

PROBLEMS OF ROOF TOP GARDENING IN DHAKA CITY

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This is to certify that the thesis entitled “**PROBLEMS OF ROOF TOP GARDENING IN DHAKA CITY**” submitted to the Department of Agricultural Extension and Information System, Faculty of Agriculture, Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka in partial fulfillment of the requirements for the degree of Master of Science (M.S.) in Agricultural Extension, embodies the result of a piece of bona fide research work carried out by **MD. TUHIN KAZI, Registration No. 13-05357** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

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**DEDICATED
TO
MY BELOVED
PARENTS**

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LIST OF CONTENTS

CHAPTER	TITLE	Page
	ACKNOWLEDGEMENT	i
	TABLE OF CONTENTS	ii
	LIST OF TABLES	vi
	LIST OF FIGURES	vii
	LIST OF APPENDICES	vii
	ABBREVIATIONS	viii
	ABSTRACT	ix
CHAPTER I	INTRODUCTION	1-10
1.1	General Background of the Study	1
1.2	Statement of the Problem	4
1.3	Justification of the study	4
1.4	Objectives of the study	6
1.5	Assumptions of the Study	7
1.6	Limitations of the Study	7
1.7	Scope or rationale of the study	8
1.8	Definitions of some frequently used terms	9
CHAPTER II	REVIEW OF LITERATURE	11-23
2.1	Review of the previous research findings on rooftop gardening	11
2.2	Relationship between selected characteristics of the farmers and their problem faced in rooftop gardening	14
2.2.1	Age and problem	14
2.2.2	Education and problem	15
2.2.3	Family size and problem	16
2.2.4	Annual income and problem	17
2.2.5	Income from house rent and problem	18
2.2.6	Rooftop space and problem	18
2.2.7	Use of information sources and problem	18
2.2.8	Training and problem	20
2.2.9	Attitude towards roof top gardening and problem	21
2.2.10	Knowledge on roof top gardening and problem	21
2.3	Conceptual Framework of the Study	21
CHAPTER III	METHODOLOGY	24-36
3.1	Locale of the Study	24
3.2	Population and Sampling Procedure	27
3.2.1	Distribution of the population, sample size and reserve list	27
3.3	Data Collecting Instrument	28
3.4	Data Collection	28
3.5	Variables of the Study	29
3.6	Measurement of Independent variables	29
3.6.1	Age	30
3.6.2	Education	30
3.6.3	Family size	30
3.6.4	Annual family income	30

3.6.5	Annual income from house rent	31
3.6.6	Rooftop area	31
3.6.7	Use of information sources	31
3.6.8	Training on rooftop gardening	32
3.6.9	Attitude towards rooftop gardening	32
3.6.10	Knowledge on rooftop gardening	32
3.7	Problems in rooftop gardening	33
3.7.1	Rank order of problem faced by rooftop gardeners	34
3.8	Statement of the Hypotheses	34
3.8.1	Research hypotheses	35
3.8.2	Null hypotheses	35
3.9	Data Processing and Analysis	35
3.9.1	Compilation of data	35
3.9.2	Categorization of data	36
3.10	Statistical Treatments	36
CHAPTER IV	RESULTS AND DISCUSSION	37-54
4.1	Characteristics of the rooftop gardeners	37
4.1.1	Age	38
4.1.2	Level of education	39
4.1.3	Family size	40
4.1.4	Annual family income	41
4.1.5	Annual income from house rent	42
4.1.6	Rooftop area	43
4.1.7	Use of information sources	43
4.1.8	Training on rooftop gardening	44
4.1.9	Attitude towards rooftop gardening	45
4.1.10	Knowledge on rooftop gardening	46
4.2	Problem faced by the rooftop gardeners in rooftop gardening	47
4.3	Contribution of the selected characteristics of the rooftop gardeners to their problems faced in rooftop gardening	48
4.3.1	Contribution of gardeners' knowledge on rooftop gardening to their problems in rooftop gardening	50
4.3.2	Significant contribution of training on rooftop gardening to their problems in rooftop gardening	51
4.3.3	Significant contribution of attitude towards rooftop gardening to their problems in rooftop gardening	51
4.3.4	Significant contribution of education to their problems in rooftop gardening	52
4.4	Rank order of problem faced by rooftop gardeners	53
CHAPTER V	SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS	55-62
5.1	Major Findings	55
5.1.1	Selected characteristics of the rooftop gardener	55
5.1.2	Problem faced by the rooftop gardeners in rooftop gardening	57
5.1.3	Contribution of the selected characteristics of the rooftop gardeners and their problems faced in rooftop gardening	57

5.1.4	Comparative severity among the problems faced by the rooftop gardeners in rooftop gardening	57
5.2	Conclusions	58
5.3	Recommendations	59
5.3.1	Recommendations for policy implications	59
5.3.2	Recommendations for the further study	60
	REFERENCES	61-66
	APPENDIX	67-70

LIST OF TABLES

TABLE	TITLE	PAGE
3.1	Distribution of the rooftop gardeners according to population and reserve list	28
4.1	Salient features of the selected characteristics of the rooftop gardener	38
4.2	Distribution of the rooftop gardener according to their age	39
4.3	Distribution of the rooftop gardener according to their education	39
4.4	Distribution of the rooftop gardeners according to their family size	40
4.5	Distribution of the rooftop gardeners according to their annual family income	41
4.6	Distribution of the rooftop gardeners according to annual income from house rent	42
4.7	Distribution of the rooftop gardeners according to their rooftop area	43
4.8	Distribution of the rooftop gardeners according to their use of information sources	44
4.9	Distribution of the rooftop gardeners according to their training	45
4.10	Distribution of the rooftop gardeners according to their attitude towards rooftop gardening	46
4.11	Distribution of the rooftop gardeners according to their knowledge on rooftop gardening	47
4.12	Distribution of the rooftop gardeners according to their problems of rooftop gardening	48
4.13	Multiple regression coefficients of contributing factors related to the rooftop gardener's problem of rooftop gardening	49
4.14	Rank order of the Problem faced by the rooftop gardeners in rooftop gardening	54

LIST OF FIGURES

FIGURE	TITLE	Page No
2.1	The conceptual framework of the study	23
3.1	Map of Dhaka city showing the study area -Mirpur	25
3.2	Map of Mirpur of Dhaka city showing the study area- Mirpur-1	26

LIST OF APPENDICES

APPENDIX	TITLE	Page No
APPENDIX-A	An English Version of the Interview Schedule on “PROBLEMS OF ROOFTOP GARDENING IN DHAKA CITY”	67

ABBREVIATIONS

BBS	Bangladesh Bureau of Statistics
RTG	Roof Top Garden
NGO	Secondary School Certificate
DNCC	Dhaka North City Corporation
BRI	Bangladesh Rice Research Institute
BRAC	Bangladesh Agriculture Research Council
URGS	Urban Roof Gardeners Society
SPPS	Strengthening Plant Protection Services
FAO	Food and Agriculture Organization
SAU	Sher-e-Bangla Agricultural University
SPSS	Statistical Product and Service Solutions
PFI	Problem Faced Index

PROBLEMS OF ROOFTOP GARDENING IN DHAKA CITY

MD. TUHIN KAZI

ABSTRACT

The objectives of this study were to describe the selected characteristics of the rooftop gardeners; to determine the extent of problem faced by them in rooftop gardening; to explore the contribution of the selected characteristics of them to their problems of rooftop gardening and to compare the problems faced by them in rooftop gardening. The study was conducted with randomly selected 86 rooftop gardeners in one ward of Mirpur Thana under Dhaka district. A pre-tested interview schedule was used to collect data from the respondents during 1st January to 30th January, 2020. Problem faced by the respondents in rooftop gardening was the dependent variable and the dependent variable was measured on basis of severity of problem. The majority 63.95 percent of the rooftop gardeners faced medium problems in rooftop gardening, 20.93 percent faced low problems in rooftop gardening and 15.12 percent faced high problems in rooftop gardening. Among 10 selected characteristics of the farmers 4 characteristics namely level of education, training on rooftop gardening, attitude towards rooftop gardening and knowledge on rooftop gardening of the gardeners had significant negative contribution to their problems faced in rooftop gardening and the rest 6 characteristics namely, age, family size, annual family income, income from house rent, rooftop area and use of information sources of them had no significant contribution to their problems faced in rooftop gardening. According to Problem Faced Index (PFI), “lack of technological information and advice” was the highest ranked problem followed by “scarcity of source of water”, “lack of quality seed”, seedlings, saplings, input, roof leakage”, “lack of proper water drainage system on the roof”, “lack of skilled labor”, “lack of training”, “lack of motivational work”, “insect infestation and advice” and “lack of enough time for taking care of garden”.

CHAPTER-I

INTRODUCTION

1.1 General Background of the Study

Dhaka is the largest and fastest growing city of Bangladesh. Rapid population growth in Dhaka has created severe pressure on the land of the already overcrowded country. Agricultural lands have given way to housing developments and roads in an agriculturally based economy like Bangladesh. With rapid and unplanned urbanization, incidence of urban poverty and food insecurity has been also increasing alarmingly in Dhaka (Choguill, 1995).

Rooftop gardening can be an effective method in ensuring food supply and satisfying nutritional needs of the inhabitants (Helen Keller International and Institute of Public Health Nutrition, 1985). Rooftop gardening, although is being practiced in the city in many forms for years in the past, there have been hardly any concerted effort on part of the Government, community organizations and as well the general citizens to integrate it to urban agriculture. Proper understanding of the problems and prospects associated with the adoption of policies will contribute to a great extent to increased food supply in the city. The proposed study is an effort in this direction. It identifies the long-term policy measures for rooftop gardening that can become the basis for a sustainable approach for urban agriculture.

Rooftop gardens guide the social life, as an area to be satisfied outside surroundings with household and friends. It additionally develops an experience of self-identification and independence, the place one can in particular acquire self and emotion legislation (Rashid and Ahmed, 2009) and affords restorative ride from stressful daily things.

Rooftop performs a necessary function in the intellectual well-being of the gardeners as nicely as in amelioration of the bodily environment. Roof gardening has additionally a promising plausible as small-scale enterprise that can speed up extra household income. Nevertheless, it may additionally generate some employment services via its backward and ahead linkages. The manufacturing of clean fruits and greens from the rooftop backyard can be multiplied dietary fame of family contributors of the city residents and it will make a high-quality contribution to the environment. Sajjaduzzaman (2005) said that the important reason of roof gardening is passing amusement time (100%), growing aesthetic values (100%), contributing in environmental amelioration (45%) and economic reap being a very minor subject (4% only) in Dhaka Metropolitan metropolis of Bangladesh. On the other hand, Rumana Rashid et al. (2010) described the financial and social gain of roof pinnacle gardening along with clean meals furnish for city residents, converts the tough floor into smooth green surface, power saving, etc.). Many researches display that there are many components of out of doors environments and inexperienced areas that are desirable to people, regardless of age (Ward Thompsol, 2007).

