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RESEARCH NOTE

Food and Nutritional Security of Farm Households in Meghalaya: A Food Basket Approach Using Temporal and Spatial Analysis

Baiarbor Nongbri*, Ram Singh*, S.M. Feroze[†], L. Devarani* and L. Hemochandra*

ABSTRACT

The objectives of the study are (i) to calculate the household food availability from different sources and (ii) to understand the food consumption, requirement and gap in nutrition among the farm households in Meghalaya. Meghalaya has 11 districts with three major divisions inhabited by three major tribes the *Khasi*, *Jaintia* and the *Garo*. Among the mentioned divisions, East Khasi Hills, West Garo Hills and West Garo Hills districts were selected purposively based on the dominance of the tribal population. From each district, two blocks were selected purposively based on the epoch of establishments of the blocks and a total of 6 blocks and 12 villages were selected. A total of 240 farmers' households were selected using proportionate to population size random sampling and they were interviewed using pre-tested schedules. The study concluded that the state has a gap or deficit in the calorie intake by 313.59 kcal per person per day with only 62.33 per cent households being sufficient in the food intake. It is recommended that proper training must be imparted by the government agencies concerned with the Social Welfare Department and Block Development Offices (BDOs) along with the health departments in making people understand in regard to the consumption pattern and importance of nutrition in the food consumed. The farmers should also be equipped with the present agriculture system and off farm income opportunities ought to be encouraged.

Keywords: Food availability, Consumption, PDS, Calorie intake, Meghalaya.

JEL.: P36, Q11, Q13

I

INTRODUCTION

Food is the basic necessity of any living being, to survive and to sustain. It is imperative to create and enforce legal entitlements and obligations to ensure that every person is assured of adequate food as it is necessary to lead an active and healthy life (Aubree, 2006). Consumption on the other hand can be defined as the economic activity performed by any household (Mor and Sethia, 2018). In order to sustain for a living, every individual needs food, shelter and clothing. In India, 89.35 million farm households engage themselves in agricultural activities and about 55 per cent of its inhabitants depend on agriculture for their livelihood (Paroda, 2019).

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Hence, their livelihood, employment and income are linked directly or indirectly to the performance of the agricultural sector. Although the total food grains production in India has been estimated of 281.37 MT during 2018-19 (Government of India, 2019a) yet, 195.9 million people of its population are undernourished (World Bank, 2015). Chinnakali *et al.* (2014) also reported that 77.2 per cent of the households were food in-secure in the North Indian region. The reason behind the food insecurity could be because of the lack of availability of food (physical access to food) due to less farm diversification, low adoption of modern agricultural practices etc., and lack of purchasing power (economic access to food). Most of the large farmers in the rural areas were more food secure and nourished as compared to the medium and moderate farmers which was the worst among the marginal and small farmers (Sajjad and Nasreen, 2014). The International Food Policy Research Institute (IFPRI) reported that India holds 31 per cent of the world's burden for stunting and its prevalence differs from state to state and among the 119 countries in the world, India ranked 100th position in terms of Global Hunger Index (IFPRI, 2017) realising the burden the country had towards the fight against hunger.

In another observation, it has been found that large farm households, although has more production and more income generated sources to suffice their daily food availability, yet, intra households decision-making processes in terms of consumption and overall food nutrition has still been a loophole. The households must be able to consume the right quantity of balanced foods, equivalent to approximately, 2400 Kcal per capita per day in the rural areas and 2100 Kcal in urban areas (Rao and Sivakumar, 2010). In the last 20 years, there have been no significant changes in patterns of dietary intake in India and cereals remain the staple food providing most of the energy intake (Ramachandran, 2014). The National Sample Survey reported that the calorie consumption for rural India and the urban areas was 2099 and 2058 Kcal per day per capita during 2011-12 which was concluded to be an improvement than the previous years. However, additional concern is expressed that anthropometric indicators in terms of nutrition in India, for both adults and children, remains the worst in the world (Gupta and Kumar, 2015).

