ATTITUDE OF THE HOUSE OWNERS TOWARDS ROOFTOP GARDENING AT DHAKA CITY

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ATTITUDE OF THE HOUSE OWNERS TOWARDS ROOFTOP GARDENING AT DHAKA CITY

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CERTIFICATE

This is to certify that the thesis entitled, **"Attitude of the House Owners towards Rooftop Gardening at Dhaka City"** submitted to the faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **Master of Science (MS) in Agricultural Extension,** embodies the result of a piece of bona fide research work carried out by **Md Mohiuddin Mithon**, Registration No. 10-04076, under my supervision and guidance. No part of this thesis has been submitted for any other degree or diploma.

I further certify that any help or sources of information, as has been availed of during the course of investigation have been duly acknowledged.

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DEDICATION

DEDICATED TO MY BELOVED MOTHER AND RESPECTED TEACHERS OF SHER-E-BANGLA AGRICULTURAL UNIVERSITY

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LIST OF ABBREVIATIONS AND GLOSSARY

Abbreviation	Full word
Ag. Ext. Ed.	Agricultural Extension Education
Ag. Ext. and Info. Sys.	Agricultural Extension and Information System
B	Multiple regression
DNCC	Dhaka North City Corporation
et. al.	All Others
PFI	Problem Faced Index
MoYS	Ministry of Youth and Sports
RTG	Rooftop Gardening
URGS	Urban Roof Gardeners Society

ATTITUDE OF THE HOUSE OWNER TOWARDS ROOFTOP GARDENING AT DHAKA CITY

Md Mohiuddin Mithon

ABSTRACT

The study analyzes the attitude of the house owner towards rooftop gardening at Dhaka city and to explore the contribution of the selected characteristics of the respondents on their attitude towards rooftop gardening. The study has been conducted based on data collection in Mirpur-1 (word-3) of Dhaka North City Corporation (DNCC). Data were collected from 82 house owners in a time period of 07 January, 2017 to 06 February, 2017. Descriptive statistics, multiple regression were used for analysis. Most of respondents (62.1 percent) had a moderately favorable attitude towards rooftop gardening while 22.0 and 15.9 percent of them had poorly and highly favorable attitude respectively. Among the influential variables, level of education, use of information sources, training exposure and knowledge on rooftop gardening were significant contributor and all of them provided 51 percent contribution on attitude towards rooftop gardening. It was also found that lack of skilled manpower positioned the 1st and scarcity of source of water in last position as per Problem Faced Index (PCI). It is recommended that the DAE should take necessary steps considering the above mentioned significant factors to make more favorable attitude of the house owners towards rooftop gardening.

Key words: Attitude, Rooftop Gardening, Mirpur-1, Dhaka city;

CHAPTER I

INTRODUCTION

1.1 General Background

Urban Rooftop Gardening (URG) is the development of gardening activities on the top of buildings by taking advantage of the available spaces in roofs or terraces. URG can be developed through open-air and protected technologies and used for multiple purposes. Just over half the world's population now lives in urban as opposed to rural environments. As the rate of urbanization increases over time, food production sites should be increasingly located near main consumption centers. Consequently, urban agriculture is gaining relevance all over the world (Orsini *et al.*, 2013) and it is necessary to devise new strategies to ensure the food supply and food security of those who live in urban environments (Tixier and de Bon, 2006).

The concept of ecological citizenship (Wackernagel and Rees, 1996) uses the metaphor of 'ecological footprint' in which each of us is responsible for taking up a certain amount of ecological 'space' (both for resource use and capacity burden), expressed as a personal footprint left on the Earth. Although it is assumed that an equal allocation of the available space on Earth would result in 1.8 available global hectares per person, the footprint of the average European citizen is actually 4.9 ha, and in the USA up to 9.2 ha (Seyfang, 2006; Global footprint network, 2005). Many of the citizens are already trying to take back some unused and abandoned areas and convert them into green spaces (Saldivar-Tanaka and Krasny, 2004). Their functions include a range of ecosystem services beneficial to people, including food supply (Braat and De Groot, 2012; La Greca *et al.*, 2011; Jim 2004). Throughout the city area, urban green spaces can be linked to one another, forming a network of rooftop gardening in Bangladesh as well as the Dhaka city through Urban Roof Gardeners Society (URGS).

To make the capital a greener city, Dhaka City Corporation (both Dhaka North City Corporation- DNCC and Dhaka South City Corporation- DSCC) has recently taken a number of environment-friendly initiatives. Of the many projects regarding massive plantation, one of the lucrative projects for its citizens is encouraging more people into rooftop gardening. The person, who will make a garden in his /her roof, will get a 10 percent holding tax rebate (DSCC, 2016).The rate at which our temperature is rising day by day, a garden on the roof of every house can help cool the air, by absorbing excessive carbon dioxide. Not just that, of birds and the rarest species of insects rooftop gardens create biodiversity in nature, through the presence of different kinds. Besides the environmental advantages, a rooftop garden can help a family to a great extent by creating a number of opportunities. If we plant several types of vegetables and fruits, it can significantly reduce our daily food costs. Furthermore, a planned and properly maintained garden on the roof can easily be a great source of earning and employment opportunities. If a person grows only vegetables in a 600-700 square feet roof, it is enough to meet the yearly demand of a family having 6-7 members. Urban Roof Gardeners Society (URGS)give the consultation or sometimes direct help to make a rooftop garden in Bangladesh about how we can make gardens on our roofs like getting the soil, planting trees, or sometimes, suggesting the best varieties of vegetables or fruits. This way, people who have no prior knowledge about rooftop gardening are getting involved with this and being the beneficiaries of the project, Urban Roof Gardeners Society (URGS) are encouraging people around them as well.

The vegetables and fruits we grow in our garden are totally fresh and of highest nutritional value. In big cities like Dhaka, opportunities for doing manual labor out of our routine work are very less. But if anyone works in the garden, like-weeding the garden, watering the plants, taking care of the fruits, collecting them etc, it can help him/her live healthy and free from all kinds of stress. Many of us have a common misconception that gardening on the rooftop may

damage the roof by reducing the stability. But it is proved by many experienced rooftop gardeners that a proper and planned garden can protect the roof from all sorts of harms like direct solar heat in summer, heat loss in winter, direct storm water and many more. If we keep your garden clean on a regular basis, and use a thick layer to keep the tubs or drums, it will no longer do any harm to the roof. A research published by the National Research Council of Canada shows that an extensive green roof reduces the daily energy demand for air conditioning in the summer by over 75 percent (Liu and Baskaran, 2003).

A rooftop garden can be the primary way of our urban agriculture to keep the environment calm and cool. It can be a great source of our local food system, employment, and daily engagement with nature. Even with a small space, one can start the garden of his/her dreams (Jahan, 2016). A range of studies have addressed the role played by urban rooftop gardens in improving human well-being through the provision of both ecosystem services and food supply to the city dwellers (Orsini *et al.* 2013). So, it is quite pertinent and necessary to know the extent of attitude of the house owners towards rooftop gardening at Dhaka city. But a very limited research work has been done on this aspect. Therefore, the researcher felt necessity to conduct a research entitled 'Attitude of the house owners towards rooftop gardening at Dhaka city'.

1.2 Statement of the Problem

At the city scale, the increase of population implies an expansion of the urbanized area, causing two main issues: the destruction of farmland and the disconnection of consumption and production areas (Seto *et. Al,.* 2011; Paül and McKenzie 2013). The urban sprawl not only occupies and displaces farmland area but also increases the land value, leading to an abandonment of some farming activities as land speculation becomes more profitable (Robinson, 2004). Consequently, the importance of farmland and its potential food supply of peri urban areas are notably reduced (Allen, 2003; Zeng *et al.*, 2005; Thapa and Murayama, 2008; Zasada, 2011; Paül and McKenzie, 2013).

However, an increased population demands a larger amount of food and, thus, the rift between production and consumption areas is enlarged, enlarging the food miles of products which needs to be imported to meet the urban food demand. So, the attitude towards rooftop gardening is an important aspect. In order to formulate suitable strategic measures for the improvement of the study, the researcher focuses on socio-economic characteristics of respondents and their existing situation towards attitude towards rooftop gardening. This was finished by looking for answers to the accompanying queries:

- What is the extent of house owners attitude?
- What are the characteristics of the respondents?
- Is there any contribution of selected characteristics of the respondent on their attitude towards rooftop gardening?

For getting a view of above questions, the researcher undertook a study entitled 'Attitude of the House Owners towards Rooftop Gardening at Dhaka City'.

1.3 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 determine the attitude of the house owners towards rooftop gardening
ii. To describe the following selected characteristics of the respondents:
    - Age
    - Level of education
    - Family size
    - Annual family income
    - Income from house rent
    - Effective rooftop area
    - Use of information sources
    - Training exposure

- Knowledge on rooftop gardening

iii. To explore the contribution of the respondents' selected characteristics on their attitude towards rooftop gardening

iv. To analyze the problems faced by the respondents in rooftop gardening

1.4 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.

ii. The findings of the study may also be subsidiary to the field worker of extension service to enhance their action strategies on rooftop gardening.

iii. 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.

iv. 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.

1.5 Justification of the study

Making use of unused spaces such as rooftops, which are abundant in cities, for urban food production is one such creative solution that can contribute to resident's food security and employment. The term 'urban agriculture' is often thought of as a contradictory term.

Few would imagine that food could be grown in cities, the centers of development and abundant pavement. But cities are actually ideal locations for growing food. Doing so shortens distances food travels from field to table and helps people become more connected to their food sources, enabling them to take food security into their own hands. Rooftop greening can also help solve some environmental problems unique to cities. The pavement and buildings in urban areas have been built upon the soil. This characteristic reduces the surface area for rain to fulfill the water cycle by returning to the earth. Black tar and concrete also cause the temperature in cities to be much higher than surrounding rural lands. It is our collective responsibility to recognize humankind's contribution to these environmental problems, and seek ways to resolve them. Covering rooftops with vegetation is one such way to reduce the negative consequences of the current state of our development. So, it is logical to investigate about attitude towards rooftop gardening. The finding of the study will be especially applicable to the Dhaka city. The findings will also have implications and applicability for other areas of the country, having similarities in physical, socio-economic and socio-cultural conditions with the study area. Thus, the findings are expected to be useful to extension workers and planners for their preparation of extension programmers for rooftop gardening. The findings of the study are also therefore, expected to be conducive to the researchers, academicians and policy makers who are concerned with rooftop gardening. Keeping the above facts in view, a study has undertaken which is entitled 'Attitude of the house owners towards rooftop gardening at Dhaka city.

1.6 Assumptions of the study

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

i. The respondents were capable of furnishing proper answers to the questions contained in the interview schedule.

ii. The data collected by the researcher were free from any bias and they were normally distributed.

iii. The responses answered by respondents were valid, acceptable and reliable.

iv. Information sought by the researcher elicited the real situation was the representative of the whole population of the study area to gratify the objectives of the study.

v. The researcher was well adjusted to himself with the social contiguous of the study area. Hence, the collected data from the respondents were free from favoritism.

vi. The selected characteristics and the attitude towards rooftop gardening of the study were normally and independently allotted with respective means and standard deviation.

1.7 Limitations of the study

Considering the time, respondents, communication facilities and other necessary resources available to the researcher and to make the study manageable and meaningful, it became necessary to impose certain limitations as mentioned below-

i. The study was confined to only Mirpur-1 at Dhaka North City Corporation (DNCC) which may fail to represent the actual scenario of the whole situation as people develop their strategies according to the concrete situation they face.

ii. It is difficult to get exact information on attitude of the house owners towards rooftop gardening indicator from the respondents as many of them are elite society member.

iii. Characteristics of the respondents were many and varied, but only ten characteristics were selected for the research study.

iv. There were embarrassing situations at the time of data collection. So, the researcher had to manage proper rapport with the respondents to collect maximum proper information.

v. Several methods, scales and statistical tests have been utilized in this study over a relatively short period of time.

1.8 Definition of important terms

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.

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.

Variable: The variable is a characteristic, which can assume varying, or different values in successive individual cases.

Independent variable: An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon.

Dependent variable: A dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variable.

Age: Age refers to the actual years from their birth to the time of the interview, which was found on the basis of the verbal response of the respondents.

Education: Education was measured by assigning score against each successful years of schooling.

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 exposure: Training exposure refers to the total number of days when she/he attended in different training programs in his life.

Hypothesis: A supposition or proposed explanation made on the basis of limited evidence as a starting point for further investigation.

Population: Population is the entire pool from which a statistical sample is drawn. The information obtained from the sample allows statisticians to develop hypotheses about the larger population. Researchers gather information from a sample because of the difficulty of studying the entire population.

Sampling: Sampling is a statistical procedure that is concerned with the selection of the individual observation; it helps us to make statistical inferences about the population.

Data: Facts and statistics collected together for reference or analysis.

Variance: In probability theory and statistics, variance is the expectation of the squared deviation of a random variable from its mean, and it informally measures how far a set of (random) numbers are spread out from their mean.

Analysis: Detailed examination of the elements or structure of something, typically as a basis for discussion or interpretation.

Regression analysis: In statistical modeling, regression analysis is a statistical process for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables (or 'predictors').

Findings: The principal outcomes of a research project; what the project suggested, revealed or indicated. This usually refers to the totality of outcomes, rather than the conclusions or recommendations drawn from them.

Discussion: The purpose of the discussion is to interpret and describe the significance of your findings in light of what was already known about the research problem being investigated, and to explain any new understanding or insights about the problem after you've taken the findings into consideration.

Research methods: Research methods are a structured set of guidelines or activities to generate valid and reliable research results.

Value of R^2: The value of R^2 is a measure of how of the variability in the dependent variable is accounted for by the independent variables.

Adjusted R^2: The adjusted R^2 indicates the loss of predictive power or shrinkage. Therefore, the adjusted value tells us how much variance in Y (dependent variable) would be accounted if the model has been deprived from the populations from which the sample was taken.

F-ratio: The F ratio indicates that the regression model significantly improved the ability to predict the outcome variable.

CHAPTER II

REVIEW OF LITERTURE

Review of literature gives the clear and concise direction to the researcher for conducting the experiment. In this chapter, review of literatures relevant to the objectives of this study was presented. This was mainly concerned with 'attitude towards rooftop gardening'. There was serious dearth of literature with respect to research studies on this aspect. So, the directly related literatures were not readily available for this study. Some researchers addressed various aspects of the adoption of technology and its effect on client group and suggesting strategies for their emancipation from socio-economic deprivations. A few of these studies relevant to this research are briefly discussed in this chapter under the following five sections:

Section 1: Concept of Attitude and Past Related Research

Section 2: Review of the Previous Research Findings on Rooftop Gardening

Section 3: Attitude Towards use of Various Technologies

Section 4: Research Gap of the Study

Section 5: Conceptual Framework of the Study

2.1 Concept of Attitude and Past Related Research

2.1.1 Concept of 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' according to (Bhuiyan, 2012). Different persons have defined attitude in different ways. Some of these are mentioned below:

Attitude as the effect for or against a psychological object (Thurstone, 1928). According to Morgan *et al.* (1929) Attitude means one's feeling towards persons, ideas, institution, practices of facts. Attitude as a specific mental disposition towards an incoming or arising experience, whereby that experience is modified, or in other words, it is a condition of readiness for a certain type activity (Warren, 1934). Goode (1945) in his Dictionary of education defined the term attitude as a state of mental and emotional readiness to react to situations, person or things, in harmony with a habitual emotional readiness to react to situations, person or things, in harmony with a habitual pattern of response previously conditioned to or associated with these stimuli. Green (1954) distinguished three kinds of attitude universe to represent three different classes of individual responses to sets of social objects. These are: i) verbal attitudes, given in response to question, ii) spontaneous verbal attitude, usually expressed in normal conversation and iii) action attitudes which include both verbal and non-verbal behavior directed towards object in referent class.

Sherif and Sherif (1956) defined the term attitude as a relatively stable tendency to respond with a positive or negative effect to a specific referent. McGrawth (1966) defined attitude as the learned orientations towards objects, or predisposition to behave in certain ways towards a given objects or a class of objects. An attitude has always in object, person, thing or concept and it may be general or specific. Drever (1968) defined an attitude as more or low a stable set or disposition of opinion, interest or purpose, involving expectancy of certain kind of experience and readiness with appropriate kind of response. Doob (1948) stated that attitude affects behavior since an implicit, drive producing response considered socially significant in the individual society. If this definition is broken down typographically into phases and clauses, an attitude implies the following.

i) It is an implicit response.
ii) It is both (a) anticipatory and (b) mediating reference to covert responses.

iii) It is evoked by (a) a variety of stimulus patterns (b) as a result of previous learning, or of gradients of generalization and discrimination.

iv) It is itself a cue and drive producing.

v) It is considered socially significant in the individual's society.

Allport (1935) who devoted the major part of her life to research on attitude, defined the term in the following manner. An attitude is a mental and neural state of readiness, organized through experience, exerting experience or dynamic influence upon the individual, response to all objects and situation with which it is related.

2.1.2 Components of attitude

Krech (1962) explained attitude as a system of three interrelated components and the authors express as; "In defining attitude as systems, we are emphasizing the interrelatedness of the three attitude components become mutually interdependent about an object are influenced by their feelings and action tendencies toward that object will tend to produce changes in her feelings and action tendencies toward it". Another definition of attitude made by Triandis (1971), "an attitude is an idea changed with emotion which predisposes a class or actions to a particular class or social situations. "This definition suggests that attitude has three components. These components are cognition, affective and behavioral.

a) The cognitive component of an attitude consists of the belief of the individual about the object. This may also be said as understanding, knowledge and conception.

b) The feeling or affective component with the object. The object in felt to be pleasing or displeasing it is liked or it is disliked.

c) The action or behavioral component of an attitude includes all the behavioral readiness associated with the attitude. Attitude as a system bearing these three components is expected to be consistent but there may have some degree of inconsistency.

2.1.3 Formation of attitude

The term ‘attitude formation’ is important within the individual in order to ensure more accurate prediction about their behavior and to have greater control over action. Rosenberg (1956) studied on goals and attitude and found that the individuals coping with various problems try to satisfy his wants and to develop attitudes. He develops favorable attitude towards objects that satisfy his wants, final goal object will be favorably evaluated and develops unfavorable attitude towards objects that block the achievement of his goal.

Krech (1962) from the results of different experiments and observations enlisted individual’s wants, information, group affiliations and personality as factors for attitudes while coping with various problems in trying to satisfy his wants. He develops favorable attitudes towards objects and people that satisfy his wants and unfavorable attitude towards objects and persons that block the achievement of his goal.

2.1.4 Review related to measurement of attitude

Getting information from data of social science is not so easy. There is no standard measurable unit to convey the meaning of the behavior of respondents to the people. But, scientific survey measurement is a key tool. For this reason, many scientists had developed techniques for measuring attitude like any other psychological concept. Many opined that attitude may be measured from respondent’s behavior and opinion. But these are not correct enough to assess one’s attitude. Because, people are often unwilling to express opinions and may simply answer that they are undecided or do not know or are uncared of their attitudes towards a given psychological object. On the other hand, in many situations behavior is designed to conceal feeling or behavior observed may be determined by factors data quantitatively. For statistical analysis and scientific interpretation there must be quantitative data. In this regard, Thurstone (1928) made a good contribution by evolving a scale named as Thurstone scale for measuring attitudes. In 1928, he first adopted the methods of psychological

scaling originated by year to the scaling of judgments of favorableness and unfavorable toward various objects.

i) **The method of equal appearing intervals**

This method was developed by Thurstone (1928). This technique is the approximation of interval scale. An interval scale is one on which the distances between the points on the measuring instrument are known and on which equal numerical distances represent equal distance along the continuum being measured (Selltiz *et. al.,* 1959). The first step to construct this scale is to collect a large number of statements usually ranging from 100-200 related to attitude being investigated. A large number of judges usually from 50 to 300, working independently are to classify this statement into eleven groups or piles. In the first pile, the judge places the statement he considered most unfavorable to the object, in the second, then he considered the next most unfavorable and in the eleventh piles, the statements he considers most favorable. The sixth or the neutral positions defined as the point at which there is neither favorableness nor unfavorableness. The judges are not asked to give their own opinions, but merely to estimate the degree of favorableness or unfavorableness expressed by each statement. The scale value of a statement is computed as the medium position to which it is assigned by the judges. Statements that have too broad a scatter are discarded as ambiguous or irrelevant. The formal selections made, taking those statements about twenty, which scale values relatively, equally spaced along the continuum. The form of statements with which they agreed, the score for each respondent is the mean scale values or items with which he showed agreement.

ii) Method of summated ratings

This method was developed by Likert (1932) and was used more or low similar to the other Thurston scale. The difference is that this method does not require panel of judge ratings. It is low cumbersome and takes low time to construct. This scale is more reliable than Thurstone (Selltiz *et al.*, 1959). The procedure

for constructing this type of scale starts with the selection of a large number of statements which are considered, relevant to the attitude being investigated. Statements failing to meet the prescribed standards are eliminated from the scale. The selected statements should be the expression or desired behavior as far as possible and not statements of facts. The favorable and unfavorable statements are distributed randomly throughout the scale. The ambiguous statements are avoided and only clear, concise and straightforward ones are retained. The half of the statements are so worded that the response of agreement indicates a favorable response to the rest a response of agreement indicates an unfavorable reaction. The favorable and unfavorable statements are distributed randomly throughout the scale. The respondents are asked to check whether they strongly agree, agree, undecided, disagree, and strongly disagree with each statement. These four alternative responses are assigned scores of 4, 3, 2, 1 or 1, 2, 3, 4 in proper order, the direction of scoring determined by the favorableness or unfavorableness or each statement. Sometimes scores of 3, 2, 1, 0 and 0, 1, 2, 3 are preferred for weighting the statements. Each individual's total score is computed by adding his item score.

2.2 Review of the previous research findings on rooftop gardening

2.2.1 Problem faced in rooftop gardening

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 are passing leisure time (100%), creating aesthetic values (100%), contributing in environmental melioration (45%) and financial gain being a very minor concern (4% only).

2.2.2 Adoption of rooftop gardening

Nira (2006) found that majority (62%) of the respondents possessed no adoption compared to 15% and 23% had low and medium adoption of roof gardening respectively. The main problem was found the lack of time for roof gardening. Most of the respondents were interested to flower plant for their roof garden.

2.3 Attitude towards use of various technologies

The title of the current study was attitude of the house owners towards rooftop gardening at Dhaka city as no study found on this issue, there are several studies focused on attitude towards various technologies. Some of those findings which are related to this attitude are given below:

Tarannum (2013) conducted a study on farmers' attitude towards improved agricultural implements in Jamalpur district. She revealed that (50.08%) respondents had favorable attitude while 41.7% had neutral attitude and only 7.5% had unfavorable attitude.

Noor (2010) revealed that almost half (48.57%) of the respondents had moderately favorable attitude while 43.81% had highly favorable attitude and only 7.62% had low favorable attitude towards 'one house bone farm' program.

Zahan (2008) revealed that 38.1% of the women had more positive attitude while 36.2% had most positive attitude and 25.7% had positive attitude towards livestock rearing.

Bhuiyan (2008a) revealed that above half (64%) of the respondents had moderate level attitude while 20% had lowest level attitude and 16% had highest level attitude towards farmers' information need assessment.

Bhuiyan (2008b) revealed that above half (62%) of the respondents had slightly favorable attitude while 23% had slightly unfavorable attitude and only15% had moderately favorable attitude towards organic cultivation of rice.

Islam (2007) revealed that 39% of the respondents had highly favorable attitude while 37% had favorable attitude and 24% had less favorable attitude towards modern jute cultivation.

Shehrawat *et. al.* (2002) conducted a study in Haryana state (India) to ascertain the attitude of farmers for diversification in farming system. The study revealed that the cropping pattern was cereal based dominated by rice and wheat crops and less than half of the farmers had favorable attitude towards diversification in farming system.

Sadat (2002) in a study revealed that majority (72%) of the Proshika beneficiaries‟ possessed highly favorable attitude towards Proshika while 20 percent possessed moderately favorable attitude and only a few possessed unfavorable attitude towards Proshika. For non-beneficiaries, majority of the respondents (32 percent) possessed a moderately favorable attitude while 21.33 percent highly favorable, 6.67 percent possessed neutral, 26.67 percent possessed moderately favorable and 13.33 percent were found having extremely unfavorable attitude towards Proshika.

Sarker (2002) found that greater majority (62 percent) of the rice growers had moderately unfavorable attitude and 27 percent had favorable attitude toward the use of DAP in rice field. Only 11 percent of them possessed highly favorable attitude towards the use of DAP in rice field.

Ahmed (2002) revealed that majority (74 percent) of the farmers had slightly favorable attitude towards BRRI dhan 29 while only 10 percent respondents had favorable and 16 percent had highly favorable attitude towards the variety.

Mannan (2001) conducted a study on attitude of Proshika farmers towards the ecological agricultural programme (EAP) and found that majority of the Proshika farmers (57.3 percent) had moderately favorable attitude towards the EAP while 12.7 percent and 30 percent had slightly and highly favorable attitude towards EAP respectively.

2.4 Research gap of the study

There are available lab researches on roof top gardening but lack in social science aspect. Under the social science aspects, some researches had done in problem faced by the house owners and adoption of rooftop gardening but current study solely focus on to assess the attitude of the house owners towards rooftop gardening.

The study conducted on problem faced and adoption of rooftop gardening were held in Mohammadpur and Mirpur-10 whereas the present study conducted in Mirpur-1, Dhaka.

The present study has done on the basis of regression analysis whereas the past study on problem faced and adoption of rooftop gardening were analyzed through correlation analysis.

2.5 Conceptual framework of the study

In scientific research, selection and measurement of variables constitute an important task. Studies on individual, group and society revealed that acceptance of modem technologies is conditional upon many factors. Some of these are social, personal, economical and situational factors and the behavior of respondents are influenced by these characteristics. The hypothesis of a research while constructed properly consist at least two important elements i.e.: a dependent variable and an independent variable. Variables together are the causes and the phenomenon is effect and thus, there is cause effect relationship everywhere in the universe for a specific events or issues.

This study is concerned with the ‘attitude of the house owners towards rooftop gardening’. Thus, attitude of the house owners towards rooftop gardening were the dependent variable and 9 selected characteristics of the rooftop gardeners were considered as the independent variables under the study. Attitude of the house owners towards rooftop gardening may be affected through interacting forces of many independent variables.

It is not possible to deal with all of the independent variables in a single study. It was therefore, necessary to limit the independent variables, which were age, level of education, family size, annual family income, income from house rent, effective rooftop area, use of information sources, training exposure and knowledge on rooftop gardening for this study. 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.

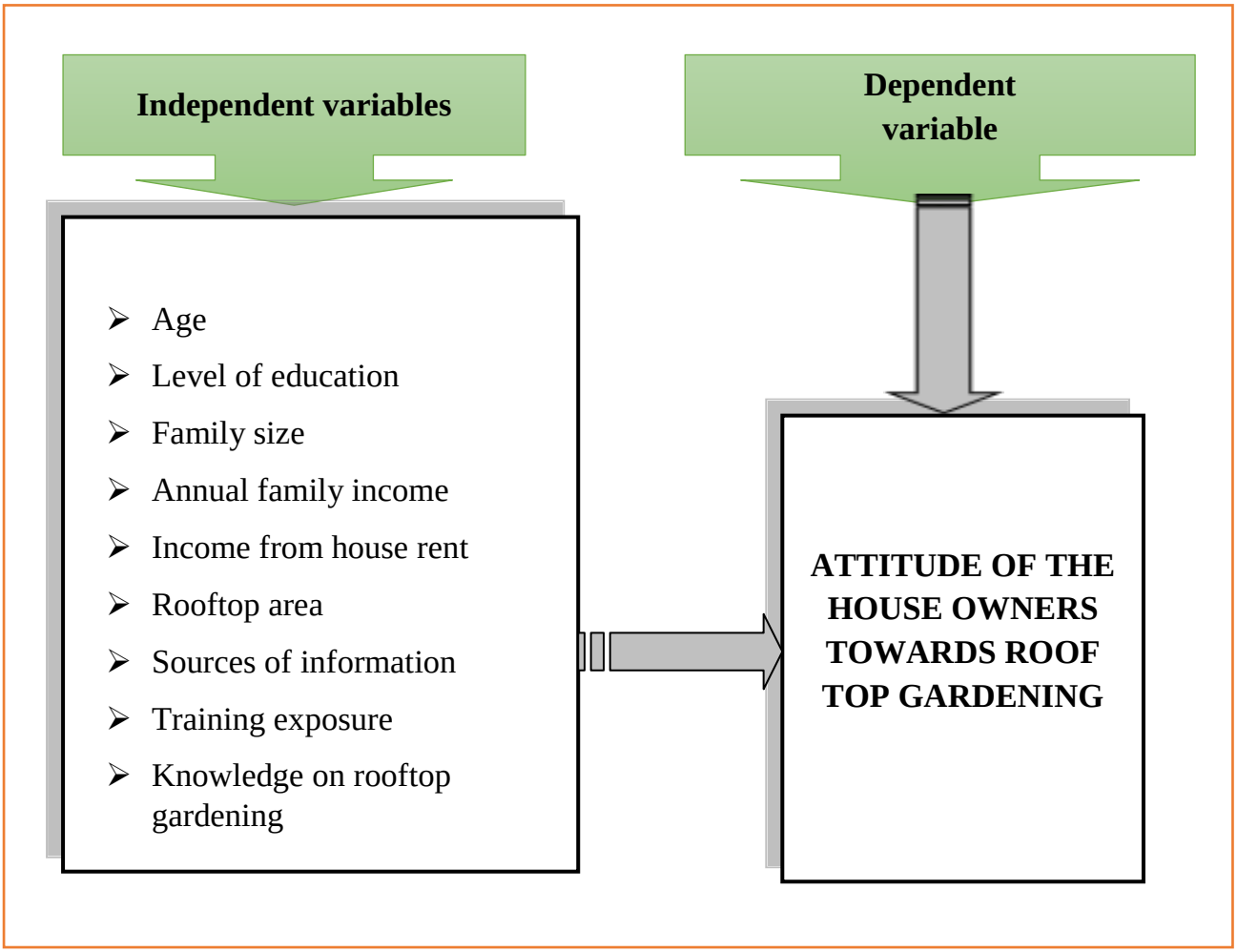

Figure 2.1 The conceptual framework of the study

CHAPTER III

MATERIALS AND METHODS

Methods play an important role in a scientific research. To fulfill the objectives of the study, a researcher should be very careful while formulating methods and procedures in conducting the research. According to Mingers (2001), research method is a structured set of guidelines or activities to generate valid and reliable research results. This chapter of the thesis illustrates the research methods and procedures used to collect and analyze the data for answering the research questions and attaining the purposes. The methods and operational procedures followed in conducting the study are selection of study area, sampling procedures, instrumentation, categorization of variables, collection of data, measurement of the variables and statistical measurements. A chronological description of the methodology followed in conducting this research work has been presented in this chapter.

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-3) 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 are 560.

The map of the Dhaka city has been presented in Figure 3.1and the specific study location namely Mirpur area have also been shown in Figure 3.2.

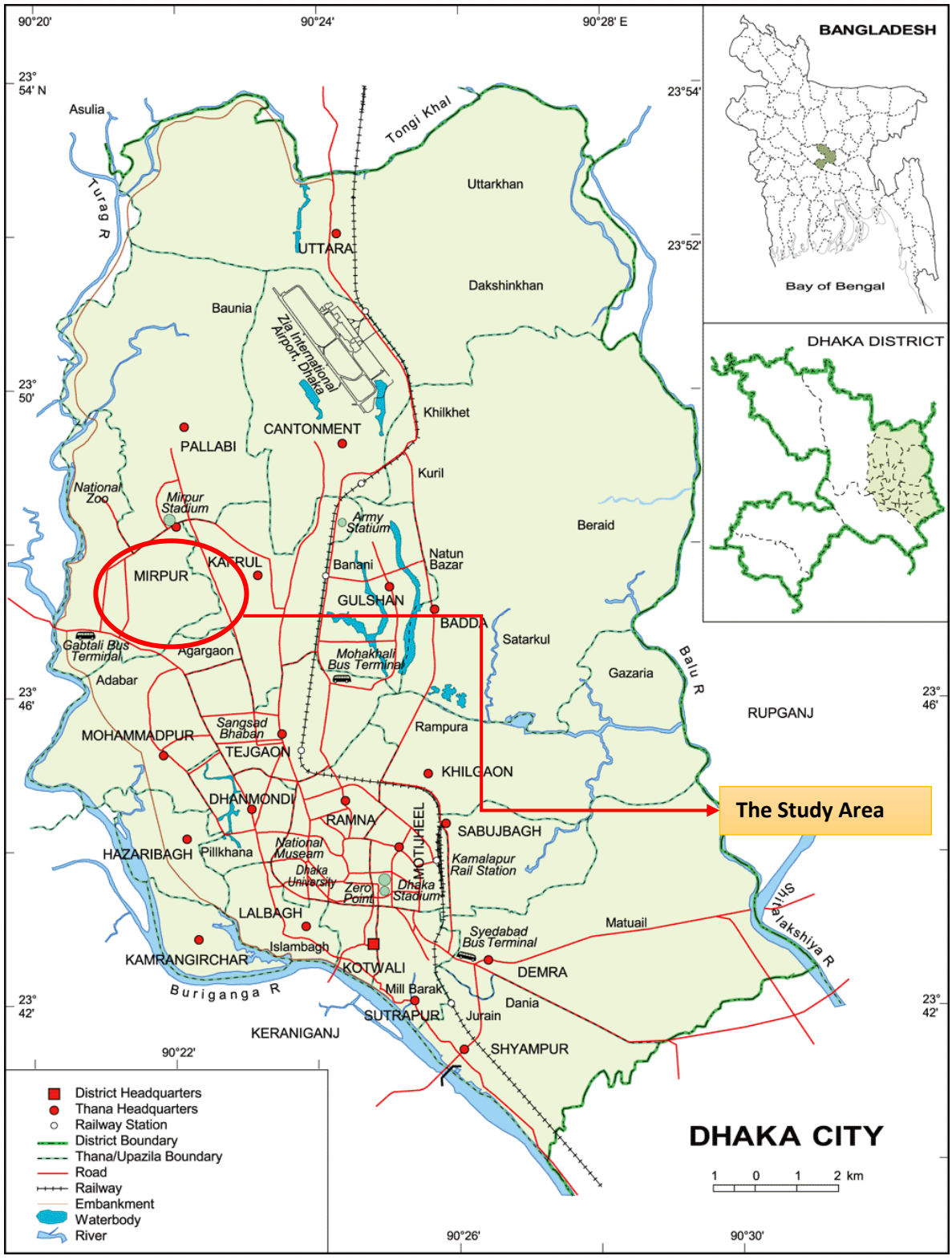

Figure 3.1 Map of Dhaka city showing the study area -Mirpur

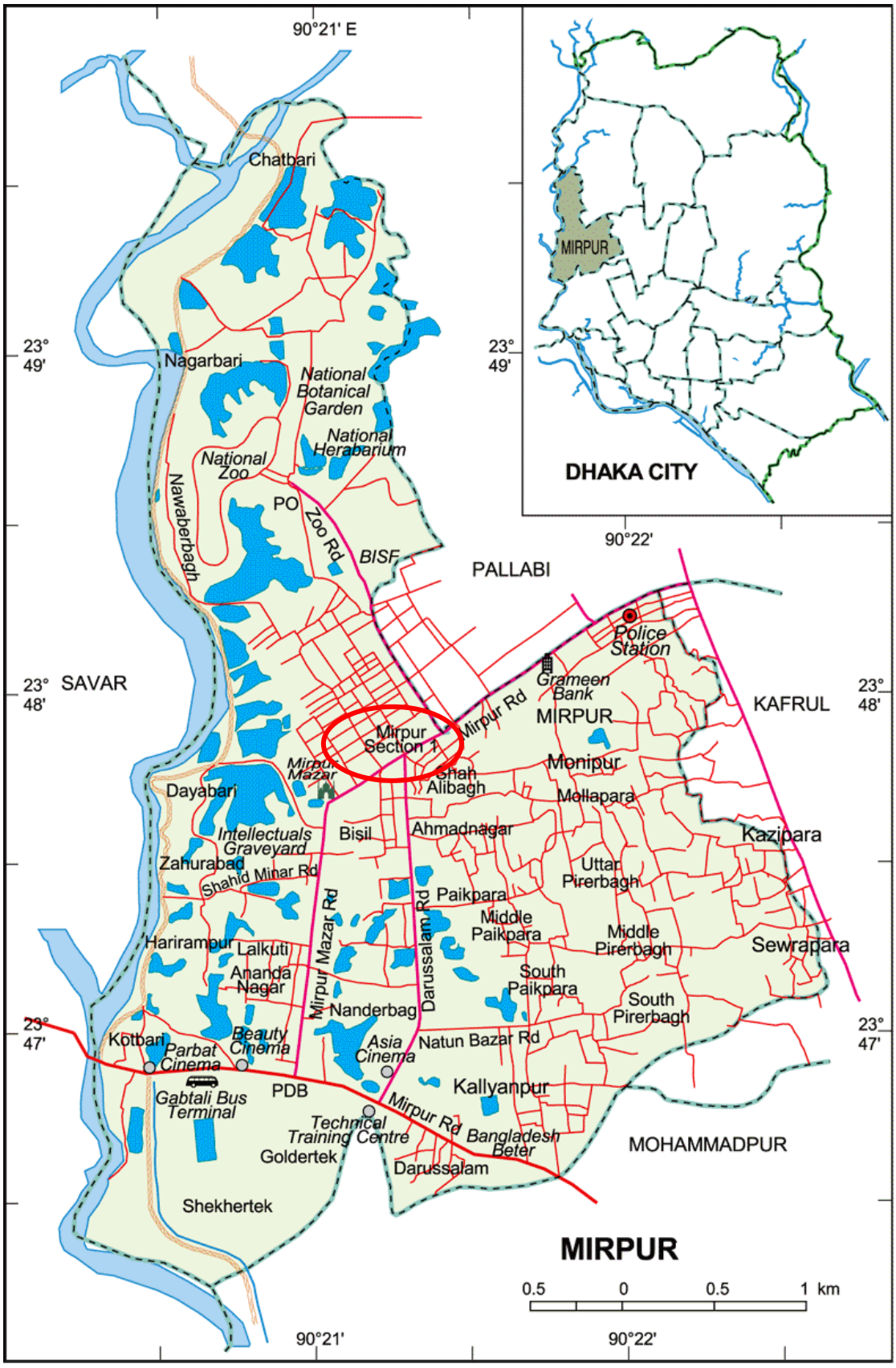

Figure 3.2 Map of Mirpur of Dhaka city showing the study area- Mirpur-1

3.2 Population and sample of the study

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 560; Thus, 560 rooftop gardeners constituted the population of the study which is shown in the following table 3.1.

3.2.1 Determination of sample size

There are several methods for determining the sample size; here, the researcher used Yamane's (1967) formula for study group:

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

Where,

n = Sample size;

N, Population size = 560;

e, The level of precision = 9%;

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%;

The sample size (n) is = 82.

3.2.2 Distribution of the population, sample size and reserve list

According to Yamane's formula, the respondents comprised of 82 rooftop gardeners. A reserve list of 8 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 gardener s 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 (82) 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)	560	82	8

3.3 Data collection methods and tools

3.3.1 Data collection methods

The survey method was used to collect quantitative and qualitative data that allow to answer the research questions framed and to gain an understanding of the determinants of respondents' attitude towards rooftop gardening. Individual interviews were used in the survey and were conducted in a face-to-face (Bryman, 2001) situation by the researcher. This method is useful to get unanticipated answers and to allow respondents to describe the world as they really see it rather than as the researcher does (Bryman, 2001).

3.3.2 Data collection tools

Structured and different semi-structured interview schedules were prepared to reach the objectives of the study. A structured interview schedule was prepared containing open and closed from questions. The open questions allowed for the respondents to give answers using their own language and categories (Casley and Kumar, 1998). The questions in this schedule were formulated in a simple and unambiguous way and arranged in a logical order to make it more attractive and comprehensive.

The instruments were first developed in English and then translated into Bengali. The survey tools were initially constructed based on an extensive literature reviews and pre-tested. The schedule was pre-tested with 7 randomly selected respondents in the study area. The pre-test was helpful in identifying faulty questions and statements in the draft schedule. Thus, necessary additions, deletions, modifications and adjustments were made in the schedule on the basis of experiences gained from pre-test. The questionnaires were also checked for validity by supervisor and educational experts at Sher-e-Bangla Agricultural University (SAU). Finally, based on background information, an expert appraisal and the pre-test, the interview schedule was finalized. Data was gathered by the researcher personally. During data collection, necessary cooperation was obtained from word commissioner office (word no.3) of DNCC and Urban Roof Gardeners Society (URGS) of Dhaka city. The primary data were collected from 30 December, 2016 to 05 January, 2017. Books, journals, reports and internet documents were used as secondary sources of data supporting or supplementing the empirical findings of the study. The final data were collected from 07 January, 2017 and completed at 06 February, 2017.

3.4 Variables and their measurement techniques

The variable is a characteristic, which can assume varying, or different values in successive individual cases. A research work usually contains at least two important variables viz. independent and dependent variables. An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. In the scientific research, the selection and measurement of variable constitute a significant task. Following this conception, the researcher reviewed literature to widen this understanding about the natures and scopes of the variables relevant to this research. At last 9 independent variables which include The independent variables were: age, level of education, family size, annual family income, annual income from house rent, effective rooftop area,

use of information sources, training exposure and knowledge on rooftop gardening. The dependent variable of this study was the 'attitude of the house owners towards rooftop gardening'.

The methods and procedures in measuring the variables of this study are presented below:

3.4.1 Measurement of independent variables

The 9 characteristics of the respondents mentioned above constitute the independent variables of this study. The following procedures were followed for measuring the independent variables.

3.4.1.1 Age

Age of the respondents was measured in terms of actual years from their birth to the time of the interview, which was found on the basis of the verbal response of the people (Rashid, 2014). A score of one (1) was assigned for each year of one's age. This variable appears in item number 1 in the interview schedule as presented in Appendix-I.

3.4.1.2 Level of Education

Education was measured by assigning score against each successful year of schooling by a respondent. One score was given for passing each level in an educational institution (Rashid, 2014).

For example, if a respondent passed the final examination of class five or equivalent examination, his/her education score has given five (5). Each respondent of can't read & write has given a score of zero (0). A person not knowing reading or writing but being able to sign only has given a score of 0.5. If a respondent did not go to school but took non-formal education, his educational status was determined as the equivalent to a formal school student. This variable appears in item number 2 in the interview schedule as presented in Appendix-I.

3.4.1.3 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-I.

3.4.1.4 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-I.

3.4.1.5 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-I.

3.4.1.6 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 squire feet variable appears in item number 6 in the interview schedule as presented in Appendix-I.

3.4.1.7 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 ten selected source of information. Thus, sources of information score of a respondent could range from 0 to 40, 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-I. Based on the available information cited by the respondents, they were classified into three categories (Mean ± Standard Deviation) namely 'low', 'medium' and 'high' use of information sources.

3.4.1.8 Training exposure

Training exposure of a rooftop gardener was determined by the total number of day when he attended in different training programs in his 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-I.

3.4.1.9 Knowledge on rooftop gardening

Rooftop gardening knowledge of a respondents was measured by asking him/her 12 questions related to different components of rooftop gardening e.g. how could one make soil for rooftop garden? how could one maintain plant

nutrition in RTG? When de-potting is necessary? What type of fertilizers do anyone can use and at what rate etc. It was measured assigning weightage two (2) for each question. So, the total assigned scores for all the questions became twenty-four. 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-four (24), where zero indicates very poor knowledge and twenty-four indicates highest knowledge. This variable appears in item number ten (10) in the interview schedule as presented in Appendix-I. Based on the information cited by respondents, they were classified into three categories (Mean ± Standard Deviation) namely 'low', 'medium', 'high' knowledge on rooftop gardening.

3.4.2 Measurement of dependent variable

Attitude towards rooftop gardening of a respondent implies to his/her beliefs, outlook, perception and action tendencies. To determine this criterion, a number of 12 statements (6 positive and 6 negative) were randomly presented before the interviewees. A five-point scale was used to measure the attitude of the beneficiaries. This scoring was done in the following manner: For positive statements a score of 5, 4, 3, 2 and 1 was given for responses strongly agree, agree, neutral, 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 twelve (12) to sixty (60) where twelve (12) indicate poor attitude and sixty (60) indicate highest or favorable attitude of the house owners towards rooftop gardening at Dhaka city. This variable appears in item number ten (10) in the interview schedule as presented in Appendix-I.

3.5 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
Moderate problem	2
Little problem	1
No problem	0

Rooftop gardening problem of a respondent was measured by asking her 10 questions related to different components of rooftop gardening problems. Thus, problems in rooftop gardening score of a respondent could range from 0 to 48 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-I.

3.5.1 Rank order of problem faced by respondents

To ascertain the best problem confrontation strategies 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 faced strategies by using the formula:

$$PFI = PVH\times4 + PH\times3 + PM\times2 + PL\times1 + PNA\times0$$

Where, PVH = Very High extent of Problem

PH = High extent of Problem

PM = Medium extent of Problem

PL = Low extent of Problem

PNA = Not at All of Problem

Problem Faced Index (PCI) for each problem faced strategies could range from 0 to 328, where 0 indicating lowest extent and 328 indicating highest extent of problem faced by the house owner in rooftop gardening.

3.6 Hypothesis of the study

According to Kerlinger (1973) a hypothesis is a conjectural statement of the relation between two or more variables. Hypothesis are always in declarative sentence form and they are related, either generally or specifically from variables to variables. In broad sense hypotheses are divided into two categories: (a) Research hypothesis and (b) Null hypothesis.

3.6.1 Research hypothesis

Based on review of literature and development of conceptual framework, the following research hypothesis was formulated:

"Each of the 9 selected characteristics (age, level of education, family size, annual family income, annual income from house rent, effective rooftop area, use of information sources, training exposure and knowledge on rooftop gardening) of the respondents has significant contribution on attitude of house owners towards rooftop gardening."

3.6.2 Null hypothesis

A null hypothesis states that there is no contribution between the concerned variables. The following null hypothesis was formulated to explore the contribution of the selected characteristics on attitude of the house owners towards rooftop gardening. Hence, in order to conduct tests, the earlier research hypothesis was converted into null form as follows: "There is no contribution of the selected characteristics (age, level of education, family size, annual family income, annual income from house rent, effective rooftop area, sources

of information, training exposure and knowledge on rooftop gardening) of respondent on house owners attitude towards rooftop gardening."

3.7 Data processing and analysis

Bogdan and Biklen (2006) insist that data analysis is an on-going part of data collection. Initially, all collected data were carefully entered in Access, exported to Microsoft Excel. Exported data were checked randomly against original completed interview schedule. Errors were detected and necessary corrections were made accordingly after exporting. Further consultation with research assistants and in some cases with the community people were required. Finally, data were exported from the program Microsoft Excel to SPSS/windows version 22.0, which offered statistical tools applied to social sciences. Qualitative data were converted into quantitative numbers, if required, after processing, scaling and indexing of the necessary and relevant variables to perform subsequent statistical analysis for drawing inferences.

As outlined earlier, there are many different forms and methods that can be used to analyze both quantitative and qualitative data in accordance with the objectives of the study. Both descriptive and analytical methods were employed in order to analyze the data. Descriptive techniques have been used to illustrate current situations, describe different variables separately and construct tables and graphs presented in results. These included: frequency distribution, percentage, range, mean, and standard deviation.

In most cases the opinions of respondents were grouped in broader categories. Analytical techniques have been utilized to investigate the contribution of the selected characteristics of the respondents on their attitude towards rooftop gardening. Statistical test like regression was used in this study. Each statistical technique is used under specific conditions and depends on the measurement scale of different variables.

3.8 Statistical analysis

Regression analysis was used to identify the linear combination between independent variables used collectively to predict the dependent variables (Miles and Shevlin, 2001). Regression analysis helps us understand how the typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held fixed. Ordinary Least Squares (OLS) is used most extensively for estimation of regression functions. In short, the method chooses a regression where the sum of residuals, ΣUi is as small as possible (Gujarati, 1995). The factors that contribute to the attitude of the house owners towards rooftop gardening are analyzed using a regression model. The overall quality of fit of the model has been tested by ANOVA specifically F and R^2 test.

The data were analyzed in accordance with the objectives of the proposed research work. The factors that contribute to the attitude of the house owners towards rooftop gardening are analyzed using a regression model, multiple regression analysis (B) was used. Throughout the study, five (0.05) percent and one (0.01) percent level of significance were used as the basis for rejecting any null hypothesis. If the computed value of (B) was equal to or greater than the designated level of significance (*p*), the null hypothesis was rejected and it was concluded that there was a significant contribution between the concerned variable. Whenever the computed value of (B) was found to be smaller at the designated level of significance (*p*), the null hypothesis could not be rejected. It was concluded that there was no contribution of the concerned variables.

The model used for this analysis can be explained as follows:

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8 + b_9x_9 + e$$

Where, Y= is the attitude of the house owners towards rooftop gardening;

Of the independent variables, x_1 is the age of respondent, x_2 is level of education, x_3 is family size, x_4 is annual family income, x_5 is income from house rent, x_6 is effective rooftop area, x_7 is sources of information, x_8 is

training exposure and x_9 is knowledge on rooftop gardening. On the other hand, b_1, b_2, b_3, b_4, b_5, b_6, b_7, b_8 and b_9 are regression coefficients of the corresponding independent variables, and e is random error, which is normally and independently distributed with zero mean and constant variance.

CHAPTER IV

RESULTS AND DISCUSSION

The recorded observations in accordance with the objective of the study were presented and probable discussion was made of the findings with probable justifiable and relevant interpretation under this chapter. The findings of the study and their interpretation have been presented in this chapter. These are presented in four sections according to the objective of the study. The first section deals with the selected characteristics of the respondents, while the second section deals with the attitude towards rooftop gardening. The third section deals with contribution of the respondents' selected characteristics on their attitude towards rooftop gardening, while the fourth section deals with the problem faced by respondents in rooftop gardening.

4.1 Characteristics of the respondents

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, level of education, family size, annual family income, annual income from house rent, effective rooftop area, use of information sources, training exposure, rooftop gardening management practice and knowledge on rooftop gardening that might be greatly influenced the attitude of the house owner towards rooftop gardening are presented below-

4.1.1 Age

The age of the respondents has been varied from 43 to 67 years with a mean and standard deviation of 54.89 and 6.13 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 4.1.

Table 4.1 Distribution of the respondents according to their age

Category	Range (years)		Respondents		Mean	SD
	Year	Observed	Number	Percent		
Young aged	≤ 35	43-67	0	0	54.89	6.13
Middle aged	36-50		19	23.2		
Old aged	> 50		63	76.8		
Total			82	100.0		

From Table 4.1 it was revealed that the old-aged respondents comprised the highest proportion (76.8 percent) followed by middle aged category 23.2 percent) and no respondents were in the young aged category. Data indicates that middle and old aged respondents were involved in rooftop gardening. 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 9.25 and 4.69 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 4.2.

Table 4.2 Distribution of the respondents 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	9.25	4.69
Can sign only	0.5		0	0		
Primary education	1-5		24	29.3		
Secondary education	6-10		26	31.7		
Above secondary	>10		32	39.0		
Total			82	100.0		

Table 4.2 shows that respondents under above secondary education category constitute the highest proportion (39.0 percent) followed by secondary education (31.7 percent) category. On the other hand, the lowest 29.3 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. Overwhelming respondents (39.0 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 6 with the mean and standard deviation of 4.21 and 0.91 respectively. According to family size the respondents were classified into three categories (Mean ± Standard Deviation) namely ‘small’, ‘medium’ and ‘large’ family. The distribution of the respondents according to their family size is presented in Table 4.3.

Table 4.3 Distribution of the respondents according to their family size

Category	Range (Number)		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Small family	Up to 3	3-6	20	24.4	4.21	0.91
Medium family	4-5		55	67.1		
Large family	> 5		7	8.5		
Total			82	100.0		

Data in Table 4.3 indicate that the medium size family constitute the highest proportion (67.1 percent) followed by the small size family (24.4 percent). Only 8.5 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 17 to 37 lac (BDT) with a mean and standard deviation of 25.70 and 4.19 respectively. On the basis of annual income, the rooftop gardeners were classified into three categories (Mean ± 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 4.4.

Table 4.4 Distribution of the respondents according to their annual family income

Category	Range ('lac' BDT)		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Low income	≤ 21	17-37	12	14.6	25.70	4.19
Medium income	22-29		56	68.3		
High income	> 29		14	17.1		
Total			82	100.0		

Data reveals that the rooftop gardeners having medium annual family income constitute the highest proportion (68.3 percent), while the lowest proportion in low family income (14.6 percent). The high family income category constituted with 17.1 percent respondents. Overwhelming majority (88.4 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. Their

average annual family income was higher than national average annual family income because they had more than one income sources namely business, income from house rent etc. 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 4.53 and 1.12 respectively. On the basis of annual income from house rent, the respondents were classified into three categories (Mean ± 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 4.5.

Table 4.5 Distribution of the respondents according to annual income from house rent

Category	Range ('lac' BDT)		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Low income	≤ 3	2-8	11	13.4	4.53	1.12
Medium income	4-6		55	67.1		
High income	> 6		16	19.5		
Total			82	100.0		

Data reveals that rooftop gardeners having medium annual family income from house rent constitute the highest proportion (67.1 percent), while the lowest proportion in low annual family income from house rent (13.4 percent) The high annual family income from house rent category constituted with 19.5 percent respondents. Overwhelming majority (87.6 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 2400 to 4200 square feet. The average and standard deviation were 21.02 and 3.82 respectively. Bases on rooftop area, the respondents were categorized into three classes' (Mean ± Standard Deviation) namely low, medium and high rooftop area. Distribution of respondents according to their rooftop area is presented in Table 4.6.

Table 4.6 Distribution of the respondents according to their rooftop area

Category	Range ('00' sq. ft.)		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Low area	≤ 24	24-42	19	23.2	28.02	3.82
Medium area	25-32		33	40.2		
High area	> 32		30	36.6		
Total			82	100.0		

The observed data shows that most of the respondents (40.2 percent) had medium rooftop area while 23.2 and 36.6 percent of them had low and high rooftop area respectively (Table-4.6). Overwhelming majority (64.4 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 23 to 36 against a possible range of 0 to 40. The average score of the respondents was 30.64 with a standard deviation 4.49 (Table 4.10). 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. Data showed that the highest proportion (42.7 percent) of the respondents had medium use of information sources as compared to 30.5 percent of them having low use of information sources and 26.8 percent fell in high use of information sources (Table 4.7).

Table 4.7 Distribution of the respondents according to their use of information sources

Category	Range		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Low use	≤26	23-36	25	30.5	30.64	4.49
Medium use	27-35		35	42.7		
High use	>35		22	26.8		
Total			82	100.0		

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 exposure

Training exposure score of the rooftop gardeners ranged from 0 to 4 with a mean and standard deviation of 1.63 and 1.12 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 4.8.

Table 4.8 Distribution of the respondents according to their training exposure

Category	Range (score)		Respondents		Mean	SD
	Score	Observed	Number	Percent		
No training	0	0-4	15	18.3	1.63	1.12
Low training	1-2		23	28.0		
Medium training	3		40	48.8		
High training	> 3		4	4.9		
Total			82	100.0		

Table 4.8 indicates that the highest proportion (48.8 percent) of the rooftop gardeners had medium training exposure compared to 28.0 percent in low

training exposure and 18.3 percent in no training exposure category, respectively. 4.9 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 Knowledge on rooftop gardening

Rooftop gardening knowledge scores of the respondents ranged from 15 to 21 against possible score of 0 to 24. The average score and standard deviation were 18.42 and 1.89 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 4.9).

Table 4.9 Distribution of the respondents according to their knowledge on rooftop gardening

Category	Range		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Poor knowledge	≤ 16	15-21	16	19.5	18.42	1.89
Moderate knowledge	17-20		52	63.4		
Sound knowledge	> 20		14	17.1		
Total			82	100.0		

Data presented in the Table 4.8 reveals that 63.4 percent of the respondents had medium rooftop gardening knowledge, 19.5 percent had low knowledge and 17.1 percent had high knowledge on rooftop gardening. Thus, an overwhelming majority (82.9.1percent) of the respondents had poor to moderate knowledge on gardening. This lead to understanding that rooftop gardening knowledge would reflected 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 Attitude towards rooftop gardening

The score of attitude towards rooftop gardening of the respondents ranged from 24 to 46. The average and standard deviation were 32.25 and 4.03 respectively shown in the following Table 4.10. On the basis of attitude towards rooftop gardening, the respondents were categorized into three classes' (Mean ± Standard Deviation) namely poorly favorable attitude, moderately favorable attitude and highly favorable attitude. The observed data (Table 4.10) showed that most of the respondent (62.1 percent) had a moderately favorable attitude towards rooftop gardening while 15.9 and 22.0 percent of them had highly and poorly favorable 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.

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

Category	Range (score)		Respondents'		Mean	SD
	Score	Observed	Number	Percent		
Poorly favorable attitude	≤ 28	24-46	18	22.0	32.25	4.03
Moderately favorable attitude	29-37		51	62.1		
Highly favorable attitude	> 37		13	15.9		
Total			82	100.0		

From the Table-4.10, 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.

4.3 Factors related to attitude of house owner towards rooftop gardening

In order to estimate the influential factors on attitude of the house owner towards rooftop gardening from the independent variables, multiple regression analysis was used which is shown in the Table 4.11.

Table 4.11 shows that there is a significant contribution of respondent's level of education, use of information sources, training exposure and knowledge on rooftop gardening on attitude towards rooftop gardening. Of these, level of education and use of information sources on attitude towards rooftop gardening were the most important contributing factors (significant at the 1 percent level of significance). Training exposure and knowledge on rooftop gardening on attitude towards rooftop gardening was significant at the 5 percent level of significance while coefficients of other selected variables don't have any significant contribution on attitude of respondents towards rooftop gardening.

Table 4.11 Multiple regression coefficients of contributing factors related to the respondents' attitude towards rooftop gardening

Dependent variable	Independent variables	B	*p*	R^2	Adj. R^2	F	*p*
Attitude of the house owner towards rooftop gardening	Age	-.006	0.788	0.537	0.514	19.381	0.000**
	Level of education	0.061	0.000**				
	Family size	0.168	0.262				
	Annual family income	0.014	0.822				
	Income from house rent	0.022	0.733				
	Effective rooftop area	0.005	0.892				
	Use of information sources	0.018	0.007**				
	Training exposure	0.017	0.046*				
	Knowledge on rooftop gardening	1.734	0.013*				

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

51.4 percent (Adj. R^2 = 0.514) of the variation changed attitude of respondents towards rooftop gardening can be attributed to their level of education, use of information sources and rooftop gardening management practice on attitude towards rooftop gardening, making this an excellent model (see Table 4.11). The F value indicates that the model is significant ($p<0.000$).

4.3.1 Influence of level of education on house owner attitude towards rooftop gardening

The contribution of level of education on house owner attitude towards rooftop gardening was significant at 1% level of probability. Moreover, the direction between educational level and house owner attitude towards rooftop gardening is positive which indicates higher the education higher the favorable attitude towards rooftop gardening. This may be due to the fact that education help them to be more aware about food safety and environment which ultimately help them to make favorable attitude towards rooftop gardening.

4.3.2 Influence of use of information sources on house owner attitude towards rooftop gardening

The contribution of use of information sources on house owner attitude towards rooftop gardening was significant at 1% level of probability. Moreover, the direction between use of information sources and house owner attitude towards rooftop gardening is positive which indicates higher the use of information sources higher the favorable attitude towards rooftop gardening. This may be due to the fact that use of information sources help them to be more alert about the usefulness of rooftop gardening which ultimately help them to make favorable attitude towards rooftop gardening.

4.3.3 Influence of training exposure on house owner attitude towards rooftop gardening

The contribution of training exposure on house owner attitude towards rooftop gardening was significant at 5% level of probability. Moreover, the direction between training exposure and house owner attitude towards rooftop gardening

is positive which indicates higher the training exposure higher the favorable attitude towards rooftop gardening. This may be due to the fact that training exposure help them to be more skillful on rooftop gardening which ultimately help them to make favorable attitude towards rooftop gardening.

4.3.4 Influence of knowledge on rooftop gardening on house owner attitude towards rooftop gardening

The contribution of knowledge on rooftop gardening on house owner attitude towards rooftop gardening was significant at 5% level of probability. Moreover, the direction between knowledge on rooftop gardening level and house owner attitude towards rooftop gardening is positive which indicates higher the knowledge on rooftop gardening higher the favorable attitude towards rooftop gardening. This may be due to the fact that knowledge on rooftop gardening help them to be more aware about the benefits of rooftop gardening which ultimately help them to make favorable attitude towards rooftop gardening.

4.4 Problem faced by the house owner towards rooftop gardening

Problem faced by house owner towards rooftop gardening scores ranged from 21 to 29 against possible score of 0 to 40. The average score and standard deviation were 25.06 and 2.25, respectively. Based on the problems on rooftop gardening scores, the respondents were classified into three categories (Mean ± Standard Deviation) namely low, medium and high problems on rooftop gardening (Table 4.12).

Table 4.12 Distribution of the respondents according to their problems on rooftop gardening

Category	Range		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Low problem	≤ 22	21-29	14	17.1	25.06	2.25
Medium problem	23-27		52	63.4		
High problem	≥ 27		16	19.5		
Total			82	100.0		

Table 4.12 reveals that 63.4 percent of the respondents had medium problems on rooftop gardening, 17.1 percent had low problems on rooftop gardening and 19.5 percent had high problems on rooftop gardening. Thus, an overwhelming majority (82.9 percent) of the respondent had medium problems on rooftop gardening.

4.4.1 Rank order of problem faced by respondents

Rank order of the ten strategies of problem faced by the respondents is presented in the following Table 4.13. As per Problem Faced Index (PFI), lack of skilled manpower positioned the 1st and scarcity of source of water in last position.

The problems faced by house owner in rooftop gardening according to descending order through the analysis of the received data from respondents are lack of skilled manpower, lack of quality seed, seedlings, saplings, input, lack of knowledge on plant nutrients, lack of knowledge on soil preparation, insect infestation, unavailability of proper water drainage system on the roof, costly management system, lack of training, lack of technological information and advice and scarcity of source of water respectively.

Table 4.13 Rank order of the problems faced by house owner towards rooftop gardening

Sl. No.	Nature of problems	PFI score	Rank
1.	Lack of skilled manpower	256	1st
2.	Lack of quality seed, seedlings, saplings, input	246	2nd
3.	Lack of knowledge on plant nutrients	228	3rd
4.	Lack of knowledge on soil preparation	217	4th
5.	Insect infestation	204	5th
6.	Unavailability of proper water drainage system on the roof	198	6th
7.	Costly Management System	192	7th
8.	Lack of training	178	8th
9.	Lack of technological information and advice.	172	9th
10.	Scarcity of source of water	164	10th

The results showed that the highest problem faced by respondents in rooftop gardening is lack of skilled manpower. 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 scarcity of source of water. This happened because the respondents use the water supplied by WASA through the supply water using machine in the study area.

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

The study was conducted in the Mirpur Section-1, DNCC (word No. 3) to find out the attitude of the house owner towards rooftop gardening at Dhaka city. Total 560 rooftop gardeners were selected from the study area as the population and according to Yamane's formula, the respondents comprised of 82 rooftop gardeners constituted the sample of the study. A well-structured interview schedule was developed based on objectives of the study for collecting information. The independent variables were: age, level of education, family size, annual family income, annual income from house rent, effective rooftop area, use of information sources, training exposure, rooftop gardening management practice and knowledge on rooftop gardening. The dependent variable of this study was the attitude towards rooftop gardening. Data collection was started in 07 January, 2017 and completed in 06 February, 2017. Various statistical measures such as frequency counts, percentage distribution, average, and standard deviation were used in describing data. In order to estimate the contribution of the selected characteristics of rooftop gardeners to their attitude towards rooftop gardening, multiple regression analysis (B) was used. The major findings of the study are summarized below:

5.1 Major Findings

5.1.1 Selected characteristics of the rooftop gardener

Age: The old-aged rooftop gardeners comprised of the highest proportion (76.8 percent) and the middle-aged category constituted by 23.2 percent respondents.

Level of education: Above secondary education constituted the highest proportion (39.0 percent) while 29.3 percent and 31.7 percent were Primary and secondary education category.

Family size: The medium size family constitute the highest proportion (67.1 percent) followed by the small size family (24.4 percent).

Annual family income: Medium annual income constituted the highest proportion (68.3 %), while the lowest proportion in low income (14.6 percent) category among the rooftop gardener of the study area.

Annual income from house rent: Medium annual income constituted the highest proportion (67.1 %), while the lowest proportion in low annual income from house rent (13.4 percent) category.

Effective rooftop area: Most of the respondents (40.2 percent) had medium rooftop area while 23.2 and 36.6 percent of them had low and high rooftop area respectively.

Use of information sources: The highest proportion (42.7 percent) of the respondents had medium use of information sources as compared to 30.5 percent of them having low use of information sources.

Training exposure: The highest proportion(48.8 percent) of the rooftop gardeners had medium training exposure compared to 28.0 percent in low training exposure.

Knowledge on rooftop gardening: 63.4 percent of the respondents had medium rooftop gardening knowledge, 19.5 percent had low knowledge and 17.1 percent had high knowledge on rooftop gardening.

