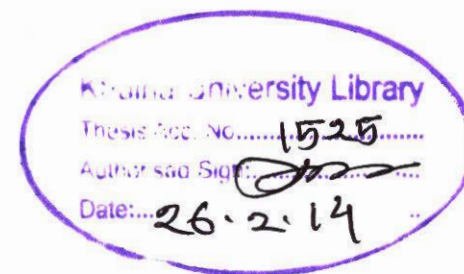


**PERFORMANCE ANALYSIS OF THE TRAINED FISH FARMERS
AND GENDER PARTICIPATION IN SMALL-SCALE
AQUACULTURE**

**A THESIS
BY**

ASHOKE KUMAR SARKER

**Roll NO. : MS 000611
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**Submitted to the Fisheries and Marine Resource Technology Discipline under the
Life Science School
in partial fulfilment of the requirements
for the degree of**

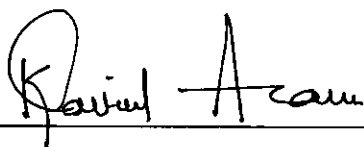
**Master of Science (MS)
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March, 2003

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AND GENDER PARTICIPATION IN SMALL-SCALE
AQUACULTURE**

Approved as to style and content
by

A handwritten signature in black ink, appearing to read 'Khairul Azam', is written over a horizontal line.

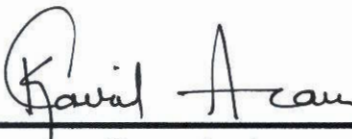
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Declaration

The results in this thesis are entirely of the candidate's own investigations and no part of the results has been accepted for any degree, nor it is being concurrently submitted for any degree.


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***DEDICATED
TO MY
BELOVED PARENTS***

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Ashoke Kumar Sarker

ABSTRACT

An investigation on the socio- economic profile of the selected farmers, adoption of training messages, assessment of fish production after receiving training and identification of the constraints of women participation in small scale aquaculture were conducted. Farmers were selected from Jheneidah Sadar Upzia under Jheneidah District. Socio-economic profiles of the selected farmers were presented in terms of age structure, household size, educational level, household cropland holding, annual household cash income and status of previous training on management of small-scale aquaculture. The age groups of 26 to 35 years were found to be the highest for men farmer's (68%) and women farmers (72%). The largest household size was found to vary between 5-7 persons for men and women respectively. The principal occupation of men farmers (42%) was agriculture while all women farmers were engaged in household keeping. Both men farmers (42%) and women farmers (64%) had 10-20 decimal aquaculture resource (pond) ownership. Household croplands of 50-75 decimal were owned by men farmers (56%) compared to 58 percent for women farmers. Annual households cash income of men farmers (74%) and women farmers (64%) were observed to vary between Tk. 20001-25000. All men and women farmers did not receive any training on management of small-scale aquaculture before this study. The average fish production rate for men farmers was recorded as 4.14 ± 1.30 Kg/decimal while the production rate was 3.74 ± 1.24 Kg/decimal of women farmers before training. However, after training the average fish production rate was recorded as 7.80 ± 2.4 and 6.60 ± 2.3 Kg/decimal for men and women farmers respectively. As well, there was increased fish production (88.88%) for men farmers compared to the production (76.47%) for women farmers from the baseline production. Age group 26-35 years of men (68%) and women (72%) adopted training messages in equal range. Most men (74%) and women farmers (64%) having upto primary education adopted training messages at significant level. Maximum men farmers (42%) who were involved in agriculture and women farmers (100%) in house hold work adopted the training messages almost equally. Annual household cash income of men farmers (40%) and women farmers (44%) varied Tk. 25001-30000. Both men and women farmers in this group also adopted the training messages at the significant level. Despite the fact that there were various constraints such as dependent upon men members of family for decision and inputs of fish culture, religious taboo, bearing children in training session, low level education, want of productive job, malnutrition, unable to contact Fisheries office, women farmers adopted training messages and performance of fish production after training were observed to be in significant range in comparison to men farmers who did not have such constraints.

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ABBREVIATIONS AND ACRONYMS

BLRI	Bangladesh Livestock Research Institute
BARC	Bangladesh Agricultural Research Council
BBS	Bangladesh Bureau of Statistics
BFRI	Bangladesh Fisheries Research Institute
PADEK	Partnership for development in Kampuchea
FFP	Fourth Fisheries Project
ICLARM	International centre for living aquatic resource management
FGD	Focus group discussion
<i>et al.</i>	Associates
DOF	Department of Fisheries
PRA	Participatory Rural Appraisal
CI	Confidence interval
NGO	Non-Governmental organization
SUFER	Support for University Fisheries Education and Research
SRDI	Soil Research and Development Institute
FMRT	Fisheries and Marine Resource Technology

CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

Fish is very important source of animal protein to the people of Bangladesh providing as much as 63 percent (DoF, 2002,). Annual per capita fish need is 18.0 kg while the amount produced is only 12 kg (DoF, 2002,). With the extensive gap between the supply and the increasing demand for fish, Bangladesh is looking to aquaculture as a means of filling the gap. The decline in fish production is affecting rural households mainly as a means of income as well as mitigation of malnutrition. This quantity is even lower to the poor rural people, which has resulted a tremendous negative impact on the health condition of those people. According to nutrition survey approximately 30,000 children are becoming blind each year due to vitamin – A deficiency in this country (Thilsted *et al.* (1997)

Fisheries sub-sector in this country is broadly divided into two categories: (i) capture fishery and (ii) culture fishery. Capture fishery includes: (i) fresh water capture fishery and (ii) marine water capture fishery. Culture fishery, on the other hand, consists of fresh water aquaculture and coastal aquaculture (Planning Commission, 1998).

In Bangladesh, a total area of the inland closed water body in the country is about 388,341 hectare and out of that the area of pond & ditches is about 241,500 hectare (62%), which produced 712,640 metric ton and other inland closed water bodies produced 615,825 metric ton fish for the year 2000-2001 (DoF, 2002). During 2000-2001 sector wise fish production in Bangladesh was the highest (40%) from inland culture fisheries that was followed by inland capture fisheries (39%) and Marine capture fisheries (21%) (DoF, 2002). It is clear to all that aquaculture is contributing the lion share of the total production of fish from inland closed water bodies. In addition to that numerous small water bodies (ponds & ditches) that are the farm resource of rural households and community have been identified as an important resource base for rural aquaculture development (Ahmed, 1992). Also other Scientist (Khan, 1990 and Ahmed, 1992) have also recognized the potentiality of small-scale aquaculture in these water bodies.

In recent times, the Government of Bangladesh and its development partners have been emphasizing the need for introducing scientific methods of aquaculture as a means of increasing fish supply for country's growing population as well as for generating income and employment in the rural area. On the other hand, they have been giving unique importance to involve women in small-scale aquaculture through different projects and many Non- Governmental organizations (NGOs), they have also been doing so because of women constitute around 48.58 per cent of the total population in Bangladesh (BBS 1998). Around 80.0 per cent women of this country are active for productive activities. Shinha (1999) has also reported similar figure for India.

Before initiating to involve women in aquaculture, men had been culturing fish in their water bodies exclusively because once it was believed that fish culture was the job for men only. Despite many adverse factors some women were involved actually in small-scale aquaculture through hand on motivation by the Government and Non-Governmental Organizations and they were given training on small- scale aquaculture management aiming to increase the fish production through the optimum utilization of pond or other small water bodies by practicing better management. It is reported that the fish production depends upon activities of the resource users so that women may be good resource users as they live around the resource generally in the rural areas. Women participation in small-scale aquaculture will encourage them as a means of their family income as well as increase of family consumption.

The present study was undertaken to understand the socio- economic profiles of the selected farmers both women and men, to determine the gross performance through the indicators such as the degree of adoption of training messages, assessment of fish production in per unit area after training of selected both trained men and women fish farmers and identification of constraints of women participation in small-scale aquaculture in the study area, Jheneidah sadar Upazila under Jheneidah district. The results of the study may contribute largely in the formulation of appropriate management measures for the increase involvement of women in small-scale aquaculture of Bangladesh. There is scanty of information so far as know by the researcher.

Therefore, keeping view in mind, aquaculture as new business for women, the present study has been set out to address the following specific objectives:

- To understand the socio-economic profiles of the selected both men and women farmers in the study area.
- To determine the adoption rate of training messages for the selected men and women fish farmers.
- To assess the fish production in the per unit area of pond after training for the selected men and women fish farmers.
- To identify the constraints of women participants in small- scale aquaculture.