Hypothetically, the primary channels for food comprises four pathways, i.e., their own production from their own fields, open market, fair price shops, wages in kind or cash or exchange with their relatives or neighbours. The food self sufficiency through farmers' own farms depend on other factors such as total production, family size and family compositions. The accessibility of individual households to foods could advance only through income levels added with the purchasing power. These instances cannot not be solved overnight. Thus, the government had initiated through cash earning mechanism via employment opportunities and various government aided schemes. The work for cash/kind schemes and also the distribution and acquiring ready-made foods to primary schools, lactating women and adolescent girls have been initiated by the government to enhance the food and nutritional security. The Government of India has undertaken various initiatives to achieve this objective by

providing subsidised foods to two-thirds of the 1.3 billion people population (World Bank, 2015) at reasonable rate. To acquire that objective of subsidised food, the Total Public Distribution System (TPDS) was implemented by the Government of India during 1997 that provided reasonable and affordable price of commodities such as rice, sugar, kerosene oil etc. TPDS was later coalescing under the same umbrella of the National Food Security Act (NFSA) of 2013. NFSA has covered 80.72 crores number of beneficiary individuals during 2018 (Government of India, 2018a).

The North-Eastern Region (NER) of India has more than 70 per cent of its population depending on agriculture and agri-related activities to sustain their livelihood (Patel, 2017). The maximum share of their household income is contributed by cultivation activities (Singh and Datta, 2016). However, the farm households of NER was found to be more food insecure in the country with 64.28 per cent at visit- I and 67.02 per cent at visit- II as per 68th NSS reports (Singh and Datta, 2016). This is because most of the farmers in the region were small and marginal land holders leading to poor performance in terms of production and self-sufficiency as compared to the national level of 50 per cent. Although Minimum Support Price (MSP) was initiated by the Government, yet did not assume importance or failed to provide a major effect as the region produces only 1.5 per cent of the country's food grain production and is the net importer of food grains even for its own consumption (Patel, 2017).

Thus, in a nutshell, food availability at the table has always been a major concern for any household or any family in any region. The different food sources should be acquired by the households whether farmers or any consumers via different means. In order to augment the food availability farming, wage work, business etc. has to be carried out provided the food available suffices the nutritional value. Again for generation we have been mostly concerned with food quality rather than the quantity of foods. In this regard, researches linking food availability and nutrition and the impact of certain schemes have not been carried out in the region especially in Meghalaya. Hence, this research was initiated with the following objectives: (i) To calculate the household food availability from different sources and (ii) to understand the food consumption, requirement and gap in nutrition among the farm households.

II

METHODOLOGY AND DATA

Meghalaya, a sister state among the Northeast Hill states of India has been chosen purposively as the area of study. The state has also its uniqueness being the only matrilineal society in India. According to the 68th round of the National Sample Survey on Consumer Expenditure conducted in 2011-12, the per capita intake of calories and protein was reported to be the least in the country with only 1703 Kcal. It emphasised that the intake has been declining over the years (Shadap and Pala, 2017). The Comprehensive National Nutrition Survey reported that Meghalaya has the highest prevalence to acute malnutrition and has the highest number of stunting

children in the country. The Food and Nutrition Security Analysis (Government of India, 2019b) reported that across states in India, the per capita per day intake of energy was the least in Meghalaya. In Meghalaya the per capita per day intake for energy was also comparatively low than the national level recommended dietary allowance (RDA).

Meghalaya has 11 districts with three major divisions inhabited by three major tribes the *Khasi*, *Jaintia* and the *Garo*. The Khasi Hills division comprises East Khasi Hills, West Khasi Hills, South West Khasi Hills and Ri Bhoi districts. The Jaintia Hills division comprises West Jaintia Hills and East Jaintia Hills district and the Garo Hills division comprises North Garo Hills, East Garo Hills, South Garo Hills, West Garo Hills and South West Garo Hills. Among the mentioned divisions, East Khasi Hills, West Garo Hills and West Garo Hills districts were selected purposively based on the dominance of the tribal population. From each district, two blocks were selected purposively based on the epoch of establishments of the blocks and a total of 6 blocks and 12 villages were selected. A total of 240 farmers' households were selected using proportionate to population size random sampling and they were interviewed using pre-tested schedules (Table 1).

