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Different farming system models to overcome malnutrition: A study in Meghalaya

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Abstract
The study was an attempt to enlist the different types of integrated farming system models practiced by the Garo hills farmers to overcome malnutrition. The study was conducted in West Garo Hills and South Garo Hills district of Meghalaya. Total 20 numbers of respondents were taken and their socio economic characteristics were studied. Data were collected through interview method. The farmers of West Garo Hills and South Garo Hills followed seven different types of IFS models. The highest percentage of respondents followed IFS models - 2 and 7 with 20 per cent each and the lowest percentage of respondents followed IFS models 1, 4 and 6 with 10 per cent each respectively. Hence it can be concluded that integrated farming system help in ensuring food security, upgrading nutritional status, utilizing of organic waste, reduce poverty and improved standard of living.

Keywords: Nutrition, malnutrition, integrated farming system

Introduction
Man needs food for growth and development to lead an active, productive and healthy life. Nutrition is the science of foods, the nutrients and other substances therein, their action, interaction and balance in relationship to health and disease. In addition, nutrition is concerned with social, economic, cultural and psychological implications of food and eating. In short, nutrition science is the area of knowledge regarding the role of food in maintenance of health. (Srilakshmi, 2012) [1, 2].

In relation to nutrition malnutrition is the state of under-nutrition, over-nutrition, imbalance and specific deficiency. Under–nutrition is the condition which results when insufficient food is eaten over an extended period of time. There is decreased physical and mental development and there is low immunity. Over – nutrition is a pathological states resulting from the consumption of excessive quantity of food over an extended period of time. This can result in obesity and metabolic syndrome. Imbalance is the pathological state resulting from a disproportion among essential nutrients with or without absolute deficiency of any nutrients. Specific deficiency is the pathological state resulting from a relative or absolute lack of individual nutrients. It is mostly occur in children below 5 years. The clinical features of protein energy malnutrition are kwashiorkor, marasmic kwashiorkor, marasmus, nutritional dwarfing and underweight child (Srilakshmi, 2012) [1, 2].

Integrated Farming system is a multi-disciplinary approach to solve the problems of food insecurity. The practiced of integrated farming system help on smallholder farms, and also low resource endowed farmers mitigate problems of poverty and food insecurity by improving the quantity of food, income and resilience of soil productive capacity. The declining trend of land availability poses a serious challenge to the sustainability and profitability of farming systems. Under such conditions, it is appropriate to integrate land-based enterprises such as fishery, agriculture, poultry, duckery, piggery, and horticultural cropping within the farm (Gurjar and Swami, 2019) [3].

Considering all the point a research study was undertaken with following objectives include:

1. To study the socio economic status of Respondents.
2. To enlist the different models of integrated farming system practice in Garo Hills along with nutritional components.

Materials and Methods
The study was conducted in Garo Hills of Meghalaya as the study was focused on the Garo farm men and women. Garo Hills consist of five districts out of which two districts were selected for study that is West Garo Hills and South Garo Hills Districts of Meghalaya. West

Garo Hills and South Garo Hills Districts were selected purposively due to easy accessibility of researchers. Selections of the Villages were done through simple random sampling method. List of integrated farming system models were enlisted from the two selected district. All total twenty numbers of respondents were taken for study from both the district.

Data were collected through Interview method using the semi structured interview schedule to collect the information. Predesigned and pretested interview schedule were the tool used in the study area. In addition, Focus Group Discussion and Key Informants interviews were also conducted.

The Information was collected from the KVKs, line departments; Government Programmes, Non-Governmental Organizations and different models of Integrated Farming System practice in Garo Hills for the study.

Appropriate statistical techniques were used for analysing the data. Statistical software like SPSS (Statistical Package for the Social Science) and MS-excel spread sheet were used for analysis. Suitable tables were prepared with the appropriate statistical analysis namely percentage, frequency, mean, standard deviation, Spearman rank correlation and etc. were incorporated wherever necessary for analysis.

Result and Discussion

The table 1 revealed that 40 percent of the respondents belonged to age group (30-40 years) followed by 35 per cent of the respondents of age group (above 60 years) and 20 per cent of the respondents of age group (41-50 years) while only 5 percent of the respondents belonged to age group (51-60 years) respectively. Thus, it is stated that majority of the respondents belonged to age group (30-40 years) and lowest percentage belonged to age group (51-60 years).

