Seasonal and Regional Dimensions of Nutritional Stress among the Rural Poor in Bangladesh

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Introduction

Malnutrition, especially affecting the rural poor, continues to be a serious and wide-spread problem in Bangladesh [1-8]. Several studies conducted during the last three decades evidenced ever increasing prevalence of dietary inadequacy, despite the fact that aggregate food production increased manifold during the same period [9-14]. Continued process of landlessness and lack of employment opportunities in rural areas have forced many rural poor to migrate to different urban centres in search of employment [15, 16]. Seasonal decline in on-farm as well as off-farm employment opportunities also affects the rural poor which is considered to be a major cause of seasonal out-migration from rural areas [17]. However, little is known about the extent of nutritional stress the rural poor are confronted with, especially in those areas from where large number of people had already migrated to different urban centres, conceivably due to similar stress.

This study was undertaken to delineate the extent of dietary stress and its seasonal pattern prevailing in selected rural areas from where large number of people came to live in different slums of Dhaka city. The breadwinners from many households in these areas also migrate seasonally to different urban centres in search of employment.

Materials and Methods

Study locations

Based on preliminary information on rural out-migration [18], a number of areas were first identified and then three ecologically different locations were arbitrarily chosen for the study. Geographically the locations represent the Central, North-central and Southern regions of the country. The chosen locations were then visited and first hand information about the villages,

Bangladesh Journal of Nutrition, Vol. 9, Nos. 1 & 2, June 1996. Printed in Bangladesh. Institute of Nutrition and Food Science, University of Dhaka, Bangladesh.

including the migration patterns of the population were obtained. Two adjacent villages from each location were then selected for the study.

Location 1, situated in the central region of the country, is a low lying remote area of Madaripur district with no modern amenities in and around the study villages. One of the two villages in this location was hit by a severe tornado in mid-seventies, which took away all the movable properties of the people. Prior to the occurrence of the tornado the people of this area were primarily dependent on agriculture. After the tornado they started selling cultivable land for cash which eventually transformed them into virtually landless. Large scale out-migration from this area started since then.

In the North-central location in Sherpur district (location 2), the study villages are subject to annual flooding, and in most years floods cause moderate to severe damage to the standing monsoon crops. Large scale migration from this area was triggered by the 1974 devastating flood.

Location 3 is situated in the deltaic island district of Bhola in the mouth of the river Meghna. The two study villages are located on the flood protection embankment. People living on the flood protection embankment reportedly were land owning farmers in the past, many of whom were relatively large farmers. Due to continued process of river erosion, people were forced to take shelter on the flood protection embankment. Now they are mainly engaged in fishing and allied works.

Selection of households

Since the purpose of this study was to investigate the nutritional stress in a particular population group i. e. the rural poor it was necessary to identify households on the basis of certain defined criteria. The study locations were so chosen that they were predominantly inhabited by the rural poor. Even then not all households could be classified as poor. For the purpose of this study households with the following criteria were defined as rural poor :

- Landless agricultural and non-agricultural labourers;
- Marginal cultivators who frequently work as wage labourers;
- Seasonally migrate to different urban centres in search of employments;
- Kins or neighbours with similar socioeconomic background already migrated to different urban centres;

During preliminary visits to the selected villages all households fulfilling the above criteria were enumerated. Then 30 households from each village, with a total of 60 households from each location were randomly selected for the study.

In order to account for seasonal variability data were collected in two different seasons. Season 1 was chosen as a period of declined employment opportunities for the rural poor, and season 2, when prospects of employment are better.

Household information

Information on various parameters of household demographic and socioeconomic characteristics such as age, sex, family size and occupation of the household head, pattern of household expenditures; and environmental conditions, access to safe water, access to health care facilities etc. were obtained through a structured and pre-coded questionnaire.

Dietary intake

Household dietary intake was estimated by a combination of recall and weighing method for 3 consecutive days. Foods consumed were recorded on raw weight basis. Cooked foods were converted into their raw equivalents. Nutrient values were calculated using the local Food Composition Table [19].

Data analyses were done in the computer using dBase and SPSS software packages. Appropriate statistical treatments of data were done to determine the levels of significance in the observed inter-locational and seasonal differences.

Results

The housing and environmental sanitary conditions of the study population are given in Table 1. About 76% of the observed population live in thatched houses with bamboo or jute stick fencing. The housing condition was the worst in location 3. In this location some of the houses had roof tops covered with coconut leaves only with extremely dilapidated fencing of the same materials. Nearly 11% of the households however, own tin-roofed houses. The housing conditions in location 1 were relatively better than the other two places. Most of the households (77%) live in single roomed houses and 57% of them do not have any kitchen. They usually cook their food in the open space or in the living room on wet days. As to the access to safe water, over 85% of the households use hand tube wells for drinking water. But polluted water

Table 1. Housing, environmental, sanitary conditions and health care practices by location (% distribution of households)

	Location 1	Location 2	Location 3	All
Housing type :				
Semi pucca	1.7	1.0	1.3	1.3
Tin roofed	12.8	8.7	10.1	10.7
Thatched	72.6	88.5	63.3	75.7
Others	12.8	1.9	25.3	12.3
Number of rooms :				
No room	2.6	1.0	1.3	1.7
One room	71.8	70.2	93.7	77.0
Two rooms	17.9	27.9	5.1	18.0
More than 2 rooms	7.7	1.0	0.0	3.3
Whether owns kitchen :				
Non-response	1.7	2.9	3.8	2.7
Owns kitchen	51.3	51.9	8.9	40.3
No kitchen	47.0	45.2	87.3	57.0
Where cooked :				
Cooks in open	73.5	57.7	12.7	52.0
Cooks in living room	25.6	39.4	87.3	46.7
Shares with others	0.9	2.9	0.0	1.3
Type of fuel used :				
Fire wood	11.1	19.2	16.5	15.3
Straw	88.0	71.2	81.0	80.3
Others	0.9	9.6	2.5	4.3
Sources of drinking water :				
Tube well	89.7	71.2	97.5	85.3
Well	0.0	19.2	0.0	6.7
Other	10.3	9.6	2.5	8.0
Latrine facilities :				
Kutcha	64.1	40.4	58.2	54.3
Open space	35.9	59.6	41.8	45.7
Garbage disposal :				
Fixed place	24.8	8.7	7.6	14.7
No fixed place	75.2	91.3	92.4	85.3
House lighting :				
Lantern	8.5	1.0	0.0	3.7
Kupi	91.5	99.0	100.0	96.3
Treatment during illness :				
Govt. or Charitable hospital/clinic	12.8	16.3	0.0	10.7
Private doctor/quack	34.2	10.6	50.6	30.3
Traditional	53.0	73.1	49.4	59.0
Washing after defeacation :				
Non response	1.7	1.9	2.5	2.0
Water only	12.8	5.8	5.1	8.3
With soil/ash	81.2	92.3	92.4	88.0
With soap	4.3	0.0	0.0	1.7

Table 2. Mean energy and nutrient intake (per capita per day ± SD) by season.

Energy/Nutrients	Season 1 (Jan - Feb)			Season 2 (May - June)		
Energy (kcal)	1460	±	506	1728	±	492
Protein (gm)	35.9	±	14.0	40.5	±	12.9
Fat (gm)	5.6	±	3.2	8.4	±	7.0
Carbohydrate (gm)	315.2	±	108.0	372.2	±	104.7
Calcium (mg)	242.0	±	141.0	239.0	±	169.0
Iron (mg)	27.0	±	14.0	25.8	±	11.3
Vit. A (IU)	17.0	±	55.1	122.4	±	664.5
Carotene (mcg)	4378.5	±	5013.9	5725.3	±	6412.7
R. E. (mcg)	735.0	±	835.0	991.0	±	1092.0
Thiamine (mg)	1.07	±	0.43	1.22	±	0.37
Riboflavin (mg)	0.43	±	0.25	0.47	±	0.20
Niacin (mg)	15.80	±	5.36	18.49	±	5.16
Vit. C (mg)	27.0	±	22.0	24.01	±	21.0

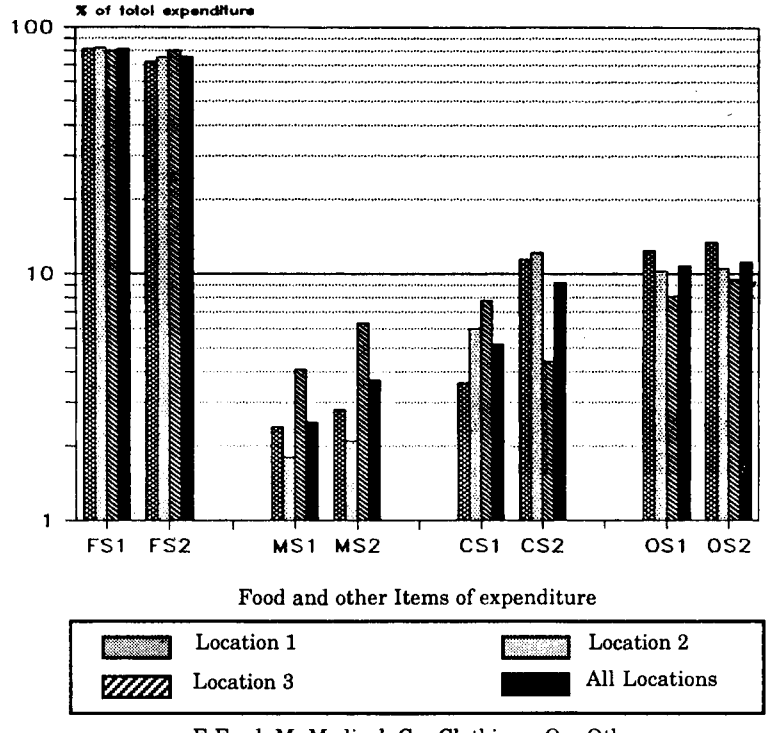
Table 3. Mean per capita energy and nutrient intake by season by location.

Energy and	Season 1 (Jan-Feb)			Season 2 (May-June)		
Nutrients	Location 1	Location 2	Location 3	Location 1	Location 2	Location 3
Energy	1662	1449	1276	1850	1790	1538
(Kcal)	± 526	± 506	± 413	± 355	±572	± 477
Protein	40.2	36.2	31.6	42.3	40.0	39.1
(gm)	± 15.8	± 14.7	± 11.9	± 10.3	± 13.7	± 14.5
Fat (gm)	6.0	6.8	4.3	9.2	7.7	8.4
	± 2.5	± 3.5	± 3.1	± 5.6	± 4.4	± 9.9
Carbo-	359	310	278	399	390	327
hydrate (gm)	± 113	± 107	± 98	± 75	± 123	± 96
Calcium	314	194	218	245	285	186
(mg)	± 130	± 111	± 150	± 127	± 207	± 150
Iron (mg)	35.2	24.9	21.0	30.6	24.9	21.9
	± 16.0	± 12.2	± 8.7	± 13.0	± 10.0	± 9.3
Vit-A. RE	1211	366	618	1538	1127	286
(mcg)	± 1066	± 411	± 630	± 1039	± 1219	± 462
Thiamine	1.05	1.23	0.92	1.31	1.25	1.09
(mg)	± 0.35	± 0.54	± 0.32	± 0.30	± 0.41	± 0.38
Ribo-	0.41	0.54	0.34	0.51	0.49	0.40
flavin (mg)	± 0.19	± 0.33	± 0.13	± 0.17	± 0.22	± 0.18
Niacin	16.84	16.52	14.12	19.79	18.83	16.80
(mg)	± 5.1	± 5.9	± 4.7	± 3.7	± 6.0	± 5.1
Vit C (mg)	44.0	22.3	14.7	24.8	37.0	10.9
	± 27.5	± 13.1	± 10.5	± 19.9	± 23.5	± 10.6

from ponds/canals/ditches is used for bathing and washing, and often for cooking purposes. Latrine facilities are very poor. Fifty four per cent of the households use 'kutcha' latrines and the remaining 46% defeacate in the open space. Garbage disposal practice in all the three areas is poor. More than 85% of households do not have any fixed place for garbage disposal.

Health care practices of the observed population groups show that well over half the households (59%) are still dependent on traditional healers for their treatment. Some 30% go to private practitioners. Most of these private practioner are, however, quacks, dispensing modern medicines. Very few of the rural poor go to the distant rural health centres for treatment. Most of the people (88%) wash their hand with soil or ash after defeacation.

Figure 1 shows the household expenditure patterns in the two seasons observed. Ecological differences in expenditure pattern are



F-Food; M=Medical; C = Clothings; O = Other
S1 and S2 indicats season 1 and season 2

Figure 1. Seasonal Pattern of Household Expenditue

apparent. On average food accounts for over 80% of the total household expenditure in season 1 which declines to less than 76% in season 2. It is obvious that as the total household income of the low income groups increases, the proportion of income spent on food decreases. Percentage decline in food expenditure in season 2 demonstrates the effect of increased household income due to greater employment opportunities during this season.

Table 2 shows the mean intakes of energy and nutrients in the two seasons studied. Although the overall dietary intake is poor in both the seasons observed seasonal variations in dietary intake are quite marked. Compared to season 1 energy and nutrient intakes are substantially higher in season 2. The mean per capita energy intake increased from 1460 kcal in season 1 to 1728 kcal in season 2. Seasonal differences in the intake of energy and protein were statistically significant ($P < 0.05$). Intake of other nutrients follows more or less the same pattern as that of energy and protein.

Table 3 shows the three days mean dietary intakes by location. Overall dietary intakes in all the three locations were poor, and the situation in location 3 was the worst. Energy and nutrient intakes were far below the acceptable levels which are also lower than the overall national dietary intake levels observed in other studies [3, 4]. Significant differences among the locations studied are indicative of regional variations in the dietary intake. Seasonal variations within individual locations, except location 1 are also apparent. Significantly higher intakes of energy, protein and fat were observed in season 2 in all the three locations. Although the overall dietary intake markedly improved during season 2 in all the locations, the improvements were not sufficient enough to meet the desirable levels of intake.

In both the seasons observed the overall dietary intake in location 1 was comparatively better than in the other two locations and the situation in location 3 was the worst. Significant difference ($P < 0.05$) in dietary energy intake between location 1 and the other two was observed during season 1. During season 2 the dietary intake in both locations 2 and 3 improved significantly and the differences between location 1 and 2 were minimal. With regard to location 3 however, although the situation improved quite markedly the overall dietary intake was substantially lower than in the other two locations.

In season 1 vitamin A intake in location 1 was significantly higher ($P < 0.05$) than that in the other two locations. During season 2 vitamin A intake increased markedly in both locations 1 and 2. While in location 1 the increase was of the order of 27%, it was more than three times in location 2, and the difference between these two locations disapp-eared during season 2. In location 3, on the other hand, vitamin A intake decreased to an extremely low level in season 2 and it was not even half the amount of intake in season 1. It may be noted here that in this location season 2 was the peak period for fish catch (the main economic activity) when the availa-bility of green leafy vegetables also declines. Moreover, increased avai-lability of fish leads to its increased consumption which replaces part of vegetables that would otherwise be consumed. Similar seasonal pattern in the intake of fish and food sources of vitamin A was evidenced during the 1961-62 National Nutrition Survey [8].

Discussion

The dietary study presented in this paper was undertaken to delineate the seasonal nutritional stress among the rural poor in three ecologically different settings of Bangladesh. The overall nutrition situation of the population groups studied is grave. Both qualitative and quantitative deficiencies in food intake were observed. The mean energy intake in all the three areas was lower during season 1 when employment opportunities decline due to slackening of agricultural activities. The inter-locational difference is also noteworthy. The situation in location 3 was the worst. Protein intake follows more or less the same locational and seasonal pattern as that of energy. Dietary fat intake was very low in all the areas.

One major fact that came out in this study is about the traditional notion about seasonality. In Bangladesh it has long been held that the period that follows 'aman' (the principal rice crop) harvest is the period of relative plenty, and hence reduced nutritional stress for all population groups. It is important to note that the seasonal pattern of relative plenty or shortage are not the same for all population groups. The period of relative plenty for the farmers or others who are not dependent on daily wage may, in fact, be the period of nutritional stress for the day labourers. This study revealed that January-February, which is the post-harvest period relative to the principal rice crop, 'aman', is in fact the period

when employment opportunities for the rural landless agricultural labourers decrease due to slackening of agricultural activities. The traditional pre-or post-harvest seasons may be of no nutritional significance for those rural poor who are not directly dependent on agriculture. The lean season in location 3 where people are mainly dependent on fishing, and when fish catches are small, incidentally coincided with the lean season (January-Fabruary) in the other two locations. The period of June-July is the peak season for fishing in this location.

Since mid-1970s national food grain production has been increasing at a rate close to 3.5% a year[20]. This increase in food production demands higher labour requirements of nearly 1.5% a year. But the increase in the rural labour force has been reported to be about 3% a year[21]. Consequently the volume of unemployment in rural areas increased further. This resulted in further decline in the daily wage rate in real terms. Therefore, the real per capita income failed to cope with the increase in market prices, thus further increasing the rate of rural out-migration.

The study revealed an alarming nutrition situation among the landless agricultural and non-agricultural workers in rural Bangladesh. Unless pragmatic measures are undertaken to increase employment opportunities in rural areas through strengthening rural social and economic infrastructure, the overall nutritional situation of the rural poor will further deteriorate, which will result in increased overflow of rural poor to different urban centres. Urban centres are already confronted with coping with many social, economic and health problems prevailing in urban slums and squatters. Measures should be taken to check rural- urban migration by providing the rural poor with income generating activities. Emphasis should also be given in targeting programmes to the ecologically more distressed or disadvantaged regions. The traditional notion about seasonality appears to be of little nutritional significance to the daily wage earners. While seasonally targeting interventions, periods of reduced employment opportunities and also their ecological pattern should be kept in view.

Summary

This study was undertaken to delineate the seasonal and ecological (regional) variations in the dietary in take of the rural poor. Three locations were purposively chosen for the study from three

ecologically different regions of the country.

Household dietary intakes were estimated by a combination of recall and weighing method for three consecutive days in two different seasons. Season 1 was chosen as a period of reduced employment opprtunities for the rural poor and season 2 as a period when employment opportunities are better.

The study revealed that the overall dietary intake of the rural poor is very poor. Rural poor are also subject to seasonal stress in terms of employment opportunities and hence dietary intake. There are substantial seasonal differences in the dietary intake of rural poor. In season 1 the mean dietary energy intake was 1460 Kcal/p/d which increased to 1728 kcal/p/d in season 2. The seasonal pattern of intake of protein and other nutrients is more or less similar.

The study revealed an alarming situation, in terms of inadequacy in the dietary intake of rural poor, especially when employment opportunities for land less agricultural wage labourers become scarce. The seasonal stress encountered by the rural wage earners may not necesarily coincide with what is traditionally considered as the lean season in Bangladesh. There are also ecological variations in the seasonal stress in dietary intake of rural poor. Programmes to address the rural poor should be seasonally as well as ecologically targeted.

Acknowledgement

This study was conducted as part of a larger study supported by an FAO grant which is gratefully acknowledged.

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