TABLE 1. SELECTION OF DISTRICTS AND RESPONDENTS

District (1)	Block (2)	Village (3)	Total HH (No. in lakh) (Census, 2011) (4)	HH selected (5)
East Khasi hills	Mawphlang	Wahnongkseh	1.6	80
	Mylliem	Lynkien		
West Jaintia Hills	Laskein	Mylliem	0.64	80
		Mawklot		
	Thadlaskein	Shangpung		
West Garo Hills district	Dadengiri	Mookyndur and	1.21	80
		Khliehtyrshi		
	Rongram	<u>Dadenggre</u>		
Total		Abokgre		240
		Rongdangree		
		Sampalgre		

Food Availability

Primary data were collected seasonally for three years 2017-19, viz., pre-monsoon (March), monsoon (September) and post-monsoon (December) to understand the food availability across the households.

Formulation of Food Basket

To study the food availability, a food basket has been formulated. In short, Meghalaya has three major tribes but the daily food intake variation was less

significant and there was a huge similarity in the food items consumed. The monthly food basket consist of those set of foods typically consumed by households in the particular area and make up 67 to 88 per cent of total calories consumed by the average household (Cochrane and D'Souza, 2015). From the food basket a series of food items were selected as mentioned in Table 2.

TABLE 2. MAIN FOOD CONSUMED ACROSS HOUSEHOLDS

Main food items (1)	Seasons (2)
Rice	Across the seasons
Potato	Across the seasons
Masoor Dal	Across the seasons
Vegetables	Pre-monsoon
Cabbage	Monsoon
Beans	Post-monsoon
Mustard	Pre-monsoon
Fruits	Monsoon
Banana	Post-monsoon
Pineapple	Across the seasons
Mandarin	Across the seasons
Meat- Pork	Across the seasons
Milk	Across the seasons
Fresh	Across the seasons
Packaged	Across the seasons

Source: Researcher's pilot survey.

Analytical Tools

A tabular presentation and charts were used to understand the food availability across households. In order to understand the gap in calorie intake, the difference of requirement and consumption of calories have been calculated using the calorie conversion adopted by Gopalan *et al.*, (1980). The method used in computing the gaps in calories is given as

$$\text{Calories Gap} = \text{CA} - \text{CR} \quad (\text{Singh and Datta, 2016}),$$

where,

CA= Calories available from the item consumed, i.e., sum of the calories of each product, which household consumed and

CR= Calories requirement normative requirement of the calories (which was 2400 kcal per person per day as per ICMR standards).

1. To Calculate the Household Food Availability from Different Sources

Rice

Rice has been regarded as the staple food crop of the people in the state. The rice varieties grown in the state were *Ranjit*, *Bahadur*, *Pankaj* at low land, *RCPL 1-87-8*, *RCPL 1-3*, *RCPL 3-3* at mid altitudes, *RCPL1-29*, *RCPL 1-28*, *IET 13783*, *IET 13459* at upland mid altitudes and *Megh Rice-1* and *Megh Rice-2* at high altitude (Government of Meghalaya, 2019). The annual growth rate in area and production of

rice was observed to have significantly increased over the years during 2011-12 to 2016-17 and 2008-09 to 2016-17 by 0.39 per cent and 7.22 per cent, respectively (Government of Meghalaya, 2019). Rice has been reported to be available to the households from three main sources in Meghalaya across all seasons viz., own farm produce, market and PDS. The average availability through own farms was estimated to be 58.77 kg per household per month and from market and PDS it was estimated to be 25.77 and 22.29 kg per household per month (Table 3). The average availability per person has been comparatively improved than the latest NSSO report (2012) which was reported as 10.22 kg per person per month in rural areas and 9.26 kg per person per month in urban areas.

TABLE 3. FOOD COMMODITIES AVAILABILITY FROM DIFFERENT SOURCES IN MEGHALAYA

Food commodities (1)	Own farm (2)	Market (3)	PDS (4)	Total (5)
Rice	58.77	25.77	22.29	106.84
Potato	4.48	4.71	-	9.18
Masoor dal	2.55	-	-	2.55
Vegetables	3.38	3.4	-	6.78
Fruits	1.72	2.5	-	4.22
Meat- pork	2.96	3.55	-	6.51
Milk	2.2	3.32	-	5.52

Source: Field survey.