CHAPTER 2

REVIEW OF LITERATURE



2.0 REVIEW OF LITERATURE

Sufficient scientific research works are yet to be done in the field of aquaculture. Socio-economic and technology adoption of aquaculture were done by the researchers through Government and Non-Government organizations. But the handful research works on the performance of women in small-scale aquaculture comparing with male farmers and constraints of women participation in small-scale aquaculture were not yet done exclusively in Bangladesh. Aquaculture was once thought to be the work of men but some portions of women were involved in small-scale aquaculture due to policy of the Government, development partners of the Government and Non-Government organizations. However, these types of research and/or study work have so far been done in India and other countries that have been reviewed in this chapter.

Nandeesh *et al.* (1999) described that Gender issues appear to have been better understood in the agriculture sector. Within the fisheries sector, aquaculture, which is the new emerging activity, issues related to gender were not brought forth for open discussion until 1987, and also stated that if the aquaculture production has to increase considerably, social issues need to be understood and the programmes designed to address the social issues like women participation rather than just the technical issues.

He also reported that the following points as the key criteria to involve women as the target group for aquaculture-

- As the ponds are located close to home and women are regularly at home, they provide better care to the ponds.
- Owing to their customary habits of providing better care, women will follow the procedure better and take care of the pond better than men.
- Fish farming does not provide full time work and hence women can take care of ponds as part time job in addition to other household works.
- Because of the importance of fish in the family diet, women will care the fish better.

Baluyut (1987) reviewed the role of women in Asian aquaculture and noticed tremendous contribution of women to all sectors of aquaculture related activities in China from pond digging to processing of fish. Rapid growth of aquaculture in China has been attributed partly for the contribution of women to various activities.

Varghese *et. al.* (1994) reported that in Southern part of India, women participation in aquaculture activities is less as compared to North and Northeastern parts. Whenever women are involved, they generally take care of the pond fertilization and feeding activities in small-scale aquaculture units.

Alagarwami (1992) described in the study that in the coastal aquaculture sector, women are generally engaged in activities like shrimp seed collection, management of small ponds, collection of snails for feeding shrimp, feed preparation, mussel attachment to ropes, nucleus implementation in pearl culture, net making and fabrication of cages and in the commercial aquaculture sectors, women were found largely at the technical level in India.

Goddard *et. al* (1994) found that in the project areas of Cambodia, nearly 31% of the total activity was carried out by women in the 16 families surveyed, while the men contributed to 55% of the activity and children added significant amount of labour (14%) to the aquaculture sector. Both men and women carried out marketing equally but men dominated in the financial decision making (76%) and extension activities (66%).

Hattha *et al.* (1994) conducted the study in Svay Rieng province, Cambodia, small-scale aquaculture was found to add considerable amount of labour to women, children and men in the family. In regard to aquaculture activity, women were found to be able to carry out most of the activities except harvesting. Most female headed households obtained better production, the fact that women were probably be able to make decisions based on day to day observations and make immediate decisions without waiting for men approval in the family. Fish harvesting was recognized as the major constraint and this would impair the

access of women to fish pond and harvest fish for family consumption and income generation.

PADEK (1994) conducted a study in respect of various activities related to pre-stocking, stocking and post-stocking management in its project areas, located in Southern part of Cambodia (Prey Veng and Svay Rieng provinces), it revealed that the involvement of women was varied between the two provinces. Among 52 families covered in the Prey Veng province, in 13.5% of the families almost all the activities were found to be carried out by women themselves with the help of children. In another 33% of the families, women carried 50% of the activities and only 13.36% families women involvement was at 25% and in the rest it was less than 25%. In contrast to this, in the Svay Rieng province, women participated in the training and various activities of aquaculture and their contribution was more visible in most cases than men in the family. In only five families, women involvement was found out of 20 families, 9 families, 75% of the activities were carried out by women and children that followed by 6 families, 50% activities were carried out by women and in only 5 families women involvement was found to be poor in various activities of aquaculture. Production of fish was higher in those families where the women involvement was better. Svay Rieng province being fish deficit province, women appeared to have taken higher interest in the activities as compared to Prey Veng where the fish availability was better.

Keamany (1996) presented a paper on women in aquaculture in the Lao P.D.R based on the observation made in the three provinces (Luang Prabhang, Savanakheth and Champasak). In all the three areas women were found to be very active in carrying out day to day activities like fertilization, feeding and other pond management aspects, spending time anywhere between 1-3 hours in the aquaculture activity. Men usually undertook heavy work like pond digging and women assisted in the activity. Like in other countries, here also, it was the men who attended most of the training, while women carried out significant portion of the activities. Whenever, women attended the training, they participated very actively in the training.

Minh *et al.* (1996) conducted a study in Vietnam, a country where the aquaculture is growing very rapidly. Minh *et al.* reported that fish nursing is an important economic activity in Vietnam, which could be easily carried out by women and contribute significantly for the family income. While men were found to work for 13.8 hours, women were found to work for 14.8 hours per day the season when the activity were in full swing. In the families surveyed, income from fish nursing alone contributed to nearly 80% of the family income. Contribution of women to the family income from fish nursing was around 35% with any training. It suggested that if the women were given adequate training, they would be able to undertake this activity as an independent economic activity by themselves in the family.

DoF (2001) conducted a study in its project areas, for the purpose of the study it studied on 10 villages (two villages from each upazila) among 250 trained fish farmers by the project itself from the 10 upazila under 5 districts namely Manikgonj from Dhaka division, Natore from Rajshahi division, Chandpur from Chittagong division, Barisal from Barisal division and Jessore from Khulna division. The study revealed that only 18% of women were trained for hand on motivation by the project staff. Highest participation of women recorded in Barisal (48%) followed by Rajshahi (28%) and Khulna (22%), it also reported that female farmers' performance in fish production was better than male. Trained female pond operators produced higher (average 8.4 kg/dec.) than that of trained male pond operators (average 6.7kg/dec.).

Kohinoor *et al.* (1996) reported in the study that men generally do field level activities while women are involved in post-harvest work along with usual day-to-day household activities in agriculture of Bangladesh. This situation, of course, is gradually changing and good number women are being attracted by non-traditional activities, which are outside the homestead and include different kinds of field level agricultural activities as well.

Miah (2000) conducted a study on impact assessment of BFRI evolved technologies covering 11 Upazilas namely Bhaluka, Gouripur, Muktagacha, Phulpur and Trishal under Mymensingh district, Tangail sadar and Kalihati under Tangail district, Bogra sadar

under Bogra district, Godagari under Rajshahi district and Jessore sadar and Jhikorgacha under Jessore district. This study clearly indicated that aquaculture technologies have been identified as great blessing for men and women of rural Bangladesh. Thus, the study confirmed that BFRI evolved aquaculture technologies have created an ample scope for men and women to get self-employed job and better opportunities for income earning activities. Women were identified as two categories such as adopter and worker in fish farming activities. This study revealed that around 32.0 per cent adopters were women while, on an average, 20.0 per cent woman worked in the selected aquaculture technologies as labourers. It was learned that there was virtually no difference in terms of per hectare profitability between men and female adopters. Although women adopters were found relatively new to this aquaculture farming business and they were trained in the influence of the officials of BFRI, DOF and NGOs, but it did not make any significant differences in both operational and management aspects. Here the old religious villagers to go out side the house discouraged women.

Nathan and Apu, (1998) conducted the study on Fish ponds in the Oxbow Lakes Project, Bangladesh, it analyzed the experience in acquisition of women of user rights in fish ponds, excavated on government-owned land. This study concluded that fish ponds enabled women to generate higher per capita incomes than the usual small livestock activities, gain knowledge of new methods of production, interact with traders and officials and enhance their social and familial position. They also reported that women participated in guarding the fishponds during the day. But guarding at night was done entirely by men. In a sense, the unpaid labour that women usually performed is being done by men from their families, since it was the women who own the right to culture fish in the ponds. They also reported that women participated in other activities in pond fish culture (such as daily feeding and other maintenance) and the related vegetable cultivation on the dykes. Women also participated along with men in repairing the dykes damaged due to flooding.

CHAPTER 3

MATERIALS AND METHODS

3.0 MATERIALS AND METHODS

3.1 Study area

Jheneidah sadar upazilla under Jheneidah district was selected for the study. This upazila is situated in the middle of Jheneidah district. Jheneidah sadar upazila consists of one Municipality and 17 (seventeen) union covering 471.31 sq. Km. It is located between $23^{\circ}26'$ and $23^{\circ}36'$ north latitudes and between $88^{\circ}57'$ and $89^{\circ}20'$ east longitudes. The upazila is bounded on the north by Sailakupa and Harinakunda upazila of Jheneidah district, on the south by Kaligonj and Kotchandpur upazila of Jheneidah district, on the east by Magura sadar and Sreepur upazila under Magura district and on the west by Chuadunga sadar under Chuadunga district. According to population census 2001, the total population is 395,637 of which 204,957 are males and 190,680 are females. The study was conducted for a period of 16 (seventeen) months from March'2001 to June'2002 in the study area. Samples have been collected from 5 (Five) villages such as Kodalía, Paglakanai, Mayadharpur, Goriala and Pakka out of 316 villages of Jheneidah sadar upazila. This upazila is moderately high land and flood free area. In the agriculture point of view Jheneidah sadar is under 11 (eleven) Agri-ecological zone (SRDI, 1993). The location of the upazila is presented in Fig-3.1.

