

Research Article

A Study on Changes of Vegetables' Marketing Network and Effect on Farmers' Income in the Bogra District of Bangladesh

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Abstract: The study attempts to clarify the changes of vegetables' marketing network and effect on farmers' income after the construction of Jamuna Bridge in the northern part of Bangladesh in 1998. Based on farmer categories, the study has compared the factors such as selling quantities, different channels and markets, marketing costs and selling prices and net margin and net incomes received by the farmers. The study shows that differences in farmers' incomes and market choosing are greatly determined by farmers' classification.

Keywords: Farmers' classifications, income, marketing network of vegetables, new marketing channel

INTRODUCTION

Bogra is one of the largest vegetable-producing areas in this the northern part of Bangladesh where better marketing facilities are needed in order to develop this sector. The ineffective and underdeveloped marketing networks in the rural areas for connecting to urban markets are barriers to the development of agriculture. The World Bank Report notes that better infrastructure is necessary to ensure that products are delivered to distant markets in qualities and quantities that meet market demand (The Task Force, 1999). Previously the Jamuna River was the barrier to transportation to the terminal market in the capital city, Dhaka, or other distant markets, so farmers used to sell their produce in the nearer markets at lower prices. After construction of the 4.8 km-wide braided Jamuna Bridge in 1998, a marketing network has been developed and it mainly influences the markets on two aspects: the first one is farmers' easier access not only to the markets of Bogra but also to the wholesale markets of the capital city Dhaka; and the second one is the increasing number of buyers in the markets of Bogra entering from the markets of Dhaka and other distant markets. Consequently, northern agriculture has become a part of a wider market. In fact, various changes in the marketing network with increasing farm gate prices for crops have resulted in some positive developments and this is especially reflected in farmers' changing economic situation. Actually, earnings from vegetables account for a good share of increased farmers' income as having capabilities in light of using different marketing components-markets, price of the produce, different means of transport, buyers, etc. As a result of

their increased incomes, farmers' classifications have been considered in terms of the amount of land they own: Landless (0-0.49 acres) (LL), Small (0.50-2.49 acres) (SF), Medium (2.50-7.49 acres) (MF) and Large (7.50 acres and above) (LF).

A few studies have been conducted in relation to these issues. Adhikari *et al.* (2001) studied production of various crops, gross margin, transported goods, etc., in the entire northern part on a sample selection basis. The study showed that farmers' share in margin had increased based only on the price differences between retailers' and farmers' farm gate prices. In that study, a village-based situation, marketing network, transportation cost, net margin and net income received by the farmers were not considered. Therefore, an attempt has been made to analyse the classification of farmers' net margin and net income only from vegetables in a case study comparing data from 2009 to that from before the opening of the bridge in 1998. In addition, the changes of:

- Marketing network, including marketing places and buyers, marketing channels and means of transport.
- Selling of vegetables have all been examined in terms of farmer categories.

METHODOLOGY

The study was conducted in Bogra District, situated in the northern part and covering four villages under Amrool Union-Demazani, Poranbari, Jhalopara and Kundoish. The study area is situated 16 km from Bogra District headquarters, 8 km from a business centre, Sherpur Sub-district, 90 km from the Jamuna Bridge and

215 km from the capital city, Dhaka. The data were collected in August-September 2009 and compared to data from 1998. A total of 79 farmers, comprising of 10 landless, 38 small, 24 medium and 7 large farmers, were interviewed from each sample household in the four villages by using structured questionnaires. In addition, several case studies were also conducted among the farmers. Focus and open group discussions were also carried out among customers, traders and retailers.

RESULTS AND DISCUSSION

During the period from 1998 to 2009, a remarkable change in the marketing network of the northern part occurred due mainly to the construction of the bridge and was reflected in marketing of vegetables in terms of markets and buyers, selling quantities, means of transport and costs, net margin and net income and other measures.

Marketing network of vegetables:

Markets and different types of buyers: According to the Bangladesh administrative system, some villages constitute a Union and some Unions constitute a Sub-district (Upazila); hence, some Sub-districts constitute a District. Generally, markets are situated surrounding or nearer to different administrative units and are categorized as three main types of markets: Primary, Secondary and Terminal Markets. Primary Markets are the principal centres for exchanging crops in rural areas. These include Demazani and Noimail markets at the Union level and are usually held twice a week. Secondary Markets serve as wholesale outlets that also operate as assembly centres used as distribution mechanisms from rural to urban areas. These include Sherpur and Foteh Ali markets under Sherpur Sub-district and Bogra District, respectively. The Terminal Market serves as the major contact point between rural and urban markets. It includes the market called Kawran Bazaar in the capital city of Dhaka. Here, produce is assembled from inside and outside Dhaka and subsequently redistributed to various retail markets (Fig. 1).

