Farmers' Constraints on Vegetable Production in the Northwest Region of Bangladesh

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Abstract

This research focused on various aspects of the constraints that farmers experience when producing vegetables in the northwest region of Bangladesh. The goal was to describe selected characteristics of vegetable producers in the research region and to investigate the relationship of these characteristics with the constraints they experience. Data were gathered at random from vegetable producers from several places in Chapainawabganj by a properly structured interview schedule. The findings revealed that in terms of overall constraints, most of the farmers (90.5%) encountered medium constraints in vegetable cultivation. Based on the Constraint Facing Index (CFI), the input constraints had the greatest impact on the production of vegetables. The high amount of land rent was ranked first among the input constraints. The lack of suitable cold storage systems held the first position in the case of technical constraints, and the high price fluctuations of vegetables scored the highest among the constraints in the marketing of vegetables. The technical constraints also had a great impact on the production of vegetables in the study area. High land rent, a lack of suitable cold storage, and the high cost of cold storage each scored above 100 out of a total score of 126 according to the CFI index.

Keywords

Constraints, Vegetable cultivation, Characteristics of farmers, CFI index

Introduction

In terms of vegetable production, Bangladesh is one of the pioneering countries in South Asia. Vegetable cultivation is profitable, and the future performance of this sector will primarily determine the country's success in diversifying agricultural

production and reaching greater agricultural growth rates. Vegetables have fewer storage facilities than other agronomic crops because of their perishability (Islam *et al*., 2019), but they can be grown year-around depending on rainfall, temperature, market need, grower preferences, and social considerations. The production of vegetables is sometimes disrupted for such reasons as natural calamities, unavailability of water, the high price of agricultural commodities, high perishability of the vegetables, lower price of vegetables in the market, high cost of production, unavailability of a storage system, lack of proper transportation system, or lack of proper knowledge about vegetable cultivation, etc. (Mohanty *et al.,* 2013). The constraints of vegetable cultivation are hampering the total production of vegetables in many countries, including Bangladesh (Azad *et al.,* 2014).

The northwest region of Bangladesh is endowed with natural resources such as fertile soils, water, and other favorable climatic and agro-ecological features. Winter is the main vegetable-producing season, lasting about a month longer than in other parts of the country (Uddin *et al*., 2006). Chapainawabganj is a district in this region with about 9,530 hectares of land that were cultivated to produce about 157,245 metric tons of vegetables in the winter season of the year 2018 (Mahmud, 2018). The vegetable farmers of this area face several obstacles that constrain their development of their farms. Khan *et al*. (2021) conducted a study in this area which indicated that 68.3% of farmers have faced medium constraints in the adoption of vegetable production technologies, which shows that the vegetable growers of this region are not willing to overcome the constraints by adopting new technologies. Keeping this in mind, the present study was undertaken to find out the specific constraints faced by the vegetable growers of the Chapainawabganj district, which is famous for its vegetable cultivation in the northwest region of Bangladesh.

The current study was designed to assess the extent of the constraints faced by farmers in the production of vegetables, describe the socio-demographic profile of vegetable growers, and explore the relationship between the socio-

demographic characteristics and constraints faced by farmers in the production of vegetables to provide an appropriate track to this field of research work. All the potential constraints to vegetable production faced by farmers in the research region were highlighted in this study. The study's findings will help to accelerate agricultural improvement, provide logistical support for the farmers, and meet information demands. The findings may also be useful to planners, policymakers, extension workers, and agricultural beneficiaries. Academics may find the results useful in further conceptualizing the systems model for assessing the constraints faced by farmers in vegetable production.

Materials and Methods

Location of the study

The study was conducted in Sadar Upazila in Chapainawabganj district, which is located in Bangladesh's northwestern region. Chapainawabganj is located between latitudes 24º22' and 24º57', and longitudes 87º23' and 88º23'.

Data collection procedure and analysis

Among the five upazilas of Chapainawabganj, the district Sadar Upazila was purposively selected. Three unions and two different villages from each union were selected purposively for the study. Seven respondents were selected randomly from each village. Thus, a total of forty-two respondents constituted the sample of the study from six villages. A pre-structured questionnaire was used to collect data during the face-to-face interviews. SPSS (Statistical Package for Social Science) was used to conduct the analyses. For data analysis and interpretation, statistical tests such as frequency counts, percentages, means, and standard deviations (SD) were used. To investigate the link between the variables in question, a 95% confidence level regression analysis was done.

