# PROFITABILITY AND TECHNICAL EFFICIENCY OF MUSHROOM PRODUCTION IN SELECTED AREAS OF BANGLADESH

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# PROFITABILITY AND TECHNICAL EFFICIENCY OF MUSHROOM PRODUCTION IN SELECTED AREAS OF BANGLADESH

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## *CERTIFICATE*

*This is to certify that thesis entitled,* ***"PROFITABILITY AND TECHNICAL EFICIENCY OF MUSHROOM PRODUCTION IN SELECTED AREAS OF BANGLADESH"*** *submitted to the Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of* ***MASTER OF SCIENCE IN AGRICULTURAL ECONOMICS,*** *embodies the result of a piece of bona fide research work carried out by* ***Mahbubur Rahaman****, Registration No.* ***12-05000*** *under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.*

*I further certify that such help or source of information, as has been availed of during the course of this investigation has duly been acknowledged.*

***Dated:  , 2019***
***Place: Dhaka, Bangladesh***

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*DEDICATED*
*TO*
*MY BELOVED PARENTS*

# ABSTRACT

The present study was designed to measure the profitability and technical efficiency of Mushroom farmers in selected areas of two area in Savar under Dhaka District and Taragonj under Rangpur district. Primary data were collected from randomly selected 20 farmers each study area total 40 sample. Both tabular and functional analyses were applied in this study. The major findings of the study reveal that Mushroom production is profitable. Total cost of production was Tk. 9146.45 per 100 bags Mushroom. Gross return was Tk. 15,883.17 per 100 Mushroom and net returns was Tk. 6736.71 per 100 bags Mushroom. Benefit Cost Ratio (BCR) was found to be 1.59 which implies that one taka investment in Mushroom production generated Tk. 1.59. The Cobb-Douglas stochastic frontier production function was used for this study to measure technical efficiency of Mushroom farmers. The coefficients of parameters of Spawn, water cost and Mushroom subtract cost were 0.5703, 0.2024, 0.1289 negative and significant at 10%, 5% and 1% level of significant respectively. Where human labor was found positive and significant at 1 percent level of significant. In the technical inefficiency effect model, experience, training, farm size, extension service and credit service have negative coefficients indicating that this helps in reducing technical inefficiency of Mushroom farmers. The coefficients of education is positive meaning that these factors have no impact on the technical inefficiency. That is, these factors do not reduce or increase technical inefficiency of producing mushroom. The study revealed that a considerable improvement took place to increase household income of the farmers in the study area and to improve the socioeconomic conditions with the introduction of large-scale commercial Mushroom production. The study also identified some Production , Marketing , Technical and Awareness problems and constraints faced by the Mushroom farmers and suggested some recommendations to improve the present production situation so that per 40 Mushroom yield of Mushroom would possibly be increased.

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November 2019

Mahbubur Rahaman

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# ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| BARI | : Bangladesh Agricultural Research Institute |
| BBS | : Bangladesh Bureau of Statistic |
| BCR | : Benefit Cost Ratio |
| BDT | : Bangladeshi Taka |
| BER | : Bangladesh Economic Review |
| DAE | : Department of Agricultural Extension |
| *et al.* | : and others (at elli) |
| GR | : Gross Return |
| gm | : Gram |
| ha | : 100 Mushroom |
| HIES | : Household Income and Expenditure Survey |
| HYV | : High Yielding Variety |
| IOC | : Interest on Operating Capital |
| kg | : Kilogram |
| MoP | : Muriate of Potash |
| mt | : Metric Ton |
| NGO | : Non-Government Organization |
| RIB | :Research Initiatives Bangladesh |
| SRC | : Spices Research Center |
| t | : Ton |
| TC | : Total Cost |
| TFC | : Total Fixed Cost |
| Tk. | : Taka |
| TSP | : Triple Super Phosphate |
| TVC | : Total Variable Cost |
| US | : United States |
| USDA | : United States Department of Agriculture |
| $ | : Dollar |

# CHAPTER-1

# INTRODUCTION

## 1.1 General Background

Mushroom is a large reproductive structure of edible fungi, which is the most popular nutritious, delicious and medicinal vegetable in the world. It is now one of the promising concepts for crop diversification in Bangladesh. The climatic condition of Bangladesh is completely suitable for mushroom cultivation. It does not require any cultivable land. It can grow in room by racking vertically. Therefore, its yield as well as benefit per unit area is higher than any other vegetable in our country. It requires short time, little capital and easy technique for cultivation. This is why all types of people like male and female, youth and old even children and disabled can easily participate in its cultivation. Therefore, it can generate huge scope of employment opportunities for unemployed people. The raw materials for mushroom cultivation like sawdust, paddy straw, wheat straw, sugar can baggage, waste paper, used cotton, dervishes etc are very cheap and available in our country and no materials are required to import from abroad for its cultivation. Moreover, no chemical is necessary for its cultivation, therefore it is completely organic and eco-friendly. Used substrate of mushroom cultivation is one of the best sources of organic matter in the soil. Its cultivation may be “a lifeboat” for survival of the landless people who do not have any source other than their houses and own labor. Its cultivation can transfer as a cottage industry and create a good opportunity for export.

Mushroom is an edible vegetable which is delicious, nutritious and having medicinal value cultivated scientifically from seeds produced in the laboratory in a neat and clean environment (Siddiqui, 2002). Mushroom is one kind of lower class parasitic fungus which becomes edible through modem technique of cultivation. The mushroom is a fleshy, spore-bearing organ of fungi. The fleshy nature of the mushroom is the main attraction to man as a source of food. But the biological role of the mushrooms is the production and

dissemination of spores in numbers sufficient to assure the propagation of the species under diverse environmental conditions (Chang and Miles, 1993). The vegetative parts of the mushrooms mainly consist of thread-like long, thin mycelia which under suitable condition form fruit bodies or sporocaps are the general term applied to the flashy fungi i.e., mushroom. Mushrooms grow under various ecological conditions from desert to forest. They comprised of a large heterogeneous group with different shapes, size, color and edibility. The use of mushrooms as human food dates back to antiquity. It is said that, "Nature alone is antique and the oldest art is mushroom". In ancient cultures such as the Indian, Greek and Roman, mushrooms have been described as sophisticated delicious food associated with Royal class (Bahl, 1994). Indeed, mushroom, which had once been favorite of royal-cuisine and frequent praised "food for good's" and also known as "vegetable meet" or "vegetable beef stick" is fast becoming popular to common man of many countries of the world for its excellent nutritional values (Haider, 1994).

Mushrooms are non-green fungal plants occurring seasonally all over the world in various habitats varying from plains to thick forests or green meadows to roadside pathways. It comprises a large heterogeneous group having various shapes, sizes, appearance and edibility. They are recognized as the alternate source of good quality protein and are capable of producing the highest quantity of protein per unit area and time from the worthless agro-wastes (Chadha and Sharma, 1995). Mushrooms are the source of extra ordinary power and virility and are used in the preparation of many continental dishes. They are good source of protein, vitamins and minerals (Khan *et al.* 2001) and contain about 85-95% water, *3%* protein, 4% carbohydrates, 0.1% fats and 1% minerals and vitamins. Mushrooms contain appreciable amount of potassium, phosphorus, copper, iron and low level of calcium (Anderson and Feller, 1997). Mushroom protein is intermediate between that of animal and vegetable and the amount of niacin, pantothenic acid and biotin are of appreciable level. The detrimental cholesterol is absent in mushroom but necessary ergosterol is present (Chadha and sharma, 1995).

The present nutritional status of Bangladesh is a matter of great concern. Most of our people have been suffering from malnutrition. Mushrooms can mitigate the sufferings from malnutrition to some extent. Because they grow in large quantities in a short time and provide more protein per unit area than any other crop (Gupta, 1986). Mushrooms have medicinal properties like anti-cancerous, anti-cholesteral and anti-tumorous activities and are useful against diabetes, ulcer and lungs diseases. Maitake *(Grifola frondosa*) and shitake *{Lentinns edodes*) mushrooms have been reported to inhibitory to AIDS virus in USA and japan. Pharmaceuticals are produced in Japan from Lentinus. Coriolus, Schizophyllum and Ganoderma (Chadha and Sharma, 1995).

The economy of Bangladesh is mainly agro-based. The country enjoys a salubrious climate without the extremes of either summer or winter. Nearly all the arable areas of the country have been brought under the plough and further agricultural expansion is almost impossible. On the other hand the unemployed population in our country is 2.2 million out of which 0.8 million is female. Mushroom cultivation is labor intensive but land saving short duration crop, can be welcomed by the poor farmers of Bangladesh, as it is a profitable agribusiness. The technology of artificial cultivation of mushroom is somewhat recent innovation and incorporation of this non-conventional crop in existing agricultural system and that can help in improving the social as well as economic status of the small farmers. Moreover, crop diversification and changes food habit is an urgent need to build up our national health. Mushroom cultivation does not compete with other crops, can be grown in homestead with the active participation of family members. The agricultural and other wastes can be used as substrates. Thus it can be produced in large quantity within a short time, provides more protein per unit area and can serves as income generating source in unemployed sector. Considering its nutritional, medicinal and economic importance it is important to improve its production techniques using local low cost materials.

Mushroom is called ‘vegetable meet’ due to its taste and nutritious value. It has occupied a favorite position in the food menu in the most of the part of the world especially in the developed countries. So its commercial production has also spread over the world as it is a very profitable business and adds a lot of revenue to those countries. But it is regrettable that we are in back foot in mushroom cultivation due to some reasons though we have a lot of potentialities in this sector in every aspect. The reasons might be lack of adequate extension service to make mushroom cultivation popular, market and marketing of the products. Beside it, Mushroom cultivation requires intensive cultivation technique as well as some religious factors also might be the causes of its less familiarity. Farmers who are involved with mushroom cultivation face various problems which also create hindrance in Mushroom cultivation.

Globally, mushroom is traded mostly in processed form. China is the largest producer of mushrooms in the category of top ten nations with a market share of 70 per cent followed by Italy 10.67 per cent, USA 5.29 per cent (Table 1.1). However Poland was the largest exporter of mushroom in the world. In terms of consumption, Netherland with 11.62 kg per head per annum topped in the list of major mushroom consumers. In China, Japan, Poland and India, the per capita mushroom consumption stood below 1 kg per annum (Table 1.2)

**Table 1.1 Top Ten Mushroom Producing Countries (2017)**

| Rank | Country | Production (Int $ 1000) | Production(MT) |
|---|---|---|---|
| 1 | China | 9,291,928 | 5,150,000 |
| 2 | Italy | 1,416,342 | 785,000 |
| 3 | USA | 700,864 | 388,450 |
| 4 | Netherlands | 553,907 | 307,000 |
| 5 | Poland | 396,936 | 220,000 |
| 6 | Spain | 263,421 | 146,000 |
| 7 | France | 210,329 | 116,574 |
| 8 | Iran | 158,188 | 87,675 |
| 9 | Canada | 147,949 | 82,000 |
| 10 | United Kingdom | 131,891 | 73,100 |

Source: http://www.mapsofworld.com/world-top-ten/mushroom-producing-countries.html

**Table 1.2 per Capita Consumption of Mushrooms (2017)**

| Country | Per capita consumption (kg/head/annum) |
|---|---|
| Netherlands | 11.62 |
| Ireland | 06.10 |
| Belgium | 04.46 |
| Denmark | 03.89 |
| Spain | 03.11 |
| United Kingdom | 03.01 |
| France | 02.72 |
| Germany | 02.47 |
| Canada | 02.30 |
| Italy | 01.62 |
| USA | 01.49 |
| China | 01.16 |
| Japan | 00.86 |
| Poland | 00.35 |
| India | 00.04 |

Source: FAO production year book, 2017

## 1.2 Importance of Mushrooms

Mushrooms are classified as vegetables in the food world, but they are not technically plants. They belong to the fungi kingdom. Although they are not vegetables, mushrooms provide several important nutrients. The key to getting enough vitamins and minerals in the diet is to eat a colorful variety of fruits and vegetables. In many cases, a food that lacks color also lacks necessary nutrients, but edible mushrooms, which are commonly white, prove quite the contrary.

Mushrooms are naturally low in sodium, fat, cholesterol, and calories and have often been referred to as "functional foods."As well as providing basic nutrition, they help prevent chronic disease due to the presence of antioxidants and beneficial dietary fibers such as chitin and beta-glucans.

One cup of chopped or sliced raw white mushrooms contains:

- 15 calories
- 0 grams of fat
- 2.2 grams of protein
- 2.3 grams of carbohydrate, including 0.7 grams of fiber and 1.4 grams of sugar

A large variety of mushrooms are available, but most provide around the same amount of the same nutrients per serving, regardless of their shape or size.

Mushrooms are rich in B vitamins such as riboflavin (B2), folate (B9), thiamine (B1), pantothenic acid (B5), and niacin B3). The B vitamins help the body to get energy from food, and they help form red blood cells.

A number of B vitamins also appear to be important for a healthy brain. Pregnant women are advised to take folic acid, or folate, during pregnancy, to boost fetal health. Mushrooms are also the only vegan, non-fortified dietary source of vitamin D.