Farming on the rooftop of the buildings in urban areas is usually done by using green roof, hydroponics, organic, aeroponics or container gardens (Asad & Roy, 2014). The first benefit of this practice is increased local supply of fresh food. In Singapore, while current local vegetable production can meet only 5% of Singapore's present-day needs, if rooftop farming is implemented across public housing estates, the share would increase to 35.5% and Singapore's carbon footprint would decrease by 9052 tons of emissions annually (Astee & Kishnani, 2010). In Bologna, Italy, if all suitable flat roof space is used for urban agriculture, rooftop gardens in the city would supply around 12,500 tons of vegetables annually which would meet 77% of residents' needs for vegetables and an estimated 624 tons of CO₂ would be captured each year (Science for Environment Policy, 2015). Lufa Farms, Montreal produces

over 25 varieties of vegetables and production is adequate to supply the needs of over 1000 people (Carrot City, 2014a).

The farm of Brooklyn Navy Yard grows more than 50,000 pounds of organic produce annually. The Gary Comer Youth Center of Chicago grows 450 kg of food per year (Clarke, 2015). Rooftop urban farming also offers many environmental and social benefits to high density urban cities like Hong Kong (Hui, 2011). By utilizing rooftops for urban farming, it is possible to attain social, economic and environmental sustainability for the buildings in urban cities. Because it can contribute to the development of urban food systems by increasing local food production, meet the nutrition demand of the people by access to nutritious food, mitigation of air pollution, increasing storm water retention capacity, improvement of public health, enhancement of the aesthetic value of the urban environment and enhancement of community functions (Bay Localize, 2007). In Dhaka, one of the world's fastest growing mega cities, open and cultivable land has been converting to built-up area indiscriminately and thus agricultural land has been decreased at an alarming rate (Islam & Ahmed, 2011).

Implementing rooftop farming can be a possible solution to reduce the food supply problems, make urban living more self-sufficient and make fresh vegetables more accessible to urban individuals. It is estimated that 10,000 ha space of Dhaka city can be brought under rooftop farming and the residents of the city can taste fresh vegetables as well as over 10 percent of the demand can be fulfilled through rooftop farming (Wardard, 2014). A survey shows that most of the roofs of Dhaka city are suitable for gardening and do not require major improvement work, sometimes only need some modifications (Islam, 2004). This study aims at exploring the existing practice and associated challenges of rooftop farming. What makes this study unique is the identification of benefits from urban sustainability perspective and

calculation of the monetary value of economic and environmental benefits of rooftop farming in Dhaka.

1.2 Statement of the problem

In regards of importance of rooftop gardening the investigator of this survey were highly interested to explore the problems of rooftop gardening in Dhaka city.

This study attempted to find out the answer of the following research questions:

- i. What are the rooftop gardeners selected characteristics?
- ii. What are the problems of rooftop gardening?
- iii. Is there any contribution of selected characteristics of the rooftop gardeners on their problem of rooftop gardening?

For getting a view of above questions, the researcher undertook a study entitled “Problems of rooftop gardening in Dhaka city”.

1.3 Justification of the study

This is almost the maiden attempt in doing such a research on Bangladesh perspective. Random studies have been conducted on problems of various aspects of agriculture but very few researches conducted at home and abroad to determine the problems of rooftop gardening of the respondents. However, it is very much important to find out problems of rooftop gardening in Dhaka city. It is about 1.7 crore people live in Dhaka metropolitan (BBS, 2015) and this number is increasing alarmingly in every single day. To create new physical structures the numbers of trees are decreasing drastically. The lack of finance is one of the critical factors that constraint the innovative projects in Roof Top Garden (RTG) in Dhaka. Lack of the provision for credit specially prevents the poor from leasing RTG and initiate food constraint the innovative projects in Roof Top Garden (RTG) in Dhaka. Lack of the provision for credit specially prevents the poor from leasing RTG and initiate food gardening. As has been expressed by the majority of the respondent’s burglary is the main concern. Many of the city of huge demand. Many of the city residents do

not have training in agriculture. Starting gardening without proper training may lead to frustrating outcomes, which might result in reluctance of the people in initiating new projects. There is no authority to take care of gardens in the commercial and public office buildings especially at night. The guards and caretaker (often known as Mali) are sometimes part-time staff. There are several constraints due to the present conditions of buildings. For example, some buildings are old, especially in the old part of the city. Dhaka is situated in an active seismic zone. Many experts express their concerns about possibility of building collapse as a large number of 3-5 storied brick buildings are built with very little seismic resistance. Moreover, many of these are founded on recent loose fills, with a possibility of ground failures during earthquake. Even some new buildings are not suitable for RTG. There have been several cases of buildings collapsing the city in recent years. These happened due to the noncompliance with the building construction regulation. In the city some buildings exceeded the limit of number of stories allowed to build on specified building foundation and structures. Shadow of taller buildings on smaller ones is one of the barriers for RTG although this is not unique to Dhaka.

Although supply of water is not an issue for those who can afford it, there is a shortage of water particularly during the dry season from November to March. The limited access of urban poor to high valued land (in this case PT) in Dhaka is the most important constraint preventing the poor to involve and exploit their skills as urban farmers. The main insight resulting from the survey and discussion is that the people are not fully aware of the benefits that can be tapped from RTG. This is mainly due to the fact that there are no organized efforts on it from government, community and NGO side. There is a pool of agricultural skills among the recent migrants, which has not been utilized for respondents. Through the use of RTG their potential can be tapped. For the earth, our next generation have to live in a worsen environment for scarcity of plants. They have to live in a polluted and unhealthy environment. To avoid this mesmerizing situation, we have to decor our city with

garden, in case of land scarcity we have to choose our rooftop for gardening. But build up a garden on the roof is not an easy or conventional task, so it is important to undertake a program to isolate the problems and solutions of those problems of roof top gardening to rescue the program. However before giving suggestions to the dwellers we have to identify the problems of rooftop gardening of the respondents. On the above circumstances the researcher has undertaken the present study entitled "problems of rooftop gardening in Dhaka city.

1.4 Objectives of the study

The focal point of the research work was to explore the trends of attitude of the house owners towards rooftop gardening at Dhaka city. This is why the following objectives were structured out in order to provide an appropriate track.

i. To describe the following selected characteristics of the rooftop gardeners:

- ✓ Age
- ✓ Level of education
- ✓ Family size
- ✓ Annual family income
- ✓ Income from house rent
- ✓ Rooftop area
- ✓ Use of information sources
- ✓ Training on rooftop gardening
- ✓ Attitude towards roof top gardening
- ✓ Knowledge on rooftop gardening

ii. To determine the extent of problem faced by the rooftop gardeners in rooftop gardening;

iv. To explore the contribution of the rooftop gardeners selected characteristics with their problem of rooftop gardening;

v. To compare the problems faced by the rooftop gardeners in rooftop

gardening.

1.5 Assumptions of the Study

An assumption is the supposition that an apparent fact or principle is true in the light of the available evidence (Goode and Hatt, 1952). The following assumptions were in mind of the researcher while undertaking this study:

- i. The respondents included in the sample had capacity of furnishing proper responses to the questions contained in the interview schedule.
- ii. The responses furnished by the respondents were valid and reliable.
- iii. Information furnished by the respondents included in the sample was representative of the whole population of the study area.
- iv. The researcher who acted as interviewer was well adjusted to the environment of the study area.
- v. The data collected from the respondents were free from bias.
- vi. The independent and the dependent variables of this study were normally and independently distributed with their respective means and standard deviation.
- vii. The findings of the study are expected to be useful for planning and execution of various programmes in connection with development of the country.

1.6 Limitations of the Study

It is necessary to impose definite limitations to make the research manageable and meaningful.

1. The research was confined to the one ward of Mirpur under Dhaka district.
2. Data were collected from a small group of respondents taken as the sample of the study because of time and resource constrains.

3. The researcher had to face many obstacles during data collection. All the data were recall data. So, the researcher had to depend on the data as given by the respondents.
4. Only ten socio-economic characteristics of the respondents were selected as independent variables.
5. Time allocation and budget was also limited in this study.
6. The researcher had to face many difficulties in conducting the research as ascertainment of effect is very complex especially in case of measuring problem of rooftop gardening as it has slow changing nature.

1.7 Scope or rationale of the study

The present study was designed to have an understanding attitude of the house owners towards rooftop gardening and to explore its contribution with their selected characteristics.

- i. The findings of the study will, in particular, be applicable to the study area at Mirpur-1 at Dhaka North City Corporation (DNCC). The findings may also be applicable to other locale of Bangladesh where socio-cultural, economic circumstance do not differ much than those of the study areas.
- iii. The findings of the study may also be subsidiary to the field worker of extension service to enhance their action strategies on rooftop gardening.
- iv. The findings of the study will be conducive to accelerate the improvement in agriculture, information needs and the way of dissemination especially tuned to key role players in the society as well as rooftop gardening. The outcomes might also be helpful to the planners and policy makers, extension workers and beneficiaries of the agriculture.
- v. To the academicians, it may help in the further conceptualization of the systems model for analyzing the rooftop gardening. The findings of this study may have other empirical evidence to all aspects of rooftop gardening strategies which may be used to build theory of rooftop gardening.

1.8 Definitions of some frequently used terms

The researcher used some uncommon terms and references in this study. They should be clarified and explained them properly by the researcher for easy understanding for all concerned quarters. Therefore, the terms used in this piece of research work are defined and interpreted as follows:

Rooftop Garden: A roof garden is a garden on the roof of a building. Besides the decorative benefit, roof plantings may provide food, temperature control, hydrological benefits, architectural enhancement, habitats or corridors for wildlife, recreational opportunities, and in large scale it may even have ecological benefits. The practice of cultivating food on the rooftop of buildings is sometimes referred to as rooftop farming.

Age: Age of the respondents is defined as the period of time from birth to the time of interview.

Education: It is the act or process of imparting or acquiring general knowledge, developing the powers of reasoning and judgment, and generally of preparing oneself or others intellectually for mature life.

Family size: Family size of a respondent refers to the total number of members in his/her family including him/her, children and other dependents.

Annual family income: The term annual family income refers to the annual gross income of respondents and members of his family from different sources.

Annual income from house rent: Annual income from house rent refers to the total financial return from house rent in one year.

Effective rooftop area: The area under rooftop garden in which gardening operation carried out.

Use of information sources: It defines as one's extent of exposure to different communication media.

Training experience: Training experience refers to the extent of participation of the farmers to any kind of training program offered by different organizations and agencies up to the time of interview.

Attitude: Attitude may be thought of as a person's perspective toward a specific target and way of predisposition to act, perceive, think and feel in relation to something's. It is expressed as one's views regarding an object as positive or negative, favorable or unfavorable, like or dislike etc. with varying degrees.

Knowledge on Rooftop gardening: Literally knowledge means knowing or what one knows about a subject, fact, person etc. Knowledge, however, refers to the amount of facts or information about an idea, object or person which a person knows. Regarding technological aspect knowledge occurs when an individual is exposed to a technologies existence and gains some understanding of how it functions (Rogers, 1983).

