ASSESSING FARMERS' KNOWLEDGE ON FOOD SAFETY

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CERTIFICATE

This is to certify that thesis entitled ‘’**ASSESSING FARMERS’ KNOWLEDGE ON FOOD SAFETY”** submitted to the *Department of Agricultural Extension and Information System*, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **MASTER OFSCIENCE in** *Agricultural Extension and Information System*, embodies the result of a piece of bona fide research work carried out by **FARZANA KHAN TINNI,** Registration No. **16-07550** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

……
Dated:
Place: Dhaka, Bangladesh

…….
Md. Abul Bashar
Professor
Department of Agricultural Extension and Information System
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Dedicated To
My Beloved Parents

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The Author

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ABSTRACT

The main purpose of this study was to determine the farmer's knowledge on food safety and explore the relationship of the selected characteristics of the growers on their knowledge on food safety. The selected characteristics were age, education, family size, farm size, annual family income, training exposure, extension contact, innovativeness and cosmopoliteness. Data were gathered from proportionally and randomly selected 110 respondents (farmers) of two villages of Kadir para union of Shreepur upazila under Magura district by using a pretested interview schedule during the period of 1st September to 30 October, 2018. Apart from descriptive statistical methods, Pearson's Product Moment Correlation Co-efficient analysis was used in order to analyze the data. Findings indicated that the majority (59.09%) of the respondents had medium knowledge on food safety, 32.91% had high knowledge on food safety and 8% had low knowledge on food safety. Out of nine selected characteristics of the respondents, education, farm size, extension contact and innovativeness had positive significant relationship with their knowledge on food safety. The rest of the variables namely: age, family size, annual family income, training exposure and cosmopoliteness did not show any significant relationships with their knowledge on food safety.

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ABBREVIATIONS AND ACRONYMS

BADC	Bangladesh Agricultural Development Corporation
BARC	Bangladesh Agricultural Research Council
BBS	Bangladesh Bureau of Statistics
BINA	Bangladesh Institute of Nuclear Agriculture
BRRI	Bangladesh Rice Research Institute
CDP	Crop Diversification Program
DAE	Department of Agricultural Extension
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GO	Government Organization
HYV	High Yielding Variety
IPM	Integrated Pest Management
CIMMYT	International Maize and Wheat Improvement Centre
IMPP	International Maize Promotion Project
MS	Master of Science
MOA	Ministry of Agriculture
NGO	Non Government Organization
No.	Number
‘r’	Co-efficient of Correlation
RDRS	Rangpur Dinajpur Rural Service
SD	Standard Deviation
UNDP	United Nations Development Program
USAID	United States Agency for International Development
“000’ Tk.	Thousand Taka

CHAPTER I

INTRODUCTION

1.1. General Background

Agriculture is the majority important employment sector in Bangladesh. The action of this region has a great contact on primary macroeconomic objectives like employment generation, poverty alleviation, human assets progress and food safety (Wikipedia: Food Security, 2016). Safe foods, as frequently understood are those fit for human consumption items that do not cause or bear any threat of any health hazards for the consumers. Food safety in food production may be achieved by natural or organic farming and even in agriculture by using chemicals with a recommended dose and practices with recommended inputs.

The main consideration is that the total process in the food chain should not involve any practice or material that directly or indirectly results in hazards to consumer health. unsafe foods are as explained as (1) foods that contain microbes in enough quantities to lead to short term illness or death, (2) foods that contain substances that are supposed to pose potential long term health problems such as pesticide residues or bovine spongiform encephalopathy, (3) foods that have unknown, but suspected, health consequences such as foods that have been genetically modified or irradiated, and (4) foods that contain ingredients that when consumed in excess quantities lead to continual diseases such as diabetes, cancer and cardiovascular disease (Kinsey, 2003).

Most of the vegetables and fruits are grown in Bangladesh are vulnerable to be attacked by insect pests. The role of insecticide apply has become critically important with modernization of agriculture in Bangladesh. Modernization of agriculture implies the enlarged use of modern inputs such as chemical fertilizers, irrigation, quality modern seeds etc. But these provide a favorable climate for rapid growth of insects.

Moreover, the critical weather (such as low temperature, dew drops stored on the leaf, continuous fog etc.) prevailing in this period causes various kind of diseases of vegetables. Pests, inclusive insects, mites, pathogens (disease-causing organisms), weeds, nematodes, rodents and others significantly contribute to high farm production costs and decrease quality and yields (Henneberry *et al*., 1991). The use of insecticides, however, carries several dangers. The yield failure varies in different environmental conditions but can exceed 65% in Bangladesh (BARI, 1999). Non-optimal and non-judicious apply of insecticides may result in severe problems connected to crop production and certain externalities like pollution and health hazards.

Recent seeds are more vulnerable to insect pests and diseases. Both excess apply and misuse of insecticides may lead to the failure of usefulness of insecticides due to the development of resistance (Forrester, 1990) and could reason human health risk and environmental pollution (Maclntyre *et al*., 1989). Paul (2003) reported that intensified use of insecticides can cause a severe public health hazard primarily in the form of residues in food.

Inappropriate selection of insecticides and doses, improper spray scheduling and inadequate spray coverage (Abolhasan *et al*., 2010) may lead to the loss in managing insect pests. For vegetables in general, Sabur and Mollah (2000) viewed enhance in the use of pesticides by farmers in combating pests throughout Bangladesh.

Balanced diet is human need and right as it provides elements for better health. But in Bangladesh, food is very much biased to cereals resulting imbalanced diet. Moreover, the produced food is contaminated with different chemicals. As a result, malnutrition, which is the symptom of under nutrition, is wide spread with different diseases like diabetics, heart diseases, blindness, beriberi, anemia etc. (Mukul *et al*., 2013). Food is usually original from animal and plant resources. With increasing awareness and consciousness on environmental, moral and well -

being issues, customer now expect their food to be produced and processed with larger respect for the environmental safety and the customers are increasingly looking for quality in food products.

Organic methods are the right choice to fulfill the demand of the consumers. Natural foods are foods that are produced using way of organic farming – that do not engage current synthetic inputs such as synthetic pesticides and inorganic fertilizers. Natural foods are also not processed using irradiation, manufacturing solvents, or chemical food additives. Natural food production is a greatly regulated industry, diverse from personal gardening. The ambition of food utilization is not only body diet but also heath improvement over lifetime. If the food available is not safe or its utilization does not enhance health, it does not contribute to food security. Organic food has been resolved from many perspectives and in many countries. It contributes to rising paradigm for food production which depends on biology, ecology and sociology rather than more one-dimensional chemical and physical management approaches. (Wilkins and Hillers, 1994). The worldwide organic food market has anticipated 25 billion US$ in the year 2003. Accurate through the world, about 90 developing countries, of which about 15 are Least Developing Countries (LDCs) are producing specialized organic and gaining the remarkable share from the universal organic food market (Tregear *et al*., 1994).

1.2. Statement of the problem

In Bangladesh, a large amount of the producers (farmers), be it produced or processed, are insecure for consumption or adulterated in varying degrees. This problem persists at every level of food production to consumption. Foods are added by using different harmful chemicals and toxic non-natural colours on the one hand; and rotten perishables turning to be toxic foods are stored, sold and served to consumers in an unhygienic environment on the other. This unsafe of food is contributing to the public health dangerously with numerous chronic and

non-chronic diseases. In spite of different reasons for this unsafely and adulterations of foodstuffs in Bangladesh, this study will concentrate on the regulatory failures to combat the present food safety problems persisting in Bangladesh.

One major adulterant is pesticide which is actually mainly used for protection of crops from pest and insect attacks and diseases. But farmers use it so heavily and so frequently that pesticides get leached into water bodies and remains in the crops including processed crops. Then again, some of these pesticides have been banned worldwide including in Bangladesh. Yet these including DDT are still used. But there are hardly any scientific studies on such adulterants or contaminants in food to know their extent and severity of use. There is also some indication that some of the crops including rice and vegetables as well as fish may contain heavy metals in concentration beyond permissible limits.

On the basis of the above discussion, the researcher undertook an investigation entitled "**Assessing Farmers' knowledge on food safety**". The main purpose of the study was to determine knowledge of the farmers in safe food production and to ascertain the contribution of the selected characteristics of the farmers to their knowledge on safe food production. However, the study attempts to find out the answers to the following questions:

1. To what extent the farmers have knowledge on safe food production.
2. What are the selected characteristics of the growers?
3. To what extent relationships exist between the selected characteristics of the farmers and their knowledge on food safety?

1.3. Specific objectives of the study

In order to give proper direction to the study the following specific objectives are formulated:

1. To assess the extent of food safety knowledge among the farmers,
2. To describe following determinant factors of the respondents:
    a) Age
    b) Education
    c) Family size
    d) Farm size
    e) Annual family income
    f) Training exposure
    g) Extension contact
    h) Innovativeness
    i) Cosmopoliteness
3. To explore relationships between the selected characteristics of the respondents and their knowledge on food safety

1.4. Justification of the study

The ambition of food consumption is not only body nourishment but also heath development over lifetime. If the food available is not safe or its consumption does not improve health, it does not contribute to food security. Food safety mainly aimed to guide an appropriate farming and post-harvest methods not only for farmers but also for any intermediaries who are engaged in trading, processing and consuming.

Food safety is multi-dimensional and its main components are: (a) availability of food, (b) access to food, (c) quality or nutritional sufficiency of food, and (d) utilization of food. Over the past 30 years or so, Bangladesh had made important

achievement in food grain production and food accessibility. The fact that nationwide food availability is assured does not guarantee equal regional availability and distribution of the secure food at the household and individual levels.

Poverty is the main cause against safe food production. Most of the farmers in our country are less capitalized. They have low input in production system. They are involved in producing cereals, pulse, vegetables, fish, poultry and livestock etc. They are interested to return maximum output from low input. Also avoiding natural calamities, they also intended quick return of produces. Preservation is also another concerned matter for marketing system. Considering these facts, most of the farmers try to use such policies that have quick action in favor of them. But most of the cases, they do not consider about food safety through health related problems. They have not also much knowledge about food safety. Awareness on production of safe food in relation to sound health is not sufficient among the producers (rural farmers). Advertisement about food safety by different social organization and government stuff is not also sufficient. As a result health degradation is rising day by day through consumed infected foods. Foods are being contaminated in different ways due to excess use of chemicals, fertilizers and also uses of forbidden materials at production to storage and marketing levels. As such, food safety has been considered as a worldwide indicator of households and individuals personal well being. The consequences of appetite and malnutrition are adversely affecting the livelihood and well being of a huge number of people and inhibiting the development of many poor countries (Gebremedhin, 2000). This is why it is urgently needed to reduce and/or remove harmful chemicals from food production and consumption chain to ensure safe food.