Dairy products are normally a good food source of vitamin D, but vegans do not consume any animal products, so mushrooms can offer an alternative source of this important vitamin.

Several other minerals that may be difficult to obtain in a vegan diet, such as selenium, potassium, copper, iron, and phosphorus, are available in mushrooms.[1]Beta-glucans are a type of fiber that is found in the cell walls of many types of mushrooms. Recently, beta-glucans have been the subject of extensive studies that suggest they might improve insulin resistance and blood cholesterol levels, lowering the risk of obesity and providing an immunity boost.

Mushrooms also contain choline, an important nutrient that helps with sleep, muscle movement, learning, and memory. Choline assists in maintaining the structure of cellular membranes, aids in the transmission of nerve impulses, supports proper fat absorption and reduces chronic inflammation.

### 1.3 History of Mushroom in Bangladesh

Mushroom is a very nutritious, delicious and fully ‘halal’ vegetable having medicinal qualities. Mushroom cultivation in Bangladesh began in 1979 with assistance from Japanese organization JOCDV. Later, Japan International Cooperation Agency (JAICA) came up in 1987 with its assistance. Mushroom cultivation slowed down in 1990 following withdrawal of JAICA’s support.

In 2003, the government introduced a Mushroom Development Project under Agriculture Extension department. Different research works are being conducted under the project in addition to providing, training on mushroom cultivation.

Apart from Savar, this project has activities in Dinajpur, Jessore, Barisal, Chittagong, Sylhet, Comilla, Khulna Mymensingh, Bandarban, Rangamati, Chapainawabganj and Rangpur fomotivating people to cultivate mushroom.

Currently 13 species of mushroom are cultivated in Bangladesh of which yester Mushroom is produced commercially to a large extent. Mushroom fanning is in fact a very easy job. There is an opportunity to make good profit by investing a little amount of capital and labour. One can earn Tk 4-5 thousand a month by investing only Tk 10-15 thousand.

## 1.4 Specific Objectives of the Study

In view of the problem as stated above, the following specific objectives were formulated for giving proper direction to the study:

1. To access the socio economic characteristics of the mushroom growers in study area
2. To workout the cost of cultivation and returns of mushroom at sample farms in study area.
3. To analyze technical efficiency of Mushroom growers.
4. To identify the constraints faced by the producers in the production and marketing of mushroom and to suggest some measures to improve them.

## 1.5 Justification of the Study

In recent years, it has occupied a very important place in man's dietary as a food item and has always been appreciated as a delicacy, nutritional and therapeutic properties (Haider, 1994). The international cultivation of mushroom for food goes back to about 600 AD when *Auricularia spp.* was first cultivated in China (Chang and Miles, 1993).

There is a great interest today in edible species whose gastronomic appeal is known from mushrooms collected in the wild, but for which the cultivation technology has not yet been developed. There are about 2000 edible mushrooms species and 20 of them have been possible to cultivate at present (Siddiqui, 2002). Presently, mushrooms are being cultivated in about 100 countries with an annual production of 3.763 million metric tons. The USA, European and Southeast Asian countries are the major producers; Taiwan being the major one in Asia (Gupta, 1986). In India, the position of mushroom is in second among exportable agricultural produces (Basher, 1994).

Recently, Bangladesh produces and markets commercially 60 thousands packets of spawn per year through Mushroom Cultivation Center, Savar, Dhaka under Directorate of Agriculture Extension (DAE) (Bashar, 1994). But the amount of mushroom production is very less in compared to other countries due to lack of higher technology. Use of proper media and substrate instead of traditional culture media can increase the production of our country.

Besides these, mushroom cultivators face some problems in mushroom cultivation. But there was no research work on the problems of mushroom cultivators. Therefore the researcher felt necessity to conduct a research work on “Problems confrontation of the Farmers in Mushroom Cultivation”.

So that the farmers can ensure the supply of desire amount of vegetable protein through identifying the constraints in adopting mushroom production technologies. Identifying and minimizing constraints in adopting mushroom production technologies have beneficial effect on increasing mushroom production as well as mitigated the nutritional problem. Therefore, the findings of the study are expected to be of great value to researchers’ extension service providers, students and particularly mushroom production technology generators and planners in formulating and designing extension approaches.

## 1.6 Scope of the Study

The present study was profitability and technical efficiency confronted by the farmers in mushroom cultivation and to explore its relationship with their selected characteristics. The findings of the study will in particular be applicable to Savar upazila of Dhaka district and Taragong Upazila of Rangpur district. However, the findings may also be applicable to other areas of Bangladesh where socio-cultural, psychological, and economic situation do not differ much than those of the study area. The findings may be also helpful to the field works of agricultural extension service providers to improve strategies of action for adopting mushroom production technologies in the rural and urban people. Lastly, it is assumed that the recommendation of this study will be helpful in formulating extension programmers for reducing hindrances of mushroom production and increasing mushroom protein supply in the country.

## 1.7 Limitations of the Study

In order to make the study manageable and meaningful from the point of view of research, it was necessary to impose some limitations as stated below:

i) The study was confined in four villages near savar upazilla under Dhaka district and Taragong Upazila under Rangpur district

ii) The study was confined mainly to cost of production by the farmers in mushroom cultivation.

iii) Characteristics of the farmers are many and varied, but time, money and other resources did not permit the researcher to include all of them in the study. Hence, only six characteristics of the farmers and their problem faced in mushroom cultivation were selected for investigation in this study.

(iv)Various problems in adopting mushroom cultivation were likely to be confronted by the farmers. However, four type's problems have been considered for investigation in this study.

v) For information about the study, the researcher was dependent on the data furnished by the selected respondents during data collection.

### 1.7 Setup of the study:

This thesis has been divided into eight chapters including the present chapter which consists of introduction and objectives of the study. A review of literature of work done in the past is given in Chapter- II, Chapter-III deals with material and methods, Chapter- IV has Profile of study area, Socio-Demography Chapter-V, Chapter-VI deals with Profitability Chapter-VII is Technical Efficiency, Chapter-VII deals with Marketing channel, Chapter IX is Problems and Chapter- X includes summary, conclusion and recommendations for future research work.

# CHAPTER-2

# REVIEW OF LITERATURE

A comprehensive review of literature is essential in any research endeavor. The scientific investigations arrived at through systematic thinking, factual observations and past experience, become a sound base of knowledge for future research work to be undertaken. Before initiating any study, a critical and thorough insight of the studies already carried out relating to topic of the problem under investigation, therefore, becomes imperative for conceptual clarity and methodological improvement in the research work to be carried out. This chapter reviews the available literature and to document major findings of different studies, research gaps and the recent changes that have been taking place in mushroom production and marketing in India and abroad. With this in view, brief resume of the research work already done in India and abroad on the study in mushroom cultivation, pattern of disposal and their marketing in Himachal Pradesh is presented under the following broad sections.

**Kangotra and Chauhan** (2013) in their study on economic viability of button mushroom cultivation in Himachal Pradesh found that more than one-half of sample mushroom growers had 6 to 7 years of experience and remaining up to 5 years and mostly belonged to middle aged class of 40-60 years with matriculation and graduation level formal education. The business principles like knowledge, training prior adoption of activity, market survey, etc. were given due consideration and one-half of them started enterprise with small scale of 50 or even less number of spawned compost bags each weighing 20 kg with average unit investment of Rs 45,428. Majority (80%) of them could grow a single crop with average yield of 3.62 kg per spawned compost bag which increased with the size

from 3.52 kg on small to 3.64 kg per bag on large units showing low cost of production on large units due to scale economies. The financial test ratio revealed greater economic feasibility and profitability of mushroom cultivation on large units on account of higher investment and better marketing linkages with suppliers by ensuring adequate and assured supply of produce.

**Kangotra and Chauhan** (2013) in their study reported that inadequate supply of spawned compost bags, quality spawned compost material, lack of remunerative prices and incidence of disease were reported the major constraints requiring immediate attention of policy makers. For improving productivity, the study recommended the adequate supply of quality spawned compost bags at the doorsteps of growers at appropriate time and reasonable prices in addition to encouraging them to grow at least two crops in a year. Sale of mushroom under co-operative ambit especially by small growers may help them in fetching better price.

**Singh *et al.*** (2010) has analyzed the cost, returns and break-even point of mushroom production on different categories of farms. The study revealed that the fixed capital investment was more than double in large and medium farms as compared to small farms. The use of compost has a positive relationship with the farm size. Large farmers have lowest cost of mushroom production as compared to small and medium farms due to efficient utilization of fixed farm resources.

**Meena *et al.*** (2009) studied the marketing practices and channels involved in the marketing of mushroom. The study revealed that woman cooperative society was the most important agency in the marketing of mushroom. Average quantity sold on per farm basis was 6.17 quintals. Half of the producer- sellers preferred to sell mushroom in 1 to 2 quintals size lot.

Maximum quantity (66%) of mushroom was sold within village by majority (70%) of producer-sellers. Three channels were identified in the marketing of mushroom. Producer's share in consumer rupee was highest (98.53%) in channel –I (producer  consumer). Retailer earned the maximum marketing margin (13.89%) in the marketing of mushroom.

**Kanwar *et al.*** (2009) observed that the growers sold the mushroom produce at the rate of Rs 60 and Rs 75 per kg through women self-help group in Himachal Pradesh. This disparity in the rates was because of the reason that some of the ladies sold the produce through direct marketing and fetch high rates whereas who sold through middleman could get an amount of Rs 60 per kg.

**Dhancholia and Thakur** (2008) reported more than 35 specimens of wild and edible mushrooms in Lahaul valley, Himachal Pradesh, India, for the first time. Compost bags weighing 4-5 kg yielded an average 50-200 g of fruiting bodies under severe cold conditions in the remote tribal mountain area.

**Saran *et al.*** (2008) in their study on economic analysis of mushroom cultivation in Punjab observed that a small farmer growing mushrooms round the year followed either of two rotations viz; white button  straw mushroom and dhingri  straw mushroom. From a small farm of 100 square feet each for white button mushroom (two crop system) and straw mushroom would fetch a net profit of Rs. 12,167.29 and in a rotation of dhingri straw mushroom; a net profit of Rs. 10,920.76 would be earned.

**Singh *et al.*** (2008) conducted a study in Sonepat and Gurgaon districts of Haryana. The study revealed that producer's share in consumer's rupee was highest in channel IV followed by II, III and I, respectively. The channel I was the least efficient due to the existence of middle-men.

**Dehemy *et al.*** (2007) studied that in Egypt, production of mushroom was about 0.06 per cent of the world production. The results showed that production of mushroom significantly increased by 0.15 thousand ton/year. China, U.S.A and Germany are the top producing countries contributing 46.11 per cent of the total world production. The top exporting countries namely China, Poland and Ireland accounted for 57.67 per cent in the total world exports of mushroom. Meanwhile, Germany, Japan, England and U.S.A. the top importing countries imported about 574.82 per cent of total world imports of mushroom (2002-2004).

**Khare *et al.*** (2007) conducted a study on oyster mushroom production and economic profitability in Kenya. A detailed economic profitability analysis showed that *Pleurotus* mushroom cultivation was income generating entrepreneur that farmer and unemployed youth can easily adopt.

**Nasiruddin and Tewari** (2007) analysed that the total production of all the mushrooms in China in 1986 was between 5.5-6.0 lakh metric tonnes. By 1999 the production was estimated to be 4 million metric tonnes. It was estimated that during past decades mushroom production in China has increased at the rate of 18-20 per cent per annum and likewise China has become a giant producer of mushrooms in the world.

**Saikia *et al.*** (2007) studied economic viability of oyster mushroom production in Assam and observed that the average production of mushroom per grower per crop varied from 30.70 kg in group I growing 1-50 bags of mushroom to 599.96 kg in group IV growing 301 and more bags of mushroom. Per bag production of mushroom was 98 kg which decreased with the increase in size of growers. On an average the share of variable and fixed cost in total cost was found to be 87.26 per cent and 12.74 per cent, respectively. On an average, per bag and per kg cost of mushroom production was Rs 15.00 and Rs 16.00, respectively. The net returns ranged between Rs 1,105 in group I and Rs 24,839 in group IV with the average of Rs 8,716 while the average net returns per bag of mushroom and per kilogram of mushroom were Rs 40 and Rs 41, respectively. The break-even analysis indicated oyster mushroom production as an economically viable proposition. The average price and production received by the mushroom growers were much higher than their respective break-even values.

**Singh and Ram** (2007) worked out the benefit cost ratio of mushroom cultivation in Sonepat and Gurgaon district of Haryana. The study revealed that the fixed capital investment was more than double in case of large and medium farms as compared to the small farms. The large farmers had lowest cost of mushroom production as compared to small and medium due to the most efficient utilization of fixed farm resources. The use of compost had positive relationship with the farm size. There existed a positive relationship between the mushroom production and farm size.

**Rani *et al.*** (2006) observed that the share of fixed and operational cost in total cost constituted about 17.57 per cent and 82.43 per cent in Kurukshetra and Yamunangar, respectively. In operational cost, the compost cost accounted for the highest share (34.28%) followed by marketing cost (13.28%), labour cost (12.98%), shelf making cost (9.13%) and spawn cost (5.96%). While the electricity cost was the least of 1.32 per cent.