Problem: According to sociologist's problem is A perceived gap between the existing state and a desired state, or a deviation from a norm, standard, or status quo. Although many problems turn out to have several solutions (the means to close the gap or correct the deviation), difficulties arise where such means are either not obvious or are not immediately available. In this study problem was defined as the phenomenon of constraints or hinders into roof top gardening practices by the respondents.

CHAPTER-II

REVIEW OF LITERATURE

Review was searched in Bangladesh Agriculture Research Council (BRAC), Sher-E-Bangla Agricultural University Library, and Regional office of BAN Bhaban at Mohakhali, HORTEX foundation, Green Dhaka Projects office and from Internet browsing. But there was no previous work on this exact title. Only a few work references were found from visiting those office and some articles of RD scientists and abroad works were found by internet browsing. These are described below:

2.1 Review of the previous research findings on rooftop gardening

Mithon (2016) conducted a study attitude of the house owners towards rooftop gardening at Dhaka city and found overwhelming (84.1 percent) of the respondents had low to medium favorable attitude towards roof top gardening because roof top gardening concept was comparatively new and incommodious task to them.

Morshed (2015) found that Dhaka city has 14% of open space whereas 25% of open spaces are required for fresh air and habitable living. It was also reported that 13% of Dhaka city was covered by water bodies. Most, if not all green spaces of Dhaka city were in the form of preserved natural vegetation or in the form of parks or gardens. In a broader sense, urban green resources in Dhaka city referred to all urban and peri-urban greenery. It was found that gradually decreased of green vegetation at 15.5% and 7.3% in the year 2002 and 2010 respectively. The vegetation in the Dhaka metropolitan area was only 1.87%. Most of these areas are in the form of parks and roadsides greeneries. The researcher pointed the lack of motivating as one of the problems behind creating rooftop gardening in Dhaka city.

Rahman (2014) revealed that the majority (45%) of the respondent faced medium problem while 40% percent of the respondent faced low problem. comparatively few respondents (15%) faced high problem in roof top gardening. The researcher also found that level of education, knowledge on roof top gardening, use of information sources, attitude towards roof top gardening, and training had significant negative relationship with their problems faced in roof top gardening while age, family size, family annual income and roof top space had no significant relationship with their problems of roof top gardening.

Sajjaduzzaman *et. al.* (2004) studied that estimated number of housing plots in DCC was about 186,000 out of which 80% plots (i.e., about 148,800 plots) are already used for housing. Among the houses, more than 85% are residential buildings and 15% are institutional buildings (private and public). The residential buildings are mostly in private possession and few residential buildings are government official staff quarters. The survey showed that out of 500 households, on an average only 12% of the houses are bestowed with gardens either in roofs or in balconies; majority found in expensive residential areas (e.g. in Gulshan area 25% houses with garden). It was also found that a large portion of the roof gardener belongs to middle class category having their own houses (75%). Lower class is less interested in RTG practitioners mostly prefer to use the seedlings (65%) for roof top gardening followed by propagated materials (25%) and direct seed sowing (10%). Major purpose of roof top gardening is passing leisure time (100%), creating aesthetic values (100%), contributing in environmental melioration (45%) and financial gain being a very minor concern (4% only).

Islam (2001) has published an article named "Roof top gardening as a strategy of urban agriculture for food security: the case study of Dhaka city, Bangladesh". He has reported that urban agriculture in the cities of developing countries is growing rapidly which also means the number of low-income consumers is increasing.

Because of food insecurity in these cities is increasing. Urban Agriculture (UA) contributes to food security by increasing the supply of food and by enhancing the quality of perishable foods reaching urban consumers. The exploration of local socio-economic and institutional conditions that might promote and hinder urban agriculture is needed to implement policies that effectively integrate agriculture into the urban environment. This study aims to identify & the barriers to UA with reference to roof top gardening (RTG) and to explore strategies to promote food security in Dhaka.

Rumana Rashid, Khan & Mohd. Hamdan Bin Ahmed accomplished a thesis work on "Green roof and its Impact on Urban Environmental sustainability: The Case in Bangladesh". They find that green application can reduce the indoor air temperature 6.8°C from outdoor during the hottest summer period when outdoor is recorded 39.72°C. comfort zone analysis for Bangladesh according to Sharma, Ali and Mallick (1995) during the summer season, the comfort temperature range is between 24 °C to 32 °C while relative humidity range is fixed in 50% (lower limit) to 90% (upper limit). According to the graph profile the indoor temperature of the residence shows that maximum hour of the day is stay within comfort temperature range. It is a desirable condition for the resident.

Kamrun Nahar Nira (2006) accomplished a thesis work on "Adoption of Roof Gardening at Mirpur-10 Area under Dhaka City. She found that majority (62%) of the respondents possessed no adoption compared to 15% and 23% have low and medium adoption of roof gardening respectively. The main problem was lack of time for roof gardening. Most of the respondents were interested to flower plant for their roof garden.

2.2 Relationship between selected characteristics of the farmers and their problem faced in rooftop gardening

2.2.1 Age and problem

Mithon (2016) conducted a study attitude of the house owners towards rooftop gardening at dhaka city and found that there had no significant relationship between age of the farmers and their problems of roof top gardening.

Rahman (2014) conducted a study on problems of roof top gardening at mohammadpur thana under dhaka city and found that there had no significant relationship between the age of the farmers and their problems of roof top gardening.

Rahman (1995) conducted a study to identify the relationship between the personal characteristics and constraints facing in cotton marketing of Muktagacha Thana under Mymensingh district. He found that there was no significant relationship between the age of the farmers and their faced constraints in cotton cultivation and marketing. Similar findings were obtained by Ali (1999), Rashid (1999), Pramanik (2001), Ahmed (2002), Hossain (2002), Salam (2003) and Halim (2003) in their respective studies.

Azad et al. (2014) also found that age of the vegetable growers has no significant relationship with problem faced in vegetable cultivation.

Pandict et al. (2013) conducted a study to identify the relationship between the personal characteristics and constraints facing in vegetable marketing of Trishal Upazila under Mymensingh district found that there was no significant relationship between the age of the farmers and their faced constraints in vegetable cultivation and marketing.

Bhuiyan (2002) in his study found a positive and significant relationship between age of the farmers and their constraints in banana cultivation and marketing. A similar finding was obtained by Rahman (1996) in his respective study.

Rashid (2003) found that age of the rural youth had significant negative relationship with problem faced in selected agricultural production activities and marketing.

Azad et al. (2014), Pandict et al. (2013) have found no significant relationship within the age of farmers and marketing problem but Rashid (2003) have found negative significant relationship. So further research should be taken related to this issue.

2.2.2 Education and problem

Mithon (2016) conducted a study attitude of the house owners towards rooftop gardening at dhaka city and found that there had positive significant relationship between education of the farmers and their problems of roof top gardening.

Rahman (2014) conducted a study on problems of roof top gardening at mohammadpur thana under dhaka city and found that there had negative significant relationship between the education of the farmers and their problems of roof top gardening.

Mansur (1989) found that education of the farmers had significant negative effect on their problem faced in marketing. Similar findings were obtained by Haque (1995), Rahman (1996), Karim (1996), Faruque (1997), Pramanik (2001), Ahmad (2002), Hossain (2002) Bhuiyan (2002) and Salam (2003) in their respective study.

According to Gasperini and Atchoarena (2005), education is a fundamental human right and essential for reducing poverty and improving the living conditions for rural

people. They further indicates that from a perspective of agricultural improvements, basic education improves farmer productivity and business management.

Pandict et al. (2013) conducted a study to identify the relationship between the personal characteristics and constraints facing in vegetable marketing of Trishal Upazila under Mymensingh district found that there was no significant relationship between the age of the farmers and their faced constraints in vegetable cultivation and marketing.

Azad et al. (2014) also found that age of the vegetable growers has no significant relationship with problem faced in vegetable cultivation.

Hoque (2001) found a significant negative relationship between education and problem faced of the FFS farmers in product marketing.

Pandict et al. (2013), Azad et al. (2014) have found no relationship between education and marketing problem but Hoque (2001) found a negative significant relationship between education and marketing problem. So further research should be taken related to this issue.

2.2.3 Family size and problem

Mithon (2016) conducted a study attitude of the house owners towards rooftop gardening at Dhaka city and found that there had no significant relationship between family size of the farmers and their problems of roof top gardening.

Rahman (2014) conducted a study on problems of roof top gardening at mohammadpur thana under Dhaka city and found that there had no significant relationship between the family size of the farmers and their problems of roof top gardening.

Pandit et al. (2013) found a significant negative relationship between family size and problem faced of the vegetable growers in vegetable cultivation and marketing.

Hossain (2003) found that family size of the farmers was not significantly related to farmers' knowledge on modern Boro rice cultivation and marketing practices.

Pandit et al. (2013) found a negative significant relationship and Hossain (2003) found no significant relationship between family size and marketing problem. So further research should be taken related to this issue.

2.2.4 Annual income and problem

Mithon (2016) conducted a study attitude of the house owners towards rooftop gardening at Dhaka city and found that there had no significant relationship between annual income of the farmers and their problems of roof top gardening.

Rahman (2014) conducted a study on problems of roof top gardening at mohammadpur thana under Dhaka city and found that there had no significant relationship between the annual family income of the farmers and their problems of roof top gardening.

Mansur (1998) in his study on the feeds and feeding constraints confrontation found a significant relationship between the annual family income of the farmers and feeds and feeding constraints confrontation, but showed a negative trend.

Pandit et al. (2013) found a significant negative relationship between the family income and problem faced of the vegetable growers in vegetable cultivation and marketing.

Azad et al. (2014) also found that annual income of the vegetable growers has significant negative relationship with problem faced in vegetable cultivation.

Rahman (1995) in his study found that a significant negative and substantially relationship between the annual family income of the farmers and their faced constraints in cotton cultivation.

Mansur (1998) found positive significant relationship and Pandit et al. (2013), Azad et al. (2014) and Rahman (1995) found negative significant relationship between annual income and marketing problem. So further research should be taken related to this issue.

2.2.5 Income from house rent and problem

Mithon (2016) conducted a study attitude of the house owners towards rooftop gardening at Dhaka city and found that there had no significant relationship between income from house rent of the farmers and their problems of roof top gardening.

2.2.6 Rooftop space and problem

Mithon (2016) conducted a study attitude of the house owners towards rooftop gardening at Dhaka city and found that there had no significant relationship between rooftop area of the farmers and their problems of roof top gardening.

Rahman (2014) conducted a study on problems of roof top gardening at mohammadpur thana under Dhaka city and found that there had no significant relationship between rooftop space of the farmers and their problems of roof top gardening.

2.2.7 Use of information sources and problem

Mithon (2016) conducted a study attitude of the house owners towards rooftop gardening at Dhaka city and found that there had positive significant relationship

between use of information sources of the farmers and their problems of roof top gardening.

Rahman (2014) conducted a study on problems of roof top gardening at mohammadpur thana under Dhaka city and found that there had negative significant relationship between use of information sources of the farmers and their problems of roof top gardening.