Very few organized investigations on accessible food safety faced by rural people has been under taken in the past either by private or government organizations to

fulfill the needs of extension workers, researchers and the farmers. Therefore, the finding of the study are expected to be of great value of researchers, extension service provider, students and particularly planners in formulating and designing extension approach for maintaining the natural balance. The finding of the study will be particularly applicable to the rural poor people of Sreepur Upazila kadirpara union of Magura District. The judgment of the study will show an ample picture as to how the rural people are far away from safe food production.

1.5. Scope of the study

The study will assess the level of farmer knowledge the level of farmers' knowledge on food safety. The relationship between farmers selected characteristics and their knowledge on food safety will also be explored. The finding of the study will be particularly applicable to the rural poor people of kadirpara union under Sreepur Upazila of Magura District. However the findings are also applicable for other areas of Bangladesh where the socio-economic and geographical condition is major or less same with study areas.

The findings of the study were expected to be helpful for planning and implementation of various programs in connection with the rural food safety of the country. The findings will help concerned bodies in their effort to formulate policies and develop intervention mechanisms that are modified to the specific need of the study area. Furthermore, this study will attempt to make further contribution to the previous studies and can be used as a source material for further studies.

1.6. Assumptions of the study

An assumption is the idea that an apparent fact or principle is correct in light of the available evidence (Goode and Hatt, 1952). The following assumptions were made by the researcher while undertaking the present study:

1. The subjects selected for the study were able to reply sufficiently to queries designed by the researcher.
2. The responses furnished by the respondents were applicable and dependable.
3. Information given by the selected respondents was representative of the study area.
4. The researcher who took action as interviewer was well adjusted to the social and cultural environment of the study area.
5. The respondents include in the sample were competent proper responses to the items included in the interview schedule.
6. The data collected by the investigator were free from bias and prejudice.
7. The characteristics of the rural people as well as the indicator of the food safety were normally and independently distributed with their respective means and standard deviation.
8. The environment conditions of the rural people were more or less similar throughout the study area.

1.7. Limitations of the study

Considering the time and other necessary resources and also to make the study convenient and significant, it became essential to impose certain limitations as mention below:

1. The study was confined to a selected area *i.e.* Magura Sadar Upazila of under the district of Magura.
2. The study focused on safe food faced by the rural people.
3. There were many respondents in the study area but only selected numbers of respondents were considered for this study.
4. There were many characteristics of the rural people who are concerned about food safety but only ten characteristics of them were selected for the study.
5. The researcher relies on the information furnished by the respondents while interviewing.

1.8. Definition of the important terms

Age

Age of a respondent was defined as the period of time in years from his/her birth to the time of interview.

Education

Refer to the completed years of schooling by the respondents at the time of interview.

Family size

Family size was defined as the numeral of individual in the family including family chief and other trustful members who lived and ate together

Farm size

Farm size of a respondent refers to the area of homestead, cultivated land, fruit land, area of pond, area of poultry rearing, cattle husbandry and others land their family owned or obtained.

Annual family income

It was defined as the total earning of the respondent from agricultural, non agricultural and other sources during the previous year.

Training exposure

It referred to the total number of days that a respondent had received training in his/her entire life from Proshika or other organizations under different training programmes.

Extension contact

It is referred to the respondents becoming accessible to the influence of diverse information media through different extension schooling methods.

Innovativeness

Innovativeness is the scale to which an personality is somewhat prior in adopting agricultural innovations, new thoughts, practices and things than the other members of a social system (Rogers, 1995). This was comprehended by the promptness of accepting innovations by an entity in relation to others and was deliberate on the basis of time dimension.

Cosmopoliteness

The term cosmopoliteness referred to the secure food growers mobility from their own village to another village, upazila and district.

Knowledge on food safety

Food safety is a permanent challenge in the food supply chain up to final preparation and food consumption. Food producers at all levels of the manufacture chain up to food service establishments have the liability that appropriate security and sanitation practices are followed to make sure the health of their consumers.

Assumption

An assumption is "the supposition that an obvious fact or principle is the true in glow of the accessible evidence" (Goode and Hatt, 1952).

Hypothesis

A research hypothesis is a predictive statement capable of being tested by scientific methods that related independent variables and dependent variables. As definite by Goode and Hatt (1952), "A hypothesis is a proposal which can be place

to a trial to find out its validity. It may seem opposite to or in accord with common sense. It may provide evidence to be correct on incorrect. In any occurrence, it leads to an empirical test".

Null hypothesis

A null hypothesis posture that there is no relationship linking the concerned variables. If a null hypothesis is discarded on the basis of a statistical test, it is implicit that there is a relationship between the concerned variables. Variable A general indication in statistical research characteristics that occur in a number of individuals, objects, groups etc. and that can take on various values for example the age of an individual.

CHAPTER II

REVIEW OF LITERATURE

The function of this chapter is to review the previous studies and opinions of experts and social scientists having relevance to this investigation based on the major objectives of the study. Attempts have been made in this chapter to review that finding based on farmer knowledge towards in food safety. The chapter is divided into three sections and described accordingly. The first section focused on food safety. The second section focused farmers' knowledge on food safety. The third section provided information on relationship between farmers' characteristics and knowledge on food safety. At last conceptual model of the study is presented in the last sections of the study.

2.1. Food safety

Food safety is the assurance that food will not cause any harm to the consumers when taken in its current state and as it is (FAO, 2001). Food-borne diseases and zoonoses exerts a major toll on health as thousands of millions of people fall ill and many die as a result of unsafe food. Serious outbreaks of food- borne diseases and zoonoses have been documented on every continent illustrating both their public health and social significance. Due to this, WHO (2000) recognized food safety as an essential public health priority and later on adopted the WHO Global food safety strategy (WHO, 2002).

According to the WHO (2000) Global food safety strategy, traditional food safety management systems have not been effective in preventing food-borne diseases and zoonoses over the last decades. The strategy therefore, advocates food safety programs based on a broader science based concept of risk assessment, risk management through process controls along the entire production chain and risk communication. This is a farm to table approach and involves considerations of

every step in the chain, the community and all actors from raw material to consumption. The strategy also advocates sustainable agriculture production systems and redirection of some of the existing approaches to ensure they meet the challenges of global food safety (WHO, 2002).

The primary responsibility for beef safety therefore lies with those who produce process, distribute, trade and consumer food (WHO, 2002). These include the livestock producers, livestock traders, slaughterhouse operators, meat transporters, butchers and the consumers. They should operate according to the principles of Good Agricultural Practices, Good Animal Feeding Practices, Good Veterinary Practices, Good Hygienic Practices, Good Manufacturing Practices and Hazard Critical Control Points (Slorach, 2002). Traceability of feed, food producing animals and beef should be established at all stages of production, processing and distribution.

2.2. Farmers knowledge on food safety and other agricultural events

Knowledge recalls or organizes information, ideas and principles in the approximate form, which were learned previously (Huitt, W. 2004). Bhuiyan (2012) indicated that knowledge may be defined as the scientific fact of an idea which is experimentally or empirically verified.

Islam (2007) studied on farmer's knowledge on ecological practices and found that majority (68percent) of the farmers possessed medium knowledge compared to 23 percent had high knowledge and only 9 percent low knowledge on ecological agriculture.

Khan (2005) studied on knowledge of maize cultivation and found that majority (68percent) of the farmers had relatively low level of knowledge and 32 percent of the farmers possessed relatively high level of knowledge.

Rahman (2004) found in his study that the highest proportion (62.22 percent) of the respondents had medium knowledge compared to 25.56 percent having low knowledge and only 12.22 percent had high knowledge on HYV Boro rice

cultivation practices.

Saha (2001) made an attempt on farmer's knowledge on improved practices of pineapple cultivation and found that the majority (62 percent) of the farmers possessed good knowledge, 33 percent poor knowledge and only 5 percent possessed excellent knowledge.

Hossain (2000) studied on farmer's knowledge and perception of binadhan-6. His study at 4 selected upazilas of sherpur distinct reported that majority of the farmers (62percent) had medium knowledge while 21percent had low knowledge and the rest 14 percent possessed high knowledge on Binadhan-6.

2.3. Literature related to relationship between selected characteristics of the farmers and food safety

2.3.1. Age and knowledge

Alam *et al.* (2008) in their study entitled "Involvement of farmers in BAUEC adult education activities in the Sadar upazila of Mymensingh district" showed that the age has significant relationship with their adult education.

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

Bhuiyan (2002) in his study found a positive and significant relationship between age of the farmers and their constraint in banana cultivation. Similar finding were obtained by Haque (1995) and Rahman (1996) in their respective study.

2.3.2. Education and knowledge

Alam *et al.* (2008) in their study entitled "Involvement of farmers in BAUEC adult education activities in the Sadar upazila of Mymensingh district" showed that the education has negative relationship with their adult education.

Rahman (2006) observed in his study that education level of the farmer had significant and positive relationship with their knowledge on prawn culture.

Roy (2005) in his study found that education level of the farmers had significant and positive relationship with their knowledge on Boro rice cultivation.

Islam (2005) in his study explore that education level of the farmers had significant positive relationship with their knowledge on IPM in crop.

Haque (2005) reveled that level of education of the farmers had a significant and positive relationship with their adaption of modern rice varieties.

Hasan (2005) in his study found that there was no relationship between education of the farmers and their problem confrontation in crop production activities.

Akhter (2003) found in his study that level of education of the farmers had a significant and positive relationship with their knowledge of agricultural activities.

Hossian (2003) found that education of the farmer had significant relationship with modern Boro rice cultivation.

Hoque (2001) in his study entitled "Environmental awareness and problem confrontation of the FFS farmers in practicing IPM" showed that the literacy has significant negative relationship with their problem confrontation in practicing IPM.

Islam (1993) found that the general education of the sub Assistant Agriculture officer had no significant relationship with their knowledge on modern agricultural technology.

2.3.3 Family size and knowledge

Alam *et al.* (2008) in their study entitled "Involvement of farmers in BAUEC adult education activities in the Sadar upazila of Mymensingh district" showed

that the family size has positive significant relationship with their adult education.

Rahman (2007) in his study entitled "Food Security through Homestead Vegetable Production in the Smallholder Agricultural Improvement Project Area" showed that the family size of the rural farmers had no significant relationship with their average per day per family vegetable consumption.