Variables and their measurement technique

The study's independent variables were the ten selected socioeconomic characteristics of farmers. These were age, educational status,

family size, farm size, annual income, annual profit from vegetable cultivation, farming experience, training exposure, extension media contact, and farmers' knowledge of vegetable cultivation. Appropriate procedures, such as developing appropriate scales, were employed to operationalize the independent variables. The farmers' constraints in vegetable production were the dependent variable. Three categories were evaluated to measure the constraints in vegetable production: input, technical, and marketing constraints. The responses were gathered using a four-point scale of high, medium, low, and not at all, and weights were assigned to these responses as 3, 2, 1, and 0, respectively. Pandit & Basak (2013) and Salele & Molla (2020) also used similar scales for measuring constraint scores in their respective studies. Each respondent's total constraint score was calculated by summing the constraint scores from all four areas. Each farmer's overall constraint score had the potential to range from 0 to 75, with 0 indicating the farmer faced no constraints and 75 indicating the farmer faced significant constraints. The 25 characteristics of the constraints were put in rank order for clarity by generating the following Constraint Facing Index (CFI) equation:

$$CFI = fh \times 3 + fm \times 2 + fl \times 1 + fn \times 0$$

where, CFI is the Constraint Facing Index, fh is the number of respondents who encountered severe constraints, fm is the number of respondents who encountered medium constraints, fl is the number of respondents who experienced low constraints, and fn is the number of responders who encountered no constraints. The Constraints Faced Index (CFI) for each constraint had a range of 0 to 126, with 0 indicating the fewest number of constraints and 126 indicating the highest number of constraints.

Because of the nature of the dependent and independent variables, a linear regression model was used to investigate the relationship between the variables in question. Following the collection of data from respondents in the study area, the data were categorized and classified following the study's objectives. In addition, to quantify the impact of the qualities, multiple regression analyses with significance levels of 0.5 were performed.

Results and Discussion

Socio-demographic characteristics of the vegetable growers

Data on the socio-demographic characteristics of the vegetable growers are included in **Table 1**. According to the data, middle-aged farmers made up a major proportion of those surveyed (54.8%), and the majority of farmers had completed primary school (38.1%). The majority of the farmers belonged to a medium family size (57.1%), which consisted of 5 to 7 family members. The proportion of small farm owners was the highest (59.5%) and the marginal farmer represented 11.9% of all farmers. According to the study's findings, the majority of farmers (71.4%) owned small to medium-sized farms.

The proportion of vegetable producers with a medium yearly income was the highest (85.8%), followed by those with a low income (7.1%) or a high income (7.1%). Vegetable cultivators with a medium or low annual profit from vegetable cultivation made up the majority (95.2% combined), while those with a high profit made up the remainder (4.8%). This could be the direct result of the typically small farm sizes, as well as the different criteria and constraints of the farmers in vegetable production. Khan *et al.* (2022) reported similar socio-demographic features among the area's vegetable farmers.

The majority of vegetable cultivators (64.3%) had low experience in vegetable farming, whereas 90.5% had no or medium training exposure. This demonstrates that the farmers in the research area were indifferent to receiving vegetable farming training. The majority of farmers (92.9%) had little or no contact with extension media. The farmers' lack of extension media engagement may exacerbate the constraints in vegetable output in the study area. The study also found that 90.5% of the vegetable farmers had only a basic understanding of vegetable production, indicating that they were unable to address the challenges that come with vegetable farming.

Constraints encountered by the farmers in different aspects

According to the findings, 69.0% of the farmers had medium input constraints in vegetable production (**Table 2**). In contrast, 90.5% had medium technical constraints in vegetable production. These results had significant impacts on vegetable output in the research area. The unavailability of technical materials lead the farmers to face high technical constraints in vegetable production. Farmers in the study area also suffered low to medium marketing constraints in their vegetable production. None of them had to deal with severe marketing constraints (**Table 2**).

Overall constraints encountered by the vegetable growers

In vegetable production, 90.5% of the farmers reported medium constraints, 9.5% severe constraints, and 0% reported low constraints (**Figure 1**). This demonstrates that restrictions

Table 1. Distribution of the vegetable growers according to their selected socio-economic characteristics

Variable	Category	Frequency	Percentage	Mean	SD
Age	Young (20-35)	7	16.7		
	Middle (35-55)	23	54.8	46.33	11.70
	Old (>55)	12	28.6		
Education	Cannot read and write	5	11.9		
	Primary level (1-5 yrs)	16	38.1		
	Secondary level (6-10 yrs)	15	35.7	6.45	3.37
	Above secondary level (>10 yrs)	6	14.3		
Family size	Small family (2-4)	5	11.9		
	Medium family (5-7)	24	57.1	5.79	1.47
	Large family (>8)	13	31.0		
Farm size	Marginal farm (up to 0.053ha)	5	11.9		
	Small farm (0.053-1ha)	25	59.5	0.79	0.78
	Medium farm (1-3ha)	12	28.6		
Annual income	Low income (<88,000Tk)	3	7.1		
	Medium income (89,000-315,000Tk)	36	85.8	270.28	785.11
	High income (>315,000Tk)	3	7.1		
Annual profit from vegetable cultivation	Low profit (<44,000Tk)	32	76.2		
	Medium profit (45,000-150,000Tk)	8	19.0	83.05	69.88
	High profit (>150,000Tk)	2	4.8		
Farming experience	Low farming experience (0-10 yrs)	27	64.3		
	Medium farming experience (11-25 yrs)	11	26.2	9.98	5.92
	High farming experience (26-40 yrs)	4	9.5		
Training exposure	No training exposure (0)	17	40.5		
	Medium training exposure (1-15)	21	50.0	1.07	0.83
	High training exposure (16-25)	4	9.5		
Extension media contact	Low contact (1-5)	39	92.9		
	Medium contact (6-10)	2	4.8	2.14	1.68
	High contact (11-16)	1	2.4		
Farmer's knowledge on vegetable cultivation	Low knowledge (0-10)	2	4.8		
	Medium knowledge (10-20)	38	90.5	17.83	3.96
	High knowledge (>20)	2	4.8		

Note: SD means standard deviation.

Table 2. Categorization of the constraints in different aspects of vegetable cultivation

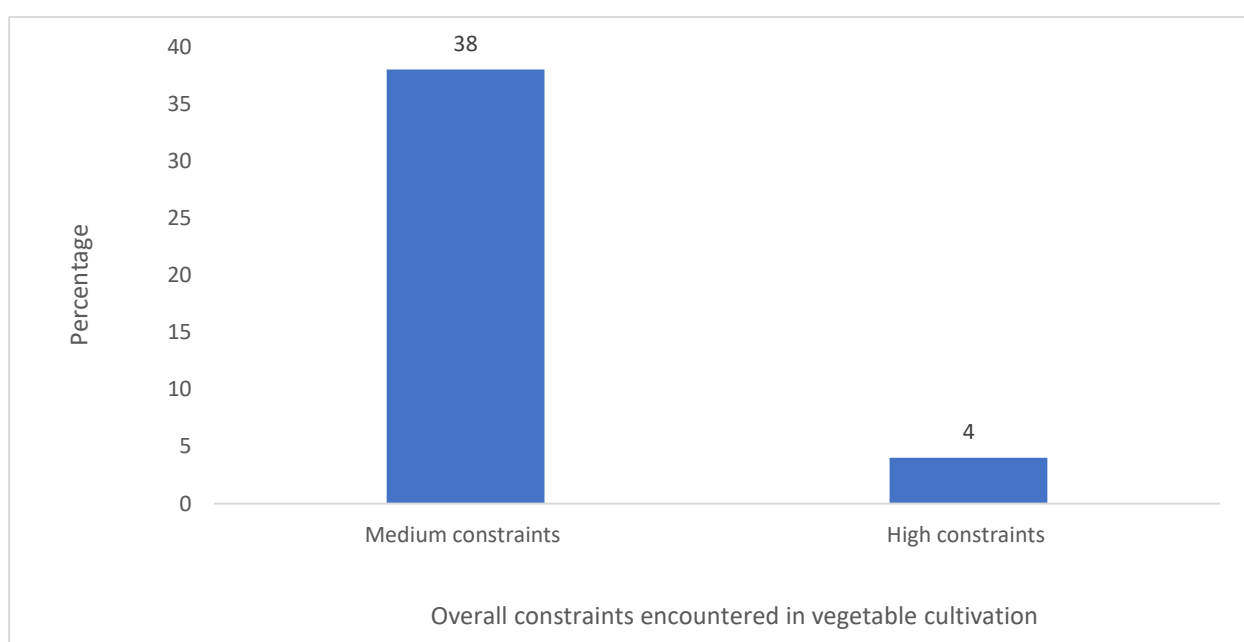| Aspect of constraint	Category	%	Mean	SD
Input constraints	Low constraints	0	19.40	2.55
	Medium constraints	69		
	High constraints	31		
Technical constraints	Low constraints	4.8	23.59	1.79
	Medium constraints	90.5		
	High constraints	4.8		
Marketing constraints	Low constraints	69	5.24	2.17
	Medium constraints	31		

Figure 1. Categorization of the respondents according to their overall constraints encountered in vegetable cultivation

were prevalent in the research region, with the majority of farmers experiencing medium to high levels of production constraints. Pandit & Basak (2013) reported that more the majority (88.90%) of respondents reported medium to high constraints in commercial vegetable farming in the Mymensingh area.

The extent of constraints encountered by the vegetable growers

A Constraint Facing Index (CFI) was established to assess the farmers' level of constraint in each of the 25 specific constraints. **Table 3** shows the computed CFI and related rank order based on the CFI values for all 25 constraint items. The highest input constraint faced by the farmers was land rent (CFI score of 122). This might be because agricultural land was scarce owing to mango production in the research location.

The most common input limitation in vegetable farming in the research region was a shortage of finances. This might have happened because the farmers in the study region had other sources of income. The greatest technical barrier faced by the farmers in vegetable production was a lack of sufficient cold storage since storage systems were not readily available in the research region (CFI score of 117). The absence of irrigation infrastructure was the most minor

technical impediment. This could occur because the farmers had extensive expertise in dealing with irrigation challenges in their vegetable fields, and irrigation water was readily available in the research location.

The high price volatility was the most significant marketing limitation encountered by the farmers in vegetable production (CFI score of 67). Price volatility is a serious issue in Bangladesh's agriculture (Younus, 1993). This might be because manufacturing strategies were not based on market demand. Price volatility had a great impact on the total marketing system. Most of the time the farmers faced problems when they tried to sell their vegetables in the market. Sometimes the farmers did not get the proper price for their vegetables. On the other hand, the dominance of traders in the village was

the lowest ranking marketing problem since the farmers were not dominated by traders in the village market. It was good to see that the farmers of the study area were not influenced by a dominance of traders in the village, which is common in many markets and can limit the farmers' ability to sell their goods.

Attributes influencing constraints encountered by the farmers in vegetable cultivation

To determine the constraints encountered by the farmers in vegetable cultivation, ten independent variables, namely age, education, family size, farm size, annual income, annual profit from vegetable cultivation, farming experience, training exposure, extension media

Table 3. Rank order of the 25 selected constraints encountered by the farmers in the study area

Category	Nature of Constraints	CFI score	Rank
Input constraints	High amount of land rent	122	1st
	High cost of storage	114	2nd
	High labor charge	89	3rd
	High cost of technologies	89	4th
	High transportation cost	83	5th
	High cost of production	76	6th
	High price of insecticide	73	7th
	High price of fertilizer	72	8th
	High cost of seed	65	9th
	Lack of credit	32	10th
Technical constraints	Lack of suitable cold storage	117	1st
	Lack of proper technologies	76	2nd
	Low price of vegetables	69	3rd
	Lack of knowledge of high yielding varieties	67	4th
	Lack of transportation	65	5th
	Less effective and costly weedicide	64	6th
	Unavailability of labor when need	57	7th
	Natural calamities	47	8th
	Lack of irrigation facilities	20	9th
Marketing constraints	High price fluctuation	67	1st
	Unorganized in a marketing system	60	2nd
	Lack of market information	32	3rd
	Higher margin of middleman	28	4th
	Delay in payments	18	5th
	The dominance of traders in the village	15	6th

contact, and farmer's knowledge of vegetable cultivation, were subjected to full-model regression analysis against the dependent variables, namely the constraints encountered by the farmers in vegetable cultivation (**Table 4**). The results indicated that 62.6% (Adj. $R^2 = .626$) of the variation in the respondents constraints faced in vegetable production could be explained by their age, education, family size, farm size, annual income, annual profit from vegetable cultivation, farming experience, training exposure, extension media contact, and farmer's knowledge of vegetable cultivation, making this the best-fitting model (**Table 4**). As $P <0.000$, it indicated that the independent variables had jointly significant effects on the constraints encountered by the farmers in vegetable cultivation. In summary, the model suggested that the relevant authorities should consider the farmers' training exposure, extension media contact, and knowledge on vegetable production technologies in reducing the constraints encountered by the farmers in vegetable cultivation.

Table 4 shows that training exposure, extension media contact, and the farmers' knowledge of vegetable cultivation were significantly and negatively related to the constraints of vegetable production. Similar relationships were also reported by Pandit & Basak (2013) and Kabir *et al*. (2011). This means that farmers with low training, low extension media contact, and low knowledge of vegetable cultivation faced higher constraints. **Table 4** also shows that education, annual profit from vegetable cultivation, and farming experience had insignificant negative relationships with the constraints faced by the farmers in the production of vegetables. So, the analysis revealed that farmers who had a higher education, higher profit from vegetable cultivation, and higher farming experience faced fewer constraints in vegetable cultivation.

Conclusions

It is possible to assume that the majority of vegetable farmers had medium to high limits based on the survey's results and their logical interpretation. The input restrictions at the research site were rather strict. Farmers in the study area, on the other hand, experienced light to moderate marketing restrictions. The relevant authorities need to take action to combat the substantial price fluctuations, which were evident in the research area, and help organize the marketing system. The main obstacles that the farmers faced in growing vegetables were technical ones, such as lacking storage systems

Table 4. Multiple regression of the contributing variables related to the constraints encountered by the farmers in vegetable cultivation

Dependent Variable	Independent variables	β	t	p	R²	Adj. R²	F	p
Constraints encountered by the farmers in vegetable cultivation	Age	-.105	-.772	.446	.717	.626	7.871	0.000**
	Educational status	-.007	-.074	.941				
	Family size	.028	.252	.802				
	Farm size	.143	.224	.824				
	Annual income	.056	.336	.740				
	Annual profit from vegetable cultivation	-.181	-.302	.764				
	Farming experience	-.124	-.890	.380				
	Training exposure	-.338	-2.375	.024*				
	Extension media contact	-.310	-2.230	.033*				
	Farmers' knowledge on vegetable cultivation	-.363	-2.137	.041*				

*Note: *Significant at P <0.05.*

and modern technologies. To make vegetable growing in the northwest a successful industry, concerned authorities must overcome these challenges. This must be made possible by the authorities enacting appropriate rules for providing low-interest loans to farmers, as well as for building crucial transportation and storage infrastructure, which must be supported by a price regulatory system that maximizes the farmers' profitability. Their limited ability to grow vegetables may be caused by a lack of training facilities, extension media coverage, and a lack of knowledge. As a result, any plans made to increase their exposure to training, interaction with extension media, and degree of knowledge may eventually lessen the limitations they have in vegetable production.

References

Azad M. J., Ali M. S., Islam M. R., Yeasmin M. & Pk K. H. (2014). Problem perceived by the farmers in vegetable cultivation. Journal of Experimental Bioscience. 5(2): 63-68.

Islam R., Ali M. S., Alam M. A., Shahriar S. A. & Moin M. J. (2019). Farmer's Constraints for Vegetables Marketing in Bangladesh. Asian Journal of Advances in Agricultural Research. 11(2): 1-9. DOI: 10.9734/ajaar/2019/v11i230050.

Kabir K. H., Kashem M. A. and Miah A. M. A. (2011). Constraints faced by the nursery owners in the production of saplings. Bangladesh Journal of Extension Education. 23(1&2): 53-60.

Khan M. R., Parvez M. F., Haque M. S., Tassaine F. M., Ali M. M. & Khatun T. (2022). Adoption of different farming technologies by the vegetable farmers of Chapainawabganj, Bangladesh. EXIM Bank Agricultural University Bangladesh Journal. 4: 90-95.

Mahmud N. (2018). Winter is here, C‟nawabganj farmers now busy cultivating vegetables. Retrieved from https://unb.com.bd/category/Special/winter-is-here cnawabganj-farmers-now-busy-cultivating-vegetables /4995 on October 25, 2018.

Mohanty A. K., Lepch B. & Kumar A. (2013). Constraints analysis in adoption of vegetable production technologies for livelihood perspective of tribal farmers in North Sikkim. Indian Research Journal of Extension Education. 13(2): 51-56.

Pandit J. C. & Basak N. C. (2013). Constraints faced by the farmers in commercial cultivation of vegetables. Journal of the Bangladesh Agricultural University. 11(2): 193-198.

Rahman M. S., Elias A. N. M. & Chowdhury A. R. (2005). Problem confrontation of potato growers in use of agricultural credit, preservation and marketing. Bangladesh Journal of Training and Development. 18(1&2): 53-56.

Salele M. & Molla T. (2020). Prioritizing Apple Production Constraints in Sinan Woreda, Ethiopia: A Constraint Facing Index (CFI) Approach. 68: 1-5. DOI: 10.7176/JAAS/68-01.

Uddin M. M., Mannaf M. A., Talukder M. A. H., Islam M.B., Saha A. K., Kamal S. M. A. H. M. & Hasan S. (2006). Farm Level Vegetable Production in Northwest Bangladesh-Experience of a GO-NGO Collaborative Program. Pakistan Journal of Biological Sciences. 9: 385-390.

Yunus M. (1993). Farmers' Response to Price in Bangladesh. The Bangladesh Development Studies. 21(3): 101-109.