Pandit et al. (2013) found a significant negative relationship between the extension media contact and problem faced of the vegetable growers in vegetable cultivation and marketing.

Saha (1983), Sarker (1983) and Mansur (1989) found in their studies that organizational participation of the farmers had a significant negative relationship with the agricultural constraints faced. On the other hand, Islam (1987) and Raha (1989) found no significant relationship with their agricultural constraints faced.

Rahman (1995) found in his study that there was no relationship between the organizational participation of the farmers and their faced constraints in cotton cultivation.

Rashid (1999) in his study revealed that the organizational participation of the rural youth had no relationship with their willingness for undertaking selected agricultural entrepreneurships in their self-employment and their problem perceived for undertaking selected agricultural entrepreneurships in their self-employment. Similar findings were obtained by Rahman (1996), Faroque (1997), Pramanik (2001), Hossain (2002), Bhuiyan (2002) Ahmed (2002) and Salam (2003) in their respective studies.

Pandit et al. (2013); Saha (1983), Sarker (1983) and Mansur (1989) have found negative significant relationship on the other hand Islam (1987) and Raha (1989), Rahman (1995) and Rashid (1999) have found no relationship within extension contact and marketing problem. So further research should be taken related to this issue.

2.2.8 Training and problem

Mithon (2016) conducted a study attitude of the house owners towards rooftop gardening at Dhaka city and found that there had positive significant relationship between training on rooftop gardening of the farmers and their problems of roof top gardening.

Rahman (2014) conducted a study on problems of roof top gardening at mohammadpur thana under Dhaka city and found that there had negative significant relationship between training of the farmers and their problems of roof top gardening.

Ortmann and King (2007) indicated that poor management, lack of training, conflict among members (due mainly to poor service delivery), and lack of funds were important contributory factors to the smallholder cooperative failures in Limpopo province.

Hossain (2001) found that the length of the training of the respondents had positive relationship with their knowledge of crop cultivation and marketing.

Azad et al. (2014) also found that training exposure of the vegetable growers has no relationship with problem faced in vegetable cultivation.

Hossain (2001) have found positive significant relationship between training received and marketing problem. Azad et al. (2014) have found no significant relationship between training received and marketing problem. So further research should be taken related to this issue.

2.2.9 Attitude towards roof top gardening and problem

Rahman (2014) conducted a study on problems of roof top gardening at mohammadpur thana under Dhaka city and found that there had negative significant relationship between attitude towards roof top gardening and problem of the farmers and their problems of roof top gardening.

2.2.10 Knowledge on roof top gardening and problem

Rahman (2014) conducted a study on problems of roof top gardening at mohammadpur thana under Dhaka city and found that there had negative significant relationship between knowledge of rooftop gardening of the farmers and their problems of roof top gardening.

Mithon (2016) conducted a study attitude of the house owners towards rooftop gardening at Dhaka city and found that there had positive significant relationship between knowledge of rooftop gardening and problem of the farmers and their problems of roof top gardening.

2.3 The Conceptual Framework of the Study

In scientific research, selection and measurement of variables constitute an important task. Problem faced by the respondents in rooftop gardening may be influenced and affected through interacting forces of many independent factors. It is not possible to deal with all the factors in a single study. Therefore, it was necessary to limit the factors, which included age, education, family size, annual family income, income from house rent, rooftop area, extent of use of sources of

information for rooftop gardening, training rooftop gardening, attitude towards rooftop gardening and knowledge on rooftop gardening. Thus, problems of rooftop gardening in Dhaka city were the dependent variable of the study and 10 selected characteristics of the respondents were considered as those might have contribution with their problem faced of rooftop gardening. Considering the above-mentioned situation and discussion, a conceptual framework has been developed for this study, which is diagrammatically presented in the following Figure 2.1.

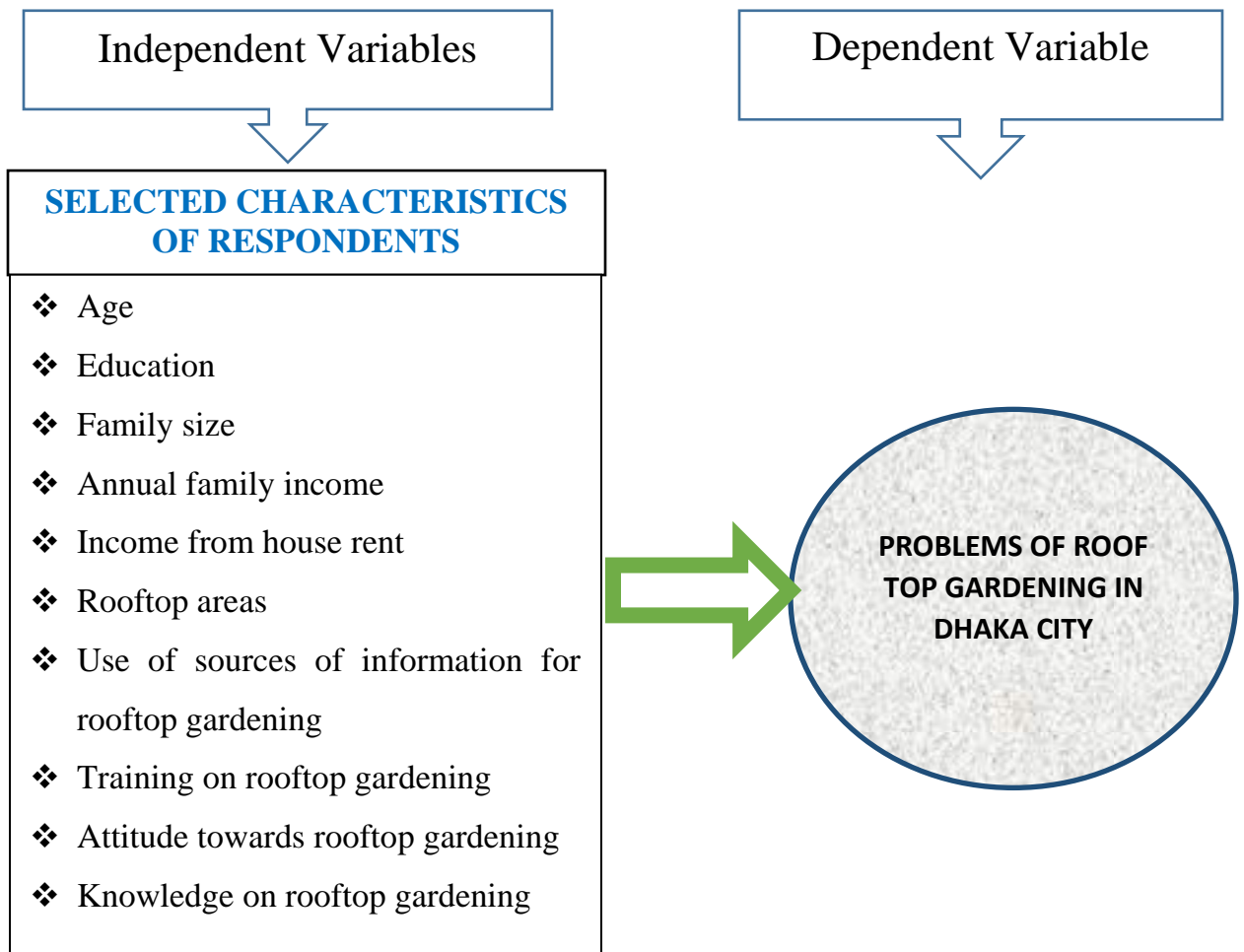


Figure 2.1 The Conceptual Framework of the Study

CHAPTER III

MATERIALS AND METHODS

A researcher should do work very carefully in formulating methods and materials. Methodology gives clear direction to a researcher about his works and activities during the total period of the study. Proper procedures for collecting data were taken by the researcher to collect valid and reliable information. Methods of analysis of data were appropriate to arrive at correct conclusion. Various methods, tools and techniques were used during different stages of this research work and compilation of data. The purpose of this chapter was to describe the methods and procedures used in conducting this study.

3.1 Locale of the Study

The study was conducted in the Mirpur (Dhaka metropolitan) area which occupies an of 4.71 sq km, located in between 23°46' and 23°48' north latitudes and in between 90°20' and 90°22' east longitudes. It is bounded by Shah Ali and Pallabi thana, Sher-e-bangla Nagar and Darus Salam thana on the south, Pallabi and Kafrul thana on the east, Shah Ali and Darus Salamthana on the west. The house owners of this area are more or less interested to make rooftop garden along with their other services. A large number of house owners are also practicing the rooftop gardening at this area especially Mirpur-1 (word-8) of Dhaka North City Corporation (DNCC). The present study was conducted at Mirpur-1 based on the population size in the selected area. The inhabitants of the study area are involved in rooftop gardening. The number of house owners who involves in rooftop gardening in the study area were 626. The map of the Dhaka city has been presented in Figure 3.1 and the specific study location namely Mirpur area have also been shown in Figure 3.2.



Figure 3.1 Map of Dhaka city showing the study area



Figure 3.2 Map of Mirpur of Dhaka city showing the study area- Mirpur-1

3.2 Population and Sampling Procedure

People who permanently reside and the owner of the multi-storied building in the selected area constituted the active population of this study. However, representative sample from the population were taken for collection of data following standard statistical formulae. Updated lists of all respondents who had own house of the selected area were prepared with the help of Urban Roof Gardeners Society (URGS). A random sampling procedure was followed to select the respondents of the study area. The total number of rooftop gardener in the study area was 626; Thus, 626 rooftop gardeners constituted the population of the study which is shown in the following Table 3.1. To determine the sample size, Yamane (1967) formula was used as follows:

$$n = \frac{z^2 P(1-P)}{z P(1-P) + N(e)^2}$$

Where,

n = Sample size;

N, Population size = 626;

e, The level of precision = 10%;

z = the value of the standard normal variable given the chosen confidence level (e.g., z = 1.96 with a confidence level of 95 %) and

P, The proportion or degree of variability = 50%;

By using the above formula, the sample size was determined as 86.

3.2.1 Distribution of the population, sample size and reserve list

According to Yamane's formula, the respondents comprised of 86 rooftop gardeners. A reserve list of 9 rooftop gardener (ten percent of the sample size) were also prepared so that the rooftop gardener of this list could be used for interview if the rooftop gardeners included in the original sample were not available at the time of conduction of interview.

The respondents of the study area were measured according to the proportionate of the total sample size (86) which was calculated using Yamane's (1967) formula. The distribution of the population, the number of sample size and number of respondents along with the reserve list are given in Table 3.1.

Table 3.1 Distribution of the rooftop gardeners according to population and reserve list

Selected district	Selected thana	Selected area	Population	Sample size	Reserve list
Dhaka	Mirpur	Mirpur Section-1, DNCC (word No. 8)	626	86	9

3.3 Data Collecting Instrument

An interview schedule was prepared to fulfill the objectives of the study. Direct questions and various scales were kept in the questionnaire to get the reliable information. After preparation of data collecting instrument pretest was conducted on 10 rooftop gardeners of the study area who were excluded from the sample. On the pretest experiences, necessary correction, addition and alternation were made in the interview schedule. Valuable suggestions and comments were received from the research supervisor. After necessary correction, the interview schedule was finalized for the data collection.