Mannan and Miah (2007) in their study entitled "Present status of fruit cultivation and problems confronted by the farmers at Dighullia upazila of Khulna district" showed that the family size has negative trend of relationship with their problem confrontation.

Kobir (2007) in his study entitled "Contribution of farming enterprises of the small farmers towards household food security" showed that the family size of the small farmers had strong negatively significant relationship with their farming enterprises towards the household food security.

Alam (2007) in his study entitled "Impact of Food Security Project on Crop Production" showed that the family size of the rural people had no significant relationship with their crop production after involvement with food security project.

Rahman (2006) examined in his study farm size of the farmers had a significant relationship with knowledge of prawn culture

Bhuiyan (2006) found that family size had no significant relationship with their effectiveness of result demonstration in adoption of BRRI Dhan 28/29.

Islam (2005) in his study explore that farm size of the farmers had significant positive relationship with their knowledge on IPM in crop cultivation

Haque (2005) conducted a study to determine the relationship of farmers characteristics with their adaption of modern rice varieties in Sadar Upazila of

Mymensing District. He reported that farm size of the rice growers had significant and positive relationship with the adaptation of modern rice varieties.

Farhad (2003) found that farm size of the rural woman farmer had a positive significant relationship with their knowledge in using IPM in vegetable cultivation.

Hossain (2003) reported that the farm size of the respondents had positive and significant relationship with their knowledge of modern Boro rice at 0.05 level of probability.

Sama (2003) reported that farm size of the shrimp cultivators had no relationship with their knowledge of shrimp culture.

Hoque (2001) in his study entitled "Environmental awareness and problem confrontation of the FFS farmers in practicing IPM" showed that the family size has insignificant relationship with their problem confrontation in practicing IPM.

Saha (2001) found that family size had no significant relationship with their Knowledge of pineapple cultivation.

Mondal (2000) in her study entitled "Women in rice post harvest activities and the training needs in Kaliganj upazila of Lalmonirhat district under RDRS" showed that the family size has positive trend of relationship with post harvest activities and the training.

2.3.4. Farm size and knowledge

Mannan and Miah (2007) in their study entitled "Present status of fruit cultivation and problems confronted by the farmers at Dighullia upazila of Khulna district" showed that the land size has negative trend of relationship with their problem confrontation.

Rahman(2006)examined in his study that farm size of the farmers had a positive

significant relationship with their knowledge on prawn culture.

Haque (2005) conducted a study to determine the relationship of farmer's characteristics with their adoption of modern rice varieties in Sadar upazilla of Mymensingh district. He reported that farm size of the rice growers had significant and positive relationship with the adoption of modern rice varieties.

Islam (2005) in his study explored that farm size of the farmer's had significant positive relationship with their knowledge on IPM in crop production.

Hasan (2005) in his study found that there was no relationship between farm size of the farmers and their problem confrontation in crop production activities.

Karmakar (2004) observed statistically insignificant relationship between farm size and their constraints in adopting aquaculture technologies.

Farhad (2003) found that farm size of rural women farmer had a positive significant relationship with their knowledge on IPM in crop production

Hossain (2003) reported that the farm size of the respondents had positive and significant relationship with their knowledge on modern Boro rice at 0.05 level of probability.

Sana(2003) reported that farm size of the shrimp cultivators had no relationship with their knowledge of shrimp culture.

Sarker (2002) found that there was a positive and significant relationship between the farm size and their knowledge on BRRI dhan-29.

David *et al.* (2001 concluded that work with smallholders, but accept that most innovation, investment and commercialization will come from only that (possibly very small) portion with more land and capital than the average. Some claim that these farmers will then create enough jobs locally, through hiring labor and spending on local goods and services, to boost the welfare of other farm

households.

Hoque (2001) in their study entitled "Environmental awareness and problem confrontation of the FFS farmers in practicing IPM" showed that the farm size has significant relationship with their problem confrontation in practicing IPM.

Aktar (2000) found that there was a positive and significant relationship between the farm size of the rural poor and their decision making role in the family with regard to development activities

2.3.5. Annual family income and knowledge

Islam (2008) found that income from vegetable had a positive and substantial significant relationship with knowledge on vegetables production activities by women member of homestead area under world vision project.

Kobir (2007) in his study entitled "Contribution of farming enterprises of the small farmers towards household food security" showed that the family annual income of the small farmers had negatively significant relationship with their farming enterprises towards the household food security.

Rahman (2007) in his study entitled "Food Security through Homestead Vegetable Production in the Smallholder Agricultural Improvement Project Area" showed that the family annual income of the rural farmers had strongly positive significant relationship with their average per day per family vegetable consumption.

Hossain (2003) revealed that annual income of the farmers had a significant relationship with their adaptation at modern Boro rice cultivation practices.

Islam (2003) in his study found that there was a positive and significant relationship between family income of the farmers and adaptation of organic manures.

Islam (2002) conducted a study on adaptation of modern agriculture technologies

by the fanners of Sandwip. He observed that the annual income of farmers had no relationship with their adaptation of modern's agricultural technologies.

Aurangozeb (2002) conducted a study on adaptation of in targeted homestead farming technologies by the rural women in RDRS. He found that there was a positive significant relationship between annual income of the respondent and their adoption of integrated homestead farming technologies.

Hussen (2001) found that the annual income had positive significant relationship with their adoption of modern sugarcane cultivation practices.

Nurzaman (2000) found that incomes of the rural women farmers had no relationship with their knowledge of the FFS and non- FFS farmers.

Saad (2000) stated that ability to emphasis on income from both farm production and nonfarm enterprises as an indispensable factor in determining economic access to food.

Ali (1999) revealed that knowledge of the rural youth had significant positive relationship with their anticipated problem confrontation in self employment by taking selected income generating activities.

2.3.6. Training exposure and knowledge

Islam (2008) found that training on vegetable cultivation had a positive and substantial significant relationship with knowledge on production activities by woman members in homestead area under world vision project.

Sana (2003) found that training received of the farmers had a positive significant relationship with their knowledge in shrimp culture.

Hoque (2003) found that training received of the responded had positive significant relationship with their practices in farmer's adoption of maize cultivation technologies.

Islam (2002) conducted a study on farmer's knowledge adoption of ecological agricultural practices under the supervision of Proshika. He found that agricultural training exposure of farmers had no significant relationship with their adoption of agricultural practices.

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

Hoque (2001) in his study entitled "Environmental awareness and problem confrontation of the FFS farmers in practicing IPM" showed that the knowledge on agriculture has significant negative relationship with their problem confrontation in practicing IPM.

2.3.7. Extension contact and knowledge

Rahman (2008) in his study entitled "Agricultural problem confrontation by charland farmers of Jamuna River" showed that the extension contact of the farmers had negative significant relationship with their problem confrontation.

Rahman (2007) in his study entitled "Food Security through Homestead Vegetable Production in the Smallholder Agricultural Improvement Project Area" showed that the extension contact of the rural farmers had insignificant relationship with their average per day per family vegetable consumption.

Alam (2007) in his study entitled "Impact of Food Security Project on Crop Production" showed that the extension contact of the rural people had strongly positive significant relationship with their crop production after involvement with food security project.

Kobir (2007) in his study entitled "Contribution of farming enterprises of the small farmers towards household food security" showed that the exposure of farming information of the family members had insignificant relationship with their farming enterprises towards the household food security.

Hasan (2005) in his study found that there was no relationship between extension contact of the farmers and their problem confrontation in crop production activities.

Biswas (2003) reported that extension contact of the rural women had positive and significant relationship with their accessibility of family decision making.

Sana (2003), Sarker (2002) and Rahman (2001) found in their study that media exposure of farmers were highly positive significant relationship with their knowledge.

Aurangozeb (2002) observed that there was significant relationship between contact with extension media and adoption of integrated homestead farming technologies.

Hossain (2000) concluded that media exposure of the farmers had a significant relationship with their knowledge of Binadhan-6.

Rahman's (1995) study on farmer's knowledge on improved practices of potato cultivation by the farmers of kajipur of Siragonj district. The study indicated a significant relationship between extension contact of farmers and their knowledge on improved practices of potato cultivation.

Vidyashankar (1987) in his study found that the contact with extension agencies had contribute favorably to the attitude of the farmers.

2.3.8. Innovativeness and knowledge

Aurangozeb (2002) observed that there was significant relationship between innovativeness and adoption of improved farming technologies.

Islam (2002) conducted a research study on adoption of modem agricultural technologies by the farmers of Sandwip. He found that innovativeness of the farmers had significant and positive relationship with their modem agricultural

practices.

Rahman (2001) revealed that the highest proportion (63 percent) at the farmers had low innovations as compared to 22 percent medium innovativeness and 15 percent very low innovativeness.

2.3.9. Cosmopoliteness and knowledge

Aurangozeb (2002) conducted a study on adoption of integrated homestead farming technologies by the rural women in RDRS. He found that cosmopoliteness of the respondents had a significant positive relationship with their adoption of integrated homestead farming technologies.

Rahman (2001) conducted an investigation on knowledge, attitude and adoption of Aalok-6201 hybrid rice by the farmers of sadar upazila in Mymenshigh district. He observed that there was a significant positive relationship between cosmopoliteness of the farmers and their modern cultivation practice.

Hussen (2001) conducted an investigation on adoption of modem sugarcane cultivation practices by the farmers of Dewangonj upazila in Jamalpur district. He observed that there was a significant positive relationship between cosmopoliteness of the farmers and their adoption of modem cultivation practices.

2.4. Conceptual framework of the study

Variables together are the cause effect and thus, there is cause-effect relationship everywhere in the universe. The conceptual framework of Rosenberg and Hovland (1960) was kept in mind while framing the structural arrangement for the dependent and independent variables of the study. The hypothesis of a research while constructed properly contains at least two important elements i.e. a dependent variable and independent variables. A dependent variable is that factor

which appears, disappears or varies as the research introduces, removes or varies the independent variables (Townsend, 1953). Here, farmer knowledge on food safety has been selected as dependent variable and the characteristics of the rural people were considered as the independent variables. It is not possible to deal with all characteristics in a single study. It was therefore, necessary to limit the characteristics, which include age, education, family size, farm size, annual family income, Extension contact, Innovativeness, Cosmopoliteness. Knowledge on agriculture and extension contact is independent variables. In view about discussion and prime findings of review of literature, the researcher constructed a conceptual framework of the study which is self explanatory and is presented in figure2.1.