Potato

The main tuber crops in the state were colocasia, potato, turnip, carrot, tapioca etc. However, potato was regarded as the main crop consumed by the households in the state (Government of Meghalaya, 2019). It was first introduced in 1830 at higher elevations of Shillong (Nakane, 1961) and later distributed to the entire state. This particular cash crop has taken over other tuber crops or starch and carbohydrate rich crops like taro, sweet potato, tapioca, and yam. Potato was regarded as the second most important cash crop after rice and has played a major role in the livelihood of resource-poor farmers in the state. Potato accounts for 8.56 per cent of the total cultivable area of the state with a productivity of 9.78 tonnes per hectare reported to be far below the national average of 17.57 tonnes per hectare (Warjri and Saha, 2019). The households reported that potato or *phan* as locally called has been prepared and consumed in almost every meal making it an important food commodity. This particular tuber has also been surprisingly used as a snack for the evening tea where households boiled and have with locally available leafy vegetable *jatira* (*O. linearis*) or *jamyrdoh* (*Houttuynia cordata*) and dry fish chutney (*Tungtap*). The potato was mainly reported to have been grown during two seasons, winter and summer. However due to the unavailability of cold storage, self sufficiency from the farmers own farm has been restrained and the product has been made available through market sources. Thus on the whole potato played a significant role in the daily diet of every family with an estimated availability of 4.48 and 4.71

kg per household (Table 3). However, the main lacuna reported was that the average percentage share of Meghalaya in terms of potato to the overall production in India was only 0.41 per cent during 2012-13 to 2016-17 which has further reduced to 0.40 per cent during 2016-17 (Government of India, 2018b).

Pulses

Pulses has been regarded as the protein retaining food item (FAO, 2010) with soya-bean universally known as the poor man's meat. The daily consumption of pulses has been recommended (Erbersdobler *et al.*, 2017) and the FAO (2010) has recommended an average of 80g daily intake of pulses among the Indians. The state of Meghalaya produced a variety of pulses like lentil, Bengal gram, green gram, soya-bean, pigeon pea, cowpea, rajmah etc., (Government of Meghalaya, 2018). However, among all the pulses, it has been observed that *masoor* dal was consumed the majority of the people in the state which was mainly acquired through market sources. As per the NSSO report (2012), the per capita availability of *masoor* dal in the state was reported to be 0.314kg and 0.001 kg in the rural and urban areas per month as compared to the national level data of 0.093 and 0.084, respectively (NSSO, 2012). The availability of dal in the state was only through market sources with an average availability of 2.55 kg per households per month (Table 3). The NSSO (2012) estimated that 0.144 kg and 0.177 kg per person per month has been consumed in the rural and urban areas in the state indicating an improvement in the pulses consumption in the state.

Vegetables

The total area of vegetables in the state was 19581 ha and 19824 ha during 2016-17 and 2017-18, respectively with an average production of 271 and 274 thousand MT during 2016-17 and 2017-18, respectively (Government of Meghalaya, 2019). In the present investigation, three types of vegetables have been taken into consideration based on the three season domains of consumption among the households. The main vegetables consumed were cabbage during pre-monsoon, beans at monsoon and mustard at post-monsoon periods. The average availability of vegetables in the state was 3.38 kg from the own farm produced and 3.40 kg through market sources across each households (Table 3).

Fruits

The state grows a rich variety of fruits. Some of the fruits mostly consumed and locally available over the years were carambola which was available during March-April, Soh ramdieng (*Baccaurea sapida*) during May-July, sohkwit (*C. macroptera*) during October-November, Sohmylleng during December January, strawberry during