Various buyers take the produce to distant markets like Foteh Ali, Kawran Bazaar and other markets

situated at Sub-district and District levels. In terms of farmer categories, landless farmers mainly sold directly to consumers and middlemen/traders in the primary markets. Small farmers used to sell to consumers, retailers, middlemen, traders and wholesalers in the primary and secondary markets and medium and large farmers sold to the same types of buyers in these markets with expansion to Kawran Bazaar.

Marketing channels of vegetables: Farmers sold a large quantity of vegetables (287.49 mt) in 2009. Thus marketing channels mainly for vegetables have been considered in this study. Figure 2 denotes different channels observed in this regard. Marketing flows were found to have increased remarkably in Noimail of the primary markets and in Foteh Ali of the secondary markets. In particular, farmers were more associated with and therefore more willing to send their produce to Foteh Ali. They also followed new channels in 2009 as:

- Farmers-wholesalers (terminal market) -retailers-consumers
- Farmers-middlemen, traders, wholesalers (primary/secondary markets) -wholesalers (terminal market) -retailers-consumers, which were also followed by local and outside buyers

Before the construction of the bridge, farmers sold their vegetables to:

- Consumers, local shopkeepers, retailers, middlemen and traders in the primary market
- Middlemen, traders and wholesalers in the secondary market

As a new channel appeared after construction of the bridge, the farmers started using terminal markets as well as primary and secondary markets. Now the vegetables can be easily transported to Dhaka in only four hours by bus or truck. The Jamuna Bridge has played an important role in creating new channels for marketing of vegetables from the study area and helped in creating demand for the produce in the local

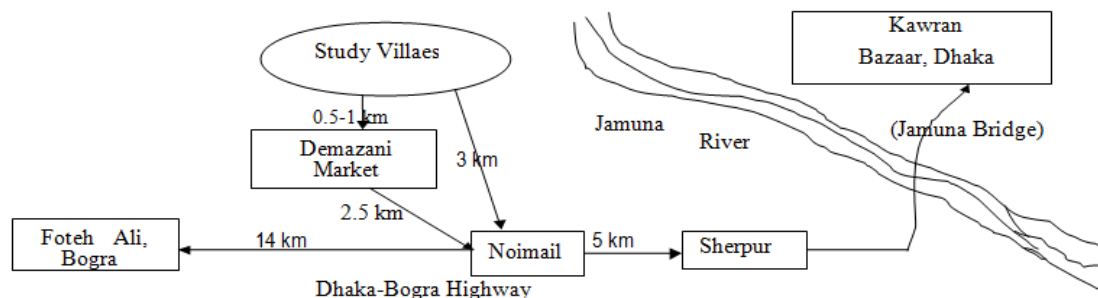


Fig. 1: Different routes of the markets from the villages
Field survey 2009 (all the data here used in the figures and tables were collected in this field survey)

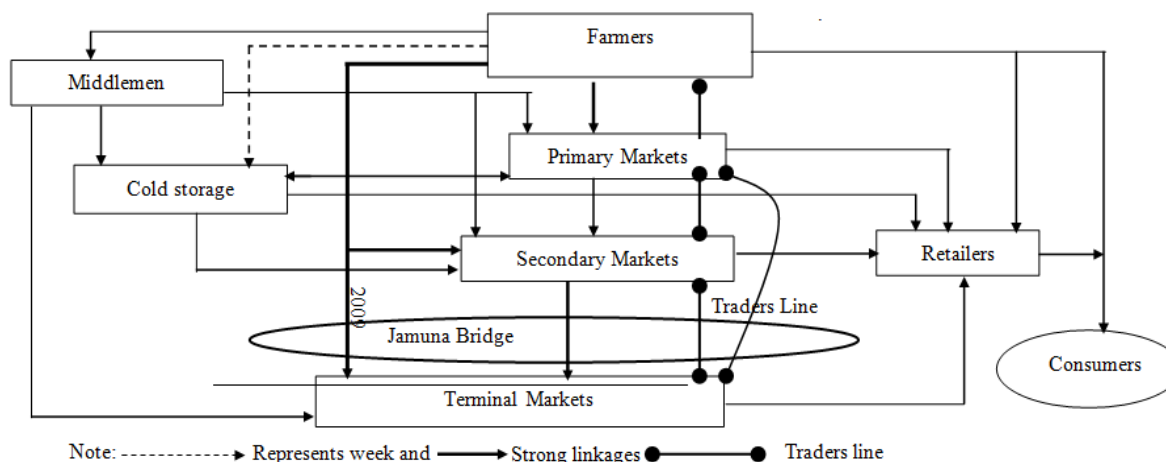


Fig. 2: Marketing channels of vegetables

Table 1: Transportation costs (Tk/kg) by different markets and transports

	The year 1998					The year 2009				
	Demazani	Noimail	Sherpur	Foteh Ali	Kawran Bazaar	Demazani	Noimail	Sherpur	Foteh Ali	Kawran Bazaar
Farmers										
Hired labor	0.18	0.24				0.20	0.28			
Cart	0.12	0.14				0.14	0.16			
Rickshaw van	0.14	0.16				0.16	0.18			
Votvoti		0.20					0.22			
Auto rickshaw			0.28					0.30		
Bus			0.30				0.35			
Truck				2.74					2.30	

Costs are calculated as (1) village to Sherpur: at first up to Demazani by cart/rickshaw van and then by votvoti to Sherpur, (2) village to Foteh Ali: up to Noimail by cart/rickshaw van then by auto rickshaw/bus to Foteh Ali, (3) village to Kawran bazaar: up to Noimail by cart/rickshaw van then by truck to Foteh Ali

markets, which in turn has inspired the farmers to boost vegetable production.

The means of transporting of vegetables: The farmers use different modes of transport such as bullock carts, rickshaw vans, votvoti (locally made auto tri-rickshaw), auto rickshaws, buses and trucks for carrying their produce. All the roads from the villages to the Demazani market are muddy and flat, so transportation in the rainy season is still difficult from the villages to this market. Generally, bullock carts and rickshaw vans are used and sometimes votvoti are used in the dry season but not frequently. The road between the Demazani and Noimail markets is partially covered by bricks and asphalt. Votvoti are used from Demazani to Sherpur and generally auto rickshaws and buses are used to connect Noimail and Foteh Ali. Buses and trucks are used from Noimail to Kawran Bazaar.

The landless used bullock carts and rickshaw vans to go to the nearer markets of Demazani and Noimail. They also carried their produce to Demazani and sometimes to Noimail on their heads or shoulders and used votvoti to go to Sherpur. Small farmers used the same modes of transport as the landless and some also used auto rickshaw or bus to travel to the Sherpur or

Foteh Ali market. Medium and large farmers had the ability to use various types of transport, including auto rickshaw or bus to Foteh Ali and bus or truck to the Kawran Bazaar market. In addition, they used mainly rickshaw van and votvoti to the primary markets of Demazani and Noimail and votvoti or auto rickshaw to the Sherpur market. It should be noted that the means of transport gradually changed since 2009 from manual to engine driven transports like votvoti, auto rickshaw, bus and truck as a result of road development between Union and Sub-district and other city/town markets.

Transportation costs from the study area to local and outside markets:

Local transportation costs: Transportation costs from villages to different markets varied depending on types of transport. Table 1 presents the types of transport and their corresponding costs in 1998 and 2009 and indicates that per-unit carrying costs were incremental with increasing distance to markets. A point to note is that engine-driven transports (votvoti, auto rickshaw, bus) were cost effective and less time consuming for traveling amongst the primary and secondary markets than the traditional transports like rickshaw van, cart, or hired labor.

Transportation costs from the study area to the terminal market: Nine farmers (11%) sold produce directly at Kawran Bazaar, Dhaka in 2009. Generally, one truck carries a total of 3,000 kg of vegetables from Noimail. The total marketing cost per truck was Tk (Taka (TK) is the official currency in Bangladesh) 6,900, which includes Tk 3,000 for renting the truck, Tk 1,500 for unauthorized subscription (toll) taken by musclemen/others in the streets/markets, Tk 750 for toll at the bridge gate, Tk 1,350 for truck loading/unloading and Tk 300 for packaging and other expenses. The marketing costs are thus Tk 2.30/kg, which is lower than the cost of Tk 2.74/kg in 1998. The main reason is a decrease in the rate for truck rental, reduced toll at the Jamuna Bridge and reduction in unauthorized tolls.

Selling of the vegetable: The change in selling of vegetables and related land use is briefly discussed here. It was found that the acreage under double and triple crops markedly increased in 2009 and cropping increased from 179 to 223%, which was higher than the national average of 174% (Bangladesh Bureau of Statistics, 2001). It was revealed that land acreage of vegetables increased substantially from 31.32 to 94.37 acres. Lands that previously were left fallow or cultivated only on a limited scale were converted to several patterns due to technological development in cultivation practices because of increased demand for the produce in various markets. This is attributable to the expansion of the cultivation of high-value cash crops (tomato, eggplant, cucumber, bitter gourd, banana, papaya, etc.) under different tenancy arrangements (Scott and Bouis, 2000).

A good number of new vegetables were found to be grown more and sold by the farmers. These changes occurred because of increased demand in the nearer and distant markets as well as faster transportation due to the Jamuna Bridge and better travel within the Districts and Sub-districts.

Case study in cultivation and marketing of vegetables: Here, change in potato cultivation and marketing have been taken as a case for observing the scenario of vegetables. According to Scott and Bouis (2000), use of the potato has evolved from a minor vegetable to the most important vegetable in the diet and an occasional partial substitute for rice (Scott and Bouis, 2000). FAOSTAT (2011) indicates that production of the potato increased in Bangladesh by 118% from 1,553,180 to 3,386,000 mt in 2009 compared to 1998. Bogra is the fourth largest potato-growing area of the country (FAOSTAT, 2011). This case study has been conducted based on farmer categories to compare factors such as selling quantities, different channels and markets, marketing costs and

selling prices and net margin and net incomes received by the farmers (Bangladesh Bureau of Statistics, 2001).

General scenario in cultivation of the potato: The number of the farmers increased from 22 to a total of 25. The numbers of LL, SF, MF and LF were 2, 10, 6 and 4, respectively in 1998 and 2, 12, 6 and 5, respectively in 2009. Their average cultivated land also increased from an average of 0.27 to 0.38 acres. A notable increase was found in the case of large farmers (0.43 to 0.64 acres) and medium farmers (0.37 to 0.47 acres). This same trend was also seen in the case of small (0.18 to 0.26 acres) and landless farmers (0.16 to 0.20 acres) though these averages were proportionately less than those of the large and medium farmers.

Marketing channels and selling of the potato in different markets: Six different marketing channels for the potato were identified. The channels in the primary and secondary markets are:

- Farmers-consumers
 - Farmers-retailers-consumers
 - Farmers-middlemen/traders-retailers-consumers
 - Farmers-wholesalers-retailers-consumers
- Channels to the terminal market are:
- Farmers-wholesalers-retailers-consumers used by the farmers directly after construction of the bridge
 - Farmers-middle men/traders-wholesalers-retailers-consumers used by the middlemen/traders from Noimail to Kawran Bazaar (terminal)

Farmers also had a weak linkage with cold storage for storing seed as there is a risk of quality deterioration with the potato because of instability of the power supply and of market price. In addition, there are few stores and these are situated at Bogra and Sherpur.

Table 2 indicates that average quantities sold by small, medium and large farmers were the highest in Sherpur in 1998, accounting for 53.1, 60 and 55.7% of quantities sold, respectively. In 2009, their highest shares were observed in Noimail and remarkably, Kawran Bazaar and Foteh Ali were added as newer markets for them. Medium and large farmers sold the potato in Noimail (35.6 and 35.4%, respectively), but they extended markets to Foteh Ali (31 and 23%) and Kawran Bazaar (16.4 and 25.5%). Their customers were retailers, middlemen/traders and wholesalers. Small farmers also sold to consumers, wholesalers and retailers at Foteh Ali (14.5%) with more shares in Noimail (54.1%). In the past, landless farmers used only Demazani and Noimail (75%) and sold only to general consumers. This clearly indicates that farmers were not confined only to local markets but were also using diversified markets-even those situated in distant places.

Table 2: Selling quantity of potato by different farmers and markets

	Demazani		Noimail		Sherpur		Foteh Ali		Kawran bazaar		Avg.	
	1998	2009	1998	2009	1998	2009	1998	2009	1998	2009	1998	2009
Farmers												
LL	302 (26.7)	350 (25.0)	829 (73.3)	1050 (75.0)	-	-	-	-	-	-	1130 (100)	1400 (100)
SF	188 (17.4)	233 (12.9)	319 (29.5)	971 (54.1)	573 (53.1)	332 (18.5)	-	257 (14.5)	-	-	1080 (100)	1793 (100)
MF	333 (12.8)	200 (6.4)	708 (27.2)	1119 (35.6)	1562 (60.0)	334 (10.6)	-	977 (31.0)	-	517 (16.4)	2603 (100)	3147 (100)
LF	392 (13.6)	280 (5.8)	883 (30.7)	1698 (35.4)	1600 (55.7)	500 (10.4)	-	1100 (22.9)	-	1220 (25.5)	2875 (100)	4798 (100)