The large growers earned more profit from mushroom cultivation than those of small and medium growers. The economy of scale operated well on large farms. One rupee increase in miscellaneous cost such as electricity, marketing, shelf making, and interest on working capital added only 0.41 paisa into the total value derived from mushroom cultivation. Similarly, one rupee each increase in spawn cost as well as other cost such depreciation on building, equipments, interest on fixed capital investments, etc. added as Rs 21.9 and Rs 3.9, respectively into the gross returns.

**Khatkar *et al.*** (2005) in their study determined the costs and returns of mushroom production as well as the margins and costs of mushroom marketing in Haryana, India. Results indicated that mushroom production was an economically viable enterprise but the middleman had the highest share of the consumer's rupee. Thus, it is suggested that cooperative marketing and processing should be encouraged to increase the producer's margins.

**Kumar and Burark** (2005) studied the economics of oyster mushroom (*Pleurotus sp*.) cultivation on small, medium and large farms in Rajasthan which revealed that the overall gross income was estimated at Rs 39,849 per unit. Average net income and family labour income was Rs 24,005 and Rs 25,201 per unit, respectively. The average cost of mushroom production and average market price on overall basis were Rs 1,758 and Rs 4,000 per quintal. The average mushroom yield varied from 4.92 quintal to 15 quintal per unit whereas the cost was Rs 15,844 per unit.

**Litvinov and Devochka** (2004) found that industrial mushroom production is a relatively new sector of agricultural production in Russia. It was estimated that approximately $ 50 million needs to be invested in developing this sector in order to increase annual mushroom production in Moscow region to the extent of 10,000 tonnes. According to official data,

Russian imports of fresh mushrooms from the Netherlands and Poland was as high as 8,000 tonnes per year. Growth in imports of mushrooms to Russia was 44 per cent per annum against growth in Russian mushroom production of only 13 per cent per annum.

**Halim** (2003) conducted a study on constraints faced by the farmers in adopting crop diversification. The top five constraints identified of this study according to their rank order were (i) lack of storage facilities for products and seeds, (ii) high price of inputs, (iii) non-availability of credit for other crops, (iv) lack of sufficient training programme in different aspects of crop diversification and (v) most of the lands are in low lying areas and not suitable for CDP crops. Salam (2003) in his study identified constraints in adopting environmentally friendly farming practices. Top six identified constraints according to their rank order were: i) low production due to limited use of fertilizer (ii) lack of organic matter in soil, (iii) lack of Govt, support for environmentally friendly farming practices, (iv) lack of capital and natural resources for integrated farming practices, (v) lack of knowledge on integrated farm management and (vi) unavailability of pest resistant varieties of crops.

**Akkaya *et al.*** (2001) studied the economics of commercial mushroom production in Antalya province (Turkey) and observed that average mushroom production was 223.27 m2 and the total capital use was LT 5,567.54 million. Yield of mushroom for a year and for one growing period was 69.20 kg/m2 and 21.83 kg/m2, respectively. Production cost was LT 3, 12,168 for 1 kg of mushroom, net return was LT 78,196 for 1 kg of mushroom and relative profitability was 1.25.

**Deshmukh *et al.*** (2001) conducted a study on profitability of *Oyster* mushroom production in Maharashtra state. The study revealed that as size of production unit increased, the total cost of mushroom production increased and thereby indicating positive relationship between unit size and total cost of mushroom production. The cost incurred by the small, medium and large units worked out to be Rs 944.98, Rs 1450.28 and Rs 4682.96, respectively. Per unit (farm) total cost of mushroom production incurred was Rs

3043.82/crop and B-C ratio for small, medium and large sized unit was 1.35, 1.86 and 3.09, respectively.

**Paul *et al*.** (2001) studied that lack of proper knowledge of composting, losses on account of perishable nature of mushroom, difficulty in borrowing loans and lack of education knowledge among villagers about nutritional value of mushroom and storage facilities were major constraints confronted by the mushroom growers. In another study Singh and Ram (2007) found that lack of finance, lack of availability of good spawn, high price of spawn and problems of insect-pest and disease, etc. were the major problems in mushroom production. The study suggested that the financial assistance through institutional agencies at cheaper rate would be the desirable entity.

**Chisti *et al.*** (2000) analyzed the cost and returns of eight mushroom farms in the Rawalpindi/ Islamabad area of Pakistan. An econometrically estimated model suggested a significant relationship between net returns and its contributing factors included fixed and variable costs, net output, sale price and farm size. Mean difference between the variable was Rs 21.44, Rs 22.40 and Rs 20.12 per kg on small, medium and large category of farms, respectively and Rs 21.10 per kg on overall sample mushroom farms .

**Philippoussis and Zervakis** (2000) examined the current situation of mushroom production in Greece and observed that production was largely dominated by the button mushroom (*Agaricus bisporus*) while the oyster mushroom (*Pleurotus ostreatus*) accounted for nearly 10 per cent of production. Per capita consumption in Greece was much lower than in most other European Union countries.

**Suman and Gupta** (2000) studied the economics of *Dhingri* cultivation and suggested that it was an economically attractive enterprise for the small and marginal farmers in lower areas of Himachal Pradesh. Its cultivation is profitable even under the adverse market and production situation. Total cost of obtaining two crops was estimated at Rs 11,211, which

came to be Rs 14.01 per bag. Share of annual fixed costs and annual variable costs was 6.4 per cent and 93.6 per cent, respectively. The share of substrate and labour in total cost was about 43 per cent and 32 per cent respectively. Net surplus generated by 2 crops of *Dhingri* over period of 4 months was Rs 5,693 (Rs 7.05 per bag). The author finally concluded that this enterprise has potential to transform the rural economy as it generates income and employment to the unemployed people of the rural areas.

**Bhatt and Singh** (1999) analysed status of mushroom cultivation in India. The study revealed that mushroom industry in India was developing fast, especially cultivation of white button mushroom for export. During the decade's ending 1996, the production increased in India by fivefold. The author further mentioned that mushroom industry has a bright future in India chiefly because of abundance of agro by products generated. The second point in favour of mushroom industry in India is the availability of labour at reasonable rates as compared to developed nations. Moreover, by 2002 AD the mushroom production with available technology was expected to cross 1, 00,000 tonnes per annum.

**Paula *et al.*** (1999) in his study observed that Shiitake commercial cultivation had been increasing mainly in Sao Paulo in Brazil, being the largest national producer. The total cost of production by kilogram of fresh mushroom was $ 5.19. The lucrativity index of 48.05 per cent at producer's level ensures repayment of the investment required in the first production cycle. The activity has been characterized as profitable, being an excellent optimum alternative for producers aiming to diversify their business.

**Research Gaps**

The above-mentioned opinions evidently show that only a few studies were conducted on mushroom production. As far from the knowledge of the researcher, no profitability and technical efficiency study on mushroom production was conducted in my study area. The present study was, therefore, undertaken to determine the profitability and technical use efficiency of mushroom production and thereby to facilitate farmers and policy maker's decision making by providing information on mushroom production.

# CHAPTER 3

# METHODOLOGY

## 3.1. Introduction

Farm management research depends on the proper methodology of the study. Proper methodology is a prerequisite of a good research. The design of any survey is predominantly determined by the nature, aims, and objectives of the study. It also depends on the availability of necessary resources, materials and time. There are several methods of collecting data for farm management research. A farm business study usually involves collection of information from individual farmers; collection of data for farm business analysis involves judgment of the analyst in the selection of data collection methods within the limits imposed by the resources available for the work (Dillon and Hardaker 1993). In this study, “survey method" was employed mainly due to two reasons:

i. Survey enables quick investigations of large number of cases; and
ii. Its results have wider applicability.

The major disadvantage of the survey method is that the investigator has to rely upon the memory of the farmers. To overcome this problem, repeated visits were made to collect data in the study area and in the case of any omission or contradiction the farmers were revisited to obtain the `missing and/or correct information. The design of the survey for the present study involved the following steps.

## 3.2. Selection of the Study Area

Selection of the study area is an important step for farm management study. The selection of an area fulfilled the particular purpose which was set for the study and also the possible cooperation from the farmer. Even mushroom is not grown all over Bangladesh, but the Dhaka and Rangpur is one of the important districts where it is grown quite extensively.

So, on the basis of higher concentration of mushroom production, Savar upazila under Dhaka districts and Taragong upazila under Rangpur district namely were purposively selected for the study.

The main reasons in selecting the study area were as follows:

a) Availability of a large number of mushroom growers in the study area;
b) These upazila had some identical physical characteristics like topography, soil and climatic conditions for producing mushroom.
c) Easy accessibility and good communication facilities in these upazila; and
d) Co-operation from the respondents was expected to be high so that the reliable data would be obtained.

### 3.3. Sampling Technique and Sample Size

In selecting samples for a study two factors need to be taken into consideration. The sample size should be as large as to allow for adequate degrees of freedom in the statistical analysis. On the other hand, administration of field research, processing and analysis of data should be manageable within the limitation imposed by physical, human and financial resources (Mannan 2001). However, because of diversity in the technical and human environment, it is necessary to sample several numbers of the population before any conclusion can be drawn. Therefore, the purpose of sampling is to select a sub-set of the population that is representative of the population (Rahman 2000).

It was not possible to include all the farmers of the study area due to limitation of time, money and personnel. In total 100 farmers were randomly selected. A purposive random sampling technique was followed in the present study for minimizing cost, time and to achieve the ultimate objectives of the study.

### 3.4. Preparation of the Survey Schedule

A draft questionnaire was prepared for collecting information from the sample farmers. Keeping the objectives of the study in mind, the questionnaire was pre-tested by interviewing some farmers who cultivated mushroom and necessary modifications, additions and alternations were made and then draft questionnaire was finalized. The final questionnaire contained three categories of information. The purpose of the first category was to obtain information about the socioeconomic conditions of the selected farmers. The second category contained information related to costs and returns. The third category of information was related to constraints and problems faced by the farmers in producing mushroom.

### 3.5. Period of the Study

Data were collected during the period from September to October in 2018. Data relating to inputs and outputs were collected by making time to time visit in the study area during this period.

### 3.6. Data Collection Methods

For the present study, data were collected from the mushroom growing farmers through field survey. The researcher himself collected the relevant data from the selected mushroom growers. Before interviewing, the selected farmers were contacted so that they could be interviewed according to their convenience of time. At the time of interview, the researcher asked questions systematically and explained the aims and objectives of the study whenever it was felt necessary. It was explained to the farmers that the study was purely academic. Farmers were also explained the usefulness of the study in their farm business context. Each time, when interview was over, the interview schedule was checked to be sure that information to each of the item was properly recorded. If there were such items which were overlooked or contradictory, they were corrected through a revisit. In addition to survey, observation method was also applied to collect information by the researcher.

### 3.7. Processing, Tabulation and Analysis of Data

The collected data were manually edited and coded. Then all the collected data were summarized and scrutinized carefully. Moreover, data entry was made in computer and analyses were done using the concerned software Microsoft Excel and STATA. It may be noted here that information was collected initially in local units. After necessary checking it was converted into standard international units.

### 3.8. Analytical Techniques

Data were analyzed with a view to achieving the objectives of the study. Several analytical methods were employed in the present study. Tabular method was used for a substantial part of data analysis. This technique is intensively used for its inherent quality of purporting the true picture of the farm economy in the simplest form. Relatively simple statistical techniques such as percentage and arithmetic mean or average were employed to analyze data and to describe socioeconomic characteristics of mushroom growers, input use, costs and returns of mushroom production and to calculate undiscounted benefit cost ratio (BCR).

In order to estimate the level of technical efficiency in a manner consistent with the theory of production function, Cobb-Douglas type stochastic frontier production function was used in the present study.

#### 3.8.1 Profitability Analysis

The net returns of mushroom were estimated using the set of financial prices. The financial prices were market prices actually received by farmers for outputs and paid for purchased inputs during the period under consideration in this study. The cost items identified for the study were as follows-

- Total spawn bags
- Human labor
- Bamboos
- Polythenes
- Cloth

- Plastic pipes
- Water supply pipes
- Tins
- Rent
- Water supply machines
- Gunny Bags/ Jute Bags woods
- Cement pillars
- Interest on operating capital

The returns from the mushroom were estimated based on the value of main products. In this study variable cost, fixed cost and total cost had been described. Total variable cost (TVC) included land preparation, human labor, seedlings, organic manure, urea, TSP, MoP, insecticides, irrigation and interest on operating capital. Fixed cost (FC) included only rental value of land. Total cost (TC) included total variable cost and fixed cost.

## Fixed costs

The fixed costs of mushroom farming considered farm house making materials as bamboos, polythene, cloths, plastic pipes, water supply pipes, tins, water supply machines, rent of house, gunny bags, woods, concrete pillars and others (electricity, water supply materials etc).

## Variable costs

Variable cost share is the largest amount in the total cost of mushroom farming. Variable costs encompasses the cost of spawn bags (purchasing and making cost) and all labor cost (family and permanent hired labor) for mushroom production.

