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Fruits and Vegetables Consumption among Farm Households in Meghalaya: An Empirical Study

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A B S T R A C T

It was universally known that in the Indian diet, cereals and millets as well as pulses and legumes do provide minerals like calcium and iron yet, vegetables and fruits were also the major sources of minerals, vitamins and fibre and households tends to neglect their importance in the daily consumption. NSSO (2014) report revealed that average monthly per capita consumer expenditure (MPCE) for Indian citizen stood at ₹ 1984 in urban area and ₹ 1054 in rural India with a share of only ₹ 175.2 (urban area) and Rs 112.9 (rural area) in fruits and 175.2 (urban area) and Rs 112.9 (rural area) in terms of vegetables. Thus, fruits and vegetables constituted a minor portion of 10.7 per cent (rural) and 8.8 per cent (urban) MPCE. The present paper emphasised on the availability of fruits and vegetables and the gap in the calorie intake of fruits and vegetables among households. Meghalaya was chosen purposively as the area of the study as the state has the highest prevalence to acute malnutrition and has the highest number of stunting children in the country. The state has also the least per capita per day intake of energy which was only 1,686 Kcal in the rural areas and 1,755 Kcal per capita at urban area day in Meghalaya of the 2400 Kcal as prescribed by the ICMR. A total of three districts viz., East Khasi Hills District, West Jaintia hills and West Garo Hills district have been studies with two blocks each with 2 village from each block. 240 farmers were interviewed and the result was documented. It has been found that the availability of fruits and vegetables to the households were mainly from their own farms and market access. In terms of calorie intake among fruits and vegetables it has been found that across each districts, there was a deficit or gap in the calorie intake by 324.71, 308.84 and 294.78 Kcal, respectively with an average deficit by 309.45 Kcal in the state. The study suggests that proper awareness by concerns department had to be initiated towards the importance of fruits and vegetables in the daily diet. As the topography of the state is very suitable for fruits and vegetables, a cluster approach in the development of appropriate crops for certain areas has to be set off by the horticulture institutions for the welfare of the farmers and the farming households as a whole.

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 comprehend for a living, every individual needs food, shelter and clothing. In this context, food and its consumption pattern and availability has been discussed in this paper. It was universally known that in the Indian diet, cereals and millets as well as pulses and legumes do provide minerals like calcium and iron (Rao, 2002), yet, vegetables and fruits were also the major sources of minerals, vitamins and fibre (Rao, 2012) and households tends to neglect their importance in the daily consumption. NSSO (2014) report revealed that average monthly per capita consumer expenditure (MPCE) for Indian citizen stood at ₹ 1984 in urban area and ₹ 1054 in rural India with a share of only ₹ 175.2 (urban area) and Rs 112.9 (rural area) in fruits and 175.2 (urban area) and Rs 112.9 (rural area) in terms of vegetables. Thus, fruits and vegetables constituted a minor portion of 10.7 per cent (rural) and 8.8 per cent (urban) MPCE. As compared to the previous NSSO survey (1990, 2010) of 1987-88 and 2007-08, the share of fruits and vegetables in consumer expenditure has not been improved. It was reported that fruits total share was 10.7 per cent during 1987-88 and 15.7 percent during 2007-08 in rural area and for vegetables it was 13.9 per cent during 1987-88 to 16.6 percent during 2007-08 in urban India. Fruits and vegetables provide a diversified, flavoured, colourful, tasty, low caloric, and protective, micro-nutrient rich diet (Sachdeva, 2013).

Prima facie, it has been contended that fruits and vegetables were still another challenge in consumption context. The general recommendation for intake of fruits and vegetables was at least 400 grams per person per day (five serving of 80 g each day) or about 146 kg per person per year (FAO, 2010). Imperative to the fact that fruits and vegetables held important constituents in the daily food basket, the paper concentrates on the availability of fruits and vegetables and the gap in calorie intake across of these two items towards each household.

Materials and Methods

Meghalaya has been chosen purposively as the area of study. 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 conducted during the years 2016-18 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 (GoI, 2019) reported that across sates, the per capita per day intake of energy was 1,686 Kcal in the rural areas and 1,755 Kcal per capita at urban area day in Meghalaya which was one of the least in the country. Meghalaya per capita per day intake for energy was also comparatively low than national level RDA. The state has three major tribes, the *Khasi*, *Jaintia* and the *Garo*. Three districts *viz*., East Khasi, West Garo Hills and West Garo Hills districts were selected purposively based on the dominance of the tribes' population in the respective regions. From each districts, two blocks each were selected purposively based on the epoch of establishments of the blocks. Mawphlang and Mylliem blocks were selected from East Khasi Hills, Laskein and Thadlaskein from West Jiantia Hills and Dadengiri and Rongram from West Garo Hills districts, respectively. From Mawphlang block, Wahnongkseh and Lynkien villages were selected randomly and from Mylliem block

two villages were selected namely Mylliem and Mawklot. From Laskein block, Laskein village and Shangpung village were selected and from Thadlaskein, mookyndur and khliehtyrshi were selected. From Dadengiri block Dadenggre and Abokgre village were selected and from Rongram block, Rongdangree and Sampalgre villages were slected making a total of 6 blocks and 12 villages. A total of 240 farmers were interviewed using pre-tested schedules. To understand the food availability, the primary data were collected seasonally *viz*., pre-monsoon, monsoon and post-monsoon where May, September and December months were selected using pre tested schedule during 2018 and 2019. The secondary data on area, yield and production of the main crops, the main schemes adopted and adhered were collected from the published journals, government institutions like District Commissioner offices, Directorate of Agriculture and Horticulture and Directorate of Rural Development Agency and from various publications of the Central government and the Government of Meghalaya *etc*.

To study the food availability, a food basket has been formulated. The monthly food baskets consist of a set of foods that are typically consumed by households in the particular area and make up 67 to 88 percent of total calories consumed by the average household (Cochrane and D'Souza, 2015). From the food basket, a number of food crop/items were picked up for the study. A tabular presentation and charts were used to understand the objectives.

To understand the the gap in calorie intake, the difference of requirement and consumption of calories has been calculated using the calorie conversion adopted by *Gopalan et al.,* (1980). The method used in computing the gaps in calories was given as

Calories Gap = CA – CR (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 (as per ICMR standards).

Results and Discussion

Availability of fruits and vegetables the households

The state was rich in a 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, sohphie (*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 (GoM, 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. The CAGR was calculated to increase significantly in terms of area and production by 2.00 and 2.54 per cent during 2000-01 and 2016-17. In terms of pineapple which is one of the main fruit crop in the state, the average area and production was 12162 ha and 11589 MT respectively, during 2000-01 to 2016-17. The CAGR was calculated to be significantly

increased over the years in terms of area by 1.7 per cent but there was a decline in the production by 0.85 per cent during 2000-01 to 2016-17. Meghalaya was also a home to many citrus fruits with Khasi Mandarin being the worldwide known fruit crop. The average area and production among the citrus fruits were 9805.76 ha and 41378.24 MT, respectively with a significant increase in the growth over the years in terms of both area and production by 2.89 and 3.3 per cent, respectively (Table 1).

Area and production of Vegetables

The Government of Meghalaya in their recent report claimed that 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 (GoM, 2019). Vegetables has been obtained to the households through own farm productions and market. In the present exploration, three types of vegetables have been taken into consideration based on the three season domains of consumption among the households. The main vegetables mainly consumed were cabbage during pre-monsoon, beans at monsoon and mustard at post monsoon periods. The production however during the 2010-11 to 2017-2018, has been calculated as 41354.4, 6546.5 and 2520.75 metric tonnes, respectively for cabbage, beans and mustard (GoM, 2018).

East Khasi Hills District

Fruits

At household level, different types of fruits were consumed across all seasons. However, banana, pineapple and mandarin were mostly consumed by the respondents. Banana was mostly available through own farms and kitchen garden. However, pineapple was mostly available to the market. During post monsoon, the households reported that mandarin was mostly consumed and made available to the households. The average availability of fruits per month per person across each household was reported to be 0.61 kg (Table 2). The average fruits availability across each households through own farm was 1.36 kg and maximum contribution was through market sources with 2.52 kg per household per month across each seasons (Fig. 1).

Vegetables

Vegetables or *jhur* as locally called has been obtained from own farm and market across each households. The average availability per households across each season for cabbage, beans and mustard has been calculated to be 3.36, 3.19 and 2.19 kg per households per month through their own farms across all seasons. The market availability across seasons was 3.46, 3.44 and 2.26 kg, respectively (Table 3). Overall, the households were met with 3.28kg per month from their own fields and the maximum contribution was through markets with 3.43 kg per month across each season (Fig.2).