3.4 Data Collection

Data were collected by the researcher himself through face to face interview of the selected rooftop gardeners by using a structured interview schedule. Interviews were usually conducted with the respondents during the leisure time, before going to the respondents for interview, they were informed earlier so that they might be available at their respective residence at the scheduled time.

3.5 Variables of the Study

The researcher employed adequate care in selecting the variables of the study. Considering personal, economic, social and psychological factors of the urban community, time and resources availability to researcher, reviewing relevant literature and discussing with relevant expert, the researcher selected the variables for the study. An organized research usually contains at least two identical elements viz. independent and dependent variable. An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. A variety of factors might have influence to the empowerment. It is very difficult to deal with all the factors in a single study. Problem faced by the rooftop gardener was the main focus of this study. As the study was conducted to gardener benefit, so the characteristics of gardener in some cases were different for the selection of independent variables, the researcher went through the past studies as far as available and also discussed with teachers, experts, and supervisor. The researcher carefully considered the various characteristics of the rooftop gardener as independent variables. These were: age, education, family size, annual family annual income, income from house rent, rooftop area, use of sources of information for rooftop gardening, training on rooftop gardening, attitude towards roof top gardening and knowledge on rooftop gardening.

3.6 Measurement of Independent variables

Variables for conducting the study in accordance with the objectives it was necessary to measure the independent variables. The independent variables were: age, education, family size, annual family annual income, income from house rent, rooftop area, use of sources of information for rooftop gardening, training on rooftop gardening, attitude towards roof top gardening and knowledge on rooftop gardening. Procedures for measuring these variables are described below:

3.6.1 Age

The age of a respondent was measured by counting the period of time from his/her birth to the time of interview on the basis of response of the respondent and was expressed in terms of complete years. A score of 01 was given for one year. No fractional year was considered for the study.

3.6.2 Education

Education of a respondent was measured on the basis of her/his years of schooling. If a respondent passed class 4, his/her education score was given as 4. If a respondent did not know how to read and write his education score was given as zero (0). A score of 0.5 was given to that respondent who could sign his/her name only.

3.6.3 Family size

Family size of a respondent was determined by the total number of members in his/her family including him/her, children and other dependents. The scoring was made by the actual number of family members expressed by the respondents. For example, if a respondent had five members in his/her family, his/her score was given as 5. This variable appears in item number 3 in the interview schedule as presented in Appendix-A.

3.6.4 Annual family income

The term annual family income refers to the annual gross income of rooftop gardeners and the members of his/her family from different sources. It was expressed in taka. In measuring this variable, total earning taka of an individual rooftop gardener was converted into score. A score of one was given for every one lac taka. This variable appears in item number 4 in the interview schedule as presented in Appendix-A.

3.6.5 Annual income from house rent

The term annual income from house rent refers to the annual gross income of rooftop gardeners from house rent. It was expressed in taka. In measuring this variable, total earning taka of an individual rooftop gardener was converted into score. A score of one was given for every one lac taka. This variable appears in item number 5 in the interview schedule as presented in Appendix-A.

3.6.6 Rooftop area

The area under rooftop garden was measured as the total area on which his/her family carried out the gardening operation, the area being in terms of full benefit to the family through rooftop gardening. It was expressed in square feet. One (1) score was assigned for 100 square feet area. The variable appears in item number 6 in the interview schedule as presented in Appendix-A.

3.6.7 Use of information sources

It was defined as one's extent of exposure to different communication media related to rooftop garden. Use of information sources by a respondent was measured by computing the contact score on the basis of their nature of use of information sources. Each respondent was asked to indicate his nature of use of information sources with five alternative responses, like regularly, frequently, sometimes, rarely and not at all basis to each of the ten sources of information and score of four, three, two, one and zero were assigned for those alternative responses respectively. These five options for each medium were defined specially to each medium considering the situation, rationality and result of pre-test. Logical frequencies were assigned for each of the four-alternative nature of contact. Extension media contact of the respondents was measured by adding the scores of 13 selected source of information. Thus, sources of information score of a respondent could range from 0 to 52, where zero indicated no use of information sources and forty indicated highest level of use of information sources. This variable appears in item number 7 in the

interview schedule as presented in Appendix-A. Based on the available information cited by the respondents, they were classified into three categories (Mean \pm Standard Deviation) namely low, medium and high use of information sources.

3.6.8 Training on rooftop gardening

Training exposure of a rooftop gardener was determined by the total number of day when his/her attended in different training programs in his/her life regarding rooftop gardening. A score of one (1) was assigned for each day of training attended. This variable appears in item number eight (8) in the interview schedule as presented in Appendix-A.

3.6.9 Attitude towards rooftop gardening

Attitude towards rooftop gardening of a respondent implies to his/her beliefs, outlook, perception and action tendencies. To determine this criterion, a number of 10 statements (5 positive and 5 negative) were randomly presented before the interviewees. A five-point scale was used to measure the attitude of the respondents. This scoring was done in the following manner: For positive statements a score of 4, 3, 2, 1 and 0 was given for responses strongly agree, agree, no decision, disagree and strongly disagree respectively. For negative statement, the reverse scoring system was followed. All the scores for positive and negative statements were summed up and the final score was determined. The range of final score is Zero (0) to forty (40) where twelve (0) indicate no attitude and forty (40) indicate highest or favorable attitude of the house owners towards rooftop gardening at Dhaka city. This variable appears in item number nine (9) in the interview schedule as presented in Appendix-A.

3.6.10 Knowledge on rooftop gardening

Rooftop gardening knowledge of a respondents was measured by asking him/her 10 questions related to different components of rooftop gardening. Two score was

assigned for each question. So, the total assigned scores for all the 10 questions became twenty. The score was given according to response at the time of interview. Answering a question correctly an individual could obtain full score. While for wrong answer or no answer he obtained zero (0) score. Partial score was assigned for partially correct answer. Thus, the rooftop gardening knowledge score of a respondent could range from zero (0) to twenty (20), where zero indicates very poor knowledge and twenty indicates very high knowledge. This variable appears in item number ten (10) in the interview schedule as presented in Appendix-A

3.7 Problems in rooftop gardening

Problems in rooftop gardening was measured on the basis of extent of problems faced by the respondent on different aspects of rooftop gardening. The following scores were assigned against each of the problems:

Extent of problems	Score
Very High problem	4
High problem	3
Medium problem	2
Low problem	1
Not at all problem	0

Rooftop gardening problem of a respondent was measured by asking 10 questions related to different aspects of rooftop gardening problems. Thus, problems in rooftop gardening score of a respondent could range from 0 to 40 where 0 indicated no problem and 40 indicated very high problem faced in rooftop gardening. This variable appears in item number eleven (11) in the interview schedule as presented in Appendix-A.

3.7.1 Rank order of problem faced by rooftop gardeners

To ascertain the best problem confrontation, Problem Faced Index (PFI) was computed. There were twelve problem faced strategies for coping with 10 selected items by the house owner in rooftop gardening. The rooftop gardening respondent implement different extent of problem faced strategies against different problems. They are presented below in rank order. A Problem Faced Index (PFI) was computed for each problem item by using the following formula:

$$PFI = P_{VH} \times 4 + P_H \times 3 + P_M \times 2 + P_L \times 1 + P_{NA} \times 0$$

Where,

P_{VH} = Very High extent of Problem

P_H = High extent of Problem

P_M = Medium extent of Problem

P_L = Low extent of Problem

P_{NA} = Not at All of Problem

Problem Faced Index (PFI) for each problem could range from 0 to 344, where 0 indicating lowest extent and 344 indicating highest extent of problem faced by the rooftop gardener.

3.8 Statement of the Hypothesis

According to Kerlinger (1973), a hypothesis is a conjectural statement of the relation between two or more variables. Hypotheses are always in declarative sentence form and they relate either generally or specifically variables to sentence form and they relate either generally or specifically variables to variables. Hypothesis may be broadly divided into two categories, namely research hypothesis and null hypothesis.

3.8.1 Research hypothesis

The following research hypothesis was put forward to know the contribution of each of the ten selected characteristics of the rooftop gardener on their problem faced in rooftop gardening.

Hypothesis: “Each of the ten selected characteristics of the rooftop gardener has contribution to their problem faced in rooftop gardening.”

3.8.2 Null hypothesis

A null hypothesis states that there is no contribution of an independent variables to the dependent variable. The following null hypothesis was undertaken for the present study:

H₀: There is no contribution of the selected characteristics of rooftop gardener to their problem in rooftop gardening.

If a null hypothesis is rejected on the basis of statistical tests, it is assumed, that there is a contribution of the concerned characteristics of the rooftop gardeners to the problem faced by them in rooftop gardening.

3.9 Data Processing and Analysis

3.9.1 Compilation of data

After completion of field survey, data from all the interview schedules were coded, compiled, tabulated and analysed in accordance with the objectives of the study. In this process, all responses in the interview schedule were given numerical coded values. Local units were converted into standard units and qualitative data were converted into quantitative data by assigning suitable scores whenever necessary. The responses of the questions in the interview schedule were transferred to a MS excel sheet to facilitate tabulation.

3.9.2 Categorization of data

For describing the different characteristics of the rooftop gardener and their problem faced in rooftop gardening, the respondents were classified into several categories. These categories were developed by considering the nature of distribution of data, general understanding prevailing in the social system and possible observed scoring system. The procedure for categorization of data in respect of different variable is elaborately being discussed in the next Chapter.

3.10 Statistical Treatments

Data collected from respondents for this study were compiled, coded tabulated and analyzed in accordance with the objectives of the study. The analysis was performed by using Statistical Package for Social Sciences (SPSS v.20) computer package. Descriptive analyses such as range, number, percentage, mean, standard deviation and ranked order were used whenever necessary. To find out the contribution of identified characteristics of the respondents to their problem faced in rooftop gardening, multiple regressions was used. Throughout the study, at least five percent (0.05) level of probability was used as the basis of rejecting a null hypothesis.

CHAPTER IV

RESULTS AND DISCUSSION

The recorded observations in accordance with the objective of the study were presented and probable discussion of the findings was made with probable justifiable and relevant interpretation under this chapter. The findings of the study and their interpretation have been presented in this chapter.

4.1 Characteristics of the rooftop gardeners

Behavior of an individual is determined to a large extent by one's personal characteristics. There were various characteristics of the respondents that might have consequence to rooftop gardening. But in this study, ten characteristics of them were selected as independent variables, which included their age, education, family size, annual family income, income from house rent, rooftop area, use of sources of information for rooftop gardening, training on rooftop gardening, attitude towards roof top gardening and knowledge on rooftop gardening those might be influenced the problem of the rooftop gardening.

In this section the results, the salient features of the rooftop gardeners selected characteristics have been discussed. The salient feature of the selected characteristics has been presented in Table 4.1.