February to March *sohshang* (*Elaeagnus latifolia*) during March-April, *sohpie* (*Myrica esculenta*) during March-April, peach and pears during April to May, passion fruit or *soh brap* during June-September, *Sohiong* (*Prunus nepalensis*) during June-August and *soh shur* *Pyrus pashia* during December-January. The other fruits mostly consumed were mango and banana (Government of Meghalaya, 2018). Among all the crops available, banana, pineapple and mandarin were taken into consideration as they were mostly consumed across all the districts. Banana had an average area of 6457.59 ha during 2000-01 to 2016-17 and an average production of 76734.24MT during the same period in the state. It was reported that fruits has significantly increased by 1.7 per cent in terms of area over the years; but, there was a decline in the production by 0.85 per cent during 2000-01 to 2016-17 due to unscientific cultural practices practiced and less quality propagating materials (Rymbai *et al.*, 2019). The average availability of fruits to the households was 1.72 kg through own farms and 2.50 kg through market produced. The respondents in the study area reported that fruits consumption was not of greater importance in the district and fruits were being consumed irregularly across all districts of the state (Table 3).

Meat

Meat is an integral part of the diet amongst people in Meghalaya and there are no taboos associated with its consumption. It was reported that that there was an increase in the meat production over the years during 2004-05 and 2016-17 by 1.25 per cent (Government of Meghalaya, 2019). Among the meat, the consumption of pork is much higher (68.75 per cent) in the Northeast region with an estimated consumption of 4075.93 thousand kg (Mahajan *et al.*, 2015). The average production reported was 78.78 thousand tonnes during the same period. There data also clearly indicated that the per capita availability of meat has been increased by 4 per cent between 2014-15 and 2015-16 with a daily per capita consumption of 48.65 grams (NEDFi, 2018) which was just 0.856 kg average monthly per consumer unit consumption during 2009 (Mahajan *et al.*, 2015). The meat availability to the households was mainly met through own farm and market with an overall availability of 6.51 kg per households per month (Table 3).

Milk

The average milk production was 78.78 thousand tonnes with an annual growth rate of 0.83 per cent during 2004-05 to 2016-17 (Government of Meghalaya, 2019). However, milk and milk products demand were not sufficient to meet the requirements in the state. It has been reported that per capita availability of milk has increased from 307 gm in 2013-14 to 355 gm in 201-17 in India showing a brighter growth in the income of dairy farmers for consumption (Government of India, 2018).

The milk consumption in the district was very less. Milk was mainly consumed with tea and most of the respondents consumed packaged powder milk and milk products. The average availability of milk in the state was 2.20 kg per households from the own farms which was fresh milk and 3.32 kg per households through market sources with an overall average availability of 5.52 kg per households per month (Table 3).

To Understand the Food Consumption, Requirement and Gap in Nutrition Among the Farm Households

The debate on food self sufficiency to counter food security has been going on for decades where supporters argued that for farmers or a farming household to rely on market and its amenities was a difficult task as the food prices were volatile (Singh and Datta, 2016). It has been reported that, although there was a drastic change in the pattern of food that were consumed in India as a whole (Gupta and Kumar, 2015), yet households depend on cereals as their main food item and to suffice their overall food requirements. India has recent development figures in terms of income and food consumption yet; the performance in terms of nutrition parameters fell short across states (Gupta and Kumar, 2015). With respect to Meghalaya it has been observed that households across follow a monotonous diet focusing more on cereals and with less emphasis laid on other food items like vegetables, fruits, meat with the result that the state has high prevalence of stunting, underweight and wasting especially among children. Chyne *et al.*, (2017) reported that there were 31 per cent children underweight, 57 per cent stunting and 10 per cent wasting in the state as nutrient intake was way below the recommended level. They also reported that only 20 per cent households were food secure.

As mentioned, cereals hold the maximum importance among other foods consumed by the households in the state with rice having leading the list. It has been reported that in East Khasi Hills district, West Jaintia Hills and West Garo hills districts, the average consumption person per month was 16.20, 15.90 and 15.30 kg which make an overall average in the state of 15.80. The NSSO (2012) also reported that the average consumption of cereals in Meghalaya was 10.22 kg in the rural and 9.26 kg in the in the urban areas with an average consumption of 9.74 kg per person per month. In terms of potato, the per person consumption was 1.52, 1.37 and 2.22 kg, in East Khasi Hills, West Khasi Hills and West Garo Hills district, respectively with an overall consumption of 1.70kg in the state. The NSSO (2012) reported that the average consumption of potato in the state was 1.23 at rural areas and 1.63 kg in the urban areas with an average consumption per person across the state of 1.43 kg. The consumption of masoor dal was 0.38 kg, 0.41 and 0.68 kg per person per month, respectively across the three districts. According to the NSSO (2012) report, the average consumption per person per month was 0.16 kg.