Upper values in the cells are average selling quantity in kg and parenthesis indicates percents; Avg.: Average

Table 3: Selling prices and marketing costs by different farmers and markets (prices and costs in TK/Kg)

Farmers	The year 1998				The year 2009					
	Demazani	Noimail	Sherpur	Averages	Demazani	Noimail	Sherpur	Foteh Ali	Kawran bazaar	Avg.
LL	3.42 (0.10)	4.15 (0.26)	-	3.79 (0.22)	4.00 (0.10)	5.00 (0.26)	-	-	-	4.50 (0.22)
SF	3.45 (0.23)	4.10 (0.25)	5.00 (0.44)	4.18 (0.34)	3.95 (0.25)	5.05 (0.26)	5.60 (0.48)	6.80 (0.58)	-	5.35 (0.35)
MF	3.40 (0.22)	4.00 (0.25)	5.00 (0.43)	4.13 (0.36)	3.80 (0.25)	5.15 (0.26)	5.70 (0.47)	7.00 (0.58)	11.00 (2.57)	6.53 (0.76)
LF	3.35 (0.22)	4.10 (0.25)	5.10 (0.43)	4.18 (0.34)	3.90 (0.22)	5.10 (0.25)	5.65 (0.46)	6.90 (0.58)	11.10 (2.58)	6.53 (0.94)
Averages (Tk/kg)	3.41 (0.19)	4.09 (0.25)	5.03 (0.43)	4.07 (0.32)	3.91 (0.20)	5.08 (0.26)	5.65 (0.47)	6.95 (0.58)	11.05 (2.57)	5.73 (0.57)

Upper values in the cells are selling prices/kg and parentheses indicate marketing costs/kg calculated from data; Avg.: Average

Table 4: Net margin/kg by different farmers and markets (net margin in Tk/kg)

Farmers	The year 1998				The year 2009						Change (%)
	Demazani	Noimail	Sherpur	Avg.	Demazani	Noimail	Sherpur	Foteh Ali	Kawran bazaar	Avg.	
LL	0.69	1.26	-	1.11	0.85	1.69	-	-	-	1.48	33.3
SF	0.58	1.21	1.92	1.48	0.64	1.73	2.06	3.16	-	1.85	25.0
MF	0.55	1.12	1.94	1.54	0.57	1.91	2.25	3.44	5.45	2.92	89.6
LF	0.48	1.20	2.02	1.56	0.72	1.89	2.23	3.36	5.56	3.13	100.6
Averages	0.57	1.20	1.96	1.42	0.70	1.80	2.18	3.32	5.51	2.35	65.5

Avg.: Average

Selling prices in different markets and marketing costs from the study area: Table 3 shows the selling prices and the marketing costs per kg in different markets. Selling prices varied in different markets according to the cost of transportation, loading and unloading, packaging, etc. The table indicates that prices and costs were incremental with the distances of the markets from the study area. In the case of the selling price, the Demazani market was the cheapest with lower transportation cost, but the farmer got the highest price (Tk 11.05/kg) in Kawran Bazaar even while spending more on marketing costs (Tk 2.57/kg). In transportation to Demazani, marketing costs were the lowest for landless using family labor. Previously, average price differences between Noimail and Sherpur were Tk 0.94/kg (Tk 5.03-4.09) and this was substantially reduced to Tk 0.57/kg (Tk 5.65-5.08) in 2009 with increased prices in the Noimail market. Medium farmers received the highest selling prices in Noimail, Sherpur and Foteh Ali; whereas large farmers got the highest prices in Kawran Bazaar.

Net margin received by the farmers: Table 4 shows different net margins per kg received by the farmers in

different markets. It has been calculated as: Net Margin/kg = Selling Price/kg-Cost/kg (production, marketing and other costs) (Firth, 2002).

It was found that large farmers got 100.6% higher net margin (Tk 3.13/kg-Tk 1.56/kg) in 2009 among all followed by medium (89.6%), small (25%) and landless farmers (33%). Large and medium farmer positions were better for extending markets to Foteh Ali and Kawran Bazaar. They got the highest net margins, Tk 5.56/kg and Tk 5.45/kg, respectively, from Kawran Bazaar in 2009 compared to the highest net margins of Tk 2.02/kg and Tk 1.94/kg, respectively, received from Sherpur in 1998. Medium farmers got the highest net margins in Noimail, Sherpur and Foteh Ali and landless got the highest net margin in Demazani in the same period using family labor during cultivation and marketing of the potato.

Rate of net margins received by the farmers: Rate of net margin is calculated as the percent of the ratio of net margin to selling value. Table 5 shows that large farmers benefited the most with an increase in rate of net margin from 34.2 to 44.6% followed by medium,

Table 5: Rate of net margins by different farmers and markets (rate of net margins in %)

Farmers	The year 1998				The year 2009					
	Demazani	Noimail	Sherpur	Avg. rate	Demazani	Noimail	Sherpur	Foteh Ali	Kawran bazaar	Avg. rate (%)
LL	20.2	30.4	-	28.0	21.3	33.8	-	-	-	31.2
SF	16.9	29.6	38.5	33.2	16.3	34.2	36.8	46.5	-	35.3
MF	16.1	28.1	38.7	34.0	15.1	37.0	39.5	49.2	49.5	43.8
LF	14.3	29.4	39.6	34.2	18.5	37.1	39.5	48.7	50.1	44.6
Avg. rate (%)	16.9	29.4	38.9	32.4	17.8	35.5	38.6	48.1	49.8	38.7

Avg.: Average

small and landless farmers. In a comparison of all markets in 2009, it was found that Kawran Bazaar was the most profitable market (49.8%) followed by Foteh Ali (48%), Sherpur, Noimail and Demazani. It should be noted that rates of net margin in Sherpur were almost the same in both the years, but the opposite was observed in Noimail as the rate had increased from 29.4 to 35.5% because of an increased demand for produce.

Farmers' net income from potato cultivation: This part depicts farmers' yearly net income/kg from the potato in the same period. Net income was calculated as the sum of net margin received plus the cost of family labor, own transport, etc. During 2009, large farmers' net income/kg was found to be the highest (Tk 3.36) followed by medium farmers (Tk 3.17), indicating a substantial positive change in earnings compared to other farmer categories. The positions in earnings by small and landless farmers were Tk 2.35 and 2.25, respectively, closer but more than in the past.

Landless, small, medium and large farmers' net income/acre in 1998 was Tk 10,759.73, 11,913.94, 12,325.41 and 12,075.95, respectively, whereas in the year 2009, these figures had increased to Tk 13,692.00, 16,330.71, 21,386.34 and 25,178.19, respectively.

In fact, farmers' incomes increased positively by 27.3, 37.1, 73.5 and 108.5%, respectively. Thus it is clear that large farmers' net income/acre increased remarkably followed by medium, small and landless farmers. Large farmers marketed a greater quantity of the potato at Foteh Ali and Kawran Bazaar than the quantity of other farmers, so their incomes were higher than others.

CONCLUSION

The study shows that differences in farmers' incomes depend on the selling prices at different markets. In particular, the case in cultivation and marketing of the potato reveals that the situation of large and medium farmers improved the most as they had the ability to use optimum resources to produce more vegetables and were able to use the distant markets of Foteh Ali and especially Kawran Bazaar as well as local markets by using various means of transport. The opposite case was observed for landless and small farmers. As a result, large

farmers' income especially, followed by medium farmers, increased more because of receiving higher prices in different markets, but small and landless farmers' incomes, though lower than the former two categories, were higher than in the past. This is also true in a general scenario for all vegetable produce. Evidently, there was a significant increase in quantities of vegetables sold in Noimail, Foteh Ali and Kawran Bazaar. Large and medium farmers' positions were higher in selling at distant markets. The Jamuna Bridge has helped significantly in creating a channel from the study area to the terminal market of Kawran Bazaar. Another point to note is that marketing costs from the study villages to the Kawran Bazaar have decreased, but the opposite result was obtained in the case of local transportation on underdeveloped roads.

Finally, the study underlines some drawbacks:

- Muddy roads in the rainy season make it difficult for villages to connect with other markets, leading the farmers to sell their produce at the cheapest rate
- Lack of cold storage facilities for vegetables
- Unauthorized tolls by musclemen during transport leads to increased transportation cost

This study elucidates the necessary measures in these regards, which may strengthen farmers' capabilities to boost crop production and, as a result, strengthen the agricultural economy and also help to alleviate rural poverty.

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