Table 4.1 Salient features of the selected characteristics of the rooftop gardener

Categories	Measuring unit	Rang		Mean	S D
		Possible	Observed		
Age	Years	-	25-70	48.67	10.10
Education	Year of schooling	-	3-18	10.47	3.61
Family Size	Person	-	3-9	4.93	1.11
Annual family annual income	('00000' Tk)	-	4-19	10.57	3.13
Income from house rent	('00000' Tk)	-	2-10	5.72	1.67
Rooftop area	('00' square feet)	-	9-34	19.74	5.41
Use of sources of information for rooftop gardening	Score	0-52	12-46	34.31	6.80
Training on rooftop gardening	No. of days	-	0-10	5.71	2.33
Attitude towards rooftop gardening	Score	0-40	14-36	24.79	5.099
Knowledge on rooftop gardening	Score	0-20	9-19	15.83	2.52

4.1.1 Age

The age of the respondents has been varied from 25 to 70 years with a mean and standard deviation of 48.67 and 10.10 respectively. Considering the recorded age, the respondents were classified into three categories namely 'young', 'middle' and 'old' aged. The distribution of the respondents in accordance of their age is presented in Table 4.2.

Table 4.2 Distribution of the rooftop gardeners according to their age

Category	Range (years)		Respondents		Mean	SD
	Year	Observed	Number	Percent		
Young aged	≤ 35	25-70	14	16.28	48.67	10.10
Middle aged	36-50		34	39.53		
Old aged	> 50		38	44.19		
Total			86	100.0		

From Table 4.2 it was revealed that the old-aged respondents comprised the highest proportion (44.19 percent) followed by middle aged category 39.53 percent) and 16.28 percent of the respondents were in the young aged category. Data indicates that middle and old aged respondents were more involved in rooftop gardening than the young aged respondents. The old aged respondents mostly found in leisure time to do rooftop gardening at the study area for their recreational activity. Rahman (2014) also found the similar findings in his studies related to rooftop gardening in Dhaka city.

4.1.2 Level of education

The level of educational scores of the respondents ranged from 3 to 18 with a mean and standard deviation of 10.47 and 3.61 respectively. Based on the educational scores, the respondents were classified into five categories. The distributions of respondents according to their level of education are presented in Table 4.3.

Table 4.3 Distribution of the rooftop gardeners according to their level of education

Category	Range (years)		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Can't read and sign	0	3-18	0	0	10.47	3.61
Can sign only	0.5		0	0		
Primary education	1-5		9	10.46		
Secondary education	6-10		37	43.02		
Above secondary	>10		39	45.35		
Total			86	100.0		

Table 4.3 shows that respondents under above secondary education category constitute the highest proportion (45.35 percent) followed by secondary education (43.02 percent) category. On the other hand, the lowest 10.46 percent in primary education category. Education broadens the horizon of outlook of respondents and expands their capability to analyze any situation related to adopt the rooftop gardening. To adjust with same, they would be progressive minded involve with modern cultural, processing of rooftop gardening. The majority of respondents (45.35 percent) had higher education because most of them live in Dhaka city, comparatively rich and they get more opportunity to receive education facilities. Rahman (2014) also found the similar findings in their studies related to rooftop gardening in Dhaka city.

4.1.3 Family size

Family size of the respondents ranged from 3 to 9 with the mean and standard deviation of 4.93 and 1.11 respectively. According to family size the respondents were classified into three categories (Mean \pm Standard Deviation) namely ‘small’, ‘medium’ and ‘large’ family. The distribution of the respondents according to their family size is presented in Table 4.4.

Table 4.4 Distribution of the rooftop gardeners according to their family size

Category	Range (Number)		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Small family	Up to 3	3-9	5	5.81	4.93	1.11
Medium family	4-5		61	70.93		
Large family	> 5		20	23.26		
Total			86	100.0		

Data in Table 4.4 indicate that the medium size family constitute the highest proportion (70.93 percent) followed by the small size family (5.81 percent) and

23.26 percent respondents had large family size. Such finding is quite normal as per the situation of Bangladesh. The findings from Table 4.3 indicated that average family size of the study area was smaller than the national average which is 4.85 (BBS, 2014). The trend of nuclear family has been rising in the study area and subsequently the family member becoming smaller than the extended family. Besides, the respondents were house owner, aged person and most of their children lived foreign country. Rahman (2014) also found the similar findings in their studies related to rooftop gardening.

4.1.4 Annual family income

The score of annual income of the rooftop gardeners ranged from 4 to 19 lac (BDT) with a mean and standard deviation of 10.57 and 3.13 respectively. On the basis of annual income, the rooftop gardeners were classified into three categories (Mean \pm Standard Deviation) namely ‘low’, ‘medium’ and ‘high’ annual family income. The distribution of the rooftop gardeners according to their annual family income is presented in Table 4.5.

Table 4.5 Distribution of the rooftop gardeners according to their annual family income

Category	Range (‘lac’ BDT)		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Low income	≤ 7	4-19	11	12.79	10.57	3.13
Medium income	8-13		60	69.77		
High income	> 13		15	17.44		
Total			86	100.0		

Data reveals that the rooftop gardeners had medium annual family income constitute the highest proportion (69.77 percent), while the lowest proportion in low family

income (12.79 percent). The high family income category constituted with 17.44 percent respondents. Overwhelming majority (87.21 percent) rooftop gardeners have medium to high level annual family income. Most of the respondents had large business farm along with the house rent constituted the above scenario which reflected the handsome annual family income. Rahman (2014) also found the similar findings in their studies related to rooftop gardening in Dhaka city.

4.1.5 Annual income from house rent

Annual income from house rent of the respondents ranged from 2 to 8 lac (BDT) with a mean and standard deviation of 5.72 and 1.67 respectively. On the basis of annual income from house rent, the respondents were classified into three categories (Mean \pm Standard Deviation) viz. low, medium and high annual income from house rent. The distribution of the respondents according to their annual income from house rent is presented in Table 4.6.

Table 4.6 Distribution of the rooftop gardeners according to annual income from house rent

Category	Range ('lac' BDT)		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Low income	≤ 4	2-10	23	26.74	5.72	1.67
Medium income	5-6		33	38.37		
High income	> 6		30	34.89		
Total			86	100.0		

Data reveals that rooftop gardeners having medium annual family income from house rent constitute the highest proportion (38.37 percent), while the lowest proportion had low annual family income from house rent (26.74 percent) The high annual family income from house rent category constituted with 34.88 percent respondents. Overwhelming majority (73.26 percent) respondents have medium to

high annual income from house rent. These results expressed due the higher house rent than other cities in Bangladesh.

4.1.6 Rooftop area

Rooftop area score of the respondents ranged from 9 hundred to 34 hundred square feet. The average and standard deviation were 19.74 and 5.41 respectively. Bases on rooftop area, the respondents were categorized into three classes' namely low, medium and high rooftop area. Distribution of respondents according to their rooftop area is presented in Table 4.7.

Table 4.7 Distribution of the rooftop gardeners according to their rooftop area

Category	Range ('00' sq. ft.)		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Low area	≤ 14	9-34	13	15.12	19.74	5.41
Medium area	15-24		61	70.93		
High area	> 24		12	13.95		
Total			86	100.0		

The observed data shows that most of the respondents (70.93 percent) had medium rooftop area while 15.12 and 13.95 percent of them had low and high rooftop area respectively (Table-4.7). Overwhelming majority (84.88 percent) respondents have medium to high rooftop area for gardening.

4.1.7 Use of information sources

The observed score of use of information sources by the respondents ranged from 12 to 46 against a possible range of 0 to 52. The average score of the respondents was 34.31 with a standard deviation 6.80. The respondents were classified into three categories on the basis of use of information sources scores and distribution of the three categories (Mean ± Standard Deviation) namely 'low', 'medium' and 'high' use of information sources by the respondents.

Table 4.8 Distribution of the rooftop gardeners according to their use of information sources

Category	Range		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Low use	≤28	12-46	21	24.42	34.31	6.80
Medium use	29-40		45	52.32		
High use	>40		20	23.26		
Total			86	100.0		

Data showed that the highest proportion (52.32 percent) of the respondents had medium use of information sources as compared to 24.42 percent of them having low use of information sources and 23.26 percent fell in high use of information sources (Table 4.8). From above table, it might be said that majority of the respondents had medium use of information sources. Above most of the respondents had medium use of information sources because accessed of use of information sources about roof top gardening was more available through internet.

4.1.8 Training on rooftop gardening

Training exposure score of the rooftop gardeners ranged from 0 to 10 with a mean and standard deviation of 5.71 and 2.33 respectively. Based on the training exposure score, the rooftop gardeners were classified into three categories namely ‘no training’, ‘low’, ‘medium’ and ‘high’ training exposure. The distribution of the rooftop gardeners according to their training exposure is presented in Table 4.9.

Table 4.9 Distribution of the rooftop gardeners according to their training

Category	Range (score)		Respondents		Mean	SD
	Score	Observed	Number	Percent		
No training	0	0-10	7	8.14	5.71	2.33
Low training	1-3		4	4.65		
Medium training	4-6		43	50.00		
High training	> 6		32	37.21		
Total			86	100.0		

Table 4.9 indicates that the highest proportion (50 percent) of the rooftop gardeners had medium training exposure compared to 4.65 percent in low training exposure and 8.14 percent in no training exposure category, respectively and 37.21 percent of the respondents had high training exposure category. Training makes the rooftop gardeners skilled and helped them to acquire deep knowledge about the respected aspects. Trained rooftop gardeners could face any kind of challenges about the adverse situation in their cultivation. Above scenario reflected due to the lack of proper coordination with rooftop gardeners.

4.1.9 Attitude towards rooftop gardening

The score of attitudes towards rooftop gardening of the respondents ranged from 14 to 36 against the possible range of 0-40. The average and standard deviation were 24.79 and 5.09 respectively. On the basis of attitude towards rooftop gardening, the respondents were categorized into three classes' namely unfavourable attitude, neutral attitude and favourable attitude.

Table 4.10 Distribution of the rooftop gardeners according to their attitude towards rooftop gardening

Category	Range (score)		Respondents'		Mean	SD
	Score	Observed	Number	Percent		
Unfavorable attitude	≤ 19	14-36	13	15.12	24.79	5.09
Neutral attitude	20-29		56	65.11		
Favorable attitude	> 29		17	19.77		
Total			86	100.0		

The observed data (Table 4.10) showed that most of the respondent (65.11 percent) had neutral attitude towards rooftop gardening while 15.12 and 19.77 percent of them had unfavourable and favourable attitude respectively. The attitude of the respondents expressed their perception about rooftop gardening. It helped the researcher to judge or measure the acceptance/rejection of rooftop gardening in the area. From the Table-4.10, overwhelming (84.88 percent) of the respondents had neutral to favourable attitude towards roof top gardening because roof top gardening concept was comparatively new and incommodious task to them.

4.1.10 Knowledge on rooftop gardening

Rooftop gardening knowledge scores of the respondents ranged from 9 to 19 against possible score of 0 to 20. The average score and standard deviation were 15.83 and 2.52 respectively. Based on the rooftop gardening knowledge scores, the respondents were classified into three categories (Mean ± Standard Deviation) namely Poor knowledge, Moderate knowledge and Sound knowledge on rooftop gardening (Table 4.11).