5.1.2 Attitude towards rooftop gardening

Most of the respondent (62.1 percent) had a moderately favorable attitude towards rooftop gardening while 15.9 and 22.0 percent of them had highly and poorly favorable attitude respectively.

5.1.3 Factors related to attitude towards rooftop gardening

There is a significant contribution of respondent's level of level of education, use of information sources, training exposure and knowledge on rooftop gardening on attitude towards rooftop gardening. 51.4 % (Adj. R^2 = 0.514) of variation in the respondents changed attitude towards rooftop gardening was attributed to the significant independent.

5.1.4 Problem faced by respondents in rooftop gardening

The Majority (63.4 percent) of the rooftop gardeners had medium problems in rooftop gardening whereas the lowest 17.1 percent had low problems in rooftop gardening category.

5.1.5 Rank order of problem faced by respondents

Rank order of the ten strategies of problem faced by the respondents was measured. As per Problem Faced Index (PFI) lack of skilled manpower positioned the 1st and scarcity of source of water was in last position.

5.2 Conclusions

Conclusion is the final decision or judgment, which is placed through contention at the end or termination of a research work. It contains inferences and logical interpretation of the findings of the research work. Conclusion should be so constructive that its words and contentions must drew the attention of the concerned individuals/organizations. The findings and relevant facts of research work prompted the researcher to draw following conclusions.

i. The findings revealed that maximum (62.1 %) of the rooftop gardeners had moderately favorable attitude towards rooftop gardening. It may be concluded that the composite attitude towards rooftop gardening needs to enhance.

ii. Level of education of the respondents showed the important contributing factor on attitude towards rooftop gardening by the respondents. This means that high literacy and educational level among the respondents might have influenced high attitude towards rooftop gardening. Conclusion could be drowned that these respondents could be more ameliorated in all aspects of socio-economic of life if government takes more project to make it moving.

iii. Maximum (73.2 %) rooftop gardeners had low to medium use of information sources category and regression analysis revealed that use of information sources was a contributing factor on attitude towards rooftop gardening. Therefore, it may be concluded that use of information sources encourages the respondents to enhance attitude towards rooftop gardening.

iv. Maximum (48.8 %) rooftop gardeners had medium training exposure category and regression analysis revealed that training exposure was a contributing factor on attitude towards rooftop gardening. Therefore, it may be concluded that training exposure makes the respondents with enhancing attitude towards rooftop gardening.

v. Rooftop gardening knowledge of the had a significant contribution on attitude towards 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 conclusion that necessary arrangements should be made to increase the rooftop gardening knowledge of respondents which would ultimately increase the attitude towards rooftop gardening.

5.3 Recommendations

5.3.1 Recommendations for policy implications

On the basis of observation and conclusions drawn from the findings of the study following recommendations are made:

i. An increased rate and extent of attitude towards rooftop gardening are vitally important for increasing the rooftop gardening. It is revealed from the attitude towards rooftop gardening that a considerable proportion (84.1 percent) of the respondents had low to medium attitude towards rooftop gardening. This is very much encouraging. This rate and extent of attitude towards rooftop gardening should be maintained at all along. It is, therefore, recommended that an effective step should be taken by the Department of Agricultural Extension (DAE) and Non-Government Organizations (NGOs) for strengthening the respondents' qualities in favor of attitude towards rooftop gardening to a higher degree.

ii. Level of education of the respondents had a significant contribution on attitude towards rooftop gardening. It indicates the importance of education of the rooftop gardener for more attitude towards rooftop gardening. It may be recommended that arrangements should be made for enhancing the education level of the rooftop gardener by the concerned authorities and other extension methods as possible.

iii. The DAE should take necessary steps to increase the use of information sources by the respondents. Therefore, it is recommended that the extension worker should provide supplementary supports to use of information sources in rooftop gardening so that respondents themselves could come in contact with information sources.

iv. The DAE should take necessary steps to increase the training facilities for the respondents in rooftop gardening. Therefore, it is recommended that the extension workers should encourage the respondents to participate in training program so that respondents themselves could come in contact training facilities.

v. Respondents having low to medium knowledge about rooftop gardening. It should be selected on priority basis for any motivational training by Department of Agricultural Extension (DAE) and Non-Government Organizations (NGOs) for gaining sustainable rooftop gardening.

5.3.2 Recommendations for further study

On the basis of scope and limitations of the present study and observation made by the researcher, the following recommendations are made for future study.

i. The present study was conducted in Mirpur Section-1, DNCC (word No. 3). It is recommended that similar studies should be conducted in other areas of Dhaka city.

ii. This study investigated the contribution of nine characteristics of the respondents with their attitude towards rooftop gardening as dependent variables. Therefore, it is recommended that further study should be conducted with other characteristics of the respondents with their attitude towards rooftop gardening.

iii. The present study was concerned only with the extent of attitude towards rooftop gardening. It is suggested, future studies should be included with knowledge and practice of rooftop gardening.

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APPENDIX-I

ENGLISH VERSION OF THE INTERVIEW SCHEDULE

Department of Agricultural Extension and Information System
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An Interview Schedule for the Study Entitled

ATTITUDE OF THE HOUSE OWNERS TOWARDS ROOFTOP GARDENING AT DHAKA CITY

Name of the respondent: …… Serial No.: ……

House No.: …… Road No.: ……

Section: ……..…….….

(Please provide the following information. Your information will be kept confidential and will be used for research purpose only.)

1. Age

How old are you? _____ years.

2. Level of education

Please mention your level of education.

a) I can't read and write ☐

b) I can sign only ☐

c) I have passed…….class.

3. Family size

How many members are there in your household including you? .....

4. Annual family income

Please mention the amount of annual income from the following sources:

Sl. No.	Income resources	Total Income (Tk.)
1.	Service	
2.	Business	
3.	Other family members	
4.	Others income source (house rent)	
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 information sources

Mention the extent of contact with the sources of information for roof top gardening:

Sl. No.	Name of information sources	Extent of contact				
		Regularly (4)	Frequently (3)	Sometimes (2)	Rarely (1)	Not at all (0)
1.	Internet/ Month	10-12 times/M	7-9 times/ M	5-6 times/ M	1-4 times/M	0 times
2.	Agricultural Magazine/Year	> 6 times/Y	5-6 times/ Y	3-4 times/ Y	1-2 times/ Y	0 times
3.	Friends, Relatives/Month	≥ 10 times/M	6 -9 times/ M	4-5 times/ M	1-3 times/M	0 times
4.	Neighbors/ Month	≥ 10 times/ M	7 -9 times/ M	4-6 times/ M	1-3 times/ M	0 times
5.	Television/ Month	≥ 10 times/M	7 -9 times/ M	4-6 times/ M	1-9 times/ M	0 times
6.	Radio/Month	≥ 10 times/ M	7 -9 times/ M	4-6 times/ M	1-9 times/ M	0 times
7.	Newspaper/ Month	≥ 10 times/ M	7 -9 times/ M	4-6 times/ M	1-5 times/ M	0 times
8.	Private Nursery Owner/Year	≥ 7 times/Y	5-6 times/Y	3-4 times/Y	1-2 times/Y	0 times
9.	Hand Books/ Year	≥ 7 times/Y	5-6 times/ Y	3-4 times/ Y	1-2 times/Y	0 times
10.	Tree fair/year	≥ 6 times/Y	5-6 times/Y	3-4 times/Y	1-2 times/Y	0 times
Total						

Note: M= Month; Y=Year

8. Training exposure

Have you participated any in training programs regarding RTG?

A) No B) Yes

If yes please mention the name of organizations and duration of training

Sl. No.	Name of the training course	Organization	Days
01.			
02.			
03.			

9. Knowledge on rooftop gardening

Please answer the following questions:

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

10. Attitude towards rooftop gardening

Please express your opinion on the following issues:

Sl. No.	Statement	Extent of agreement/disagreement				
		SA	A	N	D	SD
1(+)	Roof gardens keep flat roofs cool in Summer. So, I am Interested to build a roof garden.					
2(-)	Water Stagnant may cause moist and dampness of the roof.					
3(+)	Roof garden improves 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 rooftop garden.					
6(-)	It is difficult to supply essential plant nutrient element.					
7(+)	I enjoy my leisure time with RTG and I have a fascination to distribute vegetables, fruits, flowers among the neighbors. So, I am interested to rooftop garden.					
8(-)	Since soil is a relatively heavy substance, most roofs require reinforcements before gardening.					
9(+)	RTG not only give the pleasure but also is a source of fresh vegetables, fruits, flowers. So, I am interested to rooftop garden.					
10(-)	Roofs regularly may affect with strong winds which may lose significant numbers of plants.					
11(+)	The plants on green roofs can absorb airborne pollutants and atmospheric deposition. So, I am Interested to build a roof garden.					
12(-)	Roof gardens require intricate and costly drainage systems to ensure no water seeps into the building.					

N.B: SA= Strongly Agreed; A=Agreed; N= Neutral; D=Disagreed; SD= Strongly Disagreed;

11. Problems faced during rooftop gardening

Please express your opinion on the following problems:

Sl. No.	Nature of problems	Extent of problems				
		Very High (4)	High (3)	Medium (2)	Low (1)	Not at all (0)
1.	Scarcity of source of water					
2.	Lack of quality seed, seedlings, saplings, input.					
3.	Insect infestation					
4.	Lack of knowledge on soil preparation					
5.	Lack of knowledge on plant nutrients					
6.	Unavailability of proper water drainage system on the roof					
7.	Costly Management System					
8.	Lack of skilled manpower					
9.	Lack of technological information and advice.					
10.	Lack of training					

Thanks for your kind cooperation.

Dated: ----------.

(Signature of interviewer)