Vegetables have been consumed based on the seasons harvested. It has been reported that cabbage has been consumed per person per month by 1.08, 1.28 and

1.35 kg per person per month during peak season at East Khasi Hills, West Khasi Hills and West Garo Hills district, respectively. Overall the consumption of this vegetable was 1.24 kg per person per month. The last NSSO (2012) data reported that the average consumption of cabbage was 0.18 at rural areas and 0.27 kg per person per month at urban areas. Beans were mostly consumed during monsoon period and the average consumption per person per month was 1.05, 1.25 and 1.17 kg at East Khasi Hills, West Jaintia Hills and West Garo Hills district, respectively. The overall consumption of beans in the state was 1.16 kg per person per month. However, the average consumption of mustard which was mostly harvested and consumed during post-monsoon period was 1.5 kg, 1.25 and 1.18 kg during East Khasi Hills, West Jaintia Hills and West Garo Hills district, respectively with an overall consumption of 1.31 kg per person per day.

In terms of fruits, banana was mainly consumed at 0.68 kg, 0.71 kg and 0.96 kg per person per month over the districts of study viz., East Khasi Hills, West Jaintia Hills and West Garo Hills district, respectively with an overall average consumption of 0.70 kg per person per month. The NSSO (2012) data reported that the average consumption of banana were 2.33 at rural areas and 2.13 numbers at urban areas. During monsoon period the households consumed pineapple wherein 0.40, 0.42 and 0.86 per consumed at East Khasi Hills, West Jaintia and West Garo Hills district, respectively with an average of 0.56 kg per person per month across the state. Mandarin was mostly consumed during winter months of post monsoon and on average, 0.76 kg, 0.74 kg and 0.95 kg per person per month at East Khasi Hills, West Jaintia and West Garo Hills district, respectively making an average total consumption of 0.75 kg per person per month across the state.

Pork was consumed across all seasons of the year. The meat has been regarded as a legacy in the state with an average consumption per person per month of 1.29 kg, 1.16 kg at East Khasi and West Jaintia Hills district. West Garo hills consumed more meat than the other districts with an average of 2.26 kg per person per month. Overall, the average consumption of meat in the state per person was 1.50 kg.

Milk on the other hand was mostly consumed in processed form. The average consumption of fresh milk was 1.17 kg per person per month in East Khasi Hills district. In West Jaintia Hills district, the average consumption was 0.93 kg with the least being at Garo Hills district with an average consumption per person per month of 0.48 kg. Overall the consumption of fresh milk was 0.86 kg per person per month. In terms of packed milk, the average consumption per person per month across the districts was 3.72, 1.40 and 0.57 kg at East Khasi Hills, West Khasi Hills and West Garo hills district with average consumption of 1.90 kg per person per month. The NSSO (2012) data reported that in the state, the average consumption was 0.773 kg per person per month (Table 4).

TABLE 4. AVERAGE QUANTITY CONSUMED PER PERSON PER MONTH ACROSS DIFFERENT HOUSEHOLDS IN DIFFERENT DISTRICTS

Sl.No.	Food items	East Khasi Hills	West Jaintia Hills	West Garo Hills	Meghalaya
(1)	(2)	(3)	(4)	(5)	(6)
1.	Rice	16.20	15.90	15.30	15.80
2.	Potato	1.52	1.37	2.22	1.70
3.	Masoor Dal	0.38	0.41	0.68	0.49
4.	Vegetables Cabbage	1.08	1.28	1.35	1.24
5.	Beans	1.05	1.25	1.17	1.16
6.	Mustard	1.5	1.25	1.18	1.31
7.	Fruits Banana	0.68	0.71	0.96	0.70
8.	Pineapple	0.40	0.42	0.86	0.56
9.	Mandarin	0.76	0.74	0.95	0.75
10.	Meat- Pork	1.29	1.16	2.26	1.50
11.	Milk Fresh	1.17	0.93	0.48	0.86
12.	Packaged	3.72	1.40	0.57	1.90

Contribution to the Food Basket

It has been found that across each district, rice has been the most dominant cereal in the diet where as in East Khasi Hills, West Jaintia and West Garo Hills district, rice contributed of 66.21 per cent, 84.79 and 73.10 per cent of the food intake with an overall contribution of 71.94 towards the overall food basket across households in the state.

Potato which was the second most important staple food in the state contributed about 1.86 per cent, 2.05 and 2.69 per cent at East Khasi Hills, West Jaintia and West Garo Hills district to the food basket with an overall contribution of 2.13 per cent in the overall food basket in Meghalaya. Vegetables on the other hand contribute a mere amount with 0.56, 0.73 and 0.75 per cent across all districts with overall percentage distribution of 0.68 per cent only in the state. *Masoor* dal on the other hand contributed 1.89, 2.38 and 2.90 per cent to the overall food basket across all districts of East Khasi Hills, West Jaintia and West Garo Hills district with an overall contribution of 2.32 per cent in the state. Meat contributed about 1.76 per cent, 2.22 and 3.08 per cent to the total food basket with an overall contribution of 2.28 per cent to the food basket. Fruits contributed a minimal percentage with 0.58 per cent realising that although the state has good production yet the intake was comparatively less (Figures 1 and 2).

Rice as mentioned contributed the most to the food basket of the people in the state and also contributed the most calories to the overall nutritional intake across each districts with 1589.05, 1836.1 and 1754.34 Kcal per person per day with an overall contribution of 1726.50 Kcal per person per day in the state. Other commodities in the food basket has contributed a minimal amount towards the calorie intake in the state with potato at 51.20 Kcal, packaged milk at 98.03, and *masoor* dal at 55.58 Kcal per person per day. The total calorie intake across each district was calculated to be 1908.59, 2165.39 and 2185.26 Kcal per person per day at East Khasi Hills, West Jaintia and West Garo Hills district. Overall the food intake was 2086.41

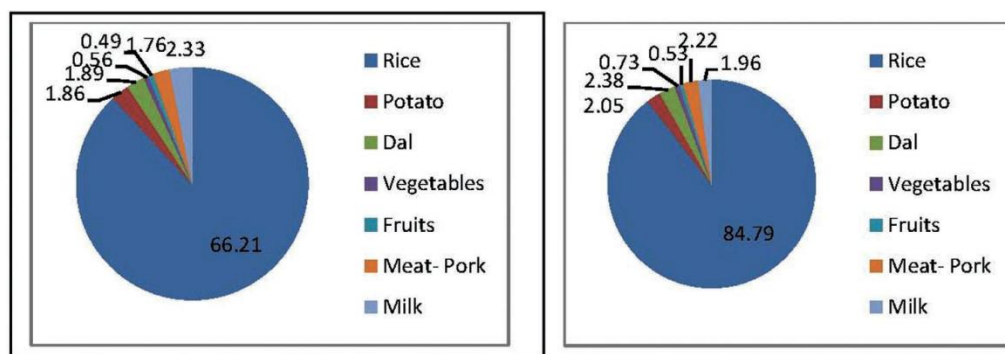


Figure 1. Percentage Share of Different Food in a Food Basket of East Khasi Hills and West Jaintia Hills District.

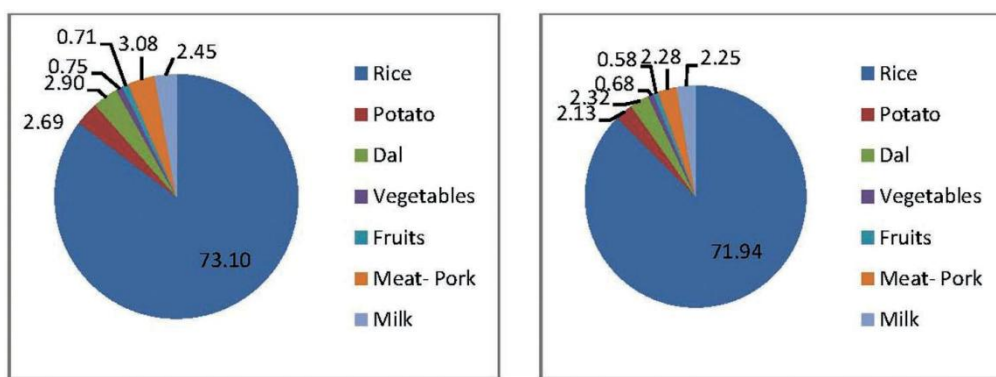


Figure 2. Percentage Share of Different Food in a Food Basket in West Garo Hills District and Meghalaya

kcal food intake per person per day in the state. However, as comparing to the recommended requirement by the Indian Council of Medical Research (ICMR), 2400 kcal was mandatory for an active life by an individual (Rao and Sivakumar, 2010). Thus, the state has a gap or deficit in the calorie intake by 313.59 kcal with East Khasi Hills being the most deficit district with 491.41 kcal followed by West Jaintia Hills and West Garo Hills with 234.61 and 214.74 Kcal per person per day (Table 5).

In order to sum up the objective, it has been calculated that most of the households (82 per cent) were sufficient in nutritional intake from the food basket at East Khasi Hills district, 58 per cent at West Jaintia Hills and 47 per cent at West Garo Hills district making an overall average of 62.33 per cent sufficient in the food intake.

TABLE 5. AVERAGE CALORIES CONTRIBUTED BY DIFFERENT FOOD ITEMS ACROSS VARIOUS DISTRICTS (KCAL/PERSON/DAY)

Sl.No. (1)	Food items (2)	East Khasi Hills (3)	West Jaintia Hills (4)	West Garo Hills (5)	Meghalaya (6)
1)	Rice	1589.05	1836.1	1754.34	1726.50
2)	Potato	44.58	44.38	64.65	51.20
3)	Masoor Dal	45.47	51.64	69.63	55.58
4)	Vegetables				
	Cabbage	10.25	13.47	14.3	12.67
5)	Beans	17.69	23.12	23.14	21.32
6)	Mustard	12.4	16.12	16.61	15.04
7)	Fruits	18.57	21.26	24.65	21.49
8)	Pineapple	9.73	10.3	11.55	10.53
9)	Mandarin	6.65	6.89	14.97	9.50
10)	Meat- Pork	42.24	48.03	73.99	54.75
11)	Milk	6.07	5.82	17.48	9.79
12)	Fresh	105.89	88.26	99.95	98.03
	Packaged				
Total		1908.59	2165.39	2185.26	2086.41
Gap		-491.41	-234.61	-214.74	-313.59

IV

CONCLUSION

Food insecurity was always the most debated topic and a global problem affecting the entire planet adding up to the continuous physical or economic access to nutritious foods for life sustenance. The lack of food alongside quality food has not only contributed to malnutrition but also on a wider scale enhanced hunger, poverty and unemployment. The context of food security has been added up with other challenges like population growth, climate change, failing market, environmental degradation etc. Conservatively, through observations and thorough survey at village level, it has been observed that boiled rice was consumed during breakfast, lunch and dinner across all districts of the state though there was a change in the various livelihood at par with previous years. The crop rotation is almost negligible especially after paddy leaving the fields barren till the next season. As pulses is mostly drought resistant, there is a need to proper training and know how to optimally use the barren lands. Fruits and vegetables also perform well in the state as the state's climatic condition varies across districts. With proper concentration, the area and production based area can be concentrated. Animal husbandry department can also play a vital role at procuring and reach out for better animal production across the state. The areas with negligible agricultural production can invest on meat and milk production through animal rearing. Overall, proper insemination of knowledge and training or proper know-how regarding the consumption pattern and importance of consumption of other food products and not just rice or potato have to be ascertained. The study recommends proper training by the government agencies concerned like the social welfare department and block development office along with the health departments concerned to impart and make people understand towards the same on a priority

basis. The farmers should also be equipped with the latest agricultural technologies and off farm income generation activities ought to be encouraged.

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