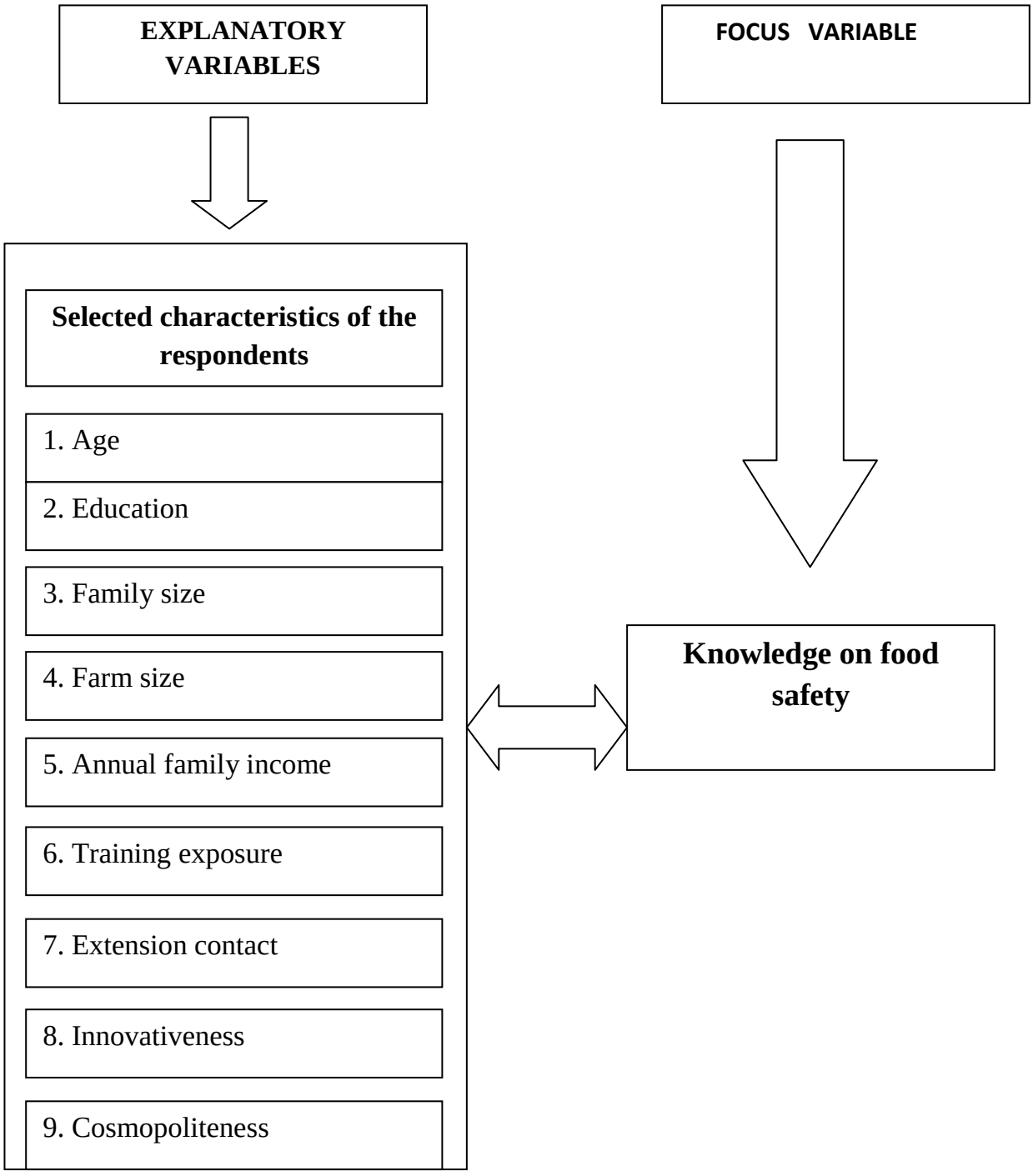

Figure 2.1. Conceptual framework of the study

CHAPTER III

METHODOLOGY

To present a scientific research methodology represents an important role. So, to fulfill the objectives of the study, a researcher should be very careful in formulating methods and procedures in conducting the research. Methodological issues followed in conducting the study have been presented in this chapter. The methods and operational procedures followed in conducting the study. The methods used and a chronological description of the methodology followed in conducting this research work has been presented in this chapter.

3.1. Locale of the study

Sreepur upazila of Magura district was selected purposely as the locale of the study. The study area was located in Sreepur upazila situated in 14 kilometers to the north-south corner of Magura district. Two villages namely, Kamlapur and maticata of Kadir para union under Sreepur upazila were selected randomly. Agriculture was the major occupation in the study area and the area has well accessibility through road and highways. The soil of this area is clay loam and silty loam textured capable of producing three crops per year. Generally, flood water does not overflow this area. This area made the soil of this area fertile and suitable for paddy, jute, spices, sugarcane, turmeric, pulses and vegetables etc. However, Sreepur upazila consists of eight union among which ward number six (Kadir para union) has comparatively more number of farmers. Besides, local communication system in this union is satisfactory. Considering the above facts, time and budget, the present study was conducted in Kadir para union.

