RESEARCH REPORTS

(2003)

ECONOMIC STUDIES

VOL – **XX**

RESEARCH AND EVALUATION DIVISION
BRAC CENTER, 75 MOHAKHALI C/A
DHAKA-1212, BNAGLADESH

ECONOMIC STUDIES

VOL-XX (2003)

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Patterns and Trends in Food Consumption in Poor Urban and Rural Households in Bangladesh

Cluster Analysis of Household Survey Data

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September 2003

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Abstract

Objectives: To identify groups within rural and urban Bangladesh demonstrating similar socio-economic characteristics and food consumption patterns.

Design: A household survey was conducted in a variety of locations in Dhaka Division to collect information from rural, and urban household. Cluster analysis was then used to group the households.

Setting: Dhaka Division

Results: The analysis highlighted 5 clusters. Cluster 1is categorised as an urban lifestyle group, with a mixed poverty profile and a transforming consumption pattern. Cluster 2 is the rural rich also experiencing a transforming consumption pattern. Cluster 3 is the poor with a traditional consumption pattern that appears to be deteriorating in balance. Cluster 6 is the rural less poor group with a traditional consumption pattern. Cluster 5 is comprised of poor female-headed households with a traditional consumption pattern, excluded by poverty and status from any dietary transition.

Conclusions: Household exhibiting a transition in food consumption towards market sourced, packaged, and new food items tend to be either urban in nature or from households classified as rich/surplus.

Not only is the diet of the poor not diversifying into these "new food items" but also the diversity of food from traditional sources is declining, with an increased reliance on rice and very low expenditure on high protein food items.

There is a distinct dietary pattern for slum dwellers, but female-headed households do share this pattern and appear to be excluded from any transition by poverty and cultural barriers.

Introduction

Spatial and poverty profile consumption patterns have been well documented in Bangladesh. This project attempts to expand on this information by adding information such as, the geographical source of the food, the market source of the food, perceived changes in consumption patterns, and consumption of "new" food items entering diets e.g. packaged and processed food items.

Changes to consumption patterns will clearly have nutritional implications, but will also have wider implications for the functioning of the food system and for producers. Employment may be created in a food system with increasing market dependency, more distant sourcing of food items, and higher consumption of processed and packaged goods. The nature of the supply and distribution networks is likely to change; this could have implications on developments in the retail sector and how producers transact in the future.

The aim of the cluster analysis is to highlight specific socio-economic groups exhibiting similar consumption patterns. This enables us to examine the nature of these consumption patterns and to ascertain characteristics that determine whether consumption patterns are changing within households. Trends might be visible through the poverty profile, suggesting that as real incomes rise there will be a widespread transition in consumption patterns. It is also interesting to see if there is growing inequality in consumption patterns with only the rich able to make a transition and the poor retrenching to an even more imbalanced diet.

Trends could be highlighted along the urban rural transect, and as urbanisation continues and infrastructure improves urban lifestyle patterns may disperse more widely. Certain groups may be more disadvantaged in the food consumption transition, if for example they are more or less market dependent, or if they gain income from work in the food system.

Method

Setting

The study aimed to provide a snapshot of one area of Bangladesh rather than a broad overview, which may be developed later. Dhaka Division was selected with two districts, Tangail and Kishoregonj, chosen to be representative of high and low vibrant rural areas. In addition char areas in Bhapur upazila and slums in Dhaka city were surveyed.

Study Design

In each district one high vibrant and one low vibrant upazila and in each upazila four villages were selected for sampling. These were selected to provide a range of villages close to and remote from the upazila centre. In each village a total of 15 households were selected by a proportionate random sampling method.

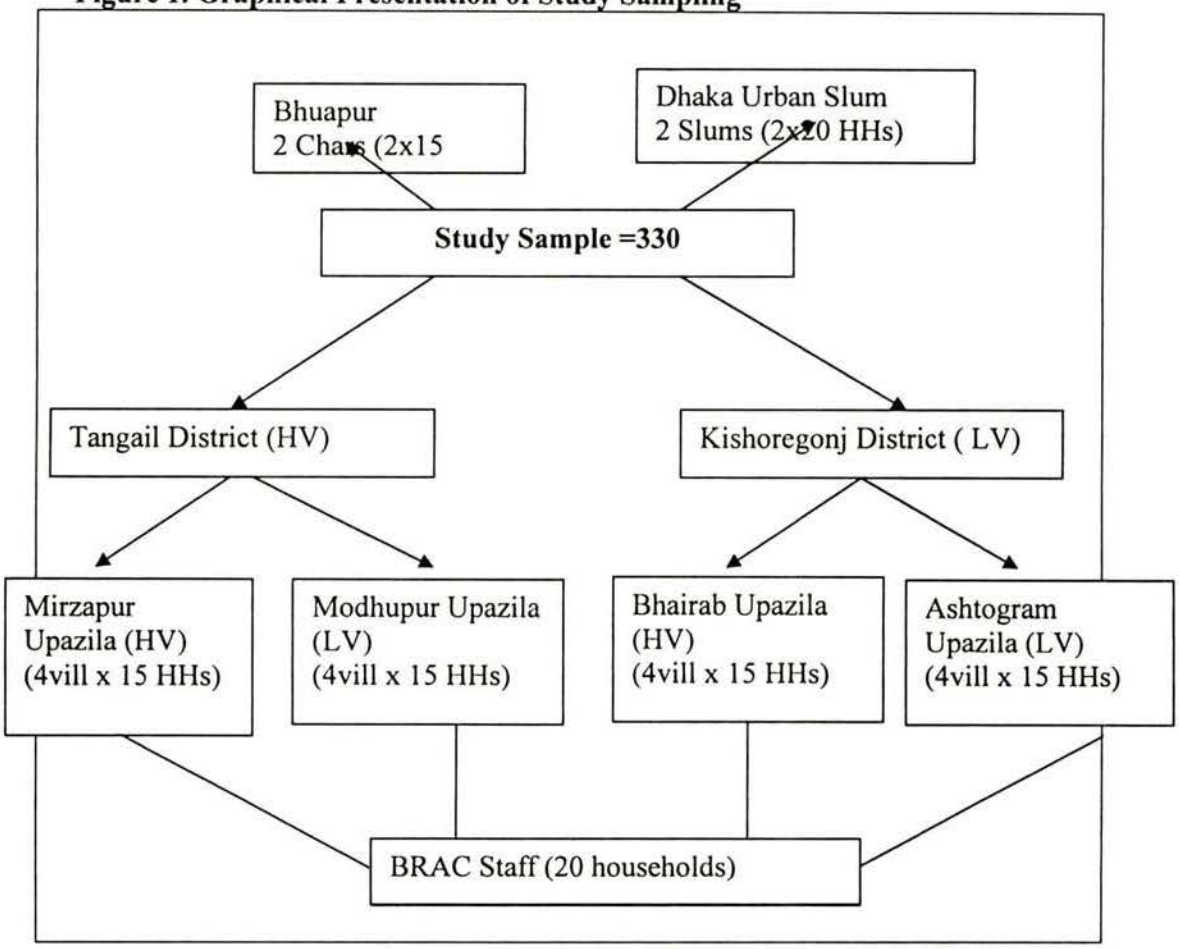
In every village wealth-ranking exercises were conducted to assess the number of poor, middle and rich households living in the village and to locate their residences. Although proportionate random sampling was used, it was important to consider at least 3 households from a particular poverty group as a minimum sample.

Consumptions patterns and vulnerability of the poor was an important focus of the study and consequently samples were taken from those living in risk prone areas. These included char land samples from Bhuapur upazila and households from two slums of Dhaka city. As a proxy for a middle income group 20 BRAC staff households residing in upazila centres were selected. Figure 1 gives a graphical presentation of study sampling.

Data Analysis

Cluster analysis was used to identify consumption groups amongst households within the study. More commonly used techniques such as regression analysis were not considered suitable due to the co-linearity among the variables of interest. The clustering technique used was the hierarchical agglomerative method available in SPSS. Ward's method was used, this has been found to be the most robust clustering method using a similarity matrix based upon squared Euclidean distances.

Figure 1. Graphical Presentation of Study Sampling



A number of variables were entered into the cluster; these can be grouped into four types.

Household variables
Number of members
Dependency ratio
Household head (HH) sex
HH age
HH education
Land per person

Expenditure variables
Total food expenditure per person (pp)
Rice expenditure pp
Wheat expenditure pp
Veg. expenditure pp
Animal protein expenditure pp
Eating out expenditure pp
New food items expenditure pp

Consumption Pattern Variables
Frequency of consumption of animal protein
Frequency of consumption of packaged items
Score for perceived changes in consumption
Score for market dependence of consumption
Score for geographical source of food

Income source variables
Score income from agriculture
Score income from wage emp.
Score " " small business
Score income from services
Score income from remittances

Continuous variables were standardised by converting to the standard normal deviate (Z scores). A stepwise fusion of cases based upon the squared Euclidean distances was computed. Statistical comparisons were made across the clusters for reported socio-economic, and consumption variables in the sample.

Results

Five clusters were identified and the breakdown shown in Table 1

Table 1. Summary of the Cluster

CLUSTER	FREQUENCY	PERCENTAGE	VALID %	CUMULATIVE %
1	53	16	16.4	16.4
2	55	16.5	17.0	33.43
3	117	35	36.2	69.6
4	73	22	22.6	92.2
5	25	7.5	7.7	100
Total	323	97	100	
Missing	9	3		
Total	332	100		

At this level of clustering all groups had a reasonable number of cases; a number of cases were removed from the analysis to avoid single case clusters. As can be seen from Table 1 cluster 3 was the largest grouping with just over one third of the cases, whilst the smallest group was cluster 5, but this still contained 25 cases.

Cluster Statistics.

Table 2 provides the break down of the clusters in terms of the survey sample groups together with the percentage make up of the cluster and the percentage of each sample found in the cluster. The respondents were asked to give an assessment of their poverty status, whether they were deficit, breakeven or surplus households and the clusters are analysed in Table 3 on the basis of this poverty profile. Table 4 provides the cluster "means" across the range of variables used for the clustering analysis, except for the sex of the head of household shown in Table 5.

Table 2 Cluster groups by sample areas

		RURAL			URBAN	BRAC	TOTAL
		Low vibrant village	High vibrant village	Char	Slum	Brac staff	
Cluster1	Count	8	9	1	18	17	53
	% Within cluster	15.1%	17.0%	1.9%	34.0%	32.1%	100.0%
	% Within sample	6.9%	7.8%	3.3%	46.2%	73.9%	16.4%
Cluster2	Count	28	21	1	1	4	55
	% Within cluster	50.9%	38.2%	1.8%	1.8%	7.3%	100.0%
	% Within sample	24.1%	18.3%	3.3%	2.6%	17.4%	17.0%
Cluster3	Count	40	55	12	10		117
	% Within cluster	34.2%	47.0%	10.3%	8.5%		100.0%
	% Within sample	34.5%	47.8%	40.0%	25.6%		36.2%
Cluster4	Count	32	25	15		1	73
	% Within cluster	43.8%	34.2%	20.5%		1.4%	100.0%
	% Within sample	27.6%	21.7%	50.0%		4.3%	22.6%
Cluster 5	Count	8	5	1	10	1	25
	% Within cluster	32.0%	20.0%	4.0%	40.0%	4.0%	100.0%
	% Within sample	6.9%	4.3%	3.3%	25.6%	4.3%	7.7%
Total	Count	116	115	30	39	23	323
	%	35.9%	35.6%	9.3%	12.1%	7.1%	100.0%

Table 3 Cluster Groups by Poverty Status

		POVERTY			TOTAL
		Poor/deficit	Middle/breakeven	Rich/surplus	
Cluster 1	Count	16	26	11	53
	% Within cluster	30.2%	49.1%	20.8%	100.0%
	% Within sample	9.5%	28.6%	17.2%	16.4%
Cluster 2	Count	3	15	37	55
	% Within cluster	5.5%	27.3%	67.3%	100.0%
	% Within sample	1.8%	16.5%	57.8%	17.0%
Cluster 3	Count	103	14		117
	% Within cluster	88.0%	12.0%		100.0%
	% Within sample	61.3%	15.4%		36.2%
Cluster 4	Count	26	33	14	73
	% Within cluster	35.6%	45.2%	19.2%	100.0%
	% Within sample	15.5%	36.3%	21.9%	22.6%
Cluster 5	Count	20	3	2	25
	% Within cluster	80.0%	12.0%	8.0%	100.0%
	% Within sample	11.9%	3.3%	3.1%	7.7%
TOTAL	Count	168	91	64	323
	% Within cluster	52.0%	28.2%	19.8%	100.0%

Table 4 Socio–economic variables (means by cluster)

CLUSTER		1	2	3	4	5
Means						
Household variables						
Number of HH members	Number	4.55	7.58	4.94	6.48	4.32
HH head age	Years	38.06	47.64	44.46	44.77	36.16
HH head education	Years	7.55	7.14	2.29	3.23	2.16
Total land area pp	Decimals	20.82	89.65	6.40	22.86	1.27
Expenditure variables						
Total expenditure pp	TK	78.82	134.23	52.58	64.18	55.55
Rice expenditure pp	TK	20.53	30.35	22.52	24.14	19.82
Veg expenditure pp	TK	10.94	15.92	8.06	8.62	9.17
Eating out expend pp	TK	4.72	3.21	0.91	1.23	0.86
Wheat expenditure pp	TK	0.96	0.51	0.37	2.11	0.73
Animal protein expenditure pp	TK	15.51	38.537	7.42	11.33	7.22
New Food expenditure pp	TK	2.32	5.98	0.29	0.37	0.67
Consumption Variables						
Consumption of animal protein	% Freq last 3 days	2.15	3.11	1.46	2.07	1.52
Consumption of packaged items	%Freq last 3 days	0.58	1.51	0.15	0.25	0.16
Score for changing consumption	*	4.04	12.87	0.50	6.57	0.92
Score for market dependency	**	35.30	28.69	27.80	24.23	29.76
Score for geographical sourcing	***	20.04	14.85	11.25	10.12	18.84
Income Source Variables						
Score for income from agriculture	****	0.79	3.18	1.60	5.18	0.24
Score for income from wage employment		0.36	0.07	2.03	0.52	1.56
Score for income from service sector		2.70	0.6	0.14	0.34	0.76
Score for income from remittances		0	0.47	0	0.014	0
Score for income from total small business		1.34	1.29	1.43	0.75	0.76

Table 6 shows the levels of electrification to households in the clusters and Table 7 gives the distance to market centres and major roads; these variables were not used in the original clustering, as there was a higher percentage of missing data for these variables.

Table 5 Cluster groups by household head Sex

	HOUSE HEAD SEX		TOTAL
	Male	Female	
Cluster1	52	1	53
Cluster 2	54	1	55
Cluster 3	117		117
Cluster 4	73		73
Cluster 5		25	25
Total	296	27	323

Table 6 Cluster Group by Electrification

	ELECTRICITY		TOTAL
	YES	NO	
Cluster1	31	9	40
Cluster 2	35	19	54
Cluster 3	22	92	114
Cluster 4	13	60	73
Cluster 5	11	7	18
	112	187	299

Table 7 Cluster group by Distances to Market Centres.

	UPAZILLA DISTANCE	BAZAAR DISTANCE	MAJOR ROAD DISTANCE
Cluster 1	3.7	1.7	1.6
Cluster 2	7.1	1.9	4.2
Cluster 3	7.6	2.4	3.8
Cluster 4	8.9	3.1	5.8
Cluster 5	4.9	2.1	2.0
Total	7.1	2.3	3.9

The Clusters

Cluster 1: Urban lifestyle / transforming consumption pattern

Cluster 1 contains 16% of the total survey sample and is predominantly made up of households in an urban context. This group contains 74% of the BRAC staff sample, that live in upazila centres and 46% of the urban slum dwellers. Only a small percentage of the rural samples appear in this group. In terms of poverty, it is a mixed group with nearly 50% in the middle/breakeven group, and splits of 30% poor/deficit and 20 % rich/surplus households.

The households are relatively small with young household heads and high education levels (clearly influenced by the BRAC staff grouping). Household heads are

predominantly male. Their landholding is average, though is clearly masks differences within the group, where the slum dwellers will have very limited access to land. The majority of this cluster has access to electricity

The group has the second highest total expenditure on food but the second lowest expenditure on rice, this is indicative of the diversification of the diet in the urban lifestyle. Expenditure on vegetables, animal proteins, and new food items are the second highest. The expenditure on eating out is the highest. This high expenditure on food could be indicative of the high market dependence of this group of primarily urban dwellers. This is supported by the source of food data; this group is the most market dependent, with food being sourced from the most geographically dispersed area.

The consumption of animal proteins and packaged items is higher than other clusters, and this group contains a large proportion of slum dwellers that one would expect to be reducing these figures. One might expect this urban grouping to have a rapidly changing consumption pattern, however the perception of increasing consumption ranks only third, this again could be the influence of the slum dwellers.

Households in this group on average live closer to upazila centres and bazaars and this is consistent with this group being more market dependent and consuming more new food and packaged items.

Income in this cluster is primarily from service jobs and small businesses, which is entirely consistent with the profile of the cluster.

This group appears to have a mixed composition, slum dwellers, educated BRAC staff, and some rural dwellers. The consumption pattern is one of an urban lifestyle, with high market dependency, increased consumption of non–traditional items, and higher levels of eating out. The fact that rural household are appearing in this group does indicate that changing consumption patterns are entering into rural areas both in low and high vibrancy villages.

Cluster 2: Rural rich/ transforming consumption pattern

Cluster 2 contains 16.5 % of the survey sample and is predominantly rural. The majority of the cases come from both low and high vibrancy villages with a number from the BRAC staff sample; the char dwellers are barely represented in the group. The poverty profile is mostly middle/breakeven and rich/surplus in nature, 67% are classified as rich/surplus households.

These households are the largest, household heads are the oldest, with high levels of education, and all but one male. Importantly this grouping has the largest landholding per person by a large margin.

Expenditure on food is the highest in all categories, except eating eat and wheat flour. These could be explained by Cluster 1 having the more urban lifestyle, and the home preparation of wheat based products no longer practised by the less poor. As could be expected from this wealthy group, consumption of animal protein and packaged items is the most frequent. The group also demonstrates the strongest perception that consumption is increasing.

This group only has average scores for market dependency and geographical sources of food. This is consistent with the large landholding and food being sourced from home production. Nevertheless food expenditure is still high in this group, illustrating that this group is spending their surplus on market-sourced food and exhibiting features of the transitory urban food consumption pattern.

Households in this cluster are on average not close to upazila centres or fixed bazaars, which is consistent with the rurality of this group. However it does indicate that a more urbanised consumption pattern is possible in rural areas, if financial resources allow.

The major income sources are agriculture and small businesses and this is consistent with the group profile of larger landowners, produce for home consumption but having surplus for market sourcing of food.

This group is clearly the rural rich with landowners and business people. The majority of income appears to be based on agricultural production. However, what is interesting is that consumption patterns are changing within this group and new food items are entering the consumption pattern. Again this is evidence that for a certain group of rural dwellers food consumption transition is possible.

Cluster 3: Rural poor/ Traditional consumption pattern

Cluster 3 is the largest accounting for one third of the sample. It is predominantly rural, with the inclusion of 40% of the char sample. Urban dwellers are in the group with a quarter of the slum sample in the cluster. The group is overwhelmingly poor with 88% falling into this category.

The size of the household and the age of the household head are average for the sample, with all the household head being male. The education levels are the lowest and land per person is low. Most of the households do not have access to electricity

The expenditure on food items is very low and in conjunction with cluster 5 often records the lowest levels of expenditure. Only rice expenditure is slightly higher, suggesting the traditional nature and the imbalance of the diet in this cluster. Expenditure on new food items is very low, and the percentage of households consuming animal protein or packaged good is minimal. The score for perception of change in the diet is nearly zero suggesting that there were as many decreasing perceptions recorded as increasing consumption for the various food items in this category.

The group has low levels of market dependency and low outside sourcing, this is no doubt influenced by the rural nature of the cluster. This indicates that some food items are coming from own production, but this is limited by levels of land holding. This group can't subsist on home production and have to rely on the market for some food (the majority for the slum dwellers) but they have limited financial resources and are not able to purchase high value products or new food items and the diet is increasingly concentrating on rice. Cheaper food from market sources, requiring better functioning markets would assist this group.

The cluster is relatively distant from upazila centres and bazaars reflecting the rural nature of this cluster, though the influence of the slum dwellers may have reduced these figures.

This cluster has diversified income sources, with agriculture, wage employment and small businesses contributing to income. This is consistent with the poor adopting diversified livelihood strategies as coping mechanisms.

This group appear to be the majority of the poor, predominantly rural but including some urban poor. Their consumption pattern is constrained by their poverty and they are unable to transform their consumption patterns to include modern food items. Consequently, it is a traditional consumption pattern with evidence that it is being even more imbalanced.

Cluster 4: Rural middle income/ traditional consumption pattern

Cluster 4 contains 22% of the survey sample and is rural in nature, containing 50% of the char dwellers. It has a mixed profile in terms of poverty status with the largest percentage in the middle-income group.

The cluster has the second highest household size and age of household head. The educational level of the household head is second lowest, and all household heads are males. The landholding is larger than cluster 3 but only a quarter of cluster 2. This is profile appears to show the middle income/breakeven rural grouping, as opposed to cluster 2 "the rich" and cluster 3 "the poor"

Expenditure on food items in this group is higher than cluster 3 across the range of food items, reflecting the middle-income nature of this group. Interestingly expenditure on wheat flour is much larger in this cluster than the others. New food expenditure is low in this group, suggesting that although this group has slightly more surplus for market expenditure it is still adopting a traditional consumption pattern, with additional expenditure being spent on animal protein and vegetables.

This group is also the most distant from upazila centres and bazaars and major roads, this could help to explain the traditional nature of their consumption pattern in spite of the less poor profile. It may also be a result of this group containing no slum dwellers.

This group has the lowest market dependency and the highest levels of food sourced locally. This group also demonstrate a high perception of increasing consumption, yet new food and packaged items do not register high levels of consumption. Consumption appears to be increasing but in the traditional locally produced and sourced food items.

This profile links with the incomes sources for this group, which are predominantly from agriculture.

This cluster appears to be the less poor rural dwellers who are able to provide a significant amount of their consumption from home production and do not become too involved in the market and they are more distant from markets. Consequently their consumption pattern is traditional with little evidence of the introduction of new items. Unlike cluster 3 consumption appears to be increasing and not retreating to a concentration on rice.

Cluster 5: Rural & urban poor female headed households / traditional consumption pattern

Cluster 5 contains 7.5% of the total survey sample, it has a mixed rural/urban profile, but does contain around a quarter of the slum dwellers and only a small percentage of the total rural sample. The group is poor, with 80% being recorded as poor or deficit households.

This cluster has the smallest household size with the youngest and least educated household heads. The most interesting finding is that this cluster is entirely comprised of female-headed households. The total land area per person is very low and can be considered landless. More than half of the households do have access to electricity, reflecting the number of urban dwellers.

Expenditure on food is low and the cluster records the lowest expenditure on rice, animal protein and interestingly eating out. It might have been expected that this group with a high proportion of urban dwellers would record higher expenditure on eating out. This is explained by the female headedness of this cluster, females do not eat out at the restaurants and stalls and consequently consumption patterns amongst this group are different from other urban poor groupings. The level of consumption of packaged items and new foods is also low.

No overall change in consumption of food items is perceived again suggesting equal numbers perceiving food consumption declines. This cluster is the second most market dependent and sources food from the most dispersed area, characteristic of the urban nature of the cluster. When this high market dependency and the low expenditure on food are combined, this is clearly a very vulnerable grouping. The cluster is relatively close to markets and major roads

Income sources are diversified, with wage employment, service and small business sectors the most important, very little income is from agricultural sources.

This group could be classified as poorer version of cluster 1, with a mixed rural/urban group profile, however this cluster displays limited transformation in the consumption pattern due to higher poverty levels and the fact that these are female headed households and have to continue with a more traditional lifestyle.

Discussion.

The cluster analysis has highlighted distinct groups whose structure in relation to socio-economic status and consumption profiles are fairly intuitive. Household that are exhibiting a transition in food consumption towards market sourced, packaged, and new food items tend to be either urban in nature or from households classified as rich/surplus.

Modern processed and packaged items are entering the rural diet, illustrating that distribution networks are making these goods available in rural areas but they are not entering the diets of the rural poor. They are primarily consumed by break even and

surplus households living close to bazaars and upazila centres. Not only is the diet of the poor not diversifying into these "new food items" but also the diversity of food from traditional sources is declining, with an increased reliance on rice and very low expenditure on high protein food items.

There is a distinct dietary pattern for slum dwellers, but this not shared by all households, female-headed households do share the same pattern of higher expenditure on eating out and snack food items. This cluster bears similarities with Cluster 3 in the study by Pryer et al, which illustrated this distinct cluster with large numbers of female-headed households. This study noted that this grouping had the worst nutritional status and the highest number of days lost through illness (diarrhoea).