*Asian Journal of Agricultural Extension, Economics & Sociology*

***40(4): 59-65, 2022; Article no.AJAEES.83065***
***ISSN: 2320-7027***

# Socio-personal Characteristics of Ecological Farmers of Nagaland in Terms of Food Security

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***Authors' contributions***

*This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.*

***Article Information***

DOI: 10.9734/AJAEES/2022/v40i430871

**Open Peer Review History:**
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/83065

***Original Research Article***

***Received 07 January 2022***
***Accepted 10 March 2022***
***Published 15 March 2022***

## ABSTRACT

The present study focuses on the socio-personal characteristics of ecological farmers with food security in Nagaland. An Ex-Post facto research design was used for the present study. The study was conducted in Nagaland state during the year 2020-21. Two districts namely, Phek and Wokha were selected randomly. Two blocks from each selected district and four villages from each blocks were selected randomly for the study. From each selected village, fifteen farmers were chosen randomly. A sample of 120 farmers was selected from Phek and Wokha districts by random sampling method. A pre-tested interview schedule was made in according to the study's objectives to collect data from the farmers. The collected data was analyzed, classified and tabulated. Statistical tools such as frequency, percentage, mean, standard deviation and Pearson's coefficient of correlation were used to interpret findings and draw conclusions. The dependent variable food security was based on Likerts' scale using 23-items in terms of four dimensions of food security like- Food availability, food access, food utilization and food stability. The socio-personal characteristics of ecological farmers indicated that majority of the farmers were middle-aged (56.67%), had primary level of education (35%), had marginal land holding (44.17%), medium family size (49.16%), medium family income (65.83%), member of one organization (70%), had fair cropping pattern (58.33%), medium number of livestock possession (80.83%), no sources of irrigation (90%), low level of extension contact (52.50%), medium level of risk preference (68.33%) and had medium level of farming experience (63.33%). The findings revealed that more than half i.e. 55.83 per cent

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of the farmers had medium level of food security. The study also found that age, education, land holding, family income, cropping pattern, livestock possession, extension contact, risk preferences and farming experience were the significant factors associated with farmers' food security status.

*Keywords: Food security; ecological farmers; Nagaland; socio-personal; ex-post facto.*

## 1. INTRODUCTION

Food security is a multifaceted issue that affects a myriad of challenges and initiatives around the world. Firstly, it focuses on social issues and is closely linked to long-term development, whereas the second examines causes and consequences at the national and international levels and provides measurement criteria [1]. According to the World food summit (1996), stated the food security as "All people at all times have physical and economic access to sufficient, safe and nutritious food to maintain their healthy and productive life". It is also based on dietary requirements and preferences of food. It includes four aspects i.e. Food availability involves the production, allocation and exchange of food. Food access refers to the affordability and distribution of food, as well as individual preferences and households. Food utilization is accomplished through nutritious food, safe drinking water, hygiene and medical care, which will meet all nutritional and physiological demands and food stability is the ability to obtain food over a long period of time. In the current scenario, food production and consumption have been increasing to the top of the global, national agenda. India ranked 72$^{nd}$ position out of 113 countries in terms of the Global Food Security Index (GFSI). According to the 2020 Global Hunger Index (GHI), India ranks 94$^{th}$ out of 107 countries signifying severe hunger [2].

Nagaland is a hilly state in the North-Eastern part of India, covering 16,579 square kilometers. The majority of the population i.e., around 73 percent are engaged in Jhum cultivation due to states topography and indigenous farming methods [3]. The state government has launched a programme called "genetic diversity preservation of indigenous rice varieties under the traditional integrated rotational farming system for enabling livelihood and food security as combating climate change and resilience strategy" with the aim of preserving the gene pool of native rice cultivars [4]. Ecological farming is a long-term strategy that comprises a set of methods that farms and ranches can use to help develop soil health, conserve our natural resources, trap carbon, and better adapt to a rapidly changing climate, depending on their own specific requirements and circumstances [5]. Changes in climate and related concerns such as increasing temperature, water scarcity, harsh weather, soil degradation, and increased disease and pest outbreaks are easier to respond with ecological agriculture. Eco-Agriculture has the potential to assist the country's food security and productivity. Nagaland ranked 6$^{th}$ among small states in the State Food Safety Index (SFSI) [6]. The National Food Security Act (NFSA), 2013 which, aims to provide food security and nutrition to intended beneficiaries at reasonable cost, went into effect in the state from July 1, 2016, which started in Kohima and Dimapur districts [7]. The priority household beneficiaries under the act would be provided 5 kilograms of foodgrains at Rs 3 per kilogram and wheat at Rs 2 per kilogram. Food security is decreasing due to various agricultural setbacks, poverty, rising food prices, unemployment, climate change and other factors. The main focus was on food security at the community level. The present paper attempts to analyze the Socio-personal characteristics of ecological farmers and the relationship between socio-personal characteristics in terms of food security of ecological farmers in the Nagaland state.

## 2. METHODOLOGY

The present study was carried out in Nagaland state of the North-Eastern region of India. The study was conducted in Phek and Wokha districts of Nagaland and from each of the districts, Pfutsero and Wokha Sadar blocks were selected randomly. Further, four villages, namely Pfutseromi, Zapami, Lekromi and Lasumi under Pfutsero block and Wokha village, Longsa, Longsachung and Niroyo under Wokha Sadar were selected randomly from each of the blocks. Fifteen farmers were selected randomly from each of the villages. A total of 120 farmers were selected for the present study by using the random sampling method. An Ex-post facto research design was used for the study. Data was gathered using the well structured interview schedule created with the study's objective in mind. The collected data was analyzed, classified and tabulated. Statistical tools such as frequency, percentage, mean, standard deviation and pearson's coefficient of correlation

were used to interpret findings and draw conclusions.

## 3. RESULTS AND DISCUSSION

Table 1 reveals that the socio-personal characteristics of ecological farmers were of middle aged (56.67 per cent), had primary school level of education (35 per cent), medium family members (49.16 per cent), marginal land holding (44.17), medium family income (65.83 per cent), were member of one organization (70 per cent), fair cropping pattern (58.33 per cent), medium number of livestock (40.83 per cent), no source of irrigation (90 per cent), low extension contact (52.50 per cent), medium risk preference (68.33 per cent) and medium level of farming experience (63.33 per cent).

**Table 1. Socio-personal characteristics of ecological farmers**

| Sl. No. | Characteristics | Farmers (n= 120) | |
|---|---|---|---|
| | | Frequency | Percentage |
| 1 | Age | | |
| | Young (Upto 30 years) | 24 | 20.00 |
| | Middle (31 to 56 years) | 68 | 56.67 |
| | Old (57 years & above) | 28 | 23.33 |
| 2 | Education | | |
| | Illiterate | 28 | 23.34 |
| | Read and write only | 9 | 7.50 |
| | Primary school | 42 | 35.00 |
| | Secondary school | 19 | 15.83 |
| | High school | 16 | 13.33 |
| | Graduate and above | 6 | 5.00 |
| 3 | Family size | | |
| | Small (upto 3 members) | 44 | 36.67 |
| | Medium (4 to 6 members) | 59 | 49.16 |
| | Large ( 7 members & above) | 17 | 14.17 |
| 4 | Land holding | | |
| | Marginal (<1 ha) | 53 | 44.17 |
| | Small (1 to 2 ha) | 36 | 30.00 |
| | Medium (3 to 4 ha) | 26 | 21.67 |
| | Large (> 4 ha) | 5 | 4.16 |
| 5 | Family income | | |
| | Low (<1,14,732) | 22 | 18.33 |
| | Medium (1,14,733 to 2,87,068) | 79 | 65.83 |
| | High (> 2,87,068) | 19 | 15.84 |
| 6 | Social participation | | |
| | Member of one organization | 84 | 70.00 |
| | Member of more than one organization | 19 | 15.83 |
| | Office bearers | 13 | 10.83 |
| | Distinctive features | 4 | 3.34 |
| 7 | Cropping pattern | | |
| | Poor (< 10.31) | 27 | 22.50 |
| | Fair (10.32 to 19.57) | 70 | 58.33 |
| | Good (> 19.58) | 23 | 19.17 |
| 8 | Livestock Possession | | |
| | Low (< 4.50) | 8 | 6.67 |
| | Medium (4.51 to 8.72) | 97 | 80.83 |
| | High (> 8.72) | 15 | 12.50 |
| 9 | Sources of irrigation | | |
| | No source | 108 | 90.00 |
| | River | 12 | 10.00 |
| 10 | Extension Contact | | |
| | Low (upto 3) | 63 | 52.50 |
| | Medium (4 to 7) | 49 | 40.83 |
| | High (8 & above) | 8 | 6.67 |

| Sl. No. | Characteristics | Farmers (n= 120) | |
|---|---|---|---|
| | | Frequency | Percentage |
| 11 | Risk preferences | | |
| | Low (< 18.75) | 21 | 17.50 |
| | Medium (18.76 to 22.03) | 82 | 68.33 |
| | High (> 22.03) | 17 | 14.17 |
| 12 | Farming Experience | | |
| | Low (< 5 years) | 18 | 15.00 |
| | Medium (6 to 18 years) | 76 | 63.33 |
| | High (19 years and above) | 26 | 21.67 |

**Food Security**

***i) Food availability***

**Table 2. Distribution of respondents according to food availability**

| Sl. No. | Items | Frequency (%) | | | | |
|---|---|---|---|---|---|---|
| | | Very low | Low | Medium | High | Very high |
| 1 | Organic agricultural production rate | 4 (3.33) | 22 (18.33) | 83 (69.17) | 11 (9.17) | 0 (0.00) |
| 2 | Arable land under cultivation of organic products | 32 (26.67) | 46 (38.33) | 41 (34.17) | 1 (0.83) | 0 (0.00) |
| 3 | Productivity in the production of organic products (the revenue than expenses) | 3 (2.50) | 10 (8.33) | 94 (78.33) | 13 (10.83) | 0 (0.00) |
| 4 | Usage rate of scientific principles in organic products (Using mulch, natural pesticides, green manure, compost, crop rotation) | 7 (5.83) | 17 (14.17) | 66 (55.00) | 16 (13.33) | 14 (11.67) |
| 5 | Participation rate in the courses of cultivation of organic products | 8 (6.67) | 14 (11.67) | 52 (43.33) | 18 (15.00) | 28 (23.33) |
| 6 | Annual lose rate of organic products at planting, harvesting and processing stage (Due to pests and diseases, untimely rainfall, non-normative harvest) | 15 (12.50) | 42 (35.00) | 61 (50.83) | 2 (1.67) | 0 (0.00) |
| 7 | Annual rate loss of organic products in producing stage due to inadequate transport, non-normative relocation of products, etc.) | 27 (22.50) | 44 (36.67) | 49 (40.83) | 0 (0.00) | 0 (0.00) |

*Note: Figure in Parenthesis denotes percentage to their relative total*

***ii) Food access***

**Table 3. Distribution of respondents according to food access**

| Sl. No. | Items | Frequency (%) | | | | |
|---|---|---|---|---|---|---|
| | | Very low | Low | Medium | High | Very high |
| 1 | Income level of producing organic products | 4 (3.33) | 12 (10.00) | 96 (80.00) | 8 (6.67) | 0 (0.00) |
| 2 | Purchasing power rate in the result of producing organic products | 4 (3.33) | 32 (26.67) | 80 (66.67) | 4 (3.33) | 0 (0.00) |
| 3 | The transport system quality for organic products transfer | 10 (8.33) | 23 (19.17) | 80 (66.67) | 7 (5.83) | 0 (0.00) |
| 4 | Credit facilities allocated for producing organic products | 5 (4.17) | 57 (47.50) | 54 (45.00) | 4 (3.33) | 0 (0.00) |
| 5 | Allocated subsidies for producing organic products | 6 (5.00) | 75 (62.50) | 31 (25.83) | 8 (6.67) | 0 (0.00) |

*Note: Figure in Parenthesis denotes percentage to their relative total*

***iii) Food utilization***

**Table 4. Distribution of respondents according to food utilization**

| Sl. No. | Items | Frequency (%) | | | | |
|---|---|---|---|---|---|---|
| | | Very low | Low | Medium | High | Very high |
| 1 | The use of organic products | 5 (4.17) | 23 (19.17) | 81 (67.50) | 11 (9.17) | 0 (0.00) |
| 2 | Reducing malnutrition rate by using own organic products | 17 (14.17) | 34 (28.33) | 63 (52.50) | 6 (5.00) | 0 (0.00) |
| 3 | Health status rate | 13 (10.83) | 7 (5.83) | 89 (74.17) | 11 (9.17) | 0 (0.00) |
| 4 | The quality of health and nutritional education services to family | 9 (7.50) | 41 (34.17) | 63 (52.50) | 7 (5.83) | 0 (0.00) |
| 5 | The rate of intake of quality food by family | 25 (20.83) | 8 (6.67) | 70 (58.33) | 14 (11.67) | 3 (2.50) |
| 6 | Food safety status in family | 38 (31.67) | 7 (5.83) | 58 (48.33) | 13 (10.83) | 4 (3.33) |