## Labor costs

Labor cost included family labor and permanent hired labor costs. The family labor cost was calculated on the basis of the principle of opportunity cost. The hired labor cost was calculated on the basis of the labor employed at the local market price.

All types of labor costs were considered as 3–months, because commercial mushroom farmers actually produce for 3 months (6 times) in one spawn bag. Labor cost is one of the main cost items in agriculture and it is also true in mushroom farming. In case of small farm owner and family members provide their labor. However, for large farm, not only owner and family members but also hired labor works in the farm.

## House rent Costs

House rent cost was calculated on the basis of opportunity cost of the use of house per square meter for the production period of four months. So, cash rental value of house has been used for cost of house rent use.

### Interest on Operating Capital (IOC)

Interest on operating capital was determined by taking all costs incurred on various operations in the process of cultivation of mushroom excluding those for which interest was already calculated. Interest on operating capital was charged at the rate of 10 percent per annum and was estimated for the duration of four months for mushroom. It was assumed that if the farmers borrowed the money from a bank, they had to pay interest at the same rate. It was estimated by using the following formula:

Interest on operating capital = AI*i*T

Where,

AI= (Total investment)/ 2

i = Rate of interest

T = Total time period of a cycle

.

## Calculation of Returns

### Gross Return

Per hectare gross return was calculated by multiplying the total amount of product and by-product by their respective per unit prices.

> **Gross Return**= Quantity of the product * Average price of the product + Value of by- product.

### Gross Margin

Gross margin is defined as the difference between gross return and variable costs. Generally, farmers want maximum return over variable cost of production. The argument for using the gross margin analysis is that the farmers are interested to get returns over variable cost. Gross margin was calculated on TVC basis.Per hectare gross margin was obtained by subtracting variable costs from gross return. That is,

> **Gross margin** = Gross return – Variable cost

### Net Return

Net return or profit was calculated by deducting the total production cost from the total return or gross return. That is,

> **Net return** = Total return – Total production cost.

### Undiscounted Benefit Cost Ratio (BCR)

Average return to each taka spent on production is an important criterion for measuring profitability. Undiscounted BCR was estimated as the ratio of total return to total cost per hectare.

> **BCR** = Total return (Gross return)/ Total cost

### 3.8.2 Technical Efficiency Analysis

Technical efficiency refers to the ability of a firm to produce the maximum possible output from a given set of inputs and given technology. A technically efficient farm will operate on its frontier production function. Given the stated relationship the firm is technically efficient if it produces on its outer-bound production function to obtain the maximum possible output which is feasible under the current technology. Putting it differently a firm is considered to be technically efficient if it operates at a point on an isoquant rather than interior to the isoquant. The homogeneity of inputs is a vital factor for achieving technically efficient output.

No one would dispute that the output produced from given inputs is a genuine measure of efficiency, but there is room for doubt whether, in a particular application, the inputs of a given firm are really the same as those represented by the corresponding point on the efficient isoquant. But it is important to note that mere heterogeneity of factors will not matter, as long as it is spread evenly over firms, it is when there are differences between firms in the average quality (or more strictly, in the distribution of qualities) of a factor, that a firm's technical efficiency will reflect the quality of its inputs as well as the efficiency of its management.

#### 3.8.2.1 The Stochastic Frontier Models

The most widely discussed, theoretically reasonable and empirically competent method of measuring efficiency is the stochastic frontier model. It is an improvement on the traditional average production function and on all types of deterministic frontiers in the sense that it introduces in addition to one-sided error component a symmetric error term to the model. This permits random variation of the frontier across farms, and captures the effects of measurement error, other statistical noise arid random shocks outside the firm's control. A one-sided component captures the effects of inefficiency relative to the stochastic frontier. The stochastic frontier model is also called the 'composed error' model introduced by Aigner, Lovell and Schmidt (1977). It was later extended and elaborated by Jondrow *et al*. (1982).

The notion of a deterministic frontier shared by all farms ignores the very real possibility that a farm's performance may be affected by factors entirely outside its control (such as poor machine performance, bad weather, input supply breakdowns, and so on), as well as by factors under its control (inefficiency). But stochastic frontiers consider all the factors while estimating the model and accordingly it separates firm- specific efficiency and random error effect. Thus the efficiency measurements as well as the estimated parameters are unbiased.

### 3.8.2.2 The Stochastic Frontier with Cobb-Douglas Production Function

The Cobb-Douglas production function is probably the most widely used form for fitting agricultural production data, because of its mathematical properties, ease of interpretation and computational simplicity (Heady and Dillion, 1969; Fuss and Mcfadden, 1978). The Cobb-Douglas function has convex isoquants, but as it has unitary elasticity of substitution; it does not allow for technically independent or competitive factors, nor does it allow for Stages I and III along with Stage II. That is, MPP and APP are monotonically decreasing functions for all X- the entire factor-factor space is Stage II-given $0 < b < 1$, which is the usual case. However, the Cobb-Douglas may be good approximation for the production processes for which factors are imperfect substitutes over the entire range of input values. Also, the Cobb-Douglas is relatively easy to estimate because in logarithmic form it is linear in parameters; it is parsimonious in parameters (Beattie and Taylor, 1985).

A stochastic Cobb-Douglas production frontier model may be written as

$$Y_i = f(X_i,\beta)\ \exp.(V_i-U_i)\ i = 1, 2, 3, \ldots\ldots\ldots, N$$

Where the stochastic production frontier is $f(Xi,\beta)\exp.(Vi)$, Vi having some symmetric distribution to capture the random effects of measurement error and exogenous shocks which cause the placement of the deterministic kernel $f(Xi,\beta)$ to vary across firms.

The technical inefficiency relative to the stochastic production frontier is then captured by the one-sided error component $U_i > 0$.

The explicit form of the stochastic Cobb-Douglas production frontier is given by

$$Y_i = \alpha X_{1i}^{\beta 1}\ X_{2i}^{\beta 2}\ X_{3i}^{\beta 3}\ X_{4i}^{\beta 4}\ X_{5i}^{\beta 5}\ X_{6i}^{\beta 6}\ e^{ui}$$

Where Y is the frontier output, X is physical input, b the elasticity of Y with respect to X, a is intercept and Ɛ = V-U is a composed error term as defined earlier. For simplicity, we have ignored the subscript.

### 3.8.2.3 Specification of Production Model

We have specified the Cobb-Douglas Stochastic Frontier Production Function in order to estimate the level of technical efficiency. The functional form of stochastic frontier is as follows:

$$Y = \beta_0\ X_1\beta_1\ X_2\beta_2\ \ldots\ldots\ldots X_5\beta_4\ eV_i\text{-}U_i$$

The above function is linearized double-log form:

$$\ln Y = \ln\beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + V_i\text{-}U_i$$

Where,

Y = Output (kg)

$X_1$ = Human labour (man days)

$X_2$ = Seed (Kg/ha),

$X_3$= Operating cost (Tk)

$X_4$ = Irrigation cost (Tk./ha).

The model of the technical inefficiency effects in the stochastic production frontier equation is defined by

$$Ui = \delta 0 + \delta_1 Z_1 + \delta_2 Z_2 + \delta_3 Z_3 + \delta_4 Z_4 + \delta_5 Z_5 + + W_i$$

Where,

$Z_1$…….. $Z_5$ are explanatory variables.

The equation can be written as:

$Ui = \delta_0 + \delta_1$ Mushroom farming experience + $\delta_2$ Farm size + $\delta_3$ Extension service + $\delta_4$ Training + $\delta_5$Taking loan + $W_i$

V is two-sided uniform random variable beyond the control of farmer having N (0, σ 2) distribution, U is one-sided technical inefficiency effect under the control of farmer having a positive half normal distribution {Ui~|N (0, σu2)|} and Wi is two-sided uniform random variable. W is unobservable random variable having a positive half normal distribution. The model was estimated simultaneously using STATA.

# CHAPTER 4
# DESCRIPTION OF THE STUDY AREA

## 4.1 Introduction

A short description has been presented in this chapter to know the overall features of the study area. It is essential to know the agricultural activities, possible development opportunities and potentials of the study area. Location, area, population, monthly average temperature and rainfall, agriculture, occupation, cropping patterns, communication and marketing facilities of the study area are discussed in this chapter. However, for the production of mushroom, it is very essential to know the climate and topography of the study areas.

## 4.2 Location

The selected sample farmers are located in four villages. Savar is under the Dhaka district and Taragongis under the Rangpur district. These four villages are located from 10 to 15 km of the upazila headquarters. The locations of the upazila are presented in the Map 4.1 and 4.2 respectively.

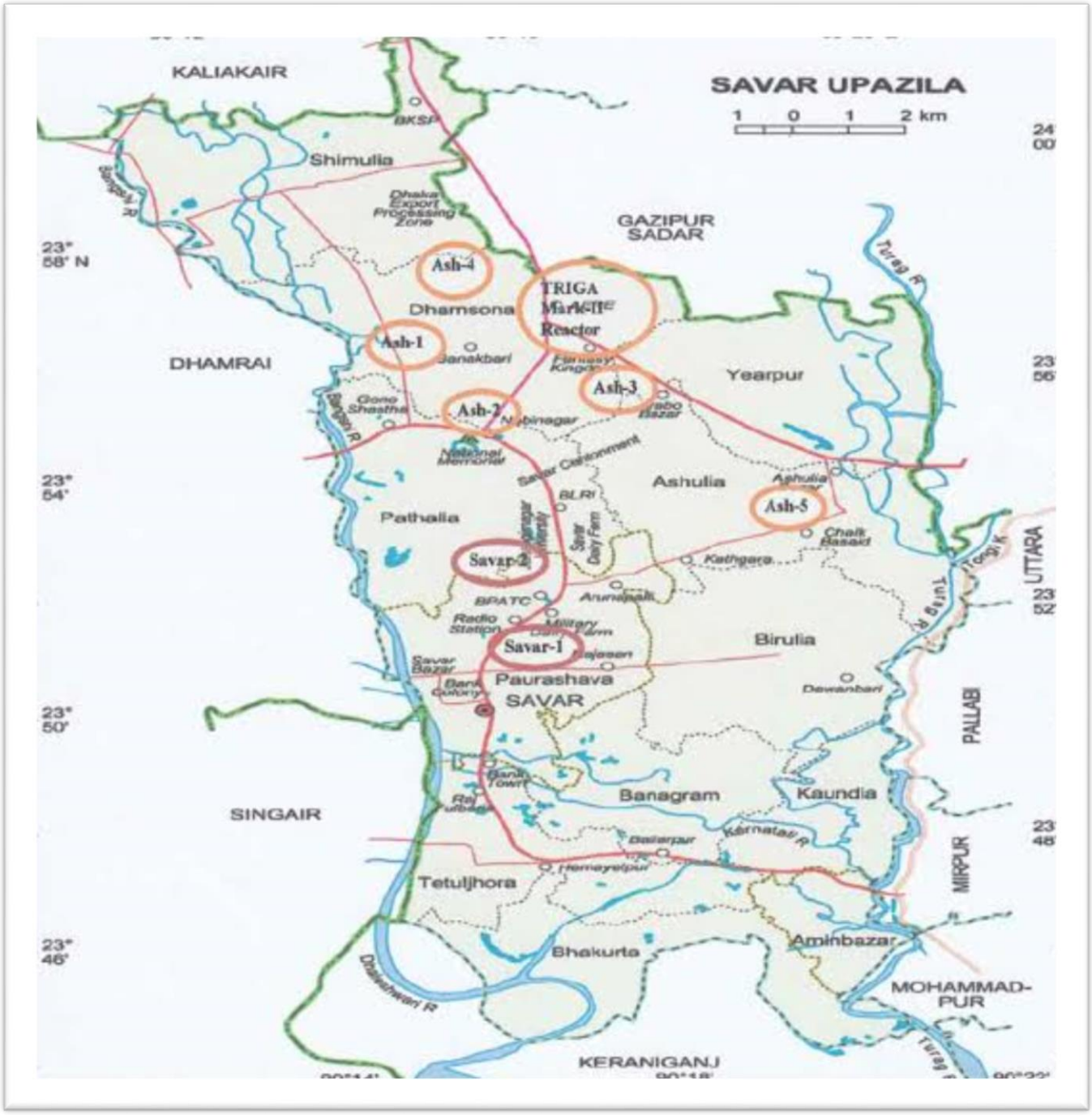


**Figure 4.1:** Map of Savar Upazila


**Figure 4.2:** Map of Taragong Upazila

## 4.3 Area and Population

The total area, population and density of population of the selected upazilas are presented in Table 4.1 .The highest population density (4948 per sq.km) is Savar and the lowest population density (1108 sq. km) is in Taragong Upazilla.

**Table 4.1 Population Size of Upazilas under the Study Areas**

| Upazila | Area (sq. km) | Population | Male % | Female % | Population density |
|---|---|---|---|---|---|
| Savar | 280.11 | 1385910 | 52.27 | 47.73 | 4948 |
| Taragong | 128.65 | 143077 | 50.48 | 49.52 | 1108 |

Source: Field Survey, 2019

## 4.4 Climate, Temperature and Rainfall

The climate, temperature and rainfall are very important factors for production of any other crops. There was no local arrangement of meteorological center for recording temperature and rainfall in the study area. It is basically warm and humid in Dhaka and Rangpur region. Maximum temperature of the study areas varies from 41.8°C to 32.2°C and minimum temperature varies from 6.0°C to 14.8°C (Table 4.2). The annual total rainfall of the study areas varies from 893mm to 2040mm (Table 4.4). The monthly rainfall of the study areas in 2013 presented in Table 4.5.