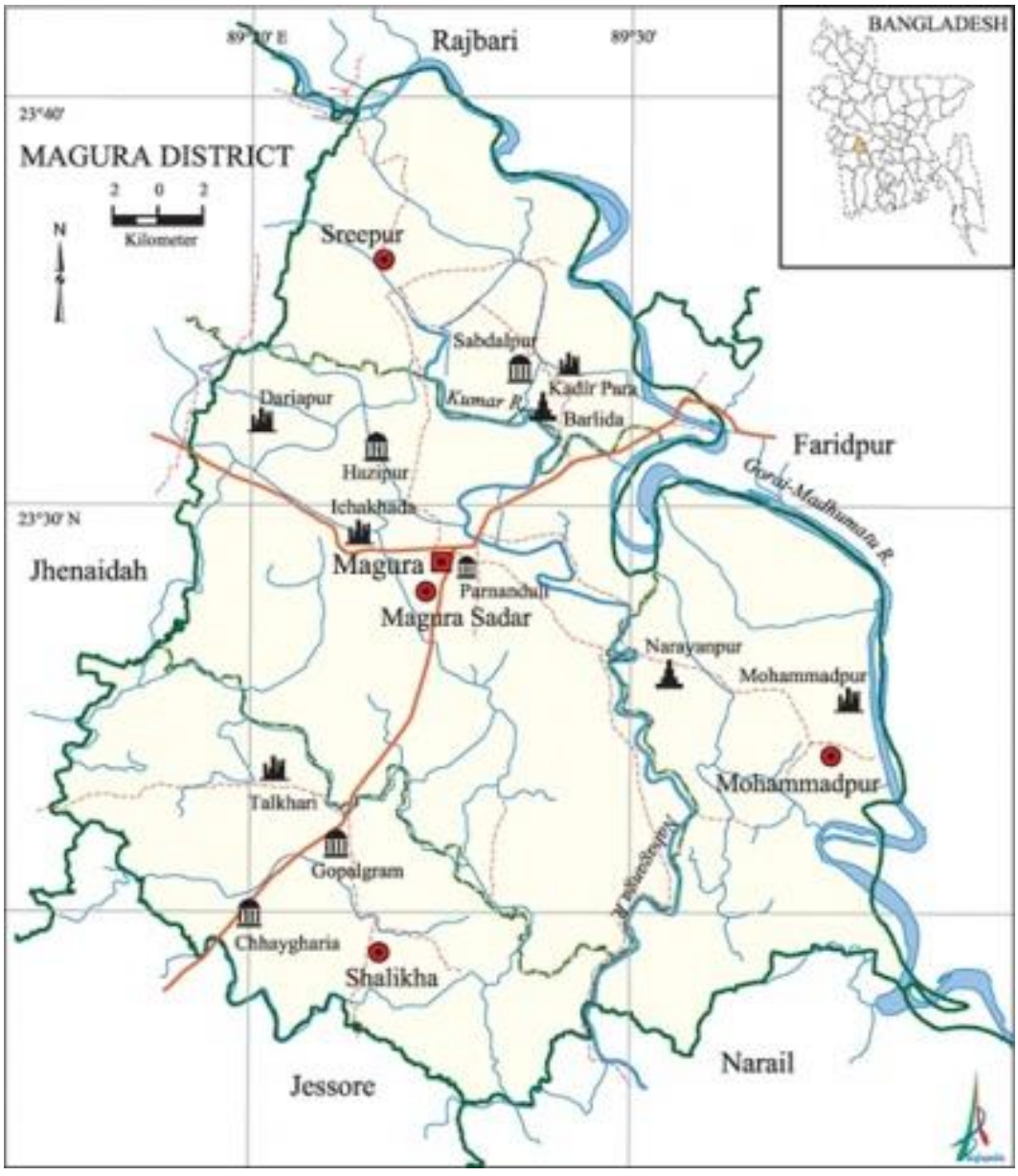

Figure 3.1. Map of Magura district showing different upazila

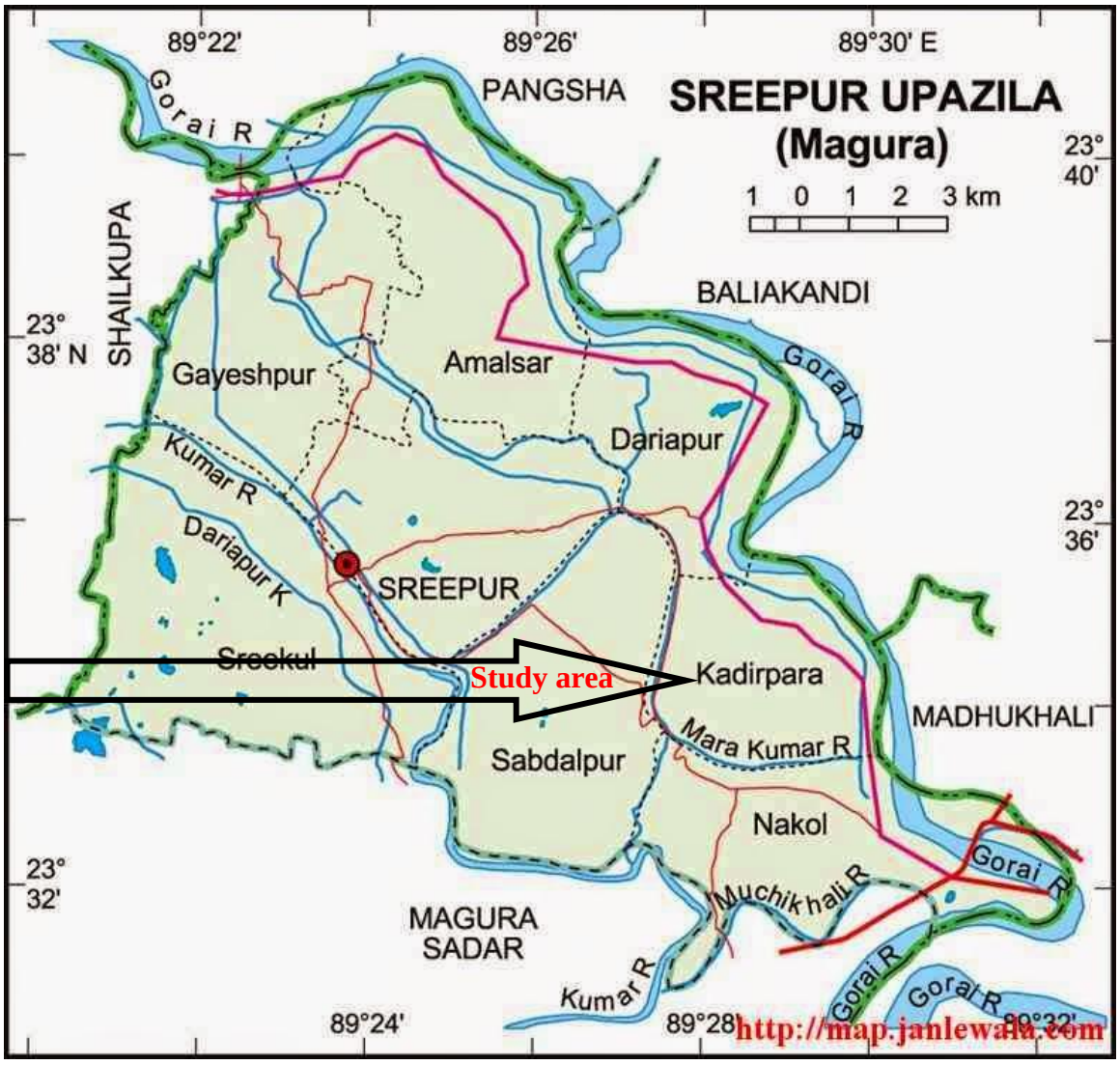

Figure 3.2. Map of Sreepur Upazila showing study area

3.2. Population and sample

People who permanently reside in the selected villages constituted the active population of this study. As all population of the study area cannot measure, head of the farm families of two villages under Kadir para union was the population of the present study. However, representative sample from the population were taken for collection of data following random sampling technique. The ward No. 6 (kadir para union) consists of nine villages among which two villages namely Kamlapur and Maticata were randomly selected. One farmer (who mainly operated the farming activities of the family) from each of the farm families was considered as the respondent. An updated list of all farm family heads of the selected villages was prepared with the help of SAAO and local leader. The list comprised of a total 550 farm families in the study area. These rural families constituted the population of this study. Twenty percent of the farm families of these villages were randomly selected as representative sample by using a Table of Random Numbers (Kerlinger, 1973). Thus, 110 farm family head constituted the sample of the study. Further eleventh respondent farmers were selected randomly from the population except the sample included in the reserved list, which were interviewed when the respondent in the original sample list were not available at the time of interview. A detailed structure of population and sample has been presented in the Table 3.1.

Table 3.1: Distribution of population and sample of the selected villages

Village	Population (Families)	Sample size	Reserved list
Kamlapur	390	78	8
Maticata	160	32	3
Total	550	110	11

3.3. Variables and their measurement techniques

In a descriptive social research, selection and measurement of the variable is an important task. A variable is any characteristics which can assume varying or different values are successive individual's cases (Ezekiel and Fox, 1959). An organized research usually contains at least two identical elements i.e. Independent and dependent variable. An independent variable is the factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. A dependent variable is the factor, which appears, disappears or varies as the experimenter introduces, removes or varies the independent variables (Townsend, 1953). According to the relevance of the research area, the researcher selected 9 characteristics of the respondents as the independent variables (e.g. age, education, family size, farm size, annual family income, training exposure, extension contact, innovativeness and cosmopoliteness). On the other hand farmers' knowledge on food safety faced by the respondents was the dependent variable. The following sections contain procedures of measurement of dependent and independent variables of the study.

3.3.1. Measurement of explanatory variables

The independent variables of the study were age, education, family size, farm size, annual family income, training exposure, extension contact, innovativeness and cosmopoliteness. The procedure followed in measuring the independent variables have been discussed in the subsequent sections.

3.3.1.1. Age

Age of the respondents was measured in terms of actual years from their birth to the time of interview, which was found on the basis of verbal response of the rural people (Azad, 2003). A score of one (1) was assigned for each year of one's age. This variable appears in item number one (1) in the interview schedule as presented in Appendix-A.

3.3.1.2. Education

Education was measured by assigning score against successful years of schooling by a respondent. One score was given for passing each level in an educational institution (Amin, 2004). For example if a respondent passed the final examination of class five or equivalent examination, his education score was given five (5). Each illiterate respondent was given a score of zero (0). A person not knowing reading or writing but being able to sign only was given a score of 0.5. This variable appears in item number two (2) in the interview schedule as presented in Appendix-A.

3.3.1.3. Family size

The family size was measured by the total number of members in the family of a respondent. The family members included family head and other dependent members like husband/wife, brother and sister, parents, children etc. who lived and ate together. The total number of family members was considered as his family size score. If a respondent had five members in his/her family, his/her family size score was given as five (5) (Khan, 2004). This variable appears in item number three (3) in the interview schedule as presented in Appendix-A.

3.3.1.4. Farm size

Farm size of a respondent referred to the total area of land on which his family carried out farming operation, the area being in terms of full benefit to the family. The term refers to the cultivated area either owned by the respondent or cultivated on share cropping, lease or taking from other including homestead area. It was measured in hectares for each respondent using the following formula (Khan, 2004):

FS = A + B + ½(C + D) + E

Where,

FS = Farm size

A = Homestead area including garden and pond

B = Own land under own cultivation

C = Land taken from others as Borga

D = Land given to other as Borga

E = Land taken from others on lease

The data was first recorded in terms of local measurement unit i.e. kani or decimal and then converted into hectare. The total area, thus, obtained is considered as his farm size score (assigning a score of one for each hectare of land). This variable appears in item number four (4) in the interview schedule as presented in Appendix-A.

3.3.1.5. Annual family income

Annual income referred to the total financial return of a household from farm (Crops, livestock, poultry and fish) and nonfarm sources (business, job, remittance and others) in one year. It was expressed in Taka. In measuring this variable, total earning in Taka of a respondent was converted into score. A score of one was given for every 1000 Taka (Waheduzzaman, 2004). This variable appears in item number five (5) in the interview schedule as presented in Appendix-A

3.3.1.6. Training exposure

Training experience of a respondent was measured by the total member of day he/she attended in different training programs in his life. A score of one (1) was assigned for each day of training attended. Data obtained in response to item number six (6) of the interview schedule as presented in Appendix-A.

3.3.1.7. Extension contact

It was defined as one's extent of exposure to different communication media related to farming activities. Extension media contact of a respondent was measured by computing extension media contact score on the basis of their nature of contact with eighteen extension media by taking seven personal, four group and seven mass media. Each respondent was asked to indicate his nature of contact with four alternative responses, like frequently, occasionally, rarely and not at all basis to each of the eighteen media and score of three, two, one and zero were assigned for those alternative responses, respectively (Hasan, 2006). These four 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 is presented in item number seven (7), Appendix-A.

Extension media contact of the respondent was measured by adding the scores of eighteen selected extension media. Thus extension media contact score of a respondent could range from 0 to 54, where zero indicated no extension media contact and fifty four indicated highest level of extension media contact. This variable appears in item number seven (7) in the interview schedule as presented in Appendix-A.

3.5.1.8. Innovativeness

Innovativeness of safe food grower was measured by computing an innovativeness score on the basis of his adoption of 8 selected agricultural innovations. Score was assigned on the basis of time dimension. Since the exact date of introduction of the selected innovations in the study area was not specifically known, the relative earliness of the adoption of a particular innovation by a respondent was ascertained by considering how long before he first adopted that innovation prior to the date of interview. The higher the length of time of his first adoption, the

earlier he was adopting the innovation than other members of his social system. A score of one (1) was assigned for each year of adoption of a particular innovation prior to the date of interview subject to a minimum of 3 for adopting the innovation for 3 years or more prior to the date of interview. The scores for all the 8 innovations were added together to constitute the innovativeness score of a respondent. This score, thus, could raged from 0 to 24. Zero (0) indicating no innovativeness at all and 24, the highest degree of innovativeness. This variable appears in item number eight (8) in the interview schedule as presented in Appendix-A.

3.5.1.9. Cosmopoliteness

Cosmopoliteness of a respondent was measured by computing a cosmopoliteness score based on his frequency of visit to selected seven (7) different places outside his own social environment. Each respondent was asked to indicate the number of times he visited to each of the six different places. Scores were assigned to his response following the item nine in questionnaire presented in Appendix A.

The above mentioned weight age obtained from visit to each of the above categories of places were added together to get the cosmopoliteness score of a respondent. Thus the score of a respondent could range from 0 to 21, where 0 indicating no cosmopoliteness and 21 highest cosmopoliteness. This variable appears in item nine (9) in the interview schedule as presented in Appendix-A.

3.3.2. Measurement of focus Variable

The dependent variables in this study, was farmers' knowledge on food safety. Selected respondents knowledge on food safety was measured by asking them fourteen questions on different aspects of safe food production. The total marks for all the question was 28. A respondent answering a question correctly obtained the full marks, while for a partial correct answer he/she was given marks proportionately. The total knowledge score obtained by a respondent was taken as

his food safety knowledge score. This score could range from 0 to 28 indicting no knowledge and 28 the highest knowledge. This variable appears in item number ten (10) in the interview schedule as presented in Appendix-A.

3.4 Hypothesis

A null hypothesis states that there is no relationship between the concerned variable. If a null hypothesis is rejected on the basis of statistical test, it is concluded that there is a relationship between the concerned variables. However, following null hypotheses was formulated for the present study:

- There was no relationship between the selected characteristics of the farmers and their knowledge on food safety.

The selected characteristics are: age, education, family size, farm size, annual family income, training exposure, extension contact, innovativeness and cosmopoliteness.

3.5 Collection of Data

Data were collected by the researcher himself during 1st September to 30 October 2018. To get valid pertinent information, the researcher made all possible efforts to explain the purpose of the study to the respondents. Interviews were conducted with the respondents in their homes and farms. While staring interview with respondent, the researcher look all possible care lo establish rapport with him/her so that she/he did not feel hesitant or hesitate to furnish proper response to the questions and statements in the schedule. The questions were clearly explained wherever any respondent felt difficulty in understanding properly. The Sub-Assistant Agricultural Officer (SAAO), Agricultural officer, DAE rendered good cooperation in arranging appointments with the respondents.

3.6 Compilation of Data

After completion of field survey data from all the interview schedules were compiled, tabulated and analyzed according to the objectives of the study. In this process, all the responses in the interview schedule were given numerical coded values. Local units were converted into standard units. The responses to the questions in the interview schedules were transferred to a master sheet to facilitate tabulation. Tabulations and cross tabulations were done on the basis of categories developed by the investigator himself.

3.7 Categorization of the respondents

It was necessary to develop suitable categories to determine the knowledge on food safety among the respondents in selected aspects. For the purpose, the respondents were classified into categories on the basis of obtained scores of knowledge on food safety.

Categories were also developed for describing each of the selected characteristics of the rural people. Nature of the data and mode of the categorization prevailing on the social system guided the researcher in developing categories in respect of selected characteristics.

3.8 Statistical analysis

Data collected from the respondents were analyzed and interpreted in accordance with the objectives of the study. The analysis of data was performed using statistical treatment with SPSS (Statistical Package for Social Sciences) computer program. Statistical measures as number, range, mean, standard deviation and rank order were used in describing the variables whenever applicable. In order to explore the knowledge on food safety performed by the respondents and their selected characteristics, Pearson's Product Moment Correlation Co-efficient (r) was used (Ray and Mondal, 2004).

Throughout the study, five percent (0.05) level of significance was used as the basis for rejecting any null hypothesis. If the computed value of (r) was equal to or greater than the table value of (r) at the designated level of significance for the relevant degree of freedom, the null hypothesis was rejected and it was concluded that there was significant relationship between the concerned variable.

Whenever the computed value of (r) was found to be smaller than the tabulated value of (r) at the designated level of significance for the relevant degrees of freedom, the null hypothesis could not be rejected. Hence, it was concluded that there was no relationship between the concerned variables.

CHAPTER IV

RESULTS AND DISCUSSION

This chapter deals with the result and discussion of present research work. Necessary explanations and appropriate interpretations have also been made showing possible and logical basis of the findings. However, for convenience of the discussions, the findings are systematically presented in the following sections.

4.1 Selected characteristics of the respondents

This section deals with the classification of the farmers according to their various characteristics. Behavior of an individual is largely determined by his characteristics. In this section the findings on the farmer's selected nine characteristics have been discussed. The selected characteristics are (i) age, (ii) education, (iii) family size, (iv) farm size, (v) annual family income, (vi) training exposure, (vii) extension contact, (viii) innovativeness and (ix) cosmopoliteness. Range, mean and standard deviations of these characteristics of the growers are described in this section. A summary profile of the farmer's characteristics has been given in Table 4.1.

Table 4.1: Prominent features of the selected characteristics of the respondents

Sl. No.	Characteristics (with measuring unit)	Range		Mean	Standard deviation
		Possible	Observed		
1.	Age (years)	--	20-75	45.74	12.02
2.	Education (schooling years)	0-14	0-14	4.72	4.44
3.	Family size (number of members)	--	2-10	4.92	1.76
4.	Farm size (hectare)	--	0.02-3.16	0.51	0.45
5.	Annual family income ('000'Taka)	--	40-530	271.17	214.94

6.	Training exposure (number of days)	--	0-9	0.90	1.54
7.	Extension contact (score)	0-54	0-24	10.84	3.63
8.	Innovativeness (score)	0-24	0-17	8.80	2.46
9.	Cosmopoliteness (score)	0-21	4-12	6.50	3.31

4.1.1. Age

Age of the respondents varied from 20 to 75 years, the average being 45.74 years with the standard deviation of 12.02 (Table 4.1). According to their age, the respondents were classified into three categories as "young aged" (up to 35 years), "middle aged" (36- 50 years) and "old aged" (above 50 years). The distribution of the farmers according to their age is shown in Table 4.2.

Table 4.2: Distribution of the farmers according to their age

Categories	Years	Respondents	
		Numbers	Percent
Young age	Up to 35	23	20.91
Middle age	36 to 50	53	48.18
Old age	Above 50	34	30.91
Total		110	100

Age is one of the most vital factors concerning to one's livelihood. Data represented in Table 4.2 indicate that near about half (48.18 percent) of the respondents were middle aged as compared to 20.91 percent being young and 30.91 percent old. This seems logical because heads of the farm families were selected as respondent. With the increase in age they find few alternatives for livelihood except farming activities in parents' farm thus become committed in agricultural activities. This lead to understanding that household food safety would reflected more by the middle-aged group in the present study. Therefore, extension

agencies should compensate a clear concentration to the middle-aged farmers for safe food production.

4.1.2. Education

Education level of the respondents ranged from 0-14 in accordance with year of schooling. The average education score of the respondents was 4.72 with a standard deviation of 4.44 (Table 4.1). On the basis of their level of education, the farmers were classified into five categories as shown in Table 4.3.

Table 4.3: Distribution of the farmers according to their level of education

Categories	Basis of Categorization (schooling years)	Respondents	
		Numbers	Percent
Illiterate	0	6	5.45
Can sign only	0.5	39	35.45
Primary	1-5	16	14.55
Secondary	6-10	40	36.36
Above secondary	Above 10	9	8.18
Total		110	100

Data shown in the Table 4.3 indicated that 36.36 percent of the farmers had secondary level of education compared to 5.45 percent illiterate, 35.45 percent could sign their name only, 14.55 percent had primary level education and only 8.18 percent had above secondary level of education.

People that have a higher education are more likely to express their positive attitudes towards healthy and environmental save product, and they also require more information about the production process and method through reading leaflets, booklets, books and other printed materials in this case.

Education helps the farmers to expand their outlook and spread out mental horizon by helping them to develop favorable attitude, correct perception and knowledge

about production technology and postharvest practices. Comparatively educated person is relatively more responsive to the technology and new innovation.

The findings of this study, however, indicate that 40.90 percent of the farmers were illiterate or could sign their name only which is supposed to face a great difficulty in producing safe food regarding knowledge on food safety. Such consideration indicates the need for improving literacy level among the farmers for practicing safe food production. Although 36.36 percent farmers had secondary education but they are engaged in production of rice and wheat in order to maintain food security. So, motivational program should be arranged to make farmers' attention in safe food production.

4.1.3. Family Size

The number of family members of the respondents ranged from 2 to 10 with an average of 4.92 and standard deviation of 1.76 (Table 4.1). Based on the family size the respondents were classified into three categories as small, medium and large family as shown in Table 4.4.

Table 4.4: Distribution of the farmers according to their family size

Categories	Basis of categorization (No. of family member)	Respondents	
		Numbers	Percent
Small family	Up to 4	55	50.00
Medium family	5-6	36	32.73
Large family	Above 6	19	17.27
Total		110	100

Data furnished in the Table 4.4 indicated that the highest proportion (50.00 percent) of the respondents had small family size consisting of 2 to 4 members, while 32.73% of the respondents belonged to the category of medium family compared to 17.27% of them having large family size. Data indicated that the

average family size (4.92) of the respondents in the study area is nearest to the national average of 5.6 (BBS, 2009).

4.1.4. Farm Size

Farm size of the respondents ranged from 0.02 hectare to 3.16 hectares with the mean of 0.51 hectare and standard deviation of 0.45 (Table 4.1). On the basis of their farm size, the farmers were classified into three categories followed by DAE (1999) as shown in Table 4.5.

Table 4.5: Distribution of farmers according to their farm size

Categories	Basis of categorization (ha)	Respondents	
		Numbers	Percent
Marginal farmer	0.03 to 0.20	21	19.09
Small farmer	0.21 to 1.00	79	71.82
Medium farmer	1.01 to 3.0	9	8.18
Large farmer	More than 3.0	1	0.91
Total		110	100

Data presented in the Table 4.5 demonstrated that highest proportion (71.82 percent) of the farmers had small farm compared to 19.09% having marginal farm and only 8.18% had medium farm. The findings indicated that overwhelming majority (90 percent) of the farmers had marginal to small farm size.

Size of the farm is highly related with achieving food security. It contributes to gross and net income. Most of the people of Bangladesh inhabit in the rural areas and majority of them have small income from small operational land. Many of them in rural area are without sufficient skill and knowledge on crop production. This is a great treat for achieving safe food. Therefore government extension agencies and NGO's should pay attention to take steps for marginal and small farm holders on the priority basis. The extension agencies will not able to give

them land but can easily train them up for modern agricultural technology related to food safety.

4.1.5. Family income

The observed ranged of the annual family income of the respondents varied from 40 to 530 thousand taka with a mean of 217.17 thousand taka and standard deviation of 214.94 (Table 4.1). On the basis of annual family income, the respondents were categorized into three classes namely low, medium and high income categories shown in Table 4.6.

Table 4.6: Distribution of farmers regarding annual family income

Categories	Basis of categorization (‘000’ taka)	Respondents	
		Numbers	Percent
Low income	Up to 171	18	16.36
Medium income	172 to 340	39	35.45
High income	Above 340	53	48.18
Total		110	100

Data shown in Table 4.6 presented that the highest proportion of the respondents (48.18 percent) had high annual family income while 35.45% and 16.36% of them had medium and low annual family income, respectively. Findings reveal that the most (83.63%) of the respondents had medium to high annual family income in the selected study area.

The gross annual family income of a farmer is an important indicator of how much he/she can invest in his farming. Generally higher income give confidence one’s integrity to achieve better routine and to show his/her individual better status in the society. The higher income increases the risk taking capacity of the farmers’ safe food production. Farmers with low income generally invest less in their farms and most of them are interested to high return with low input. It is therefore, likely

that in most of the cases food safety might be hampered with high synthetic inputs for better returns.

4.1.6. Training exposure

The score of training exposure on safe food production and processing of the farmers ranged from 0-9 days. The mean was 0.90 days and standard deviation was 1.54 (Table 4.1). On the basis of training exposure on food safety, the respondents were categorized into three groups as shown in Table 4.7.

Table 4.7: Distribution of the farmers according to their training exposure

Categories	Basis of categorization (Days)	Respondents	
		Numbers	Percent
No training	0	53	48.18
Low training	1-3	50	45.45
Medium training	Above 3	7	6.36
Total		110	100

Data presented in the Table 4.7 showed that near about half of the total respondents (48.18 percent) had no training on food safety while 45.45% of the farmers had low training exposure and 6.36% percent had medium exposure. It means that an overwhelming majority (91.63 percent) of the farmers had no or low training exposure.

It is logical that there is always a relationship between training exposure and knowledge on safe food production practices. Because training received develops the farmers' knowledge, skill, and attitude in production and processing of crops safely. The findings suggest that training experience might be the most important factor for the respondents to change their knowledge on food safety.

4.1.7. Extension contact

The score of extension contact on food safety practice ranged from 0-24 with possible score range of 0-54. The mean was 10.84 and standard deviation was 3.63 (Table 4.1). On the basis of extension contact, the respondents were categorized into three groups as shown in Table 4.8.

Table 4.8: Distribution of the farmers according to their extension contact

Categories	Basis of categorization (score)	Respondents	
		Numbers	Percent
Very Low contact	Up to 8	59	53.64
Low contact	9 to 16	48	43.64
Medium contact	Above 16	3	2.73
Total		110	100

Data presented in Table 4.8 indicate that more than fifty percent the respondents (53.64 percent) had very low extension contact while 43.64% had low and only 2.75% had medium extension contact.

Findings indicate that the respondents under the study area are not well connected with different extension services. But it is generally known that extension contact may be a good source of different information. Extension contact helps the farmers for better understanding and to get recent information regarding food safety. The finding reveals that the respondents of the study area had very poor contact with different media. It is proved that there is always a relationship between contact with different media and adoption of innovation. In order to increase safe food production practice, contact with different media of the fanners should be increased.

4.1.8. Innovativeness

The observed innovativeness scores of the respondents ranged from 0 to 17 against the possible range of 0 to 24 (Table 4.1). However, the average was 8.80 and the standard deviation was 2.46. Based on their innovativeness scores, the respondents were classified into three categories: "low innovativeness", "medium innovativeness" and "high innovativeness". The distribution of the respondents according to their innovativeness is shown in Table 4.9.

Table 4.9: Distribution of the farmers according to their innovativeness

Categories	Basis of categorization (score)	Respondents	
		Numbers	Percent
Low	Up to 8	42	38.18
Medium	9-16	66	60.00
High	Above 16	2	1.82
Total		110	100

The finding presented in Table 4.9 indicates that the highest proportion (60 percent) of the farmers had medium innovativeness as compared to 38.18 percent and only 1.82 percent having low and high innovativeness respectively. The result would help the extension planners to chalk out future extension programmes for transferring technologies to the potential growers.

4.1.9. Cosmopoliteness

Cosmopoliteness of the respondents ranged from 1 to 7 with an average of 1.50 and a standard deviation of 1.31 against the possible range of 0 to 21. On the basis of their cosmopoliteness scores, the farmers were classified into three categories: "low cosmopoliteness", "medium cosmopoliteness" and "high cosmopoliteness". The distribution of the respondents according to their cosmopoliteness is shown in Table 4.10.

Table 4.10: Distribution of the farmers according to their cosmopoliteness

Categories	Basis of categorization (score)	Respondents	
		Numbers	Percent
Low	0-4	101	91.82
Medium	5-8	7	6.36
High	Above 8	2	1.82
Total		110	100

The finding shows that majority (91.82 percent) of the farmers had low cosmopoliteness compared to 6.36% and 1.82% of them having medium and high cosmopoliteness respectively. The finding reveals that maximum respondents do not have outward exposure in terms of cosmopoliteness which has a positive relationship with acceptance on new technology.

4.2. Knowledge on food safety

Knowledge on food safety score of the respondents ranged from 10 to 27 against the possible range of 0 – 28 having an average of 17.99 and standard deviation of 5.39 (Table 4.11). On the basis of knowledge scores, the respondents were classified into three categories namely, 'low knowledge', 'medium knowledge' and 'high knowledge'. The distribution of the respondents according to their knowledge on food safety is given in Table 4.11.

Table 4.11: Distribution of the farmers according to their knowledge on food safety

Categories	Basis of categorization (score)	Respondents		Mean	Standard deviation
		Numbers	Percent		
Low	0-9	10	8.00	17.99	5.39
Medium	10-18	65	59.09		
High	19-28	35	32.91		
Total		110	100		

Data of Table 4.11 shows that 59.09 percent of the respondents felt in medium knowledge category followed by 32.91 percent in high knowledge category and 8 percent respondents were in low knowledge category. The finding is similar with Khan (2005). Knowledge is to be considered as vision of an explanation in any aspect of the situation regarding food safety. It is act or state of understanding; clear perception of fact or truth, that helps an individual to foresee the consequence he may have to face in future. It makes individuals to become rational and conscious about related field. To perform optimum production and processing of food, farmers should have adequate knowledge on different aspects of food safety.

4.3. Relationship between the selected characteristics of the farmers and their knowledge on food safety

Co-efficient of correlation was computed in order to explore the relationship between the sleeted characteristics of the farmers and their knowledge on food safety.

Pierson's Product Moment Co-efficient of Correlation (r) has been used to test the hypothesis concerning the relationship between two variables. Five percent and one percent level of probability were used as the basis of acceptance or rejection of a hypothesis. The Table value of 'r' was calculated at (110-1) = 109 degrees of freedom. The summary of the results of the co-efficient of correlation indicating the relationships between the selected characteristics of the respondents and their knowledge on food safety is shown in Table 4.13

Table 4.13: Co-efficient of correlation showing relationship between selected characteristics of the farmers and knowledge on food safety practices

Focus variable	Selected characteristics	Computed value of "r"	Tabulated value of "r" with 108 degrees of freedom	
			at 0.05 level	at 0.01 level
Knowledge on food safety	Age	0.091^{NS}	0.184	0.241
	Education	0.209*		
	Family size	0.087^{NS}		
	Farm size	0.409**		
	Annual family income	0.172^{NS}		
	Training exposure	0.139^{NS}		
	Extension contact	0.319**		
	Innovativeness	0.287**		
	Cosmopoliteness	0.008^{NS}		

^{NS} Not significant

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

4.3.1. Relationship between education of the respondents and their knowledge on food safety

The co-efficient of correlation (r) between the concerned variables was computed and found to be 0.209 presented in Table 4.13 which led to the following observations:

- The relationship showed a positive direction.
- The computed value of 'r' (0.209) was found to be greater than the Table value of 'r' (0.184) with 108 degrees of freedom at 5% level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 5% level of probability

The finding implies that the education of the respondents had significant positive relationship with their knowledge on food safety. .The findings is similar with akhter (2003). The finding is quite balanced because education helps to safe food production through gathering knowledge and experience easily.

4.3.2. Relationship between farm size of the respondents and their knowledge on food safety

The co-efficient of correlation (r) between the concerned variables was computed and found to be 0.409 presented in Table 4.13 which led to the following observations:

- The relationship showed a positive direction.
- The computed value of 'r' (0.409) was found to be greater than the Table value of 'r' (0.241) with 108 degrees of freedom at 1% level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 1% level of probability.

The finding implies that the farm size of the respondents had significant positive relationship with their knowledge on food safety. The finding is quite rational because safe food production practice is relatively costly. Hence, large growers get more scope than the small growers as they can invest more money for food safety.

4.3.3. Relationship between extension contact of the respondents and their knowledge on food safety

The co-efficient of correlation (r) between the concerned variables was computed and found to be 0.319 presented in Table 4.13 which led to the following observations:

- The relationship showed a positive direction.

- The computed value of ‘r’ (0.319) was found to be greater than the Table value of ‘r’ (0.241) with 108 degrees of freedom at 1% level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 1% level of probability.

The finding implies that the extension contact of the respondents had significant positive relationship with their knowledge on food safety. In addition, the sign of the coefficient value indicates higher the extension contact higher the knowledge on safe food production.

4.3.4. Relationship between innovativeness of the respondents and their knowledge on food safety

The co-efficient of correlation (r) between the concerned variables was computed and found to be 0.287 presented in Table 4.13 which led to the following observations:

- The relationship showed a positive direction.
- The computed value of ‘r’ (0.287) was found to be greater than the Table value of ‘r’ (0.241) with 108 degrees of freedom at 1% level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 1% level of probability.

The finding implies that the innovativeness of the respondents had significant positive relationship with their knowledge on food safety. The finding are similar with Aurangozeb(2002) and Islam(2002). Moreover, it can be said that the farmers who are more innovative have more knowledge on safe food production.

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1. Summary

The study title was undertaken as titled “Farmers knowledge on food safety” with the objectives of (i) To assess the extent of food safety knowledge among the rural households, (ii) To describe the determinant factors of the respondents (age, education, family size, farm size, annual family income, training exposure, extension contact, innovativeness and cosmopoliteness) and (iii) To explore relationships between the selected characteristics of the respondents and their knowledge on food safety. Kadir para union Union of Sreepur upazila under Magura district was the locale of the study. The sample of 110 farmers was drawn from a population of 550. Data were collected during 1st September to 30 November, 2018 using a pre-tested interview schedule. A summary of the major findings is given below:

5.1.1. Individual characteristics of the respondents

Age: Age of the respondents ranged from 20 to 75 years with an average of 45.74 years. Majority of the respondents (48.18%) were middle aged followed by 20.91% and 30.91% young and old-aged respectively.

Education: The highest proportions (36.36%) of the farmers were in the secondary level. Primary, above secondary, can sign only and illiterate level of literacy found 14.55, 8.18, 35.45 and 4.45 percent, respectively. It means, a major portion of the respondents (55.45%) of the respondent were illiterate or having education up to primary level.

Family Size: The highest proportion (50%) of the farmers had small family size, while 32.73% and 17.27% belonged to the medium family size and large family size, respectively.

Farm size: The highest proportion (71.82%) of the farmers had small farm size, while 8.18% and 18.18% belonged to the medium farm and marginal farm respectively.

Annual family income: The highest proportion (48.18%) had high annual family income compared with 35.45% having medium income and 16.36% having low annual family income.

Training exposure: Most (48.18%) of the respondents had no training compared to 45.45% and 6.36% having low training and medium training, respectively. It means overwhelming majority (83.50 percent) of the farmers had no to low training on food safety.

Extension contact: Most (53.64%) of the respondents had low extension contact compared to 43.64% and 2.73% having medium and high extension contact, respectively. It means more than 50% of the respondents had low extension contact.