Educational status of Garo farm men and women helps in gaining more knowledge and decision making process. Table 1 clearly indicates that 55 per cent of the respondents of Garo farmers were studied up to primary (up to class 4) followed by 25 per cent of the respondents were studied up to high school (class 9 and 10) and 15 per cent of the respondents were studied up to middle school (5-8 class). Only 5 percent of farmers studied up to graduation level. The finding shows that majority of the respondents were studied up to primary school.

The distribution of gender helps to know the involvement of male and female in all the farming activities and decision making process. Table 1 revealed that 80 per cent of the respondents were women followed by 20 per cent of the respondents were male.

Table 2 showed the different types of Integrated Farming System Models followed by the respondents were 20 per cent each of the respondents followed IFS Model – 2 (fish farming, agriculture farming, vegetables production, plantation crop, and poultry farming) and 7 (fish farming, vegetables production, and poultry farming), 15 per cent each of the respondents followed IFS Model – 3 (plantation crop, piggery farming, and poultry farming) and 5 (vegetables production, plantation crop, piggery farming, dairy farming, and poultry farming) and 10 per cent each of the respondents followed IFS Model 1 (fishing farming, agricultural farming, fruits or plantation crops, and piggery farming), 4 (plantation crop, dairy farming, and poultry farming) and 6 (Agriculture farming, fruits/plantation crop, dairy farming). Thus it is stated that highest percentage of respondents followed IFS Model - 2 and 7 with 20 per cent each and the lowest percentage of respondents followed IFS Model - 1, 4 and 6 with 10 percent each.

The main nutrients component of fish is omega – 3 fatty acids, and they are not a good source of energy, carbohydrates and fats but it has excellent source of protein, vitamins and minerals. The agricultural crops such as paddy and maize are greatly planted by the farmers for their consumption only and they are rich in fibres and carbohydrates. The farmers also planted vegetables crops like cabbage, cauliflower, spinach, broccoli, amaranth, etc. which are rich source of vitamins and minerals also they are good source of antioxidants and fibres. In fruits or plantation crops they widely planted areca nuts and cashew nuts which are good source of fats and oils. The people in the village rear pigs and poultry and also dairy farming for income generation and their consumption purposes to overcome poverty.

Table 1: Distribution of socio economic characteristics of the respondents (n = 20)

Sl. No.	Characteristic	Category	Frequency	Percentage (%)
		30-40 years	8	40%
		41-50 years	4	20%
		51-60 years	1	5%
		Above 60 years	7	35%
2	Education	Primary	11	55%
		Middle school	3	15%
		High school	5	25%
		Graduation	1	5%
3	Gender	Male	4	20%
		Female	16	80%

Table 2: Different models of IFS practice in Garo Hills (n = 20)

Sl. No.	Types of IFS models	Frequency	Percentage (%)
1	IFS Model 1	2	10%
2	IFS Model 2	4	20%
3	IFS Model 3	3	15%
4	IFS Model 4	2	10%
5	IFS Model 5	3	15%
6	IFS Model 6	2	10%
7	IFS Model 7	4	20%

Table 3: Enlisted IFS Models

Sl. No.	Different types of IFS models	Components of IFS models
1.	IFS Model 1	Fish farming + agriculture + plantation crop + piggery farming.
2.	IFS Model 2	Fish farming + agriculture farming + vegetables production + plantation crop + poultry farming.
3.	IFS Model 3	Plantation crop + piggery farming + poultry farming.
4.	IFS Model 4	Plantation crop + dairy farming + poultry farming.
5.	IFS Model 5	Vegetables production + plantation crop + piggery farming + dairy farming + poultry farming.
6.	IFS Model 6	Agriculture farming + fruits/plantation crop + dairy farming.
7.	IFS Model 7	Fish farming + vegetables production + poultry farming.

Conclusion

From the study it can be concluded that the farmers of Garo Hills practiced seven different types of models. Among these models, IFS model 2 comprising of fishery, agriculture, plantation crop, and piggery farming followed by IFS model 7 comprising of fishery, vegetables, and poultry farming were the most highly practiced farming system models by the farmers of Garo Hills giving the most efficient to provide food security, nutritional benefits, employment generation and providing income to resource poor small farmers.

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