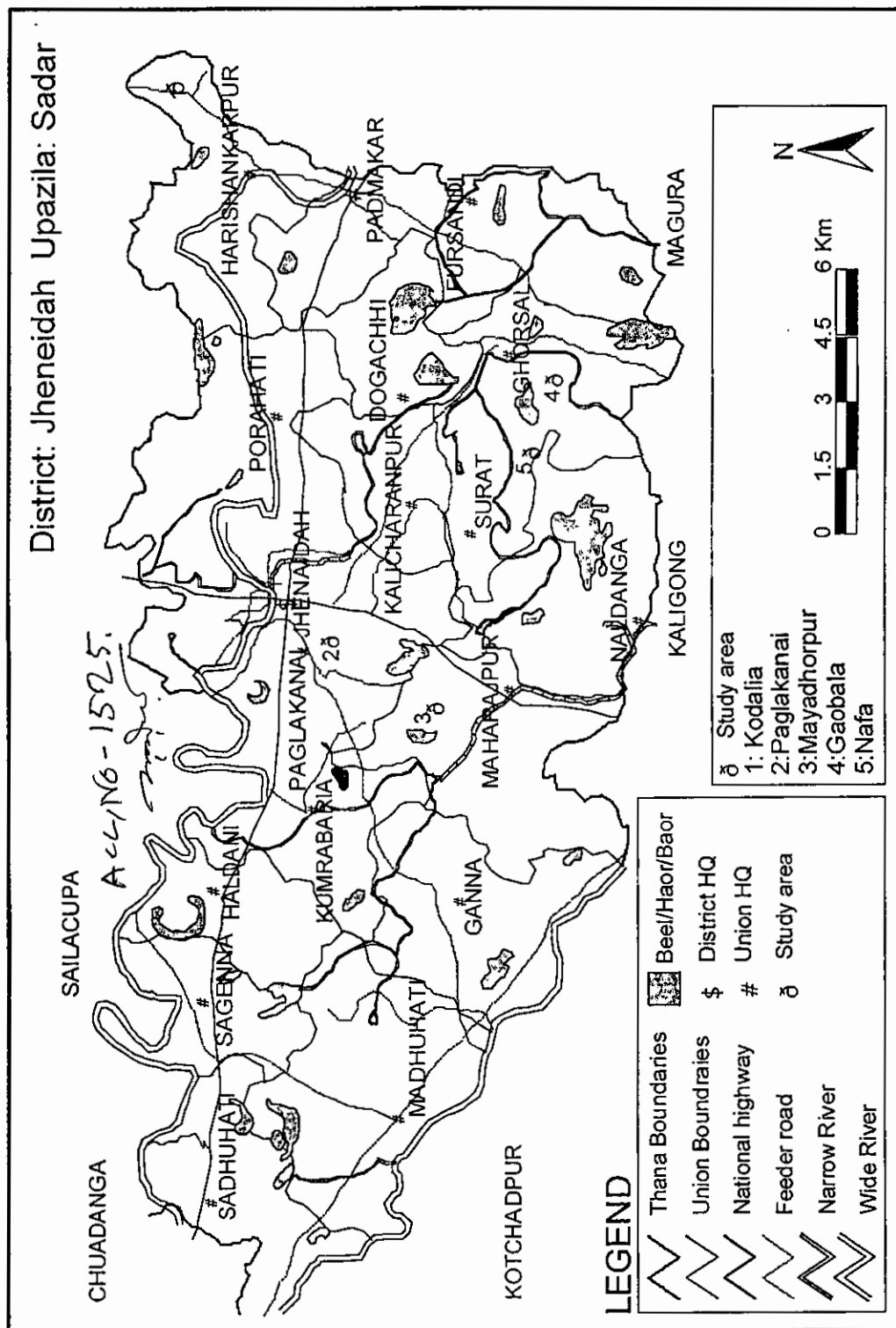


Fig-3.1: Map of Jheneidah Sadar Upazilla showing study area

3.2 Selection of sample farmers

A total of 100 (hundred) sample farmers under this study were selected randomly from five villages under Jheneidah Sadar Upazila of Jheneidah district. They were divided into two categories by sex i. e men and women containing 50 (fifty) in each sex. The farmers lists were collected from Upazila Fisheries Office, Jheneidah Sadar. After selection, a baseline survey was carried out in the selected farmers households to collected souci-economic profile.

3.3 Training session and Monitoring of the selected-trained farmers

Selected farmers were given one day motivational/ awareness meeting and a three-day long training on Small-scale aquaculture management by Upazila Fisheries office, Jheneidah sadar, Jheneidah with the direct supervision of the researcher in March'2001. The training session was based on both theoretical and practical which included pre-stocking management, stocking management and post-stocking management. The topics covered De-weeding, Dike repairing, Removal of predator/unwanted species, Liming and Pre-stocking fertilization under Pre-stocking management, the topics covered Species selection and Stocking number & Ratio under Stocking management and the topics covered feeding, Post-stocking fertilization, Partial harvesting, Re-stocking, Final harvesting and Hazard management under Post-stocking management.

The researcher monitored the trained farmers with the assistance of Extention officer, Upazila Fisheries Office, Jheneidah sadar, Jheneidah during fish production period through Farm visit and Focus group discussion during two-month interval. During Farm visit and Focus group discussion selected farmers were got the opportunity to refresh the training messages learnt through training session.

3.4 Preparation of interview questionnaire for the study

3.4.1 Preparation of interview Baseline questionnaire for collecting Socio-economic information

To collect the baseline information, a interview schedule was prepared and an in-depth survey was conducted among the selected farmers. Before preparing the final interview questionnaire, a draft interview questionnaire was developed keeping in view the objectives of the study. The draft questionnaire was pre-tested in the selected area by direct interviewing with few sampled men and women fish farmers by the researcher himself. The interview questionnaire was then changed, modified and rearranged according to the experience obtained during pre-testing. A final interview questionnaire was then developed in logical sequence, so that, the fish farmers could provide information chronologically (Appendix- 1).

3.4.2 Preparation of the questionnaire for collecting the degree of adoption of training messages after applying training messages

To collect the information about the degree of adoption of the given training messages through training, a draft format was developed keeping in view to meet up the objectives of the study. Before finalizing the draft format that was pre- tested it among the few selected-trained men and women fish farmers then it was finalized according to the experiences gathered during pretesting. The following training messages were given through training such as De-weeding, Dike repairing, removal of predator/unwanted species, liming, pre-stocking fertilization, species selection, stocking density and ratio, feeding, post-stocking fertilization, partial harvesting, re-stocking, Final harvesting and problems & hazards management (Appendix-2).

3.4.3 Preparation of the format for Assessment of Fish production after training

To compare the per unit fish production between the selected-trained men and women fish farmers after training a format was prepared according to the objectives of the study to assess fish production, the researcher himself developed a draft format. A few selected-trained farmers both men and women who completed one production cycle was taken under data collection with that draft format. This format was finalized with the experience gained through field survey (Appendix-3).

3.4.4 Constraints of women participation in small-scale aquaculture

To identify the constraints of women participation in small-scale aquaculture, a draft format was developed and pre-tested respectively and then finalized according to the objectives of the study (Appendix-4).

3.5 Collection of data

3.5.1 Socio-economic Profile of men and women fish farmers

The relevant data on socio-economic profile of the selected farmers was collected through single interview technique from the selected farmers by the researcher himself and Extension officer, Jheneidah Sadar Upazila Fisheries office before training. Several visits were made in the study area with the assistance of personnel of Upazila Fisheries office to collect data accurately related to the objectives of the study. After each visit the collected data were checked for accuracy, clarity and any confusion arisen then corrected in the next visit. Data were collected from the study area before conducting the training during the period from March'2001 to April'2001.

3.5.2 Adoption of training messages

The rate of adoption of training messages was collected by the researcher himself with the assistance of Extension officer, Upazila Fisheries office, Jheneidah Sadar by using one of the techniques of participatory rural appraisal (PRA) i.e., Focus group discussion (FGD). For each activity devised during the training session were asked the degree to which they applied or not applied the training messages learnt. According to Chambers



(1992). PRA is intended to enable local people to conduct their own analysis and often to plan and take action. Participatory rural appraisal (PRA) methods are considered by certain academics, as a better alternative to traditional survey/questionnaire methods in Socio-economic research. Of late, these methods have not only gained prominence but also propagated as an alternative paradigm in social science research (Chambers, 1994a,b and c). Though PRA boast of twenty-seven methods, most of them are being used in the standard approaches of Socio-economic research in one form or other, of course under different names or even at informal level (Reddy, 1998). During focus group discussion data were collected separately from the sampled men and women fish farmers respectively those were trained. Several visits were made for the above purpose and corrected the confused information in the next visit. The data regarding the degree of adoption of the training messages were collected during the period of May'2002 when culture cycle was almost finished.