Innovativeness: The highest proportion (60%) of the respondents had medium innovativeness as compared to 38.18% and 1.82% having low and high innovativeness respectively. It means that majority of the respondents were in medium innovativeness.

Cosmopoliteness: Most of the respondents (91.82%) had low cosmopoliteness followed by 6.36% and 1.82% medium and high cosmopoliteness respectively.

5.1.2. Knowledge on food safety

The highest proportion (59.09%) of the respondents was in medium knowledge category followed by 32.91% in high knowledge category and 8 % respondents were in low knowledge category.

5.1.3. Relationship between the selected characteristics of the farmers with their knowledge on food safety

Nine null hypotheses were formulated to explore the relationship between the selected characteristics of the farmers and their knowledge on food safety. For testing each of the hypotheses the co-efficient of correlation (r) test was used.

Correlation analysis indicates that education, farm size, extension contact and innovativeness had significant positive relationship with their knowledge on food safety. Hence, the null hypotheses concerning these four variables were rejected by the researcher. On the other hand, age, family size, annual family income, training exposure and cosmopoliteness behaviour of the farmers had no significant relationship with their knowledge on food safety. Hence, the null hypotheses concerning these five variables were accepted by the researcher.

5.2. Conclusions

Findings of the study and the logical interpretations of their meaning in the light of other relevant facts prompted the researcher to draw the following conclusions:

I. Finding shows that majority (59.09%) of the farmers had medium levels of knowledge. Besides 8 percent farmers had low knowledge on food safety. Therefore, it can be concluded that knowledge on food safety belongs to moderate satisfactory level and needs more improvement.

II. Education of the farmers showed that there was significant relationship with their knowledge on food safety. So, it may, therefore be concluded

that formal education of the respondents had relationship to increase their knowledge on food safety.

III. Farm size of the farmers had significant positive relationship with their knowledge on food safety. The farmers having large farms and being economically solvent always try to increase their knowledge. Considering the above facts, it may be concluded that the knowledge on food safety is remarkable to the farmers having large farms.

IV. Contact with different extension media of the farmers had positive significant relationship with their knowledge on food safety. It can be concluded that any attempt to increase the communication behaviour of the farmers would be helpful to increase knowledge on food safety.

V. Innovativeness of the farmers had significant positive relationship with their knowledge on food safety. Considering this fact, it can be concluded that any attempt to increase the innovativeness of the farmers would be helpful to increase knowledge on food safety.

5.3. Recommendations

5.3.1. Recommendations for policy implications

Based on the findings and conclusions of the study, the following recommendations are presented:

i. It may be recommended that attempts should be taken by DAE and other extension providers to arrange training, motivational campaigning and provide food safety guide for increasing knowledge on safe food production.

ii. Farm size played important role for the farmers to increase their knowledge on food safety. Therefore, the SAAO should motivate more the farmers having small farm to produce safe food.

iii. It may be recommended that attempts should be taken to establish adult learning centre to increase educational level as well as awareness on safe food production.

5.3.2. Recommendations for further study

A small piece of study as has been conducted which cannot provide all information for the proper understanding of food safety. Therefore, the following suggestions are made for further study:

I. The present investigation explored the relationships of the nine characteristics of the respondents with their knowledge on food safety. Further research may be conducted by taking other characteristics to observe relationships with their knowledge on food safety.

II. The present study was conducted in two villages of Sreepur Upazila under Magura district. So, similar studies may be undertaken in other parts of the country to verify the findings of the present study.

III. A positive trend of relationship was obtained between education of the growers and their knowledge on food safety. Hence, further studies are necessary to verify the relationship between the concerned variables.

IV. The present study has been carried out among the male farmers only. So, a similar study may be conducted with the farm women to examine their views and opinions regarding the knowledge on food safety.

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APPENDICES

Appendix A. Questionnaire of the study

English version of the interview schedule

Department of Agricultural Extension & Information System
Sher-e-Bangla Agricultural University, Dhaka-1207

A questionnaire on
An interview schedule for a research study entitled

ASSESSING FARMERS' KNOWLEDGE ON FOOD SAFETY

Serial No. : …….

Name of the respondent : ……..

Address : ……..

: ……..

: ……..

Please answer the following questions. Information given by you will be kept secret and only be used for research work

1. Age

What is your age? ---------- Years.

2. Education:

a) Illiterate …….

b) Can sign only …….

c) Studied up to class ……...

3. Family size

Please mention the number of your family members in the following groups:

a) Male member …….. person(s)

b) Female member ……. person(s)

c) Total member ……. Person

4. Farm Size

Please mention the area of your land possession:

Sl. No.	Types ofland ownership	Land Area	
		Local unit	Hectare
1.	Homestead area (Including pond)		
2.	Own land under own cultivation		
3.	Land given to others as shared crop		
4.	Land taken from others as shared crop		
5.	Land given to others as lease		
6.	Land taken from others as lease		
7.	Fallow land		
	Total		

5. Annual income (Tk.)

Please mention production and income of your family from different sectors in the last year.

Sl. No.	Source of income	Amount of production	Price per unit (Tk.)	Total (Tk.)
A	**Agriculture**			
1	Rice			
2	Jute			
3	Wheat			
4	Potato			
5	Pulse			
6	Oilseed			
7	Spices and condiments			
8	Vegetables			
9	Fruits			
10	Other crops			
11	Fish culture			
12	Poultry rearing			
13	Cattle rearing			
B	**Business**			
C	**Service**			
D	**Labour**			
E	**Others**			

Total annual income = A+B+C+D+E = …….

6. Training Exposure

Do you attend any training on agriculture during last 5 years? **Yes** ☐ **No** ☐

If yes, Please mention the training courses you have attended so far

Sl. No.	**Subject**	**Place**	**Duration(day)**	**Organization**
1.				
2.				
3.				
4.				
5.				
6.				

7. Extension contact

Please mention the extension contact you have attended so far

Type of media	**Name of information media**	**Extent of contact**			
		Frequently	Occasionally	Rarely	Not at all
		3	2	1	0
Personal Contact	Friends/relatives				
	Extension agents (SAAO/FMO)				
	Extension officials (AEO/AAO/UAO)				
	BADC officials/UFPO				
	NGO personnel/AHI/UMO				
	Input dealers				
	Model farmer				
Group Contact	Demonstrations				
	Field days				
	Training days				
	Group meetings				
Mass Contact	Radio				
	Television				
	Newspaper				
	Leaf lets or booklet				
	Reading agricultural books				
	Agricultural fair				
	Audio-visual aids				

8. Innovativeness

Please mention extent of use of the following modern Agricultural Practices.

Sl. No.	Name of Innovation	Used			Do not use
		Below 1 year (1)	1-3 years (2)	Above 3 year (3)	(0)
1.	Use of organic manure instead of chemical fertilizers				
2.	Use of green manure in crop production				
3.	Use of modern Agricultural Machineries(Power tiller/ Pump/ Seed Driller)				
4.	Use of pheromone				
5.	Use of HYV/Hybrid Seed				
6.	Reduction of chemical pesticides				
7.	Effective use of organic pesticides				
8.	Processing of agricultural products for storage and/or marketing using organics instead of synthetic chemicals				

9. Cosmopoliteness

Please indicate how frequently you visit the following places within a specific period.

Sl.No.	Places of visit	Degree of Visit			
		Regularly (3)	Occasionally (2)	Rarely (1)	Not at All (0)
1.	Visit to market/Relatives/friends outside of your own village but Within your own union	7 or more times/month	3-6 times/ month	1-2 times/ month	No Visit
2.	Visit to other union	6 or more Times/month	4-5 times/ month	1-3times/ month	No Visit
3.	Visit to own thana headquarter	6 or more Times/month	4-5 times/ month	1-3times/ month	No Visit
4.	Visit to other Thana headquarter	4 or more Times/year	3-4 times/ year	once/ year	No Visit
5.	Visit to own town/head quarter	4 or more Times/year	3-4 times/ year	once/ year	No Visit
6.	Visit to other District town/headquarter	4 or more Times/year	2-3times/ year	once/ year	No Visit
7.	Visit to Capital City or other Metropolitan City	4 or more Times/year	2-3times/ year	once/ year	No Visit

10. Knowledge on food safety

Kindly answer the following question:

Sl. No.	Question	Full Marks	Marks Obtain
1.	What do you mean by safe food?	2	
2.	Mention two adverse effect on health using synthetic chemical during production	2	
3.	Mention at least two residual effect of synthetic chemical	2	
4.	How many days required of food consumption after spraying of pesticides is safe for health?	2	
5.	Mention at least two substances that are harmful or useful for safe food production	2	
6.	Mention the procedure of preservation of food safely for health for long term or short term?	2	
7.	Mention one example of organic compound and one chemical compound during storage of food	2	
8.	Mention at least two examples of harmful effect of chemical compounds on health during storage of food	2	
9.	What do you mean by organic farming?	2	
10.	Do you know which substances are harmful or useful for safe food production? Mention at least two of each.	2	
11.	What are the characteristics of quality seed?	2	
12.	In which stage pest infestation is high in rice cultivation?	2	
13.	Except for pesticide, what are the methods you used for controlling pest?	2	
14.	After how many days of spraying food consumption is safe for health?	2	
Total marks =		**28**	

Thank you for your kind cooperation.

.....

Date:..... Signature of Interviewer

Appendix -B: Correlation Matrix showing interrelation among all the variables (N=110)

Category	Age	Education	Family size	Farm size	Annual family income	Training exposure	Extension contact	Innovativeness	Cosmopoliteness	Knowledge on food safety
Age	1									
Education	-0.211*	1								
Family size	0.194*	-0.024	1							
Farm size	-0.069	0.082	0.207*	1						
Annual family income	-0.209*	-0.090	0.208*	0.437**	1					
Training exposure	0.155	0.414**	-0.064	0.220*	0.075	1				
Extension contact	0.027	-0.045	0.159	0.326*	0.221*	0.259**	1			
Innovativeness	0.019	0.031	0.060	0.210*	0.156	0.031	0.404**	1		
Cosmopoliteness	-0.110	0.435**	-0.026	0.153	-0.005	0.384**	-0.052	-0.050	1	
Knowledge on food safety	0.091	0.209*	0.087	0.409**	0.172	0.139	0.319**	0.287**	0.008	1

Correlation is not significant * = Correlation is significant at the 0.05 level (2-tailed) ** = Correlation is significant at the 0.01 level (2-tailed)