Table 4.11 Distribution of the rooftop gardeners according to their knowledge on rooftop gardening

Category	Range		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Low knowledge	≤ 13	9-19	17	19.77	15.83	2.52
Medium knowledge	14-17		42	48.84		
High knowledge	> 17		27	31.39		
Total			86	100.0		

Data presented in the Table 4.11 reveals that 48.84 percent of the respondents had medium rooftop gardening knowledge, 19.77 percent had low knowledge and 31.39 percent had high knowledge on rooftop gardening. Thus, an overwhelming majority (79.23 percent) of the respondents had medium to high knowledge on gardening. This led to understanding that rooftop gardening knowledge would reflect more by the medium knowledge on respondents in the present study. Knowledge on rooftop gardening of the respondents are definitely affected by the education of the respondents because education helps to enhance the eagerness to be acquainted with new variety or technology.

4.2 Problem faced by the respondents in rooftop gardening

Problem faced by rooftop gardener in rooftop gardening scores ranged from 18 to 38 against possible score of 0 to 40. The average score and standard deviation were 22.28 and 4.87, respectively. Based on the problems of rooftop gardening scores, the respondents were classified into three categories (Mean ± Standard Deviation) namely low, medium and high problems of rooftop gardening (Table 4.12).

Table 4.12 Distribution of the rooftop gardeners according to their problems of rooftop gardening

Category	Range		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Low problem	≤ 18	18-38	18	20.93	22.28	4.87
Medium problem	19-26		55	63.95		
High problem	≥ 26		13	15.12		
Total			86	100.0		

Table 4.12 reveals that 63.95 percent of the rooftop gardeners had medium problems of rooftop gardening, 20.93 percent had low problems of rooftop gardening and 15.12 percent had high problems of rooftop gardening. Thus, an overwhelming majority (79.07 percent) of the rooftop gardeners had medium to high problems of rooftop gardening.

4.3 Contribution of the selected characteristics of the rooftop gardeners to their problems faced in rooftop gardening

In order to estimate the influential factors on problem of rooftop gardening from the independent variables, multiple regression analysis was used which is shown in the Table 4.13.

Table 4.13 shows that there is a significant contribution of respondent's level of education, training on rooftop gardening, attitude towards rooftop gardening and knowledge on rooftop gardening to their problems faced in rooftop gardening. Of these, training on rooftop gardening and knowledge on rooftop gardening were the most important contributing factors (significant at the 1 percent level of significance). Level of education and attitude towards rooftop gardening on their problem of rooftop gardening were significant at the 5 percent level of significance.

Other selected variables don't have any significant contribution on problem faced the rooftop gardeners in rooftop gardening.

Table 4.13 Multiple regression coefficients of contributing factors related to the rooftop gardener's problem of rooftop gardening

Dependent variable	Independent variables	B	<i>p</i>	R ²	Adj. R ²	F	<i>p</i>
Problem of rooftop gardening	Age	.030	0.524	0.519	0.454	8.078	0.000**
	Level of education	-.260	0.033*				
	Family size	0.254	0.560				
	Annual family income	0.195	0.149				
	Income from house rent	0.006	0.981				
	Rooftop area	0.049	0.555				
	Use of information sources	-0.068	0.296				
	Training On rooftop gardening	-0.719	0.001**				
	Attitude towards rooftop gardening	-0.178	0.029*				
	Knowledge on rooftop gardening	-0.677	0.000**				

** Significant at $p < 0.01$; * Significant at $p < 0.05$;

The value of R² is a measure of how of the variability in the dependent variable is accounted by the independent variables. So, the value of R² = 0.519 means that independent variables account for 51% of the variation with their problems faced by the rooftop gardeners in rooftop gardening. The F ratio is 8.078 which is highly significant ($p < 0$).

However, each predictor may explain some of the variance in problems faced by rooftop gardeners in rooftop gardening simply by chance. The adjusted R^2 value penalizes the addition of extraneous predictors in the model, but value 0.454 still shows that variance in problems faced by the rooftop gardeners in rooftop gardening can be attributed to the predictor variables rather than by chance (Table 4.13). In summary, the models suggest that the respective authority should consider the rooftop gardeners' level of education, training on rooftop gardening, attitude towards rooftop gardening and knowledge on rooftop gardening to reduce problems of rooftop gardening and in this connection some predictive importance have been discussed below:

4.3.1 Contribution of gardeners' knowledge on rooftop gardening to their problems in rooftop gardening

From the multiple regression, it was concluded that the contribution of knowledge on rooftop gardening on their problems in rooftop gardening was measured by the testing the following null hypothesis;

“There is no contribution of knowledge on rooftop gardening to their problems in rooftop gardening”.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. The contribution of the knowledge was significant at 1% level (.000)
- b. So, the null hypothesis could be rejected.
- c. The direction between knowledge and problem was negative.

The b-value of knowledge was (-0.677). So, it can be stated that as knowledge increased by one unit, respondents' problem decreased by 0.677 units.

Based on the above finding, it can be said that respondents having more knowledge on rooftop gardening could decreased their problem in rooftop gardening.

4.3.2 Significant contribution of training on rooftop gardening to their problems in rooftop gardening

From the multiple regression, it was concluded that the contribution of training on rooftop gardening to their problems in rooftop gardening was measured by the testing the following null hypothesis;

“There is no contribution of training on rooftop gardening to their problems in rooftop gardening”.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. The contribution of the training was significant at 5% level (0.001)
- b. So, the null hypothesis could be rejected.
- c. The direction between training and problem was negatives.

The b-value of training was (-0.719). So, it can be stated that as training increased by one unit, respondents’ problems decreased by 0.719 units.

Based on the above finding, it can be said that respondents having more training decreased the problems faced by them in rooftop gardening. Training helps respondents to gather more knowledge on rooftop gardening which ultimately helps to reduce their problems in rooftop gardening.

4.3.3 Significant contribution of attitude towards rooftop gardening to their problems in rooftop gardening

From the multiple regression, it was concluded that the contribution of attitude towards rooftop gardening to their problems in rooftop gardening was measured by

the testing the following null hypothesis;

“There is no contribution of attitude towards rooftop gardening to their problems in rooftop gardening”.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. The contribution of the attitude towards rooftop gardening was significant at 5% level (.029)
- b. So, the null hypothesis could be rejected.
- c. The direction between attitude and problems was negative.

The b-value of attitude was (-0.178). So, it can be stated that as attitude increased by one unit, their problems in rooftop gardening decreased by 0.178 units.

Based on the above finding, it can be said that respondents having higher attitude could decreased their problems in rooftop gardening.

4.3.4 Significant contribution of education to their problems in rooftop gardening

The contribution of education to their problems in rooftop gardening was measured by the testing the following null hypothesis;

“There is no contribution of education to their problems in rooftop gardening”.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. The contribution of the education was at 5% significance level (.033)
- b. So, the null hypothesis could be rejected.
- c. The direction between education and problems was negatives.

The b-value of level education was (-0.260). So, it can be stated that as education increased by one unit, their problems faced in rooftop gardening could decreased by 0.260 units.

Based on the above finding, it can be said that respondents' education decreased their problems in rooftop gardening. Education plays an important role to reduce problems in rooftop gardening in many cases. Education enhances knowledge on many aspects such as training, attitude, extension contact and so on.

4.4 Rank order of problem faced by rooftop gardeners

Rank order of the ten problems faced by the rooftop gardeners is presented in Table 4.14. As per Problem Faced Index (PFI), lack of technological information and advice positioned the 1st and lack of enough time for taking care of garden in last position.

The problems faced by rooftop gardeners s in rooftop gardening according to descending order of PFI were lack of technological information and advice, scarcity of source of water, lack of quality seed, seedlings, saplings, input, roof leakage, lack of proper water drainage system on the roof, lack of skilled labor, lack of training, lack of motivational work, insect infestation and advice and lack of enough time for taking care of garden.

Table 4.14 Rank order of the Problem faced by the rooftop gardeners in rooftop gardening

Sl. No.	Nature of problems	PFI score	Rank
1.	Lack of technological information and advice	241	1 st
2.	Scarcity of Source of water	235	2 nd
3.	Lack of quality seed, seedlings, saplings, Input.	218	3 rd
4.	Roof leakage	211	4 th
5.	Lack of proper water drainage system on the roof	201	5 th
6.	Lack of skilled labor	192	6 th
7.	Lack of training	178	7 th
8.	Lack of motivational work	171	8 th
9.	Insect Infestation	145	9 th
10.	Lack of enough time for taking care of garden	124	10 th

The results showed that the highest problem faced by respondents in rooftop gardening was lack of technological information and advice. This was caused because the respondents were more involved in non-agricultural activity found in the study area. The lowest problems in rooftop gardening at the study area was lack of enough time for taking care of garden. This happened because the respondents usually in city manpower are busy with his/her one's duty so they did not manage their time properly for rooftop gardening in the study area.

CHAPTER V
SUMMARY OF FINDINGS, CONCLUSIONS AND
RECOMMENDATIONS

5.1 Major Findings

5.1.1 Selected characteristics of the rooftop gardener

Age

The age of the respondents has been varied from 25 to 70 years with a mean and standard deviation of 48.67 and 10.10 respectively. The old-aged respondents comprised the highest proportion (44.19 percent) followed by middle aged category (39.53 percent) and 16.28 percent of the respondents were in the young aged category.

Level of education

The level of educational scores of the respondents ranged from 3 to 18 with a mean and standard deviation of 10.47 and 3.61 respectively. Respondents under above secondary education category constitute the highest proportion (45.35 percent) followed by secondary education (43.02 percent) category. On the other hand, the lowest 10.46 percent in primary education category.

Family size

The medium size family constitute the highest proportion (70.93 percent) followed by the small size family (5.81 percent) and 23.26 percent respondents had large family size.

Annual family income

The rooftop gardeners having medium annual family income constitute the highest proportion (69.77 percent), while the lowest proportion in low family income (12.79

percent). The high family income category constituted with 17.44 percent respondents.

Annual income from house rent

Rooftop gardeners having medium annual family income from house rent constitute the highest proportion (38.37 percent), while the lowest proportion in low annual family income from house rent (26.74 percent) The high annual family income from house rent category constituted with 34.88 percent respondents.

Rooftop area

Most of the respondents (70.93 percent) had medium rooftop area while 15.12 and 13.95 percent of them had low and high rooftop area respectively.

Use of information sources

The highest proportion (52.32 percent) of the respondents had medium use of information sources as compared to 24.42 percent of them having low use of information sources and 23.26 percent fell in high use of information sources.

Training on rooftop gardening

The highest proportion (50 percent) of the rooftop gardeners had medium training exposure compared to 4.65 percent in low training exposure and 8.14 percent in no training exposure category, respectively and 32.21 percent of the respondents had high training exposure category.

Attitude towards rooftop gardening

Most of the respondent (65.11 percent) had neutral attitude towards rooftop gardening while 15.12 and 19.77 percent of them had unfavorable and favorable attitude respectively. The attitude of the respondents expressed their perception about rooftop gardening.

Knowledge on rooftop gardening

The majority 48.84 percent of the respondents had medium rooftop gardening knowledge, 19.77 percent had low knowledge and 31.39 percent had high knowledge on rooftop gardening.

5.1.2 Problem faced by the rooftop gardeners in rooftop gardening

Problem faced by rooftop gardeners in rooftop gardening scores ranged from 18 to 38 against possible score of 0 to 40. The average score and standard deviation were 22.28 and 4.87, respectively. The most 63.95 percent of the rooftop gardeners had medium problems in rooftop gardening, 20.93 percent had low problems in rooftop gardening and 15.12 percent had high problems in rooftop gardening. Thus, an overwhelming majority (78.07 percent) of the rooftop gardeners had medium problems in rooftop gardening.

5.1.3 Contribution of the selected characteristics of the rooftop gardeners and their problems faced in rooftop gardening

Among 10 selected characteristics of the rooftop gardeners 4 characteristics namely level of education, training on rooftop gardening, attitude towards rooftop gardening and knowledge on rooftop gardening on their problem of rooftop gardening had significant negative contribution to their problems faced in rooftop gardening and the rest 6 characteristics namely, age, family size, annual family income, income from house rent, rooftop area and Use of information sources had no significant contribution to their problems faced in rooftop gardening.

5.1.4 Comparative severity among the problems faced by the rooftop gardeners in rooftop gardening

The observed Problem Faced Index of the respondents ranged from 124 to 241 against the possible range of 0-344. As per Problem Faced Index (PFI), lack of technological information and advice positioned the 1st followed by scarcity of

source of water, lack of quality seed, seedlings, saplings, input, roof leakage, lack of proper water drainage system on the roof, lack of skilled labor, lack of training, lack of motivational work, insect infestation and advice and lack of enough time for taking care of garden in last position.

5.2 Conclusions

Following conclusions were drawn on the basis of findings, logical interpretation and other relevant facts of the study:

1. About (10.46 percent) of the respondents had primary level of education. There existed a negative significant contribution of the education of the gardener to their problems faced. Therefore, it may be concluded that an appreciable proportion of the respondents could their problems in rooftop gardening, if they had higher level of education.
2. Almost 82.21 % of the respondents had medium to high training. Findings expressed that training of the respondents had significant negative contribution to their problems faced in rooftop gardening. So, it may be concluded that the respondents having lower training exposure faced more problems in case of rooftop gardening and vice-versa.
3. On the basis of PFI, the respondents faced serious problems in lack of technological information and advice, scarcity of Source of water, lack of quality seed, seedlings, saplings, input and insect and lack of enough time for taking care of garden. Therefore, it may be concluded that necessary steps should be taken by the concerned authorities to minimize these problems with priority.
4. The findings revealed that maximum (65.11 %) of the rooftop gardeners had medium attitude towards rooftop gardening. It may be concluded that the composite attitude towards rooftop gardening needs to enhance.
5. Maximum (80.23 %) rooftop gardeners had medium to high knowledge on rooftop gardening and regression analysis revealed that knowledge on

rooftop gardening was a contributing factor on problem of rooftop gardening. Therefore, it may be concluded that knowledge on rooftop gardening decreases their problem of rooftop gardening.

5.3 Recommendations

Recommendations based on the findings and conclusions of the study have been presented below:

5.3.1 Recommendation for policy implication

1. The findings indicated that an overwhelming majority (79.07%) of the respondents faced medium to high problem. So, it may be recommended that necessary steps should be taken by concerned authority to remove these problems as priority basis so that they could make their rooftop gardening more attractive by increasing yield with less production cost.
2. Education had significant negative contribution to their problems faced by the rooftop gardener in rooftop gardening. Therefore, it may be recommended that the concerned authorities should take the special mass education program for lower educated rooftop gardeners for solving their problems.
3. Rooftop gardening knowledge of the had a significant contribution to problem of rooftop gardening. Through rooftop gardening knowledge an individual respondent became aware of the information on the various aspect of selected rooftop gardening practices. The above facts lead to the recommendation that necessary arrangements should be made to increase the rooftop gardening knowledge of rooftop gardener which would ultimately decrease their problem of rooftop gardening.
4. Training exposure had a significant negative contribution with the problems faced by the rooftop gardeners in rooftop gardening. So, it may be recommended that the concerned authority should increase training facilities to develop skills of the rooftop gardeners technologically so that they could minimize their problems.

5. Attitude had negative significant contribution to the problems faced by the rooftop gardeners in rooftop gardening. Therefore, it may be recommended that the extension provider of concerned authority should select those rooftop gardeners with priority that has more attraction, eagerness and attention toward new technologies of more yield and income so that they could overcome their problems in rooftop gardening.

5.3.1 Recommendations for further study

1. The study was conducted on the respondents of only one selected area of Mirpur Thana under Dhaka district. Finding of the study need verification by similar research in other areas of the country including areas where rooftop gardening is yet to get popularity.
2. Contributions of 10 characteristics of respondents with their problems of rooftop gardening have been investigated in this study. Further research should be conducted to find out contribution of the other personal characteristics of the respondents with their others problems.
3. In addition to problems in rooftop gardening, the respondents also faced other problems such as social, economic, housing, sanitation, nutrition and domestic etc. Therefore, it may be recommended that research should be conducted relation to other problems of the farmer.
4. The research was conducted to find out the problems of rooftop gardening of the farmer. Further research should be taken related to other issues like inter cropping, another crop marketing etc.

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Appendix A
 Department of Agricultural Extension & information System
 Sher-e-Bangla Agricultural University Dhaka-1207

An interview schedule on
“PROBLEMS OF ROOF TOP GARDENING IN DHAKA CITY”

Serial No

Name.....

Village Union

Upazila..... District.....

Please answer the following questions (Proper secrecy will be maintained)

1. Age

How old are you? ----- (years)

2. Education

What is your educational qualification?

- a) Don't know reading and writing -----
- b) Don't know reading and writing but can sign only
- c) Passed..... class
- d) Adult education.....class

3. Family Size

Please mention the number of your family members including yourself

- a) Male members
- b) Female ----- members
- c) Total -----members

4. Annual family income

Would you please inform us about your family annual Income?

SI. No.	Source of income	Monthly income	Amount of annual income (TK.)
1.	Amount of annual income (TK.)		
2.	Business		
3.	Agriculture		
4.	Others		
Total			

5. Income from house rent

How much money do you get from house rent? Tk.

6. Rooftop area

What is the area of your rooftop? sq. ft.

7. Use of sources of information for rooftop gardening

Please indicated the extent of your visits to the following places

SI No.	Place of visit	Extent of visit				
		Regularly (4)	Frequently (3)	Occasionally (2)	Rarely (1)	Not at all (0)
1.	Facebook	15 times or more/month	10-15 times/month	9-5 times/month	1-5 times/month	0 times/Month
2.	Internet	4 times or more/month	2-3 times/month	1 time/month	1 time/month	0 times/Month
3.	Agricultural Magazine	6 times or more/month	3-5 times/year	1-2 times/year	1-2 times/year	0 times/Month
4.	Friends/Relatives	5 times or more/month	3-4 times/month	1-2 times/month	1-2 times/month	0 times/Month
5.	Neighbors	5 times or more/year	3-4 times/year	1-2 times/year	1-2 times/year	0 times/Month
6.	Local Govt. Nursery	6 times or more/year	4 times or more/year	3 times or more/year	1-2 times or more/year	0 times/year
7	Television	10 or more/Month	6-7 times/month	4-5 times/month	1-2 times/month	0 times/Month
8	Radio	10 or more/Month	5-6 times/month	3-4 times/month	1-2 times/month	0 times/Month
9	Newspaper	10 or more/Year	5-6 or more/Year	3-4 or more/Year	1-2 or more/Year	0 times/Year
10	Private Nursery	9 or more/Year	5-6 or more/Year	3-4 or more/Year	1-2 or more/Year	0 times/Year
11	Hand Books	10 or more/Year	5-6 or more/Year	3-4 or more/Year	1-2 or more/Year	0 times/Year
12	Tree fair	10 or more/Year	5-6 or more/Year	3-4 or more/Year	1-2 or more/Year	0 times/Year
13	Agri Fair	10 or more/Year	5-6 or more/Year	3-4 or more/Year	1-2 or more/Year	0 times/Year

8. Training on rooftop gardening

Do you participate in any Have you participated in training programs of RTG yet? If yes, furnish the following information:

Sl. no.	Name of the training course	Organization	Days
1.			
9. Attitude towards roof top gardening			
3.			
4.			

SL. No.	Statements	Extent of agreement				
		Strongly agree (4)	Agree (3)	No decision (2)	Disagree (1)	Strongly disagree (0)
1. +	Roof gardens keep flat roofs cool in Summer - and also help insulate in winter. So, I am Interested to build roof garden.					
2. -	Water Stagnant may cause moist & dampness of the roof					
3. +	Roof gardens have improved the environment. So, I am Interested to build a roof garden					
4. -	Roof top gardening needs close observation & good nursing. So, its practice is troublesome.					
5. +	Roof top gardening is a source of beautification of the residence. So, I am Interested to build roof garden.					
6. -	Roof top gardening plant require watering almost every day. It is difficult to manage time.					
7. -	Roofs regularly may affect with - strong winds which may lose significant numbers of plant and seedlings.					
8. +	RTG not only give the pleasure but also is a source of fresh vegetables, fruits and flowers. So, I am Interested to build roof garden.					
9. +	The plants on green roofs can absorb air borne pollutants and atmospheric deposition. So, I am Interested to build roof garden.					
10. -	Roof gardens require intricate - and costly drainage systems to ensure no water seeps into the building.					

10. Knowledge on rooftop gardening

Please answer the following questions:

Sl.	Questions	Full marks	Marks
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No.		(2)	obtained
1	What type of vegetables are suitable for roof top gardening? Why?		
2	What are the principles of Roof top gardening?		
3	How could one make soil for roof top garden?		
4	What type of vegetables are suitable for roof top gardening? Why?		
5	Do you think roof top gardening could be an earning source? How?		
6	How many times do anyone apply fertilizer in a year?		
7	Name two diseases of roof top practice		
8	When de-potting is necessary?		
9	Name two major Insects of roof top practice		
10	How could one maintain plant nutrition in RTG?		

11. Mention the problem faced by the roof top gardener

SL. No.	Problems	Extent of problems				
		Very high (4)	High (3)	Medium (2)	Low (1)	Not at all (0)
1.	Roof leakage					
2.	Scarcity of Source of water					
3.	Lack of quality seed, seedlings, saplings, Input.					
4.	Insect Infestation					
5.	Lack of proper water drainage system on the roof					
6.	Lack of technological information and advice					
7.	Lack of enough time for taking care of garden					
8.	Lack of skilled labor					
9.	Lack of motivational work					
10.	Lack of training					

Thank you for your kind co-operation.

.....
Signature of the interviewer

Dated: