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Effect of Capacity Building on Household Expenditure and Nutrition of Farmers in Bangladesh

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Abstract: The present study was undertaken to determine the effect of capacity building on household expenditure and nutrition of farmers in Bangladesh. A field survey was conducted in three districts of Bangladesh between April 2006 and March 2007. The study areas have similar geographical and climatic conditions and land is equally suitable for vegetables, rice and other crops like oilseeds. The farmers with high capacity building ability earn more income than the farmers of low capacity building category. The additional income earning is associated with the improvement of technical, social, natural and human capital of farmers. The farmers with high capacity building category changes their household expenditure pattern to uptake a balanced nutrition. They are able to uptake balanced nutrition reducing their consumption expenditure percentages and invest their money in productive areas which increases their per capita income and savings. Therefore, capacity building influences positively the balanced nutrition of the farmers changing their consumption expenditure pattern.

Key words: Capacity building, consumption expenditure, balanced nutrition

INTRODUCTION

Rice production in Bangladesh has been increased over the past decade however, at the expense of other crops. Priority given for the rice cultivation and ignoring of minor crops like vegetables, pulses, oilseeds and fruits, which are the major sources of protein, minerals and vitamins has created a nutrient imbalance in the human diet. Farmers in developing countries like Bangladesh derive most of their nutrients from plant sources. Cereals; The staple food, are the highest energy source, but non-cereal carbohydrate rich food like roots, tubers and plantains, vegetable oils and proteins from plant sources are not used much. According to Yusuf and Islam (2005) rice and other cereals (wheat, maize) constitute the main source of nutrition for the general masses in Bangladesh. The preponderance of cereals, particularly rice (currently over 470 g/person/day) in the diet is so high that their contribution to total dietary energy nears about 75-80%, which far exceeds the recommended contribution of 55-60% and therefore, is not conducive to proper growth and maintenance of populations. Internationally recognized norms emphasize that no more than 60-65% of energy should come from carbohydrates (around 55% from cereals), 10-15% from proteins and 20-25% from fat to keep the energy balance in food. It has now been realized that self-sufficiency in food production depends not only on cereal production but also the other crops like tubers, fruits and vegetables.

Bangladesh is endowed with a favorable climate and soil conditions for the production of a variety of crops all the year round. The rich genetic estate, the richness in ecosystem diversity and the vast untapped human resources who can learn and adopt new skills have been the major points of comparative advantage in Bangladesh. Thus, there are ample opportunities for minor crops balancing with the production of major crops (Hoque, 2000). To increase income, the farmers need to produce

higher value products that can be obtained by adding value to primary or secondary products (Iwanaga, 2000). Minor crops offer an opportunity for farmers to produce higher value products (Duwayri, 2000).

Production of minor crops thus plays a vital role in increasing income as well as nutrition status of the farmers, general mass in Bangladesh. Once there is an increment of income of the farmers then it is assumed that farmers are able to spend their income in a judicious way. They can uptake a balanced nutrition for their survival as well as physical and cognitive development. Therefore, investigation on the structure of household consumption expenditure is important for the minor crop producers. However, how the farmers can increase their income by producing minor crops to consume food with balanced nutrition and to meet other expenditure is an important area to study, which is not yet considered in the previous studies.

Several studies already have been conducted on structure of household expenditure using both cross section and time series data. Sengul and Tuncer (2005) showed that extremely poor household's food demand is more sensitive to prices and income than those of poor households. Abdulai and Aubert (2004) stated that income, women's education and household size exert significant effects on the demand for food and nutrients. Ray (2007) found that rice and wheat continue to provide the dominant share of calories, especially for the rural poor in India. Rae (1999) argues that expenditure and women's education are most influential in explaining differences of household food consumption patterns and nutrition. The previous studies have considered the factors like income, demographic variables, gender, women's education, health insurance etc., which affect household expenditure. Further, they have highlighted that income is the dominant factor, which affects structure of consumption expenditure.

One of the main functions of minor crops is to increase capacity of farmers through improvement of their financial capital, which is the outcome of the effective utilization of the technical, social, human and natural capital. Moreover, income is one of the components of financial capital like savings, utilization of money etc. that have some influence on consumption expenditure. Further, (1) financial capital is one of the components of capacity building and therefore, increment of capacity might have some influence on the structure of household expenditure and (2) changes in food consumption patterns which are associated with improvements of capacity of farmers necessarily induce for the better in household nutrition. The two aspects mentioned above are not considered in the previous studies and therefore this study is attempts to focus on those two aspects. The main hypothesis is maintained in this study as improvement of farmer's capacity owed to minor crops has influence on consumption expenditure and on balanced nutrition.

MATERIALS AND METHODS

Selection of Study Area and Samples

This study was conducted using data from Comilla, Jessore and Bogra districts in Bangladesh. The study areas are shown in Fig. 1. A field survey was conducted to gather relevant data using an interview schedule from the selected farmers from April 2006 to March 2007. The food consumption expenditure data were collected twice a month and non-food expenditures were collected once in every two months. These areas have similar geographical and climatic characteristics. The average temperature ranges from 10 to 22°C during the winter and from 21 to 40°C during the summer season. The land is equally suitable for vegetables, rice and other crops like oilseeds. The cropping patterns are almost similar in the study areas. A simple random sampling technique was applied to select samples and 150 farmers were interviewed selecting 50 farmers from each district. The sampling framework was prepared in accordance with the population distribution of the study area.

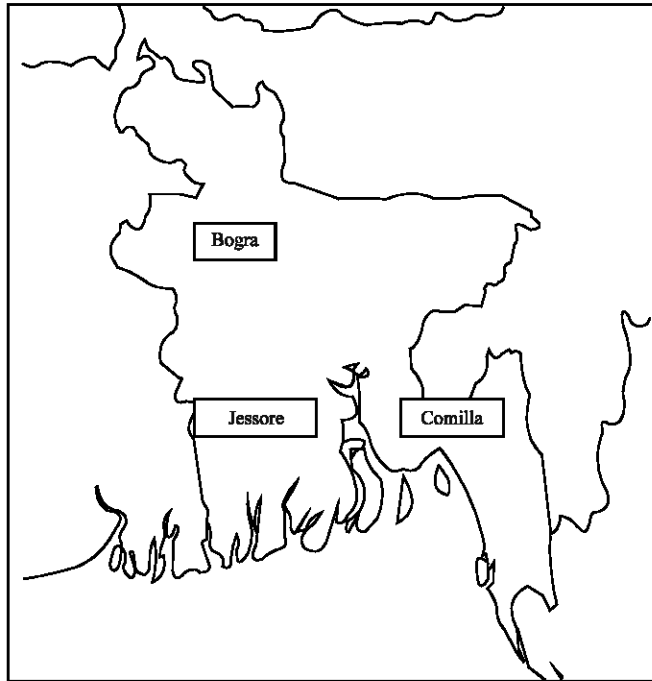


Fig. 1: The map of Bangladesh showing the study areas of this study

Table 1: Components of different capital of capacity building

Capital	Components of different capital
Technical	Effective utilization of land, family labor, soil health, technical information, insect and pest control and new production technology
Social	Communications with the government and non-governmental organizations; relationship with other farmers, wholesale market and financial institutions; and participation in local government programs
Human	Education, training, health-care including purified drinking water, sanitation and medical facilities
Natural	Cultivated land, irrigation water, other natural resources and organic fertilizer
Financial	Income, savings and bank deposit, loans and funds

Data

Data were collected from expenditure on different food and non-food item. Food items include rice, fish, meat, milk, vegetable, roots and tubers, fruits, pulses, spices and other foods. Other foods include oil, sugar, gur (made from sugarcane and date), ghee (made from milk) and butter. Non-food items include education, cloth, health care, land and capital and other expenditure. Other expenditure includes house repairing, transport and communication, festival expenditure. The food items were converted into calorie intake according to Yusuf and Islam (2005) and grouped into carbohydrate, protein, fat, vitamin and minerals. Carbohydrate includes rice and roots and tubers, protein is included fish, meat and pulse, fat included milk and other food, vitamin and minerals are included vegetables, fruits and spices. The expenditure on food items were collected every two weeks and non-food items on every two months. The income variable includes income from vegetable and rice cultivation and from non-crop sources. Non-crop sources include selling of labor, business, leased or mortgaged out of land. Vegetables are taken as a representative of minor crops. Regarding capacity building variable the farmers were asked to evaluate different components of capitals used in this study. The considered components are given in Table 1. Farmers were asked to evaluate each

component as high, medium and low. These standards are not quantitative data but category data. Therefore, measuring devices were established to evaluate every components of the capital. High, medium and low standards were counted as 3, 2 and 1 point, respectively. Accordingly, technical, social, human, natural and financial capitals got maximum points of 18, 15, 15, 12 and 12, respectively. According to the evaluated scores, the farmers are categorized into three groups, namely low, medium and high in terms of capacity building (CB). If the score is below or equal to (mean-standard deviation) categorized as low. The farmers with the score of within (mean±standard deviation) are categorized as medium. If the score is equal to or greater than (mean+standard deviation) are categorized as high.

Categorization of Farmers

Marginal, small and medium farmers are those own ≤0.40 ha of land, >0.40 ha and ≤1.00 ha and >1.00 ha and ≤3.00 ha, respectively.

RESULTS

Income, Expenditure, Farm Size (FS) and CB

The marginal and small farmers of High Capacity Building (HCB) category earn 93.4 and 90.8% of crop income from vegetables (Table 2). The marginal and small farmers of low capacity building category earn 51.0 and 52.7% of crop income from vegetables. The farmers who cultivate vegetables earn more money and increase their capacity as well. The land under vegetable cultivation also increases with the improvement of capacity building of the farmers in different farm category. The results show that the farmers of LCB of different farm category need to borrow some money to meet up their annual expenditure. There is an increasing tendency of savings with the improvement of capacity for all categories of farmers. There is a decreasing tendency of family size with the improvement of capacity for all categories of farmers (Table 3).

Table 2: Income earning from crops and non-crops and land used under vegetables and rice production according to CB and farm category

Income source and land used	Marginal (taka)			Small (taka)			Medium (taka)	
	Low	Medium	High	Low	Medium	High	Low	Medium
Vegetables	13105 (51.0)	36892 (85.8)	63638 (93.4)	20598 (52.7)	40352 (76.2)	67686 (90.8)	22641 (40.0)	42855 (50.6)
Rice	12613	6122	4490	18472	12585	6888	33979	41882
Non-crop	14733	13019	15091	5616	7224	12669	42326	53274
Total	40452	56033	83220	44686	60162	87242	98946	138011
Land in ha (vegetables)	0.13	0.25	0.31	0.20	0.28	0.32	0.22	0.30
Land in ha (rice)	0.26	0.12	0.07	0.39	0.25	0.11	0.72	0.81

Source: Field survey from April 2006 to March 2007 by authors and the following table have the same source

Table 3: Income and expenditure of the farmers according to farm and CB category

Income and expenditure	Marginal (taka/person)			Small (taka/person)			Medium (taka/person)	
	Low	Medium	High	Low	Medium	High	Low	Medium
Income	40452	56033	83220	44686	60162	87242	98946	138011
Expenditure on food	39223	39905	46661	39724	39714	46907	65270	68234
Expenditure on non-food	9735	12086	18689	11586	13046	19326	42312	57619
Total expenditure	48958	51991	65350	51310	52760	66233	107582	125853
Savings/ borrowings	-8506	4042	17870	-6624	7401	21009	-8636	12158
Family size	5.7	4.9	4.1	5.6	4.8	4.0	4.7	4.4
Per capita income	7187	11458	20649	8018	12535	22144	21119	31529
Per capita expenditure	8702	10584	16159	9203	10973	16818	22830	28744

Table 4: Per capita consumption of different food items according to capacity building and farm category

Food item	Marginal (g day ⁻¹)			Small (g day ⁻¹)			Medium (g day ⁻¹)	
	Low	Medium	High	Low	Medium	High	Low	Medium
Rice	484	442	395	492	431	402	478	425
Fish	32	38	81	32	43	89	88	88
Meat	13	12	16	11	11	13	42	46
Milk	18	34	78	20	34	82	64	120
Vegetable	65	122	200	74	123	203	67	107
Tubers	43	81	133	49	82	135	44	71
Fruit	15	27	65	17	27	69	64	98
Spices	19	24	33	19	25	34	33	43
Pulse	21	35	65	20	42	61	37	41
Other	18	32	45	15	30	49	41	52

Table 5: Per capita calorie intake from different food items according to capacity building and farm category

Food item	Marginal (kcal day ⁻¹)			Small (kcal day ⁻¹)			Medium (kcal day ⁻¹)	
	Low	Medium	High	Low	Medium	High	Low	Medium
Rice	1694	1547	1383	1722	1509	1407	1673	1488
Fish	45	53	113	45	60	125	123	123
Meat	17	16	21	14	14	17	55	60
Milk	19	36	82	21	36	86	67	126
Vegetable	36	68	112	41	69	114	38	60
Tubers	43	81	133	49	82	135	44	71
Fruit	11	19	47	12	19	50	46	71
Pulse	19	24	34	19	26	35	34	44
Spices	74	123	228	70	147	214	130	144
Other	117	208	293	98	195	319	267	338
Total	2075	2175	2444	2092	2157	2500	2475	2523

Table 6: Proportion of expenditure on different food items to total expenditure according to capacity building and farm category

Food item	Marginal (%)			Small (%)			Medium (%)	
	Low	Medium	High	Low	Medium	High	Low	Medium
Rice	37.9	32.2	21.6	38.5	31.7	20.6	27.0	22.4
Fish	15.0	14.2	16.6	13.8	15.4	18.2	19.7	18.6
Meat	9.7	8.3	7.6	8.3	7.8	6.3	16.3	15.3
Milk	2.7	3.9	5.9	2.8	3.9	6.1	3.1	4.6
Vegetable	7.5	9.8	9.5	7.9	9.8	9.4	3.8	4.7
Fruit	5.2	7.4	10.9	5.4	7.2	11.3	7.8	10.3
Spices	6.0	6.4	6.5	5.9	6.5	6.5	5.2	6.0
Pulse	6.5	6.8	9.1	6.4	6.7	9.2	4.3	4.2
Other	9.5	11.0	12.4	11.1	10.9	12.6	12.8	13.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Per Capita Consumption, Calorie Intake with FS and CB

Per capita consumption of different food item according to FS and CB is given in Table 4. The results indicate that with the improvement of capacity consumption of rice decreases and consumption of vegetables, roots and tubers, milk increases substantially for all categories of farmers. Per capita calorie intake is presented in Table 5 and trend of calorie intake is similar with the consumption trend of the farmers among different farm size and category of CB.

Expenditure on Food and Noon Food Items

The result shows that the marginal and small farmers of HCB category expend 21.6 and 20.6% of total expenditure on rice. Meanwhile, the farmers belong to LCB category expend 37.9 and 38.5% of total expenditure on rice for marginal and small farmers respectively (Table 6). Proportion of expenditure also decreases for meat consumption with the improvement of capacity for marginal and

Table 7: Proportion of expenditure on food and different non-food items to total expenditure according to capacity building and farm category

Food item	Marginal (%)			Small (%)			Medium (%)	
	Low	Medium	High	Low	Medium	High	Low	Medium
Food	80.1	76.9	71.5	77.5	75.4	70.9	60.8	54.3
Education	1.7	2.1	2.4	1.9	2.2	2.4	1.6	1.2
Cloth	3.6	4.1	3.1	4.3	4.1	3.2	4.3	4.4
Health care	1.7	1.1	1.3	0.8	1.1	1.3	1.4	2.0
Land and capital	9.9	12.8	19.2	11.9	14.2	19.7	26.7	31.4
Festival and Others	3.0	3.1	2.5	3.5	3.2	2.5	5.2	6.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 8: Percentage of calorie intake from different food category

Food category	Marginal (%)			Small (%)			Medium (%)	
	Low	Medium	High	Low	Medium	High	Low	Medium
Carbohydrate	82	71	57	82	70	56	68	59
Protein	7	9	15	6	10	14	12	13
Fat	7	11	15	6	11	16	13	18
Vitamin and minerals*	5	9	13	6	9	13	7	10
All	100	100	100	100	100	100	100	100

*Category includes vegetables, fruits and spices

small farmers. Proportion of expenditures on vegetables, fruits, milk etc. increased substantially with the improvement of capacity for different category of farmers. The result indicated that the marginal and small farmers of HCB category expend 71.5 and 70.9% of total expenditure on food respectively. The marginal and small farmers of LCB category expend 80.1 and 77.5% of total expenditure on food respectively (Table 7). The expenditures on land and capital substantially increased for different category of farmers with the improvement of capacity.

Calorie Intake from Different Food Category

Percentages of calorie intake from different food category are presented in Table 8. The marginal and small farmers of the HCB category intake 57 and 56% of total calorie respectively from carbohydrate. Whereas the marginal and small farmers of LCB category intake 82% of calorie from carbohydrate. The percentage of calorie intake from protein, fat and vitamin and minerals shows a positive trend with the increment of capacity for all categories of farmers.

DISCUSSION

Improvement of capacity of a farmer is positively associated with the production of minor crops like vegetables. The share of income from vegetable production increases at 93.4% for the HCB of marginal farmers and 90.8% for the HCB of small farmers. The land area under vegetable cultivation was 4.4 times higher than the land area under rice cultivation for HCB farmers of marginal farm category, whereas income was 14.2 times higher. The trend is similar for the HCB farmers of small farm category. The income of the farmers of LCB category was much lower than the HCB category because LCB farmers cannot increase their capacity using their different capitals.

There is an increasing tendency of savings with the improvement of capacity for all categories of farmers. The HCB farmers earn higher income through intercropping of vegetables, which increases their land use intensification. The vegetable farmers utilize their technical knowledge that is earned through training; visiting of progressive farmer's field; Participation in the activities of different social and rural development organization. The vegetable farmers have increased their capacity through proper utilization of their small lands, family labor including females and further they have maintained very good relationship with the neighboring farmers, representatives of different government and non-

government organizations and the whole sellers. The farmers are also able to maintain their soil fertility for future productions incorporating with the organic matters such as vegetable waste, cow dung, leafs of homestead tree and residual of leafy vegetables which remain in the lands after the harvesting. Therefore, income and savings (components of financial capital) increased of the HCB farmers is the result of effective utilization of their technical, social, human and natural capitals.

The farmers of different category spend their income for different food and non-food expenditure. The HCB farmers spend less of their income for food consumption and invest a significant amount for land and capital expenditure in compared to LCB farmers for different farm category. The results show that HCB farmers consume less amount of rice (395-402 g/person/day) than the LCB farmers (478-492 g/person/day), which is nearly at the level surveyed by Bangladesh Bureau of Statistics. The HCB farmers also consume high amount of vegetables, roots and tubers, fruits, pulses and fish, which are the main sources of micronutrients than the LCB farmers. Therefore, HCB farmers' uptake 56-57% of carbohydrate (from cereals and roots and tubers), 14.7-15.2% of protein, 15-16% of fat and 13% of vitamin and minerals. This result is consistent with the recommendation of Yusuf and Islam (2005), for balanced nutrition. Knowledge on financial management and health care, communications with different government and non-government organization, participation in different local government program creates positive impact for consuming more of micronutrients and less of cereals as a source of their energy. The increment of capacity shows positive trend towards consumption of various food items with balanced nutrition.

More than 2 billion people worldwide suffer from micronutrient deficiency, a lack of those essential minerals and vitamins in the diet, which keep the body healthy and help prevent disease. Lack of such essential dietary components has led to impaired physical and mental development in young children and an increased mortality, particularly in women in developing countries. The results of the present study show that a majority of the farmers belong to LCB and MCB categories consumed far less amount of vegetables, pulses, fruits and milk from their requirement, which are the major sources of micronutrients. Further, they consume more rice than their requirement as a principal source of their energy. The farmers with these categories consume less of these products, which provide less calories and imbalanced nutrition. According to the World Health Organization criteria 77% of rural populations in Bangladesh are anaemic. Further, the composition of the diet is not balanced as 85% of the calorie and 60% of the protein intake is derived from cereals (SDNP, 2004). The main reasons for such a situation are mainly the low diversification of crops, inadequate nutritional knowledge, inequitable distribution of income and low purchasing power. Therefore, production of minor crops provides an opportunity to increase financial capital with the improvement of technical, social, human and natural capitals. The farmers of the HCB category consume a balanced nutrition with their increasing financial capital, which comes through producing minor crops. Therefore, improvement of capacity of the farmers has influence on receiving balanced nutrition through changing their household expenditure pattern.

CONCLUSION

This study examine, the effect of capacity building owed to minor crops on household consumption expenditure and balanced nutrition of the farmers, which have not considered in the previous studies. The farmers with high capacity building ability spend a significant amount of money for productive purpose (land and capital expenditure) reducing food expenditure with a consumption of balanced nutrition. Therefore, the farmers with high capacity building ability can increase their per capita income and savings having balanced nutrition for a better future.

REFERENCES

- Abdulai, A. and D. Aubert, 2004. A cross-section analysis of household demand for food and nutrients in Tanzania. *Agric. Econ.*, 31: 67-79.
- BBS, 2007. Report of the Household Income and Expenditure Survey 2005. Bangladesh Bureau of Statistics, May 2007. Key findings of HIES-2005. www.bbs.gov.bd.
- Duwayri, M.A., 2000. Alternative crops and cultivars for new opportunities. A seminar paper presented in the crop diversification in the Asia-Pacific region held in Bangkok, Thailand, 4-6 July, 2000. <http://www.fao.org/DOCREP/003/X6906E/x6906e0g.htm>.
- Hoque, M.E., 2000. Crop diversification in Bangladesh. A seminar paper presented in the crop diversification in the Asia-Pacific region held in Bangkok, Thailand, 4-July, 2000. <http://www.fao.org/DOCREP/003/X6906E/x6906e04.htm>.
- Iwanaga, M., 2000. Crop diversification in Japan. A seminar paper presented in the crop diversification in the Asia-Pacific region held in Bangkok, Thailand, 4 to 6 July, 2000. <http://www.fao.org/DOCREP/003/X6906E/x6906e07.htm>.
- Rae, A.N., 1999. Food consumption patterns and nutrition in urban java households: The discriminatory power of some socioeconomic variables. *Aust. J. Agric. Resour. Econ.*, 43: 359-383.
- Ray, R., 2007. Changes in food consumption and the implications for food security and undernourishment: India in the 1990s. *Dev. Change*, 38: 321-343.
- SDNP, 2004. Sustainable Development Network Program. www.sdnbd.org/sdi/issues/agriculture/database/foodgrain_production.htm.
- Sengul, S. and I. Tuncer, 2005. Poverty levels and food demand of the poor in Turkey. *Agribusiness*, 21: 289-311.
- Sing, R.B., 2000. Welcome address at the seminar crop diversification in the Asia-Pacific region held in Bangkok, Thailand, 4 to 6 July, 2000. <http://www.fao.org/DOCREP/003/X6906E/x6906e03.htm>.
- Yusuf, H.K.M. and A. Islam, 2005. Setting a standard cereal intake for balanced nutrition in Bangladesh. Paper Presented at the National Workshop on Food Security in Bangladesh Held on October 19-20, 2005. pp: 51-60. <http://www.wfp.org/bangladesh/?NodeID=5>.