3.5.3 Assessment of Fish production

The data about fish production after training were collected by using the single interviewing technique from the Sampled trained fish farmers with the assistance of Extension officer, Upazila Fisheries office, Jheneidah Sadar. These data were collected just after completing the one production cycle during June'2002. For this purpose several visits were made.

3.5.4 Identification of Constraints of women participation in small-scale aquaculture

The information regarding constraints of women participation in small-scale aquaculture in the study area were collected by using one of the techniques of Participatory Rural Appraisal (PRA) i.e., Focus Group Discussion (FGD) during the month of June'2002.

3.6 Analysis of Data

The design of this study was descriptive in nature. A formula was used to calculate the adoption index and adoption score that was introduced and used by Kashem and Rahman (1995) in the calculation of agriculture knowledge of farmers.

Formula;

$$AI = F*2 + P*1 + N*0$$

Here,

AI = adoption index

F = % of farmers were fully adopt training messages

P = % of farmers were partially adopt training messages

N = % of farmers were not adopt training messages

Adoption score

$$AS = A_1 + A_2 + A_3 + A_4 + \dots + A_n$$

AS= Adoption Score

A = Adoption indicators

A= 2, 1 or 0

Where,

2= Fully adopt

1=Partially adopt

0= Not adopt

Descriptive statistics (numbers, percentages, standard deviation and range) were used to summarize the data pertaining to the Socio-economic profiles of the selected fish farmers, adoption of training messages and fish production attained. The MS Excel and SPSS ver11.0 packages were used to analyze the data.

CHAPTER 4

RESULTS AND DISCUSSION

4.0 RESULTS AND DISCUSSION

4.1 Socio-economic profile of selected Fish Farmers under the study area

The objective of this chapter is to understand the socio-economic profile of both men and women fish farmers in the study area. Here, it was mainly emphasized on some variables such as Age structure, household (Family) size, principal occupation, Educational status, , annual household cash income, household cropland holding, Aquaculture resource (pond) and previous training status on Fish culture and management of the selected farmers.

The results so far obtained are presented under the following headings.

4.1.1 Age structure

The age structure was examined of the trained fish farmers in different types of age groups; less than 25 years, 26 to 35 years, 36 to 45 years and more than 45 years. Among men farmers, age group of 26 to 35 years was highest (68%) that was followed by the age group of 36 to 45 years (16%) while 6 percent fish farmers were under the age group above 45 years and only 10 percent were less than 25 years. On the other hand, among women fish farmers, age group of 26 to 35 years were also highest (72%) that was followed by the age group of 36 to 45 years (10%), while 8 percent and 10 percent were more than 45 years and less than 25 years respectively (Fig-4.1). Fig- 4.2 and Fig- 4.3 shows that the direction of the skewness in on the right side of the longer tail. It was observed that the highest number of men and women farmers imparted the training at the age group of 26 to 35 years followed by the age group of 36 to 45 years.

Table 4.1. Age distribution of the farmers

Gender	Age (years)				Total
	Less than 25	26-35	36-45	More than 45	
Men (%)	10	68	16	6	100
Women (%)	10	72	10	8	100

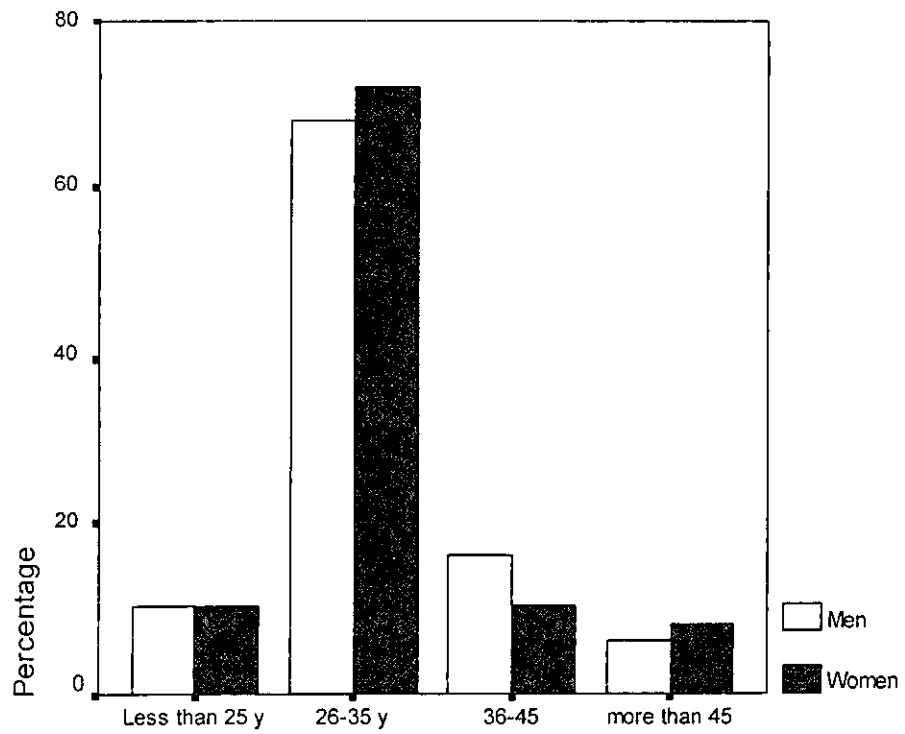
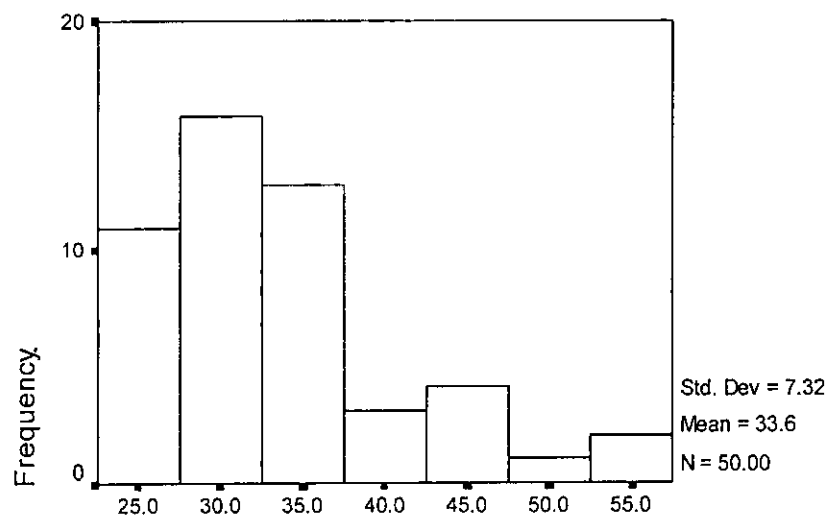


Fig-4.1: Age structure of Men and Women farmers



Age distribution

Fig-4.2: Age distribution of the Men farmers.

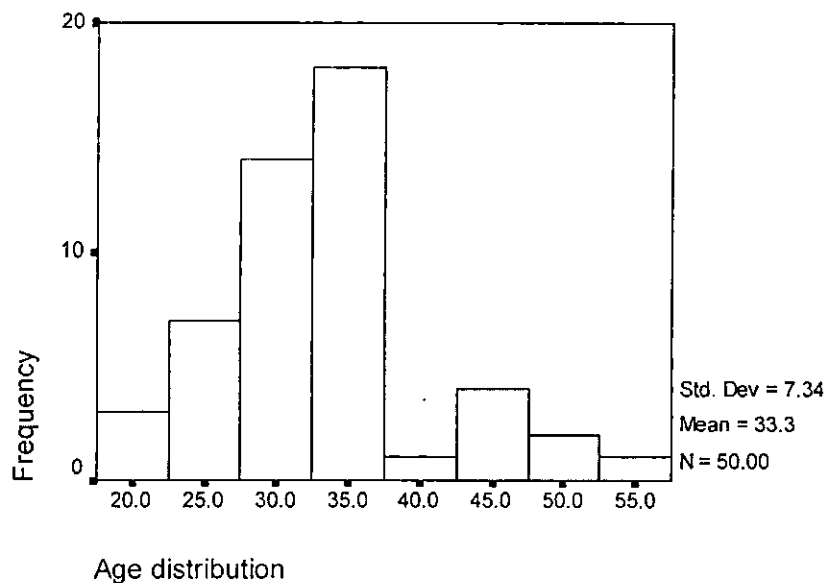


Fig-4.3: Age distribution of the women farmers.

4.1.2. Household (Family) size

As shown in Table 4.2, the highest number (52%) of the households had 5 to 7 members in their family that was followed by 32 percent had 2 to 4 members of their family and only 16% had more than 7 members of their family in case of men farmers. While on the other hand, highest number (68%) of households had 5 to 7 members in their family that was followed by 24 percent had 2 to 4 members in their family and only 8% had more than 7 members of their family in case of trained women farmers (Fig-4.4). Fig-4.5 and Fig-4.6 shows that sample distribution is symmetrical for men and bimodal for women.

Table 4.2. Household family size of the farmers

Gender	Family size			Total
	2-4	5-7	Above 7	
Men (%)	32	52	16	100
Women (%)	24	68	8	100

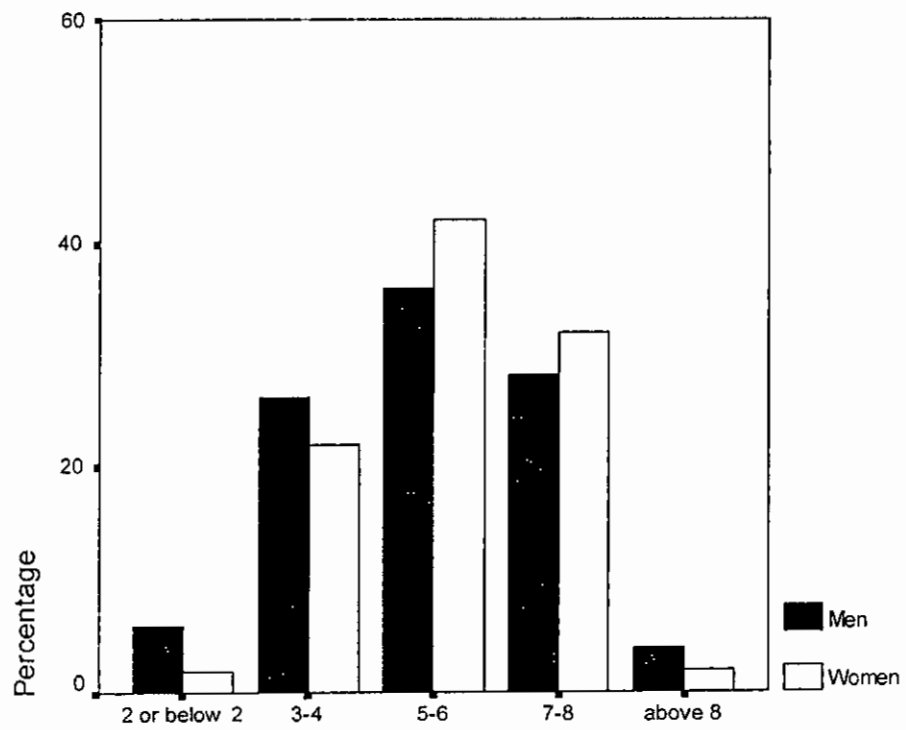


Fig-4.4: Household (family) size of men and women farmers.

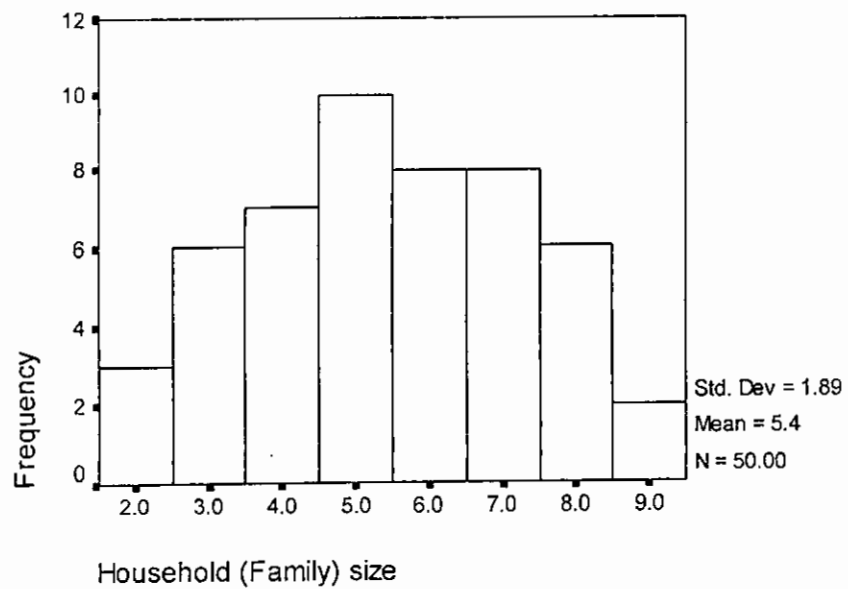


Fig-4.5: Household (Family) size of the men farmers.

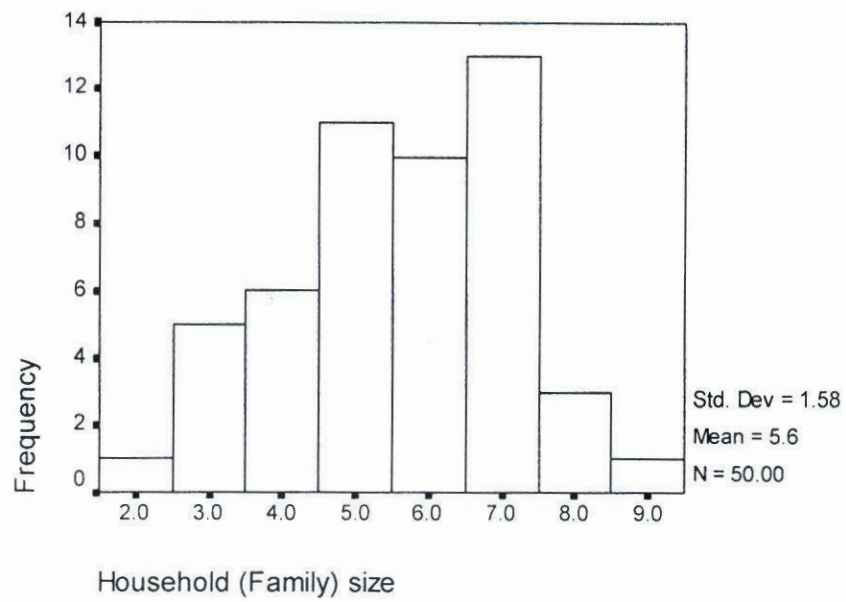


Fig-4.6: Household (Family) size of the women farmers.



4.1.3. Educational status

The educational status of the selected men and women farmers is presented in table 4.3. Among the trained men fish farmers the highest number (74%) had up to the primary level that was followed by Illiterate (can sign only) 12percent. It was found that 10 percent and 4 percent were up to secondary and higher secondary level respectively. In case of women fish farmers, the highest number (64%) had education up to primary level that was followed by can sign only (30%) and up to secondary level (6%). No women farmers were observed in above secondary level, also as shown in Table-4.3. It was also observed that farmers in highest number both men and women imparted the training having the education up to primary level that was followed by educational level up to secondary (Fig-4.7). Here it revealed that the literacy rate of men fish farmers was higher than that of women farmers.

Table 4.3. Educational status of the farmers.

Gender	Education level				Total
	sign only	Upto primary	upto secondary	higher secondary	
Men (%)	12	74	10	4	100
Women (%)	30	64	6	0	100

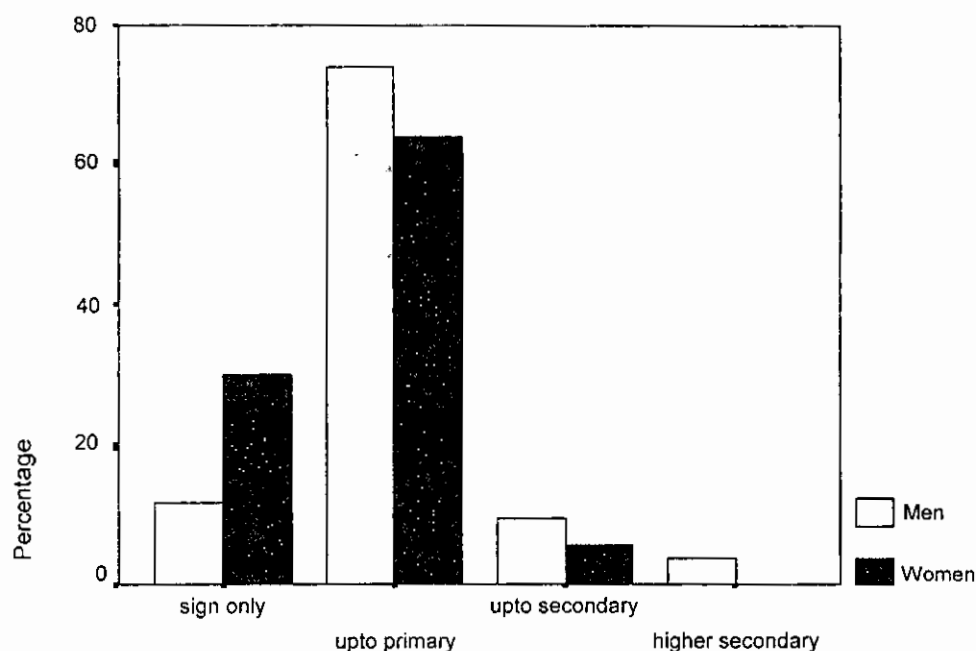


Fig-4.7: Educational status of men and women farmers

4.1.4. Occupational status

Among the trained men farmers of the study area that ad the highest number (42%) farmers were engaged in agriculture that was followed by small business (32%). It was also found that 16 percent, 6 percent and 4 percent of them were engaged in day lobour, others and service respectively. On the other hand, 100 percent women fish farmers were engaged in household keeping only. Further it was revealed that no farmers were found the principal occupation as fish culture in the study area. Fish culture was the secondary occupation in all households, as shown in Table-4.4. Here no women fish farmers were engaged in income earning activities (Fig-4.8).

Table 4.4. Occupation of the farmers.

Gender	Occupation						Total
	Agriculture	Small business	Service	Day labour	House Hold	Other	
Men (%)	42	32	4	16	0	6	100
Women (%)	0	0	0	0	100	0	100

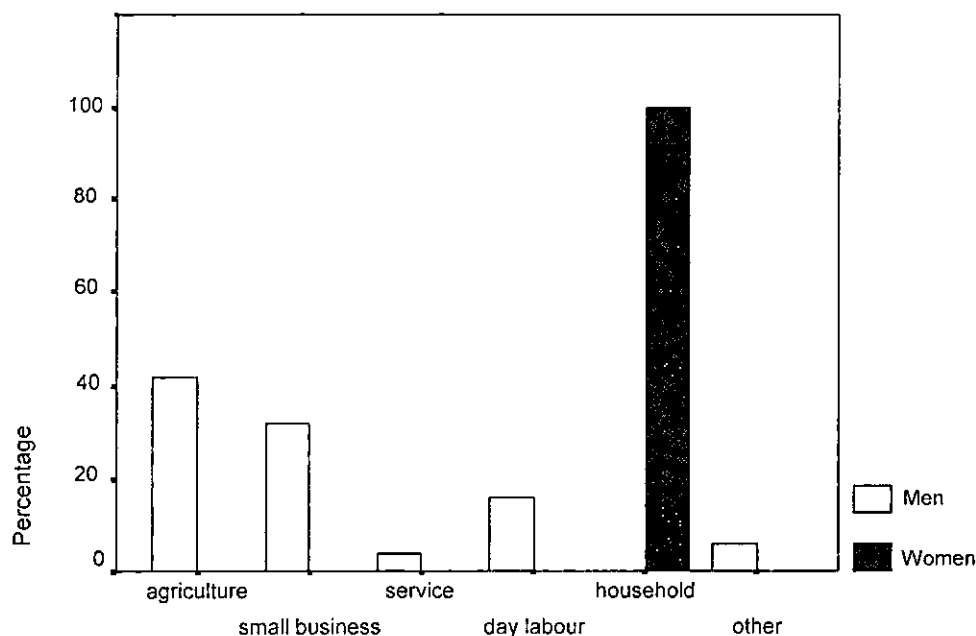


Fig-4.8: Occupational status of men and women farmers

4.1.5 Aquaculture resource (pond)

As shown in Table-4.5 among the men fish farmers, the highest number farmers (60%) had the ponds covering 10-20 decimal that was followed by the number (22%) had the pond covering 21 to 30 decimal. It was found that 12 percent and 6 percent had the ponds covering less than 10 decimal and more than 30 decimal respectively. In case of the Women fish farmers, the highest numbers (70%) had the pond covering 10 to 20 decimal that was followed by 16 percent and 14 percent had the pond covering 21 to 30 decimal and less than 10 decimal respectively. No women received training of the ponds covering more than 30 decimal (Fig-4.9). The average pond size of the man farmers is 16.5 decimals. On the other hand, the average pond size of the woman farmers is 14.6 decimals (Fig-4.10 and 4.11).

Table 4.5: Size of the pond.

Gender	Pond size (decimal)				Total
	less than 10	10-20	21-30	more than 30	
Men (%)	12	60	22	6	100
Women (%)	16	64	20	0	100

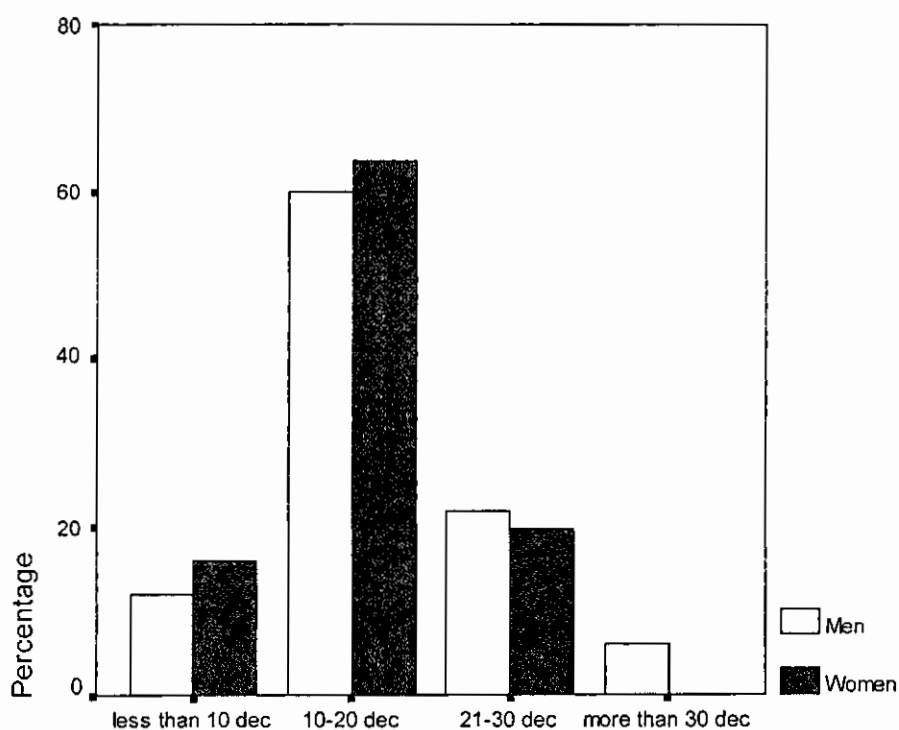


Fig-4.9: Pond size of men and women farmers

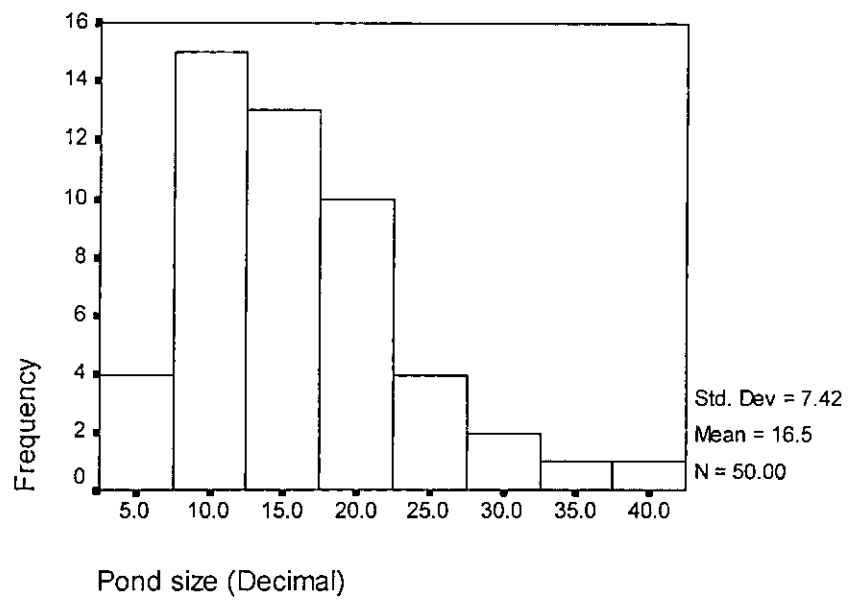


Fig-4.10: Pond size of the men farmers.