West Jaintia Hills

Fruits

The fruits that were available in the district were banana, pineapple and mandarin during pre-monsoon, monsoon and post monsoon periods. The availability of these fruits were from own farm and market except pineapple where the availability was mainly through market. During pre-monsoon, the accessibility of households towards banana were 2.00 kg through own farm and 2.3 kg through market. During monsoon and post monsoon, the availability of pineapple were 2.59 kg from market and for mandarin it was 2.08 kg and

2.49 kg through own farm and market simultaneously, across each households (Table 4). The maximum access for fruit availability to the households was through market with 2.48 kg per households per month (Fig. 3).

Vegetables

The vegetable consumption at Khasi Hills districts and West Jaintia Hills district was more or less the same. The households mostly consumed cabbage, beans and mustard during Pre-Monsoon, Monsoon and post monsoon, respectively. The availability of these vegetables across different seasons from their own farms was 3.97 kg, 3.71 kg and 3.81 kg. Through market, the vegetables availability was 3.93 kg, 3.97 kg and 3.88 kg across different seasons. The average availability per person per month was 1.26 kg (Table 3.5). Market access contributed the maximum towards vegetables availability with 3.92 kg per household per month (Fig. 4).

Table.1 Trends in area and production of banana, pineapple and citrus fruits in Meghalaya

Fruits	Banana		Pineapple		Citrus fruits	
Years	Area	Production	Area	Production	Area	Production
2000-01	5377	64100	9235	81723	8089	32311
2001-02	5311	63733	9315	82398	8043	34668
2002-03	5344	65659	9839	83333	7987	32791
2003-04	5658	66875	9480	91671	8046	36636
2004-05	6276	67875	9565	92036	9808	38989
2005-06	6426	71695	10135	93625	8871	36893
2006-07	6422	72366	10112	96812	8845	37139
2007-08	6380	72207	9808	94170	9123	37579
2008-09	6522	74314	10523	102506	9368	37702
2009-10	6802	78822	10542	103432	9784	39070
2010-11	6795	79954	10607	104130	9885	38817
2011-12	6919	82125	10766	106168	9997	39315
2012-13	6992	83988	10816	109393	10146	44896
2013-14	7039	86432	11314	117767	11813	50914
2014-15	7112	88709	11577	123126	12044	52851
2015-16	7162	91308	11874	13264	12291	55095
2016-17	7242	94320	12162	11589	12558	57764
Average	6457.59	76734.24	10451.18	88655.47	9805.76	41378.24
CAGR	2.00***	2.54***	1.7***	-0.85	2.89***	3.3***

(GoM, 2019)

Table.2 Fruits availability from different sources in East Khasi Hills District (in Kg)

Particulars	Own farm	Market	Average availability per person per month
Pre-Monsoon	2.00	2.32	0.61
Monsoon	0.00	2.51	
Post-Monsoon	2.09	2.72	
Average	1.36	2.52	

Table.3 Vegetable availability from different sources in East Khasi Hills District (in Kg)

Particulars	Own farm	Market	Average availability per person per month
Pre-Monsoon	3.36	3.46	1.06
Monsoon	3.19	3.44	
Post-Monsoon	2.19	2.26	
Average	3.28	3.43	

Table.4 Fruits availability from different sources in West Jaintia Hills District (in Kg)

Particulars	Own farm	Market	Average availability per person per month
Pre-Monsoon	2.00	2.36	0.62
Monsoon	0.00	2.59	
Post-Monsoon	2.08	2.49	
Average	1.36	2.48	

Table.5 Vegetables availability from different sources in West Jaintia Hills District (in Kg)

Particulars	Own farm	Market	Average availability per person per month
Pre-Monsoon	3.97	3.93	1.26
Monsoon	3.71	3.97	
Post-Monsoon	3.81	3.88	
Average	3.83	3.92	

Table.6 Fruits availability from different sources in West Garo Hills District (in Kg)

Particulars	Own farm	Market	Average availability per person per month
Pre-Monsoon	2.84	2.30	0.78
Monsoon	2.39	2.69	
Post-Monsoon	2.10	2.51	

Table.3.7 Vegetables availability from different sources in West Garo Hills District (in Kg)

Particulars	Own farm	Market	Average availability per person per month
Pre-Monsoon	3.73	3.54	1.06
Monsoon	3.30	2.96	
Post-Monsoon	3.20	3.15	

Table.8 Average quantity consumed per person per month across different households in different districts (in Kg)

Sl.No	Food items		East Khasi Hills	West Jaintia Hills	West Garo Hills	Meghalaya
1.	Fruits	Banana	0.68	0.71	0. 96	0.70
2.		Pineapple	0.40	0.42	0.86	0.56
3.		Mandarin	0.76	0.76	0. 95	0.75
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
Total			0.18	0.19	0.15	0.19

Table.9 Average Calories contributed by different food items across various districts (Kcal/day)

Sl.No.	Food items		East Khasi Hills	West Jaintia Hills	West Garo Hills	Meghalaya
1.	Fruits	Banana	18.57	21.26	24.65	21.49
2.		Pineapple	9.73	10.3	11.55	10.53
3.		Mandarin	6.65	6.89	14.97	9.50
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
Total			75.29	91.16	91.16	90.55
Gap			-324.71	-308.84	-294.78	-309.45

Fig.1 Fruits availability from different sources in East Khasi Hills District (in Kg)

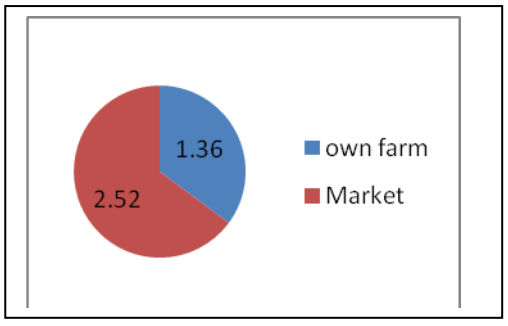


Fig.2 Vegetables availability from different sources in East Khasi Hills District (in Kg)

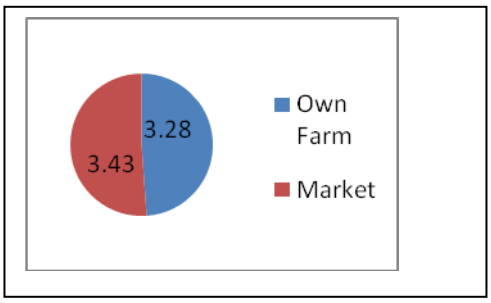


Fig.3.3 Fruits availability from different sources in West Jaintia Hills District (in Kg)

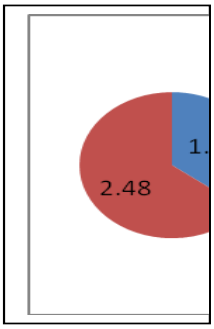


Fig.3.4 Vegetables availability from different sources in West Jaintia Hills District (in Kg)

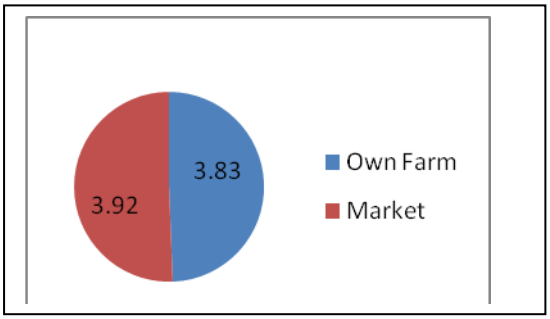


Fig.3.5 Fruits availability from different sources in West Garo Hills District (in Kg)

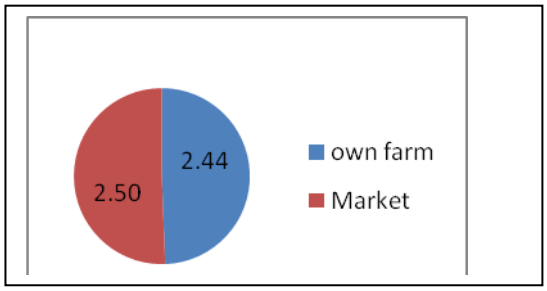
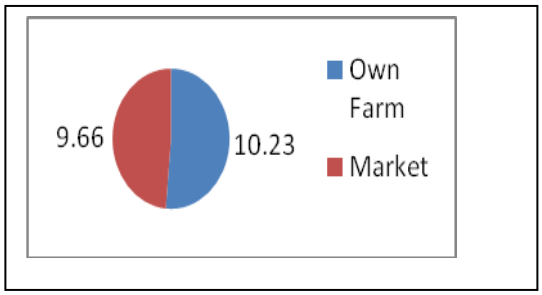


Fig.3.6 Milk availability from different sources in West Garo Hills District (in Kg)



West Garo Hills district

Fruits

Garo hills district has different types of fruits gown in their region. The main fruits were banana, mango, plums, pineapple, citrus fruits like mandarin, pumelo *etc*,.The fruits that were available in the district were banana, pineapple and mandarin during pre-monsoon, monsoon and post monsoon periods. The availability of these fruits were from own farm and market except mango where the availability was mainly through market. During pre-monsoon, the accessibility of households towards banana were 2.00 kg through own farm and 2.3 kg through market. During monsoon and post monsoon, the availability of mango were 2.59 kg from market and for mandarin it was 2.08 kg and 2.49 kg through own farm and market simultaneously, across each households (Table 6) (Fig. 5)

Vegetables

The Garo households mostly consumed varieties of vegetables across different seasons. The most common vegetables consumed across each household were cabbage, beans and mustard during Pre-Monsoon, Monsoon and post monsoon, respectively. Vegetables were made available through two important sources viz., own farm and market. The average availability during pre-monsoon, monsoon and post-monsoon were 3.73, 3.30 and 3.20 kg per households per month. It has been calculated that the average availability of vegetables per individual and across each households was 1.06 kg per month (Table 7). (Fig. 6)

The gap in calorie intake

In terms of fruits consumption, on an average, the intake of banana during pre monsoon period by an individual per month was 0.68 kg, 0.71 and 0. 96 kg, respectively. Banana was mainly consumed during this season as it was a peak season across all districts. Pineapple on the other hand was available in abundance and mainly consumed during monsoon period with an average consumption of 0.56 across each district. Whereas, during post monsoon period, mandarin or Khasi mandarin was mostly consumed across all districts with an average consumption of 0.76 kg each and 0. 95 kg, at East Khasi hills, west Jaintia and west Garo hills districts, respectively. On an average, 0.75 kg fruits have been consumed by an individual per month across each district.

The average intake of cabbage was 1.08 kg, 1.28 kg and 1.35kg in East Khasi Hills, Jaintia hills and west Garo Hills district, respectively. Overall, in Meghalaya, on average an individual consumed 1.24 kg of cabbage per month during pre-monsoon period when there was a boom harvest in terms of cabbage. During post monsoon, beans were prevalent in the study area and during the peak season, consumer consumed 1.16 kg across Meghalaya with an average consumption of 1.05, 1.25 and 1.17 kg at East Khasi Hills, Jaintia hills and west Garo Hills district, respectively. Post monsoon period was rich in mustard of which the households mostly consumed mustard above other vegetables with an average consumption per individual of 1.5, 1.25 and 1.18 kg, respectively across each district. By and large, 0.19 kg per person per month has been consumed by an individual in Meghalaya

Although, varieties of fruits and vegetables has been consumed across each districts, but, on an average, the average calories consumed across East Khasi hills, West Khasi Hills and West Garo hills district was 75.29, 91.16 and 91.16 Kcal/day. According to the FAO, an average requirement advised was about

400Kcal per individual per day of which, there was a deficit in the consumption by 324.71, 308.84 and 294.78 Kcal. Overall, there was a deficit by 309.45 Kcal in terms of consumption.

In conclusion the objectives of this paper emphasised on two main objectives, the availability of food fruits and vegetables to the households and the calorie intake provided to an individual per day. It has been found that a household mostly avail fruits and vegetables through their own farms and market. It has also been found that there was a large gap in the calorie intake among individuals across each district in the state. Thus, it is advised that proper awareness by the concern departments on the food intake and the importance of fruits and vegetables to the households has to be the priority. The state has already suffered from prevalence to acute malnutrition and stunting, hence it is required that the households should be the main priority of teaching towards the food consumption and the importance of fruits and vegetables in their daily diet. As the topography of the state is very suitable for fruits and vegetables, a cluster approach in the development of appropriate crops for certain areas has to be set off by the horticulture institutions for the welfare of the farmers and the farming households as a whole.

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