**Table 4.2 Average Maximum and Minimum Temperature (°C) in Selected Station**

| Name of Station | 2014 | | 2015 | | 2016 | | 2017 | |
|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| **Savar** | 34.2 | 12.5 | 35.6 | 14.8 | 35.5 | 12.8 | 32.4 | 12.2 |
| **Taragong** | 32.2 | 10.4 | 33.1 | 8.8 | 41.8 | 10.5 | 36.3 | 6.0 |

Source: Field Survey, 2019

**Table 4.3 Annual Total Rainfalls in Millimeter in Selected Station**

| Name of Station | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|
| **Savar** | 2197 | 1912 | 1181 | 1777 |
| **Taragong** | 1907 | 2217 | 2102 | 1932 |

Source: Field Survey, 2019

## 4.5 Land and Agriculture

Total cultivable land in two districts is 406811 hectares and 544542 hectares respectively. Paddy, jute, wheat, sugarcane, garlic, pulse, groundnut, brinjal, mushroom are also grows well in the areas. It is evident from the study that, cropping pattern in the study areas are almost same and it was jute- fellow-onion, jute-short crops-onion, jute- onion- jute and fellow-amon-onion. Land under cropped in the study areas are given in Table 4.5. It is evident from the table that almost half of the lands are utilized as double cropped land in the study areas. It also cleared from the table that near about half of the cultivated lands are under irrigation in the study areas.

**Table 4.4 Information of Land under the Study Areas**

| Upazillas | Distribution of land (acre) | | | |
|---|---|---|---|---|
| | Single crop | Double crop | Treble crop | Under irrigation |
| **Taragong** | 22822 | 3652 | 1204 | 34299 |
| **Savar** | 4661 | 10400 | 6422 | 24920 |

Source: Banglapedia, 2016

# CHAPTER 5

# SOCIO-DEMOGRAPHY PROFILE OF HOUSEHOLD POPULATION

## 5.1 Introduction

The aim of this chapter is to present a brief description of the socio-economic characteristics of the farmers producing mushroom. Socioeconomic aspects of the farmers can be looked upon from different points of view depending upon a number of variables related to their level of living, the socio-economic environment in which they live and the nature and the extent of the farmers' participation in national development activities. It was not possible to collect all the information regarding the socio-economic characteristics of the sample farmers due to limitation of time and resources. Socioeconomic condition of the sample farmers is very important in case of research planning because there are numerous interrelated and constituent attributes characterizes an individual and profoundly influences development of his/her behavior and personality. People differ from one another for the variation of socioeconomic aspects. However, for the present research, a few of the socioeconomic characteristics have been taken into consideration for discussion.

## 5.2 Age

The sample of 40 household in each study area comprised a total population of 94 and 90 in Savar upazila, Dhaka and Taragong upazila, Rangpur, respectively.In Savar upazilla about 10 percent of household populations were 20-30 years of age, about 40 percent of the populations were under 31-40 years age about 20 percent populations under 41-50 years group and 30 percent were of 50 years or above (Figure 5.1**)**. On the other hand about 200 percent of household populations were 20-30 years of age, about 35 percent of the populations were under 31-40 years age about 25 percent populations under 41-50 years group and 20 percent were of 50 years or above (Figure 5.1**)**.

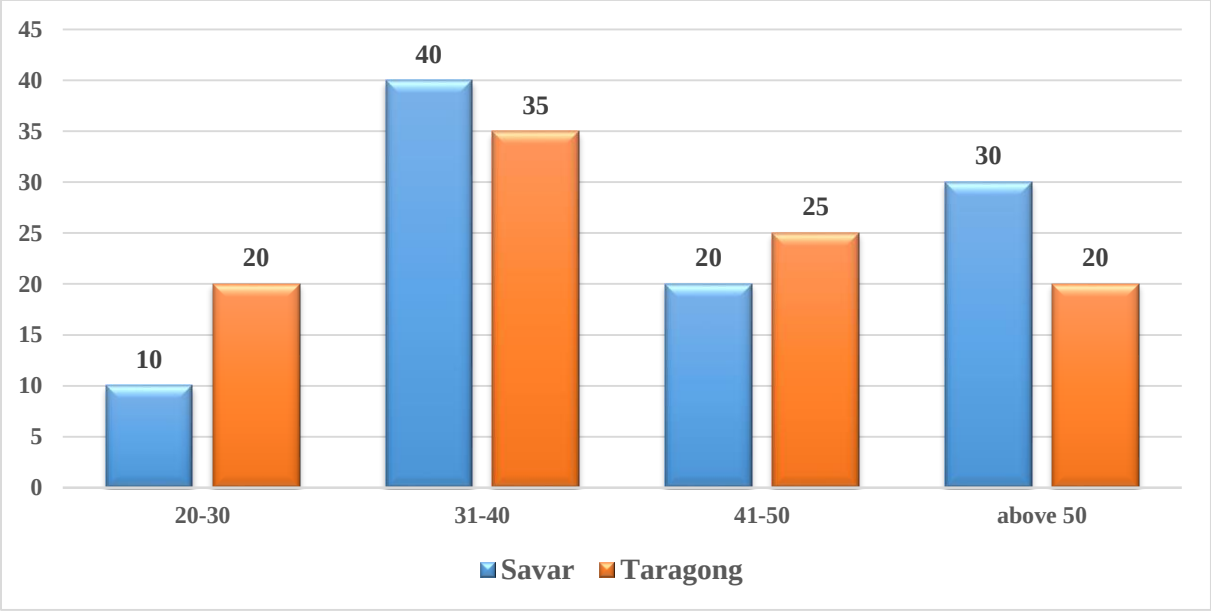


**Figure 5.1:** Age of the Household Members by Study Area

Source: Field Survey, 2019

## 5.3 Education

Figure 5.2 showed that, in Savar upazilla, about 15 percent of the study population aged 5 years or more were found to have no education and/or read/write, about 15 percent were found to have primary level education, about 45 percent were found to have secondary and/or higher secondary level education and only 10 percent people were found to have attained/completed graduation level of education. In Taragong upazila, about 55 percent of the study population aged 5 years or more were found to have no education and/or read/write, about 15 percent were found to have primary level education, about 15 percent were found to have secondary and/or higher secondary level education and only 5 percent people were found to have attained/completed graduation level of education.

The proportion of attainment of post-secondary or higher level of education was relatively higher for men than women in both study areas, partly due to gender discrimination against female (Table A.5.2).

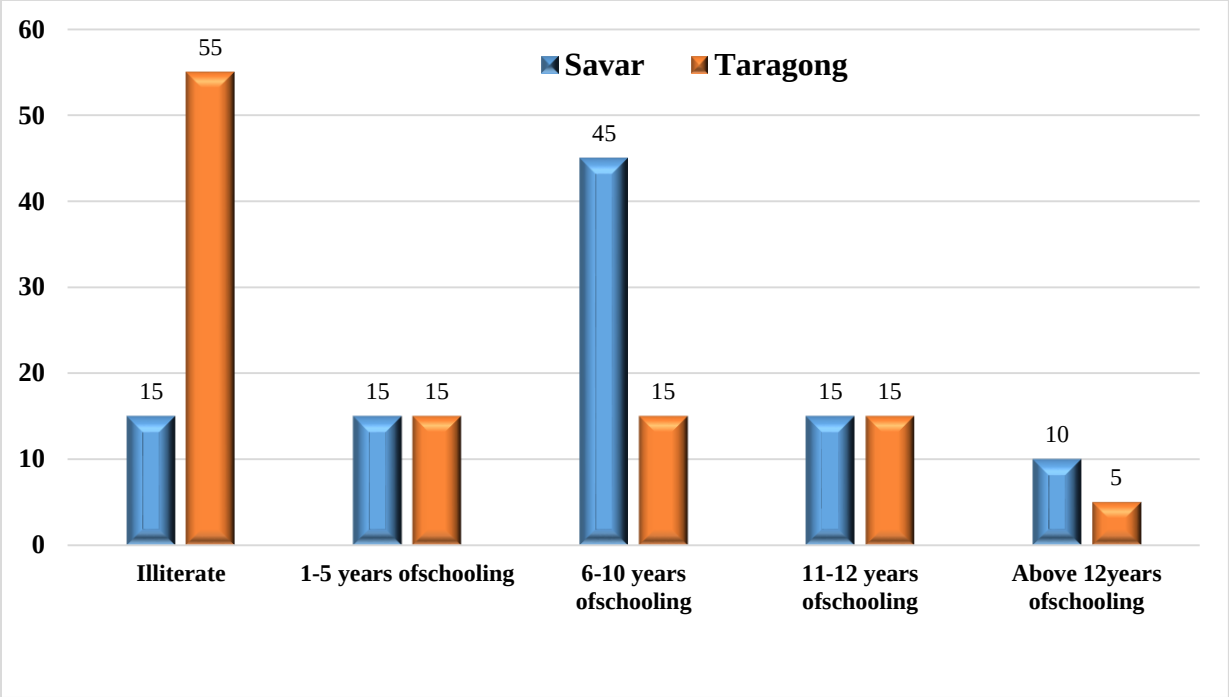


Figure 5.2: Education of the Household Members by Study Area

Source: Field Survey, 2019

### 5.4 Occupation

The occupation of the study population aged 16 years or more showed that, in Savar, about 68 percent were engaged in service sector mainly garments as a main occupation and about 52 percent were engaged in business as a subsidiary occupation. On the other hand, in Taragong, about 65 percent were engaged in agriculture as a main occupation and about 1 12 percent were engaged in agriculture as a subsidiary occupation (Figure 5.3**)**. In Savar and Taragong, respectively, 58 percent and only 2 percent were engaged in domestic work as household activities in others. Household activities and study are not directly included in Gross Domestic Product (GDP).

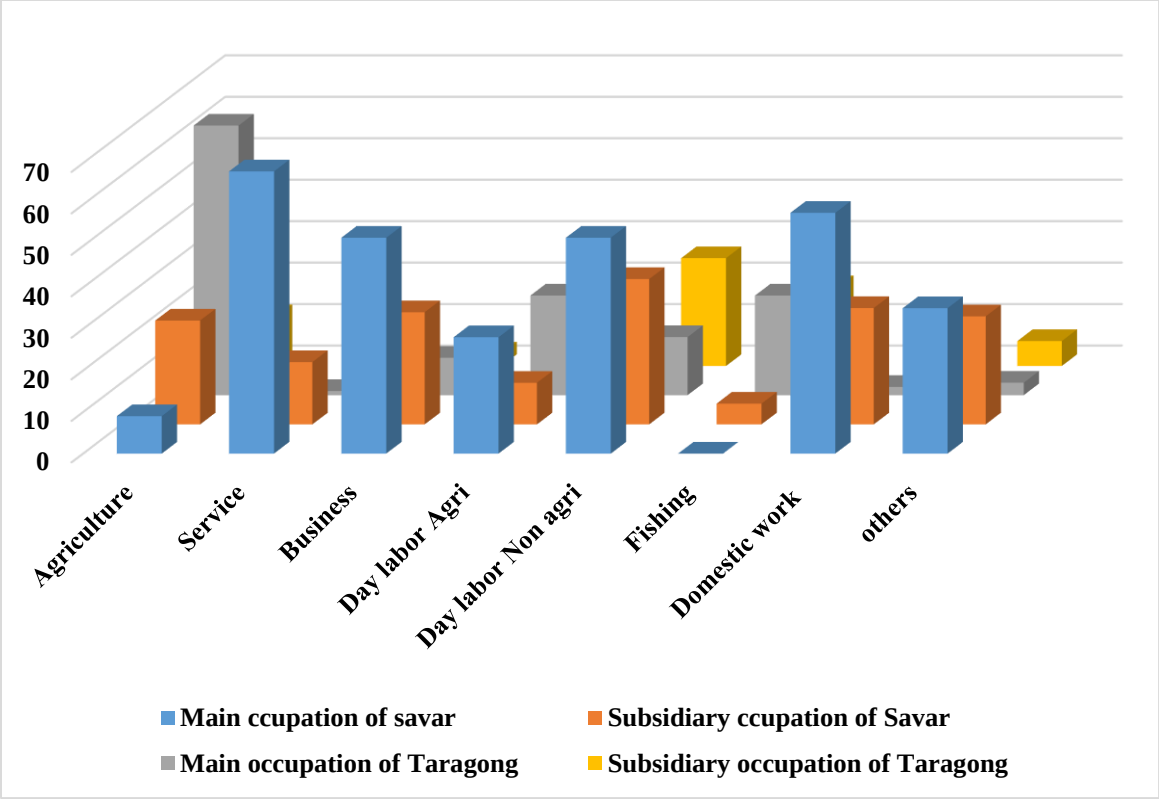


**Figure 5.3:** Occupation of the Household Members by Occupational Category

Source: Field Survey, 2019

## 5.5 Agricultural Training

Among the respondent farmers in Savar upazila, its 80 percent farmer's got training of mushrooms farming whereas, 90 percent farmers got training in Taragomg upazila, (Table 4.3). These training have improved their perceptions of good seed use, use of resistant varieties, application of insecticides and pesticides, water management, and so on.

**Table 5.1: Agricultural Training of the respondent by Study Area**

| Training received | Savar | | Taragong | |
|---|---|---|---|---|
| | No. | % | No. | % |
| **Yes** | 15 | 75 | 18 | 90 |
| **No** | 5 | 25 | 2 | 10 |
| **Total** | 20 | 100 | 20 | 100 |

Source: Field Survey, 2019

## 5.6 Membership of any social organization

Among the respondent farmers in Savar upazila, 90.00 percent mushroom producers were found to have membership in different NGOs and/or farmers' organizations whereas Taragong upazila only 60 percent of mushroom farmers had membership in different NGOs and/or farmers' organizations (Table 4.4).

**Table 5.2: Membership in any organization of the respondent by Study Area**

| Membership in any organization | Savar | | Taragong | |
|---|---|---|---|---|
| | No. | % | No. | % |
| **Yes** | 18 | 90 | 12 | 60 |
| **No** | 2 | 10 | 8 | 40 |
| **Total** | 20 | 100 | 20 | 100 |

Source: Field Survey, 2019

## 5.7 Annual Family Income of the Study Area

Crops, poultry, animal production and fisheries are the main agricultural income source of the sample in Taragonj. Most of the framer in Taragonj generate income by agriculture sector. Mushroom production is subsidiary source of income in this study area. Crop production was the main source of income among them average yearly income from crop production found TK 60837.31. Now a day's livestock sector has been developed in the study area. Farmers Tk 70666.67 yearly income from livestock. Main non agriculture was found day labor, Auto driver, Truck driver, domestic worker, small business, foreign remittance, services. Annual average income by non-agriculture source was found Tk 1, 25,071.4. The average annual income was found Tk 2, 65,098.9.

**Table 5.3:** Annual Family of Taragonj Upazila

| Sector | Average annual Income | Total |
|---|---|---|
| Crops | 60837.31 | 2,37,075.38 |
| Poultry | 30666.67 | |
| Animal Production | 30000 | |
| Fisheries | 21700 | |
| Non Agricultural | 1, 15,571.4 | |

In Savar upazila under Dhaka district, most of respondents are service holder and small business man. Most of the framer in Savar generate income by garments sector. Crops production is subsidiary source of income in this study area. Main agricultural are homestead gardening and livestock production. In this way, mushroom production is very popular in this area. In this study average annual income was found Tk 3, 10,146.84.

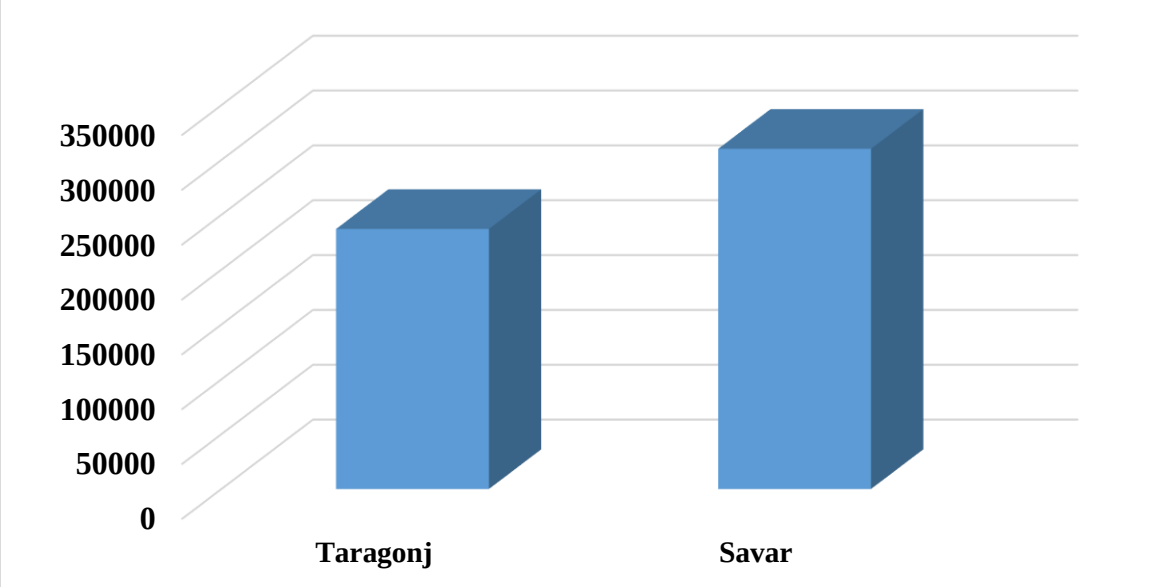


**Figure 5.4:** Annual family income of the study areas

# CHAPTER-6

# PROFITABILITY OF MUSHROOM PRODUCTION

## 6.1 Introduction

The main purpose of this chapter is to assess the costs, returns and profitability of growing Mushroom. Profitability is a major criterion to make decision for producing any crop at farm level. The cost items in the mushroom farming included different types of fixed, variable and opportunity costs. On the return side, gross return included revenue from mushroom and it's by product.

### 6.2 Fixed costs

The fixed costs of mushroom farming considered farm house making materials as bamboos, polythene, cloths, plastic pipes, water supply pipes, tins, water supply machines, rent of house, gunny bags, woods, concrete pillars and others (electricity, water supply materials etc).Interest on operating capital is also include to fixed cost. Duration of mushroom cultivation is 3 months. Thus all costs are calculated based on 3 months. Total fixed was calculated TK 3264.80 per100 bags basis. Which is covers 35.69 percent of total cost.

### 6.3 Variable costs

Variable cost share is the largest amount in the total cost of mushroom farming. Variable costs encompasses the cost of spawn bags (purchasing and making cost) and all labor cost (family and permanent hired labor), daily water supply cost and mushroom subtracted used cost for mushroom production.

### Labor costs

Labor cost included family labor and permanent hired labor costs. The family labor cost was calculated on the basis of the principle of opportunity cost. The hired labor cost was calculated on the basis of the labor employed at the local market price. All types of labor

costs were considered as 3–months, because commercial mushroom farmers actually produce for 3 months (6 times) in one spawn bag. Labor cost is one of the main cost items in agriculture and it is also true in mushroom farming. In case of small farm owner and family members provide their labor. However, for large farm, not only owner and family members but also hired labor works in the farm. Total labour cost was found TK 2189.38 for 100 bags which was covers 23.93perceent.

**Spawn Bags cost:**

Instead of seeds, mushrooms reproduce asexually through spores. Spores can be contaminated with airborne microorganisms, which will spawn. Average cost of per bag spawn was TK 17.91 found two selected study area. So, TK 1791 was found for 100 bags, which covers 19.58 percent of total cost.

**Mushroom subtracted cost:**

Mushroom spawn is mixed with the substrate material (often straw or sawdust, but a range of other materials can also be used.). This growing medium is then usually placed into bags with small holes or air filters in them for air exchange. Average cost for 100 bags mushroom subtracted cost was found TK 807.83, which was covers 8.83 percent.

**Table 6.1:** Analysis of costs and returns of mushroom production

| Particulars | Price(Taka) | Percent (%) |
|---|---|---|
| A. Fixed Cost of Mushroom Production: | | |
| I. Bamboos | 214.57 | 2.35 |
| II. Polythenes | 297.02 | 3.25 |
| III. Cloths | 142.15 | 1.55 |
| IV. Plastic Pipes | 136.75 | 1.50 |
| V. Water supply pipes | 179.37 | 1.96 |
| VI. Tins | 160.86 | 1.76 |
| VII. Rent | 146.32 | 1.60 |
| VIII. Gunny Bags/ Jute Bags | 186.29 | 2.04 |
| IX. Woods | 140.60 | 1.54 |
| X. Cement Pillars | 250.83 | 2.74 |
| XI. Others | 500.00 | 5.47 |
| XII. Interest on operating capital | 910.03 | 9.95 |
| **Total Fixed cost** | **3264.80** | **35.69** |
| B. Variable Cost of Mushroom Production: | | |
| Spawn Bags | 1791.00 | 19.58 |
| Lobour Cost | 2189.38 | 23.94 |
| Mushroom substrate used | 807.86 | 8.83 |
| Water Cost | 512.55 | 5.60 |
| Others | 580.86 | 6.35 |
| **Total Variable cost** | **5881.65** | **64.31** |
| **C. Total Cost** | **9146.45** | **100.00** |
| D. Revenue | | |
| I. Revenue from Mushroom | 14554.96 | |
| II. By-Product (compost fertilizer) | 1328.21 | |
| **E. Total Revenue** | **15883.17** | |
| F. Net Profit | 10001.51 | |

Notes: (i) Total sample size is 40; (ii) Duration of mushroom cultivation is 3 months. Thus all costs are calculated based on 3 months.

## 6.4 Total cost of mushroom production

The total cost of mushroom farming included all fixed and variable costs and are presented in Table 4. The average total cost of mushroom production was about Tk. 41,938 of which total fixed cost was Tk. 22,142. Cost of bamboo is one of the main fixed cost items for the mushroom farm. The bamboo cost was about Tk. 3,373 per mushroom farm and it was about 8.04 per cent of the total production cost. Some producers cultivated mushroom in rented houses. The highest fixed cost of mushroom production was rental cost of housing (Tk. 4,250) and it was about 10.13% of the total production cost. Another important fixed cost was wood. Spawn is the main input of mushroom production. The average cost of spawn bags was about Tk. 16,136 and its share of total production cost was about 38.48 per cent. The average labor cost was about Tk. 3,660 and it was about 7.27 per cent of total cost.

## 6.5 Gross total revenue, gross margin, and net profit

Return per 100 bags of mushroom cultivation is shown in table 6.2. Per 100 bags gross return was calculated by multiplying the total amount of product with respective per unit price. It is evident from table that the average yield of mushroom per 100 bags was 35 kg and the average price of mushroom was Tk. 575.75 and calculated average by product was found TK 1328.21 . Therefore, the gross return was found to be Tk. 15883.17 per 100 bags (Table 6.2).

Gross margin is the gross return over variable cost. Gross margin was calculated by deducting the total variable cost from the gross return. On the basis of the data, gross margin was found to be Tk. 10001.51 per 100 bags (Table 6.2).

Net return or profit was calculated by deducting the total production cost from the gross return. On the basis of the data the net return was estimated as Tk. 6736.71 per 100 bags (Table 6.2).

**Table 6.2:** Gross margin, net return, and benefit cost ratio (BCR)

| Cost Item | Cost/Returns (Tk/ha) |
|---|---|
| A. Gross Return | 15883.17 |
| B. Gross Cost | |
| C. Variable Cost | 5881.65 |
| D. Fixed Cost | 3264.80 |
| E. Total costs | 9146.45 |
| F. Gross Margin (A-C) | 10001.51 |
| G. Net Return (A-E) | 6736.71 |
| **H. Undiscounted BCR** | **1.59** |

Source: Field Survey, 2019

### 6.2.5 Benefit Cost Ratio (Undiscounted)

Benefit Cost Ratio (BCR) is a relative measure, which is used to compare benefit per unit of cost. Benefit Cost Ratio (BCR) was found to be 1.59 which implies that one taka investment in Mushroom production generated Tk. 1.59 (Table 6.2). From the above calculation it was found that Mushroom cultivation is profitable in Bangladesh.

## 6.3 Concluding Remarks

From the above discussion it is easy to understand about the different cost items and their application doses of farmers, yields and returns per 100 bags of Mushroom cultivation. It is most essential to use modern inputs such as Spawn, dust, human labour, poly, room and watering efficiently. Timely and efficient use of these inputs are the most important to increase production and profitability. On the basis of above discussions it could cautiously be concluded here that cultivation of Mushroom is a profitable. Cultivation of Mushroom would help farmers to increase their income earnings.

# CHAPTER 7

# TECHNICAL EFFICIENCY OF THE MUSHROOM FARMERS

## 7.1 Introduction

The estimation of efficiency with the help of cultivation function has been a popular area of applied econometrics. Technical efficiency reflects the ability of a farmer to obtain the maximum possible output from a given level of inputs and cultivation technology. It is a relative concept, since each farmers cultivation performance is compared to a best-practice input-output relationship or cultivation frontier. A farmer is technically inefficient in the sense that if it fails to produce maximum output from a given level of inputs. Technical inefficiency is then measured as the deviation of a farmer from the best-practice frontier. The main objective of this chapter is to estimate the technical inefficiency as well as frequency distribution of mushroom farmers through technical efficiency analysis. The technical efficiency in cultivation was estimated by using the stochastic frontier cultivation.

Since the pioneering work on technical efficiency by Farrell in 1957, which drew upon the works of Debreu (1951) and Koopmans (1951), considerable effort has been directed at refining the measurement of technical efficiency. Empirical studies suggest that farmers in developing countries fail to exploit the potential of technology perhaps due to inefficient decision making due to various reasons of which management capacity is important one.

## 7.2 Interpretation of ML Estimates of the Stochastic Frontier Cultivation Function

Maximum likelihood estimation begins with writing a mathematical expression known as the Likelihood Function of the sample data. The likelihood of a set of data is the probability of obtaining that particular set of data, given the chosen probability distribution model. This expression contains the unknown model parameters. The values of these parameters that maximize the sample likelihood are known as the Maximum Likelihood Estimates or MLE's. The maximum likelihood estimates for parameters of the Cobb-Douglas stochastic frontier cultivation function and technical inefficiency effect model for mushroom cultivation for all farmers are presented in Table 7.1.

**Table 7.1:** ML Estimates for Parameters of Cobb-Douglas Stochastic Frontier Cultivation Function and Technical Inefficiency Model for Mushroom Farmers

| Variables | Parameter | Coefficients | T-ratio |
|---|---|---|---|
| **Stochastic Frontier:** | | | |
| Constant (X0) | β0 | 11.96* | 1.63 |
| Spawn (X1) | β1 | -0.5703* | -1.75 |
| Labour (X2) | β2 | 0..4253*** | 2.10 |
| Water cost (X3) | β3 | -0.2024** | -2.16 |
| Mushroom substrate used (X4) | β4 | -0.1289*** | -3.17 |
| **Inefficiency Model** | | | |
| Constant | δ0 | 4.492* | 0.63 |
| Experience (Z1) | δ1 | -0.1062* | -1.90 |
| Distance of Market (Z2) | δ2 | -0.1596*** | -2.84 |
| Extension service (Z3) | δ3 | -0.1130*** | -3.32 |
| Training (Z4) | δ4 | -0.7510* | -1.76 |
| Credit service (Z5) | δ5 | -0.6010 | -0.80 |
| Education | δ6 | .1690** | 2.48 |

**Note: ***, ** and * indicates significant at 1, 5 and 10 percent level respectively**.
Source: Field survey, 2019.

**Spawn Cost (X1)**

The regression coefficient of Spawn cost (X1) of mushroom cultivation was found -0.5703 which was negative and significant at 10 percent level of significance, which implied that if the expenditure on spawn was increased by 1 percent then the yield of mushroom would be decreased by 0.5703 percent, other factors remaining constant (Table 7.1).

**Human Labor Cost (X2)**

The regression coefficient of labour cost (X2) of mushroom cultivation was found 0.4253 which was positive and significant at 1 percent level of significance, which implied that if the expenditure on labour was increased by 1 percent then the yield of mushroom would be increases by 0.4253 percent, other factors remaining constant (Table 7.1).

**Water Supply Cost (X3)**

The regression coefficient of water supply cost (X3) of mushroom cultivation was found -0.2024 which was negative and significant at 5 percent level of significance, which implied that if the expenditure on water supply was increased by 1 percent then the yield of mushroom would be decreased by 0.2024 percent, other factors remaining constant (Table 7.1).

**Mushroom Substrate Used Cost (X4)**

The regression coefficient of Mushroom substrate used cost (X4) of mushroom cultivation was found -0.1289 which was negative and significant at 1 percent level of significance, which implied that if the expenditure on Mushroom substrate used was increased by 1 percent then the yield of mushroom would be decreased by 01289 percent, other factors remaining constant (Table 7.1).

## 7.3 Interpretation of Technical Inefficiency Model

The maximum likelihood parameter estimates of the stochastic production function are presented in Table 7.1. Table 7.1 presents the Tobit regression model results. Technical efficiency is calculated using the conditional expectation of the above equation, conditioned on the composed error (ei =vi-ui), and evaluated using the stochastic frontier production parameters. The variables, training and level of education had positive signs while other variables experience, distance to market, Extension service and credit service had negative signs.The negative and significant (10 percent) coefficient of experience implies that experienced farmers are technically more efficient than non-experienced farmers.

The negative and significant (10 percent) coefficient of training implies that trained farmers are technically more efficient than non-trained farmers.

The negative coefficient and significant at 1 percent level of significance of distance to market implies that low distance market from households are technically more efficient than large distance marketing. Marketing is a big issues for mushroom. Dhaka is the main marketing place, so in this case the farmers of Savar are more efficient than the farmers of Taragong, Rangpur.

Technical assistance or Extension service was significant at 1% level. This means that a frequency increase in the engagement of extension officers or private consultants increased technical efficiency.

The negative coefficient of credit service postulates that farmers taking loan for producing mushroom are technically more efficient than others. Although this coefficient is not statistically significant. (Table 7.1)

The coefficients of education is positive meaning that these factors have no impact on the technical inefficiency. That is, these factors do not reduce or increase technical inefficiency of producing mushroom.

**Table 7.2:** Frequency Distribution of Technical Efficiency of Mushroom Farms

| Efficiency (%) | No. of farms | Percentage of farms |
|---|---|---|
| <0.60 | 10 | 25.00 |
| 0.61-0.80 | 13 | 32.50 |
| 0.81-0.95 | 10 | 25.00 |
| 0.96-1.00 | 7 | 17.50 |
| **Total number of farms** | **40** | **100** |
| Minimum | 0.48 | |
| Maximum | 0.99 | |
| Mean | 0.77 | |
| **Standard Deviation** | **0.17** | |

Source: Field Survey, 2019

## 7.4 Technical Efficiency and Its Distribution

Table 7.2 shows frequency distribution of farm-specific technical efficiency for mushroom farmers. It reveals that average estimated technical efficiencies for mushroom are 77 percent which indicate that mushroom production could be increased by 23 percent with the same level of inputs without incurring any further cost. Increase of only managerial skills result a substantial increase of output for mushroom. It was observed that about 42.50 percent of sample farmers were found to have received outputs which were very close to the maximum frontier outputs maintaining the efficiency level more than 95 per cent. On the other hand, per cent of sample farmers obtained up to 57.25 percent technical efficiency level. The minimum and maximum technical efficiencies were observed to be 48 and 99 per cent respectively, where standard deviation was maintained at 0.17.

# CHAPTER 8
# MARKETING CHANNEL OF MUSHROOM PRODUCTION

## 8.1 Introduction

The movement of the products from the producers to the ultimate consumers involves various types of costs such as packing, transporting, weighment charges, loading and unloading charges, losses in the transport, losses due to spoilage, taxes, etc. These costs are called marketing costs and it depends upon the marketing channels. In general, marketing margin represents the difference between price paid and received by a given market intermediary (such as wholesaler, retailers, etc) in the marketing of a commodity. So, marketing margin is the difference between the price of a product at any two points in the marketing chain or channels. In other words, marketing margin is equal to the value of the product when it leaves the farm plus the value that is added by the marketing system. Thus, marketing margin is the amount of value created by the marketing system (Drummond and Goodwin, 2004; and Reddy *et al*., 2010). Marketing margin represent the remuneration that the intermediaries (wholesalers, retailers, etc.) receive from their services in the movement of the commodity in the marketing channel. Estimation of marketing margin helps to estimate the efficiency of the marketing system. The marketing margin of mushroom production is presented in Table 8.1. Marketing margins of mushroom were higher for every point of marketing channels. The mean average selling prices of raw and dry mushroom for farm-gate, wholesalers, and retailers were Tk. 230, 360 and 575.75 per kg, respectively. Therefore, the marketing margin of mushroom for farm-gate to wholesalers and wholesalers to retailers were Tk. 130 and 275.75 per kg, respectively. It is also revealed that the selling price of mushroom per kg increased by about 46 per cent from farm-gate to wholesale, whereas, it increased about 56.5 per cent from wholesalers to retailers. However, the selling price per kg mushroom increased more than one half and double (150%) from farm-gate to retailers.

The main reason underlying high marketing margin was the limited sales of mushroom due to lack of awareness of mushroom consumption, high perishability, high spoilage rate, high transportation cost, specialized packing, etc. Thus, the producers of mushroom received only half of the price paid by the ultimate consumers and consumers paid more than double the farm gate price.

**Table 8.1.** Marketing margin (taka/kg) of mushroom at different channels

| Type | Price (taka/kg) | Marketing margin | % increase |
|---|---|---|---|
| Farm gate | 230 | - | Farm gate to wholesale (46%) |
| Whole seller | 360 | 130 | Wholesale to retailer (56.5%) |
| Retailer | 575.75 | 275.75 | Farm gate to retailer (150%) |

Source: Field Survey, 2019

## 8.2 Marketing channels of mushroom production

Marketing channel is defined as a set of interdependent organizations that help make a product or service available for use or consumption by the consumers (Kotler, 2010). The chain of intermediaries through which the various farm commodities pass between producers and consumers is called marketing channel. The existence of the agricultural farm depends on the marketing channel mainly because the agricultural commodities move from farmers to ultimate consumers through various market intermediaries that operate in the marketing system and marketing efficiency. The marketing channels of mushroom are delineated in Figure 8.1. Usually, three intermediaries are involved in the channel for mushroom - producers, wholesalers and retailers. Producers of mushroom sold their product to nearby mushroom office, wholesalers and retailers. The wholesalers buy mushroom directly from producers and mushroom office and sell it to retailers or sometimes directly to consumers. The retailers buy mushroom from wholesalers or directly from producers and sell it to consumers. Distribution of marketing channels for produced mushroom is shown in Table 8.2.

Table 8.2 shows that about 73% producers sold mushroom directly to nearby mushroom office (National Mushroom Development and Extension Centre). About 33% producers sold directly to wholesalers (33%) and only about 27% retailers sold to retailers in the study area.

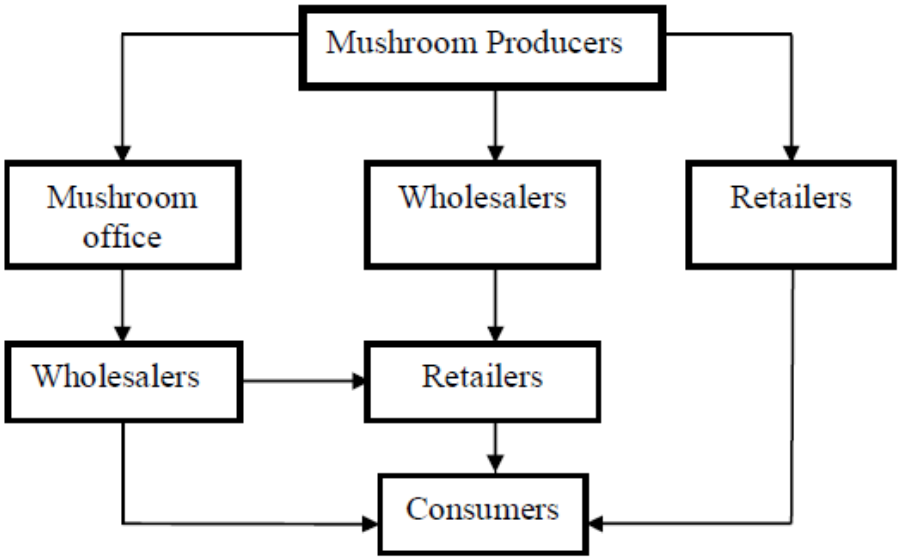


**Figure 8.1:** Marketing channels of mushroom production

Source: Field Survey, 2019

**Table 8.2.** Distribution of channels of mushroom to consumption

| **Particular** | **Number** | **(%)** |
|---|---|---|
| Retailer | 8 | 27 |
| wholesaler | 10 | 33 |
| Mushroom office | 22 | 73 |
| Retailer and Wholesaler | 3 | 10 |
| wholesaler and Mushroom office | 5 | 17 |

Note: (i) Total sample size is 40.
Source: Field Survey, 2019

# CHAPTER 9
# PROBLEMS OF MUSHROOM GROWERS

## 9.1 Introduction

Farmers faced a lot of problems in producing mushroom. The problems were price stability, social and cultural, financial and technical. Main problem for mushroom is price and market stability. This chapter aims at represent some socioeconomic problems of producing mushroom. The problems faced by the farmers were identified according to opinions given by them. Mushroom producers face many problems from cultivation to final consumption. These problems are related to production, marketing, technical and awareness and briefly discussed in this section.

## 9.2. Production problems

Mushroom is a new crop in Bangladesh and most of the farmers are facing many problems (Table 9.1). About 67% of the sampled producers expressed that fly and cockroaches destroy mushroom spawn. The main reason is that dark place is required for mushroom production and fly and cockroaches also like that environment and thus they eat mushroom spawn. About 40% producers mentioned that high temperature hinders mushroom production, about 37% producers faced virus, fungus and germ problems and about 23% said that they faced capital problem. In addition to these, the producers also faced high price of raw materials, difficulty of loan process, land scarcity and good mother spawn problems in mushroom cultivation.

## 9.3 Marketing problems

The marketing problems faced by the sampled producers are mentioned in Table 9.2. About 49% sampled producers complained against available market facility where they sell their product and about 43% producers could not sell directly their products to retailers. The main reason is the communication gap and lack of awareness about mushroom. In addition, the sampled producers also faced advertising problems and lack information about mushroom production.

**Table 9.1.** Production problems faced by Producers

| Problems | Number | (%) |
|---|---|---|
| Fly and cockroach | 20 | 67 |
| Cultivation house | 4 | 13 |
| Available good spawn | 2 | 7 |
| Hot temperature | 12 | 40 |
| Capital | 7 | 23 |
| High price of raw materials | 4 | 13 |
| Time maintain | 3 | 10 |
| Virus, fungus and germ | 11 | 37 |
| Loan | 3 | 10 |

Source: Field Survey, 2019

**Table 9.2.** Marketing problems faced by producers

| Problems | Number | (%) |
|---|---|---|
| Advertising | 10 | 45 |
| Direct sale to retailers | 20 | 43 |
| Available markets | 25 | 49 |
| Unknown product | 15 | 23 |
| Others | 3 | 10 |

Source: Field Survey, 2019

## 9.4 Technical problems

Along with production and marketing problems, technical problems also hinder the smooth mushroom production in Bangladesh (Table 9.3). Most of the sampled farmers faced Air Cooler (AC) problem (50%), experienced labor shortage (30%), electricity problem (60%) and training problem (40%) for optimum mushroom production. In addition to these, some farmers mentioned of instrument, water tank, steel shelf and lack of training in mushroom production.

**Table 9.3.** Technical problems faced by producers

| Problems | Number | (%) |
|---|---|---|
| Air Conditioner (A.C.) | 13 | 50 |
| Experienced labor | 14 | 30 |
| Instrument | 2 | 6 |
| Electricity | 30 | 60 |
| Water tank | 2 | 6 |
| Steel shelf | 2 | 6 |
| Training | 10 | 40 |
| Inefficiency | 2 | 6 |
| Others | 2 | 6 |

Source: Field Survey, 2019

## 9.5 Awareness problems

Table 9.4 shows that about 80% producers claimed that few consumers have no knowledge about mushroom consumption and its medicine and nutritional values. Only the urban residents had sufficient knowledge about mushroom consumption and the number of consumers in urban area is significantly increasing. About 75% producers explained that most of the people, especially rural people think it is fungus (frog umbrella) and about 14% said that most of the people do not know the medicine and nutrition values of mushroom.

**Table 9.4.** Awareness problems faced by mushroom Producers

| Problems | Number | (%) |
|---|---|---|
| Lack of knowledge | 24 | 80 |
| Fungus problems | 22 | 75 |
| Others | 5 | 14 |

Source: Field Survey, 2019

# CHAPTER-10

# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## 10.1 Summary

Edible mushrooms provide a good supplement to the diet in the form of proteins, carbohydrates, valuable salts and vitamins. It is mainly the Department of Agricultural Extension (DAE) that has introduced mushroom cultivation in Bangladesh in recent years. Cultivation of mushroom has opened a new opportunity of earning extra income for a good number of small, marginal and landless families. The greatest advantage for small, landless and marginal farmers is that mushroom cultivation does not need any land. It can be grown at the homestead or inside a house. Poor women can have extra income from cultivating mushrooms. Older and disabled people can also cultivate mushrooms in their homesteads.

Research Initiatives, Bangladesh (RIB) was interested to support a research project on mushroom cultivation as income generation activity for the poor women of the rural area adjacent to Dhaka city. This phase of the research will be devoted to identify the possible profitability, factors affecting, marketing points, extent of market demand, problems of the existing producers with respect to production and marketing, extent of use of mushroom by different restaurants and their sources etc.

So, Bangladesh mushroom industry is consists of above big to little firm. There is a huge prospect of mushroom cultivation in Bangladesh. It can play an important role in eradicating malnutrition, one of the main problems of the people, and preventing diseases. By mushroom cultivation, it is possible to alleviate poverty and providing employment for educated unemployed, youths, adolescents and women. The present study will give the answers of some of the important questions regarding the aspects like growth of this crop, cost of cultivation, returns from this crop and constraints to its production and marketing. Therefore, a systematic research work was required to carry out for this crop in order to make available complete information to the farmers who want to grow this crop.

The sampling frame for the present study were selected purposively as to select the area where the mushroom cultivation was intensive. On the basis of higher concentration of mushroom production, two elective area Savar and Taragong was selected. A sample size of 60 is generally. This case, who were cultivating different varieties mushroom in the selected areas were selected as samples. Data for the present study have collected during the period of January to February 2019. Primary data were collected from primary producers. Selected respondents were interviewed personally with the help of pre-tested questionnaires. The collected data were checked and verified for the sake of consistency and completeness. Editing and coding were done before putting the data in computer. All the collected data were summarized and scrutinized carefully to eliminate all possible errors. Data entry was made in computer and analysis was done using the concerned software Microsoft Excel and STATA.

Mushroom is an economically profitable and promising agricultural enterprise in Bangladesh. Usually, small, marginal and landless farmers are engaged in mushroom cultivation mainly because small piece of land, and little amount of money are required as capital. Average production cost of mushroom per 100 bags was Taka 9146.45 and revenue was Taka 15,883.17. Therefore, and gross margin (GM) and net return per 100 bags were Taka 10001.51 and Taka 6736.71, respectively. The benefit cost ratio (BCR) was about 1.59. Marketing costs and margins are relatively higher than those of other agricultural products in Bangladesh. Technical efficiency reflects the ability of a farmer to obtain the maximum possible output from a given level of inputs and production technology. Technical efficiency is then measured as the deviation of a farmer from the best-practice frontier. The regression coefficients of Spawn cost (X1), water cost and Mushroom subtracted cost (X4) and were negative but the coefficient of labor cost (X2) was found positive. It indicates that if Spawn cost (X1), water cost and Mushroom subtracted cost (X4) were increased by one percent, the production of mushroom would be decreased by 0.5703,0.2024,0.1289 percent of sample farmers respectively.

Average estimated technical efficiencies for mushroom are 77 percent which indicate that mushroom production could be increased by 23 per cent with the same level of inputs without incurring any further cost. Increase of only managerial skills result in a substantial increase of output for mushroom. The marketing margins of mushroom from farm-gate to wholesalers and wholesalers to retailers were Tk. 230 and 370 per kilogram, respectively. Smooth marketing production. Three intermediaries – mushroom office, wholesalers and retailers are involved in the mushroom marketing channels. Mushroom producers are facing many problems relating to productions, which are high price of spawn, infestation of fly and cockroaches, and high temperature, marketing, technical and awareness problems. Economically solvent, rich and middle income group people are the main customers of mushroom in Bangladesh. A large number of small, marginal and landless poor farmers as well as women can earn a significant amount of money from mushroom cultivation that can help reduce poverty and create employment opportunity in Bangladesh.

## 10.2 Conclusion

Mushroom farming can be a profitable business with low capital investment. It is an art which requires both study and experience. Mushroom is being cultivated for three decades in Bangladesh. Entrepreneurs do understand its possibilities and value. However, demand for it is not increasing among buyers and consumers, thus there are many examples of failures and some success stories. But now People are gradually becoming aware of mushrooms in our country. Edible mushrooms provide a good supplement to the diet in the form of proteins, carbohydrates, valuable salts and vitamins. It is mainly the Department of Agricultural Extension (DAE) that has introduced mushroom cultivation in Bangladesh in recent years. Cultivation of mushroom has opened a new opportunity of earning extra income for a good number of small, marginal and landless families. The greatest advantage for small, landless and marginal farmers is that mushroom cultivation does not need any land. It can be grown at the homestead or inside a house. Poor women can have extra income from cultivating mushrooms. Older and disabled people can also cultivate mushrooms in their homesteads.

RIB was interested to support a research project on mushroom cultivation as income generation activity for the poor women of the rural area adjacent to Dhaka city. . This phase of the project will be devoted to identify the possible marketing points, extent of market demand, problems of the existing producers with respect to production and marketing, extent of use of mushroom by different restaurants and their sources etc.

Bangladesh today needs fully export-oriented mushroom growing, processing and freezing plants. The objective is to bring an agro-revolution in the country and to build up the nation by creating more job opportunities with more big entrepreneurs taking the challenge in hand. Also, for the small entrepreneurs mushroom can become a good source of income from the domestic market. It may provide livelihood to many poor families in one way or other because of low capital investment and it is affordable for everyone to take mushroom cultivation/farming as an enterprise. Indeed, mushroom farming, if done in proper manner and with utmost care, can become an established and profitable enterprise.

## 10.3 Recommendations

To overcome the problems faced by the producers regarding smooth production and marketing, the sampled farmers provided some suggestions that are presented in Table 8.1. All farmers have suggested that advertisement is needed to overcome the negative concept about mushroom as well as the development of mushroom industry in Bangladesh. The main reason is that most of the people still believe that mushroom is a toxic fungi and it is harmful for health. About 75% farmers suggested reducing the price of inputs for rapid growth of mushroom industry. The main reason is that if production cost increases, the market price of mushroom will also increase and thus restrict marketing. About 65% farmers claimed that the market price of mushroom should increase or the government should subsidize inputs. About 55% farmers suggested that mushroom office should provide good quality spawn at cheaper price. About 50% farmers expected that more training and extension work are needed for smooth growing of mushroom. Only 35% farmers suggested that easy bank loan is needed because most of the mushroom producers are marginal, poor, and women.

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## APPENDIX

Sl. No.:
Mobile No. :

# PROFITABILITY AND TECHNICAL EFFICIENCY OF MUSHROOM CULTIVATION IN BANGLADESH

Village/Community.....
Upzilla.....

### A. SOCIO-ECONOMIC CHARACTERISTICS

### 1. Name of farmer……

### 2. Details of House hold

| Sl. No | Name of the member | Sex (M/F) | Age | Level of Education(Years) | Occupation (in terms of income) |
|---|---|---|---|---|---|
| 01. | Self | | | | |
| 02. | Husband/wife | | | | |
| 03. | Son(s) | | | | |
| 04. | Daughter(s) | | | | |
| 05. | Others, if any | | | | |

### 3. Farm Size

| Items | Area(Decimal) |
|---|---|
| Net cultivation land | |
| Leased in land | |
| Leased out land | |
| Mortgage in | |
| Mortgage out | |

## 4. Source of Income

### a) Agricultural Service :

| Sector | Income per year |
|---|---|
| Crop | |
| Poultry | |
| Animal production | |
| Fisheries | |

### b) Nonagricultural Service :

| Sector | Wage/day | Income per year |
|---|---|---|
| Day labor | | |
| Rickshaw puller | | |
| Construction worker | | |
| Tailoring | | |
| Shop keeping | | |
| Others (if any) | | |

## 5. Credit Access: (sources of credit facilities)

| Sources of credit | Amount (TK) | Instalment | Rate of Interest (%) |
|---|---|---|---|
| 1.Self sufficient | | | |
| 2.Borrowing money from neighbors | | | |
| 3.Borrowing money from relatives | | | |
| 4.Borrowing money from NGO | | | |
| 5.Borrowing money from co-operatives | | | |
| 6.Borrowing money from Bank | | | |

6. Do you belong to any Mushroom related co-operative/association? YES ( ) NO ( )

7. Years of experience (How long have you been in Mushroom farming)? .....

8. Do you have membership in any social organization? YES ( ) NO ( )

9. Have you ever been visited by an extension agent? YES ( ) NO ( )

10. If yes, how many times in last one year? .....

11. Do you received any training for Mushroom cultivation? YES ( ) NO ( )

12. If yes,

- ✓ How many times……
- ✓ How many days……..

13. Distance of your farm land from DAE office …….. KM

14. Distance of your farm land from Market ……..…….. KM

**B. INFORMATION ON INPUTS**

15. Planting time: Month……

Week……

16. Variety Name……..

17. Source of Spawn

| Item | No. | TK |
|---|---|---|
| a) Home | | |
| b) Purchase | | |
| Total | | |

**18. Cost of cultivation of crop**

**A)** Fixed Cost of Mushroom Production:

| Particulars | Price(Taka) |
|---|---|
| **1.** Bamboos | |
| **2.** Polythenes | |
| **3.** Cloths | |
| **4.** Plastic Pipes | |
| **5.** Water supply pipes | |
| **6.** Tins | |
| **7.** Water supply machines | |
| **8.** Rent | |
| **9.** Gunny Bags/ Jute Bags | |
| **10.** Woods | |
| **11.** Cement Pillars | |
| **12.** Opportunity cost of family labors | |
| **13.** Opportunity cost of rent | |
| **14.** Others | |

**B)** Variable Cost of Mushroom Production:

| Particulars | NO. | Price(Taka) |
|---|---|---|
| **1.** Spawn Bags | | |
| **2.** Permanent Hired labor | | |

**19. Revenue in survey area**

| Particulars | Yield | TK/KG | Total |
|---|---|---|---|
| **1.** Mushroom | | | |
| **2.** By-Product | | | |

**20.** Distribution of channels of mushroom

| Particulars | KG | TK/KG |
|---|---|---|
| **1.** Retailers | | |
| **2.** Wholesalers | | |
| **3.** Mushroom Office | | |
| **4.** Others | | |

**Constraints of Mushroom production**

1.

2.

3.

4.

5.

**Suggest possible solution to the constraints in Mushroom production**

1.

2.

3.

4.

Thank you so much for your cooperation

Name of the enumerator:

Signature: ……

Date: