelihood activity in the study area, with the majority of farmers earning moderate monthly incomes. However, the existence of substantial proportion of low-income farmers suggests

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productivity and market-oriented constraints that require targeted policy intervention.

In the study area, the majority (70%) of vegetable farmers own less than one hectare of cultivated land, approximately 20% own between one and two hectares, and about 10% own between one and five hectares (Table 1). These results indicate that most vegetable farmers are smallholders, not because vegetable production is unprofitable, but because they are constrained by structural, economic, environmental, and institutional factors. They often face numerous limitations, including limited access to land and capital, outdated irrigation systems, low levels of mechanization, and inadequate market and storage systems.

Major Vegetable Crops Grown in the Study area

The results presented in Table 2 indicate that vegetable production in the study area is highly diversified. Farmers cultivate a mixture of crops rather than specializing in a single crop. This confirms that vegetable farmers in northern Yola do not rely on a single crop but practice polyculture, an effective strategy for managing risk and stabilizing the incomes of smallholder farmers in Adamawa State.

Tomato (*Solanum lycopersicum*) is the most widespread crop, cultivated by 71.51% of vegetable farmers, and thus ranks first. This predominance suggests that tomato is a vital source of income for farmers due to strong demand, favorable market prices, and its importance in the local diet. This finding confirm.

Table 2: Distribution of the Respondents Based on the Types of Vegetables Grown

Crop	Frequency	Percentage	Rank
Tomato	123	71.51	1 st
Okra	106	61.63	2 nd
Amaranthus	95	55.23	3 rd
Sorrel	81	47.09	6 th
Onion leave	94	54.65	4 th
Lettuce	76	44.17	8 th
Moringa	87	50.58	5 th
Bitter leaf	79	45.93	7 th

Source: Author's field survey, 2025

Okra, cultivated by 61.63% of market gardeners, ranks second, indicating its importance as a staple food. Okra is valued for its stable market demand, short growing season, and flavor, making it a popular dish among many consumers in the study area. Amaranth (a leafy vegetable) comes in third with an adoption rate of 55.23%, followed by onion leaves (54.65%, fourth place) and moringa (50.58%, fifth place). These crops exceed the 50% threshold set in the study to be classified as staple crops, demonstrating the important role of leafy vegetables in household diets and farmers' incomes. Their popularity is likely due to their rapid maturation, low production costs, and consistent demand throughout the year, particularly in urban and peri-urban markets.

Sorrel (47.09%), bitter buckwheat (45.93%), and lettuce (44.17%) have lower adoption rates and are therefore classified as secondary crops in the region. Their lower ranking could be due to weaker consumer demand in the study area compared to primary crops. Overall, the crop distribution structure reflects a market-oriented production system and risk sharing. Farmers combine high-yielding crops, such as tomatoes, with fast-growing leafy vegetables to ensure steady cash flow and food security. This diversified system also helps farmers reduce their vulnerability to price fluctuations, pest infestations, and climate shocks.

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Perceived Benefits of Vegetable Farming

The results presented in Table 3 indicate that vegetable farming significantly contributes to improving farmers' livelihoods, with all five components of livelihood capital (financial, human, social, physical, and natural) showing

positive results. The average index of 4.43 indicates a strong perception of the benefits of vegetable farming for farmers' livelihoods, making it a viable strategy for improving food security in the study area.

Table 3: Perceived Benefits of Vegetable Farming

Benefit	Mean	SD	Interpretation
(A) Financial Capital (Mean = 4.58)			
1. Provides regular cash income.	4.72	0.56	Strongly Agree
2. Helps in meeting my household needs.	4.25	0.76	Agree
3. It is a reliable alternative source of income	4.83	0.48	Strongly Agree
4. It has improved my standard of living.	4.52	0.61	Strongly Agree
(B) Human Capital (Mean = 4.42)			
5. It improves my household's food security.	4.71	0.38	Strongly agree
6. It improves the nutrition intake of my family	4.28	0.67	Agree
7. It creates employment for members of my household.	4.26	0.57	Agree
(C) Social Capital (Mean = 4.03)			
8. It increases my role in household decision-making.	4.03	0.78	Agree
9. It strengthens my social relationships.	4.04	0.79	Agree
10. It improves cooperation within my community.	4.02	0.69	Agree
(D) Physical Capital (Mean = 4.66)			
11. It gives me easy access to local markets.	4.62	0.54	Strongly Agree
12. Vegetables have a ready market in my area.	4.71	0.37	Strongly Agree
13. It creates job opportunities	4.64	0.41	Strongly Agree
(E) Natural Capital (Mean = 4.42)			
14. It makes efficient use of small land areas.	4.55	0.63	Strongly Agree
15. It encourages sustainable farming practices.	4.15	0.72	Agree
16. It reduces my household food expenses.	4.55	0.46	Strongly Agree

Source: Author's computation, 2025

Note: Mean ≥ 4.50 = Strongly Agree; $3.50 - 4.49$ = Agree; $2.50 - 3.49$ = Neutral; $1.50 - 2.49$ = Disagree; ≤ 1.49 = Strongly Disagree. Grand mean= 4.43

Financial capital showed a high average index of 4.58, indicating its strong impact on farmers' livelihoods. Farmers strongly believe that vegetable farming provides them with a regular income ($M = 4.72$) and represents a reliable alternative source of income ($M = 4.83$), helping them meet household needs ($M = 4.25$) and, consequently, improve their standard of living ($M = 4.52$). These results demonstrate that vegetable farming contributes to poverty reduction and household economic stability. Human capital received a high perception index of 4.42, with farmers strongly believing that vegetable farming increases their food security ($M=4.71$) and

improves their families' nutrition ($M=4.28$), as well as creating jobs for their family members ($M=4.26$). These results indicate that vegetable farming not only provides a stable household income but also helps combat hunger and improve health by providing nutritious, high-quality food. Furthermore, it reduces unemployment in the study area by providing jobs for many people engaged in various activities related to vegetable production.

Physical capital received an average index of 4.66, reflecting strong agreement that vegetables are readily marketed ($M=4.71$) in the study area and that access to this market

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(M=4.62) is relatively easy and free. This suggests that the perishable nature of vegetables and high demand encourage frequent market participation and rapid inventory turnover, thereby strengthening farmers' engagement in local marketing systems. The results also show that respondents have a very positive perception of the benefits of natural capital (M = 4.42). They strongly believe that vegetable farming allows for the efficient use of small areas (M = 4.55) and promotes sustainable agricultural practices (M = 4.15). Farmers also strongly believe that vegetable farming reduces household food expenditures (M = 4.55). These results demonstrate that vegetable farming can be effectively implemented on limited agricultural land. A small plot of land can be effectively used for vegetable cultivation.

Social capital has a relatively low average index (4.03), although it falls into the "agreement" category. Farmers agree that vegetable farming improves decision-making in their households (M=4.03), strengthens their social networks (M=4.04), and promotes collaboration within their communities (M=4.02). This suggests that vegetable farming promotes social integration and strengthens local networks. These results support the studies of Rai (2017), Rai et al. (2019), and Mukaila et al. (2022), who found that most vegetable farmers strongly agree that vegetable production provides employment for them and their households, increases food availability for households, provides a source of income and/or increases their income, improves their nutritional status and the education of their children, and enhances their standard of living.

Factors determining farmer's perception of the contribution of vegetable farming to their livelihood

Table 4.13 presents the maximum likelihood estimates of a binary logistic regression model that examines the factors influencing farmers' perceptions of the contribution of vegetable farming to their livelihoods in the study area. The likelihood ratio (LR) of 22.729 indicates that the overall model is statistically significant, indicating that the explanatory variables jointly influence farmers' perceptions. The McFadden coefficient of determination (R^2) of 0.6960 indicates a relatively good fit for the logistic regression model, indicating that the included variables explain a large part of the variance in farmers' perceptions. The standard error of the regression (0.4513) further confirms the reliability of the model estimates.

The estimated coefficients represent the change in the logarithm of the odds ratio of adopting vegetable farming as a positive income contributor per unit change in the explanatory variable, all else being equal. Farm size has a positive and highly significant effect ($\beta = 0.3878$; $p = 0.002$). In other words, a larger farm significantly increases the likelihood that a farmer will adopt vegetable farming as a positive contributor to their livelihood. Larger farms typically benefit from economies of scale, increased productivity, and higher incomes, which reinforce positive perceptions. This result is consistent with economic theory and empirical evidence that asset ownership improves livelihoods. Access to credit has a positive and statistically significant effect at the 5% level ($\beta = 0.9182$; $p = 0.010$). Farmers with access to credit are more likely to perceive vegetable production as beneficial to their livelihoods. Credit increases their ability to purchase improved inputs, adopt advanced technologies, and manage production risks, thereby increasing their profits and reinforcing positive perceptions.

Table 4: Factors Influencing Farmer's Perception of Contribution of Vegetable Farming to Livelihood in the Study Area

Variable	Coefficient	Std. Error	z-Statistics	p-value
Constant	-0.8393	0.6949	-1.2078	0.227
Experience (X_1)	0.0083	0.0182	0.4558	0.649
Farm size (X_2)	0.3878	0.1231	3.1500	0.002***
Access to credit (X_3)	0.9182	0.3541	2.5931	0.010*

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Variable	Coefficient	Std. Error	z-Statistics	p-value
Extension contacts xX ₄)	0.4566	0.3441	1.3268	0.185
Access to inputs (X ₅)	0.2067	0.1211	1.7054	0.008***
Income (X ₆)	3.5200	3.1200	1.1282	0.009***
Mcfadden R-Squared	0.6960			
LR Statistics	22.729			
S.E of Regression	0.4513			

Source: Author's survey data (2025)

Access to resources has a positive and statistically significant coefficient ($\beta = 0.2067$; $p < 0.01$). This indicates that better access to resources (e.g., seeds, fertilizers, agrochemicals, and irrigation infrastructure) significantly increases the likelihood of vegetable production being perceived as a viable livelihood option. Sufficient and timely supply of inputs increases productivity and profitability, which directly affects perceptions. Income also has a positive and statistically significant coefficient ($\beta = 3.5200$; $p < 0.01$). Higher income increases the likelihood of farmers perceiving vegetable production as an important contribution to their livelihoods. This suggests that tangible economic benefits strongly influence perceptions and reinforce the central role of income in livelihood valuation. Agricultural experience has a positive but statistically insignificant coefficient ($\beta = 0.0083$; $p = 0.649$). This suggests that years of experience alone do not significantly influence perceptions. While experience may improve technical knowledge, it does not lead to better livelihood perceptions unless it is accompanied by increased access to resources and income.

Contact with agricultural extension services has a positive but statistically insignificant effect ($\beta = 0.4566$; $p = 0.185$). Although agricultural extension services are intended to improve farmers' knowledge and productivity, the lack of significant effects observed may reflect limited coverage, inadequate service delivery, or a weak link between these services and significant improvements in livelihoods in the study area.

The results suggest that structural and economic factors—including farm size, access to credit and resources, and income—are key determinants of farmers' perceptions of the contribution of vegetable production to improving

their livelihoods. Institutional factors, such as extension services, are positively correlated but appear ineffective in influencing this perception.

CONCLUSION

This study assessed the socioeconomic characteristics of vegetable farmers, their main crops, the perceived benefits of vegetable farming for their livelihoods, and the factors influencing their perception of its contribution to their livelihoods in Yola Norte, Adamawa State. The results reveal that market gardening in the study area is primarily practiced by small-scale male farmers of working and productive age, who possess extensive agricultural experience but generally have a low level of education. Most farmers cultivate less than one hectare, reflecting the small-scale nature of market gardening production. Despite these structural constraints, vegetable farming remains a stable and important livelihood activity. The production system is highly diversified, with tomatoes and okra being the main crops, followed by leafy vegetables such as amaranth, onions, and moringa. This diversification reflects a market-oriented risk diversification strategy that enhances income stability and food security for farmers.

The results also show that vegetable farming contributes significantly to farmers' livelihoods across all five components of subsistence capital: financial, human, physical, natural, and social. Financial and physical capital registered the highest perception indices, indicating that regular income generation, easy access to markets, and easy participation in vegetable markets are key factors in improving livelihoods. Vegetable farming also improves food security, nutrition, job creation, efficient land use, and household social cohesion.

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Logistic regression analysis demonstrates that farm size, access to credit, access to inputs, and income significantly influence farmers' perceptions of market gardening's contribution to their livelihoods. In contrast, agricultural experience and contact with extension services, while positive, were not statistically significant. This suggests that economic and resource-related factors play a more decisive role in the perception of livelihoods than demographic or institutional factors in the study area. Overall, the study concludes that vegetable farming is a viable and sustainable livelihood strategy in Yola North. However, its full potential is limited by restricted access to productive resources, credit facilities, and effective institutional support systems.

RECOMMENDATIONS

It is therefore recommended that:

1. The government and financial institutions should design farmer-friendly credit schemes with low interest rates and minimal collateral requirements. Strengthening microfinance programs and cooperative lending systems will enable farmers to increase their production and adopt improved technologies.
2. Priority should be given to rapid and affordable access to quality inputs, such as improved seeds, fertilizers, agrochemicals, and irrigation infrastructure. Public-private partnerships can help ensure the consistent availability of inputs and reduce transaction costs for smallholder farmers.
3. Extension services need to be revitalized by increasing funding, improving extension agent training, and adopting participatory and market-oriented advisory approaches. Emphasis should be placed on improving agronomic practices, post-harvest management, and value-added processes.
4. Policies that improve access to land, particularly for smallholder farmers, should be encouraged. Securing land tenure will encourage investment in vegetable production and sustainable land management practices.

5. Investing in small-scale irrigation infrastructure will enable year-round vegetable production, stabilize incomes, and reduce vulnerability to climate risks. Governments and development agencies should support community irrigation systems.
6. Youth and women should be encouraged to participate more actively in vegetable farming through targeted empowerment programmes, training and easier access to productive resources, since the sector is dominated mainly by men despite the strong livelihood potential.

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