*Note: Figure in Parenthesis denotes percentage to their relative total*

***iv) Food stability***

**Table 5. Distribution of respondents according to food stability**

| Sl. No. | Items | Frequency (%) | | | | |
|---|---|---|---|---|---|---|
| | | Very low | Low | Medium | High | Very high |
| 1 | Damage rates which are caused by unstable climates | 14 (11.67) | 26 (21.67) | 70 (58.33) | 8 (6.67) | 2 (1.67) |
| 2 | The rate of incidence of pests and diseases to organic products | 21 (17.50) | 15 (12.50) | 52 (43.33) | 12 (10.00) | 20 (16.67) |
| 3 | The rate of use of biological methods to sustain sources | 16 (13.33) | 12 (10.00) | 78 (65.00) | 11 (9.17) | 3 (2.50) |
| 4 | The possibility of lack of food access because of periodic events in family | 9 (7.50) | 17 (14.17) | 76 (63.33) | 17 (14.17) | 1 (0.83) |
| 5 | The organic products ability in securing food for future generation by considering the least negative impact on the environment | 15 (12.50) | 15 (12.50) | 60 (50.00) | 16 (13.33) | 14 (11.67) |

*Note: Figure in Parenthesis denotes percentage to their relative total*

**Table 6. Distribution of respondents according to household level food security of the farmers**

| Sl. No. | Food security | Respondents (N=120) | |
|---|---|---|---|
| | | Frequency | Percentage (%) |
| 1 | Very low (23-40) | 13 | 10.83 |
| 2 | Low (41-59) | 26 | 21.67 |
| 3 | Medium (60-78) | 67 | 55.83 |
| 4 | High (79-97) | 10 | 8.33 |
| 5 | Very High (98-115) | 4 | 3.34 |
| | **Total** | **120** | **100** |

The results mentioned in the Table 6 indicates that 55.83 per cent of the farmers had medium level of food security, 21.67 per cent had low level of food security, 10.83 per cent had very low level of food security, 8.33 percent had high level of food security and rest (3.34 per cent) had very high level of household food security. The results were in line with the findings of Morshedi et al. [8].

**Relationship between socio-personal characteristics in terms of food security of ecological farmers in the Nagaland state**

The correlation coefficient of the relationship between profile of farmers with food security are summarized in the Table 7.

**Table 7. Relationship between profile of farmers with food security**

| Sl. No. | Independent variables | Correlation coefficient (r) | p-value |
|---|---|---|---|
| 1 | Age | 0.197* | 0.030 |
| 2 | Education | 0.225* | 0.013 |
| 3 | Family size | -0.164 NS | 0.073 |
| 4 | Land holding | 0.224* | 0.014 |
| 5 | Family income | 0.266** | 0.003 |
| 6 | Social participation | -0.246** | 0.006 |
| 7 | Cropping pattern | 0.289** | 0.001 |
| 8 | Livestock possession | 0.257** | 0.004 |
| 9 | Sources of irrigation | -0.082 NS | 0.373 |
| 10 | Extension contact | 0.237** | 0.009 |
| 11 | Risk Preference | 0.263** | 0.003 |
| 12 | Farming experience | 0.193* | 0.035 |

*(** Significant at the 0.01 level of probability)*
*(*Significant at the 0.05 level of probability, NS = Non Significant)*

Table 7 indicates that the correlation coefficient (r) of independent variable such as family income (0.266**), cropping pattern (0.289**), livestock possession (0.257**), extension contact (0.237**) and risk preference (0.263**) showed positive and significant correlation at 0.01 level of probability. Whereas age (0.197*), education (0.225*), land holding (0.224*), and farming experience (0.193*) were positive and significant at 0.05 level of probability. This indicates that food security is more likely to be high to the farmers having higher age, more education, high cropping pattern, family income and possessing more number of livestock. This agrees with the work of Ada-Okungbowa and Edemhanria, Bashir et al., Haddabi et al. and Shinde [9-12].

On the other hand, family size (-0.164 NS) and sources of irrigation (-0.082 NS) were found to be negative and non-significant. These findings were in line with Hazarika [13]. The social participation (-0.246**) was negative and significant at a 0.01 level of probability. This shows that when family size, sources of irrigation and social participation increases, the level of food security of the farmers decreases or vice-versa.

## 4. CONCLUSION

Majority of the ecological farmers were small-scale and middle-aged (31 to 56 years). More than half of the farmers had moderate level of food-security. Food security was positive and significant with cropping pattern, family income, livestock possession, extension contact and risk preferences at 1% level of probability. Age, education, land holding and farming experience were positive and significant at 5% level of probability. With increase in age, food security of the farmers increases as farmers become more experienced. More experience of a farmer, food availability and access also increases due to higher productivity. Sources of irrigation and family size was negative and non-significant. Larger the family size, more the likelihood of a farmer to be food insecure. Social participation was negative and significant. It implies that as participation of farmers increases, the likelihood of food secure decreases.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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