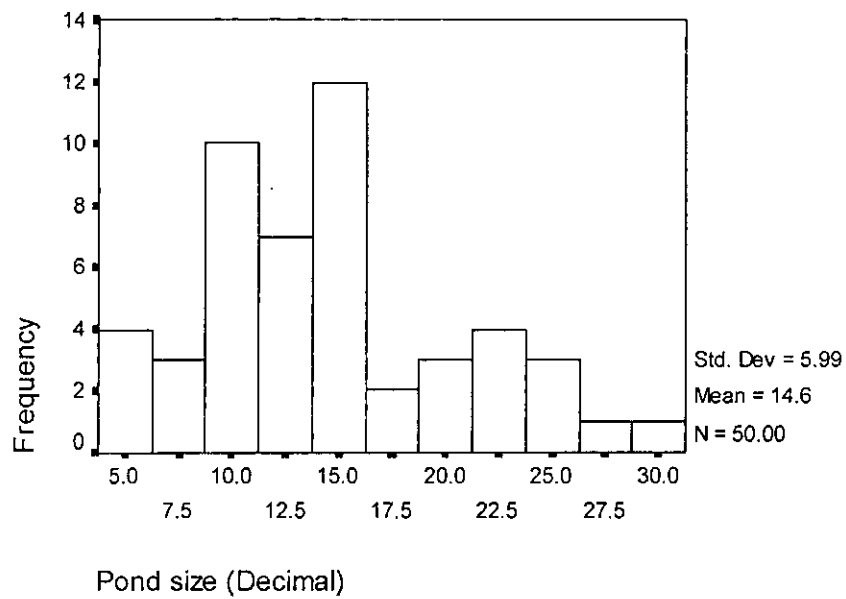


Fig-4.11: Pond size of the women farmers.

4.1.6 Household cropland

In the study area, it revealed that 56 percent of men fish farmers had cropland holding of 51 to 75 decimal followed by 20 percent of farmers had 76 to 100 decimal. It was also found that 20 percent and 4 percent had less than 50 decimal and above 100 decimal respectively. In case of the women fish farmers, the highest number (58%) of households had 51 to 75 decimal of cropland that were followed by the cropland holders of 28 percent and 14 percent had less than 50 decimal and 76 to 100 decimal respectively (Fig-4.12). It was found that no women was imparted training from the group of cropland holders of more than 100 decimal, as shown in Table-4.6. The average household cropland of the men farmers is 60.6 decimals; on the other hand, 53.7 decimals for the women farmers (Fig-4.13 and 4.14).

Table 4.6: Size of the household cropland.

Gender	Household cropland holder (decimal)				Total
	Below 50	50-75	76-100	Above 100	
Men (%)	20	56	20	4	100
Women (%)	28	58	14	0	100

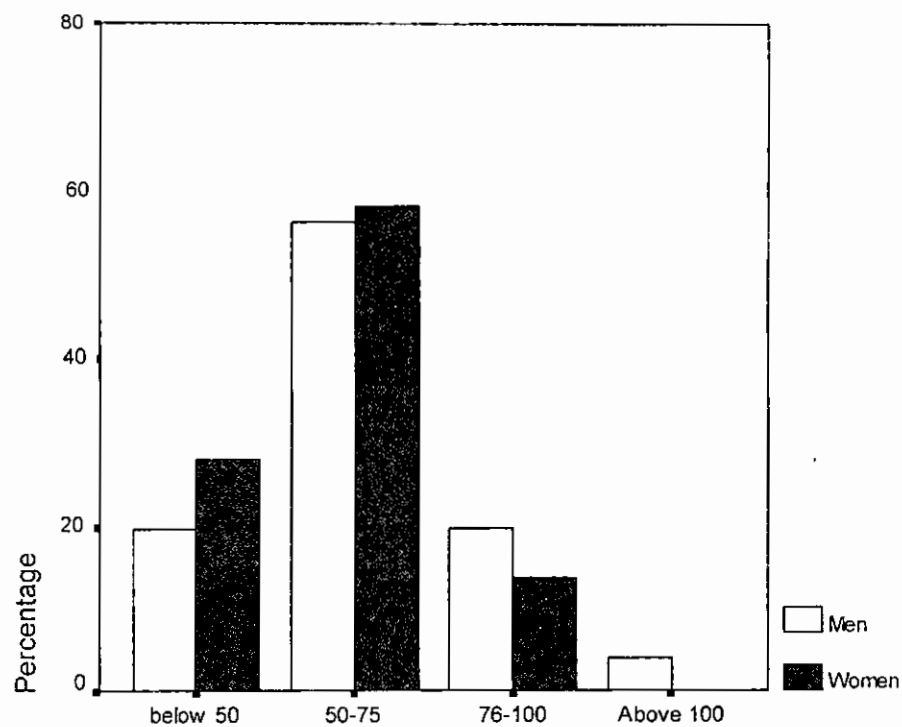
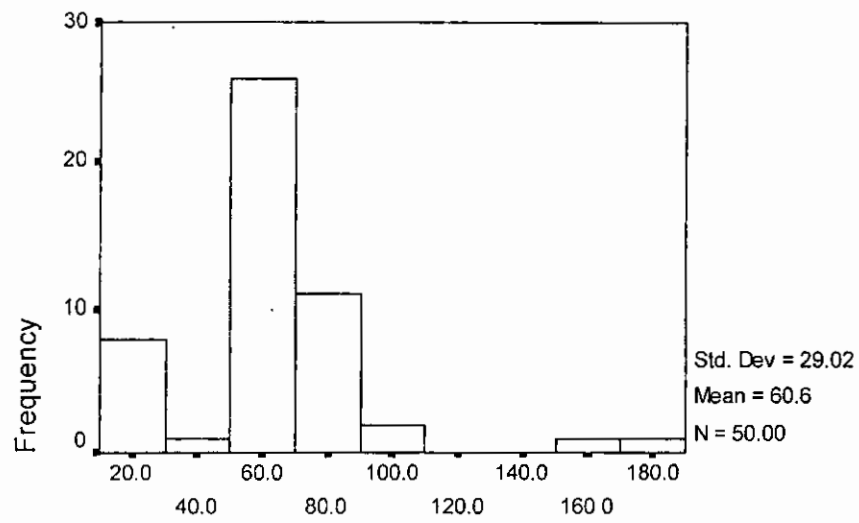
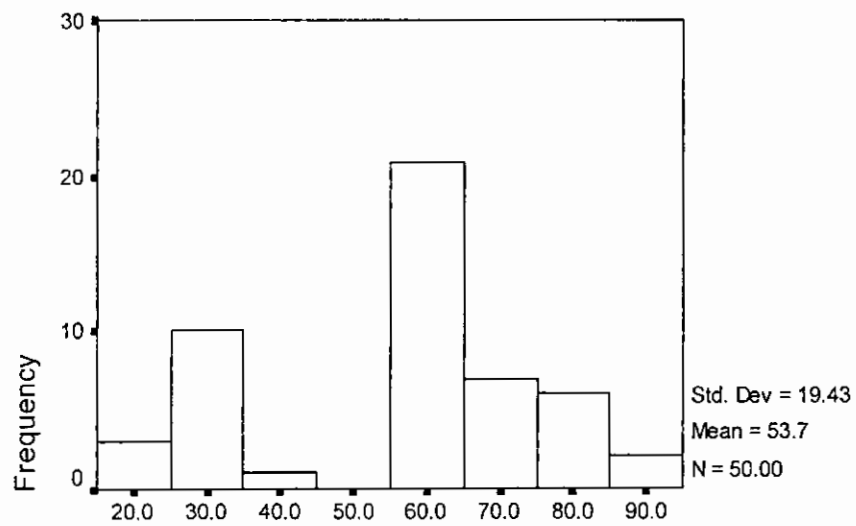


Fig-4.12: Household cropland of men and women farmers.



Household cropland

Fig-4.13: Household cropland of the men farmers.



Household cropland

Fig-4.14: Household cropland of the women farmers

4.1.7. Annual household cash income

It was found that the annual cash income group of Tk.25001 to Tk.30000 was the highest (40%) in number that was followed by the income group of Tk.20001 to Tk.25000 (34%). It was also found that 20 percent and 6 percent of men farmers had less than Tk.20000 and more than Tk.30000 respectively. Among women farmers, the household income group of Tk.25001 to Tk.30000 was highest (44%) in number that was followed by the income group of Tk.20001 to Tk.25000 (40%) and less than Tk.20000 (16%) (Fig-4.15). It was found that no women member was imparted training within the income group of more than Tk.30000. as shown in Table-4. 7.. The average annual household cash income of the man farmers is Tk.26680 taka; on the other hand, Tk.25800 for the woman farmers (Fig-4.16 and 4.17).

Table 4.7: Annual household cash income of the farmers.

Gender	Annual household cash income (Tk.)				Total
	less than 20000	20001 – 25000	25001-30000	more than 30000	
Men (%)	20	34	40	6	100
Women (%)	16	40	44	0	100

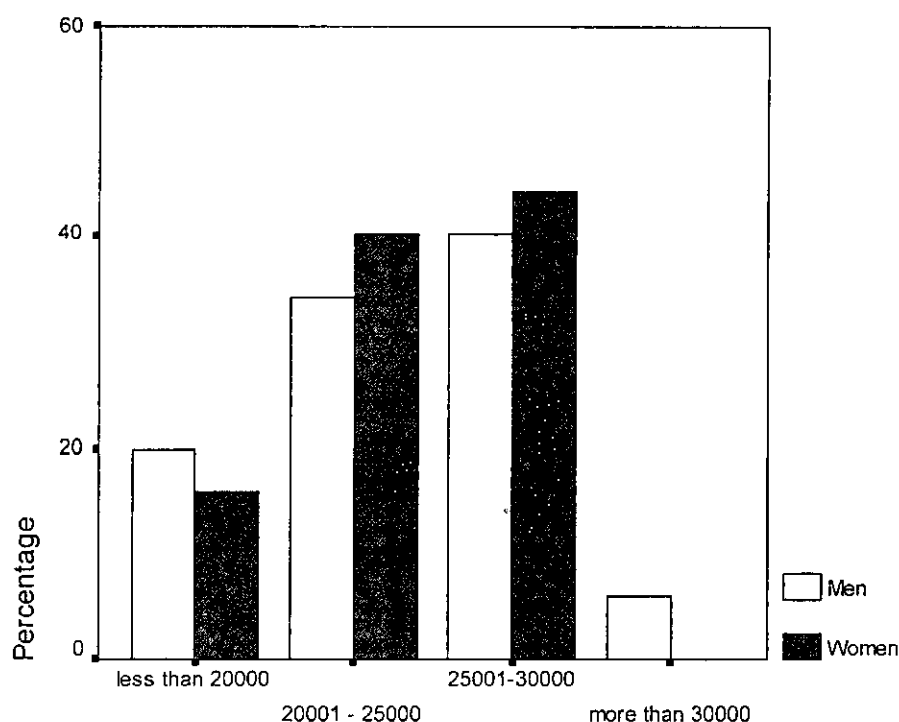


Fig -4.15: Annual household income of men and women farmers

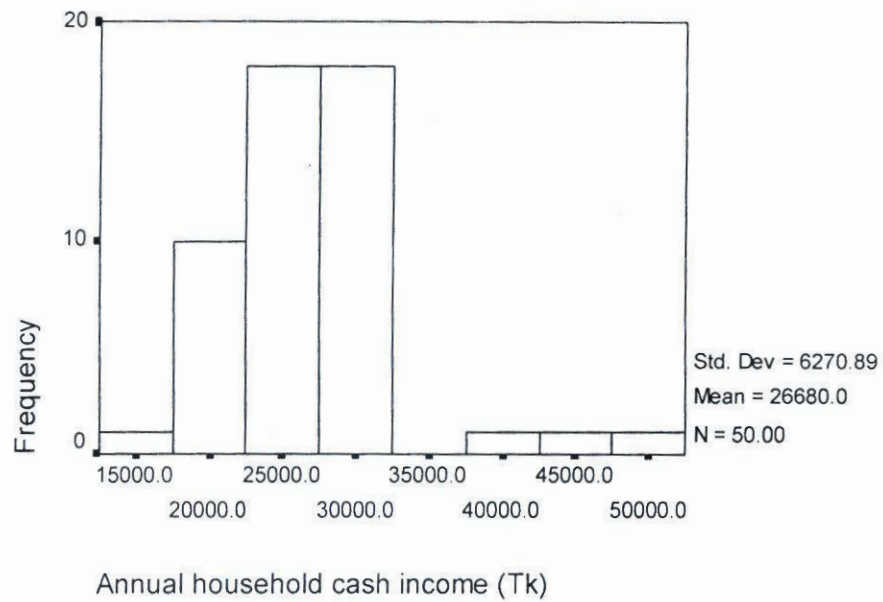


Fig-4.16: Annual household cash income of the men farmers.

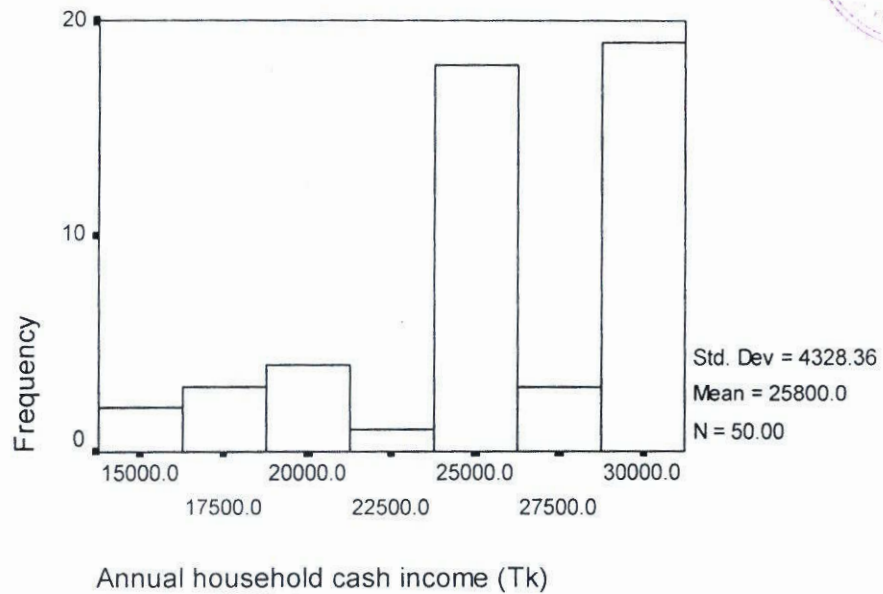


Fig-4.17: Annual household cash income of the women farmers.

4.1.8 Training status of the selected farmers before Study

It was observed that no selected farmer was received training on Fish culture and management by any organizations.

4.1.9 Fish Production rate (Before training)

The annual production of fish was recorded from selected men and women farmers before the adoption of training messages. The fish production rate varies from 2 kg/decimal to 7.5 kg/decimal. In case of men farmers, the average fish production rate was recorded 4.14 ± 1.30 kg/decimal (Fig-4.19). On the contrary, it revealed that the fish production per decimal was 3.74 ± 1.24 kg/decimal for woman farmers (Fig-4.20). As shown in Table-4.8, the production rate of most of the men fish farmers (66%) was 3-6 kg/decimal. Only 10 percent men fish farmers had 6-8 kg/decimal production rates. On the other hand, 62 percent woman farmers had 3-6 kg/decimal production rates and it was also observed that there was no women farmers who had 6-8 kg/decimal of the fish production rate (Fig4.18).

Table-4.8: Production rate of the fish (before training).

Gender	Production rate (Kg/decimal)			Total
	Below 3	3-6	6-8	
Men (%)	24	66	10	100
Women (%)	38	62	0	100

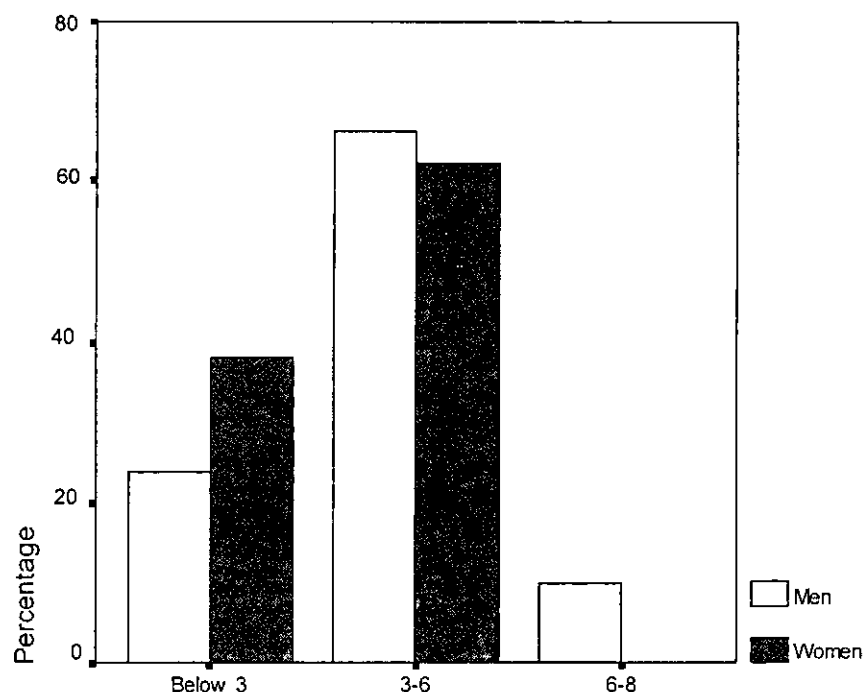


Fig-4.18: Production rate (before training) of men and women farmers.

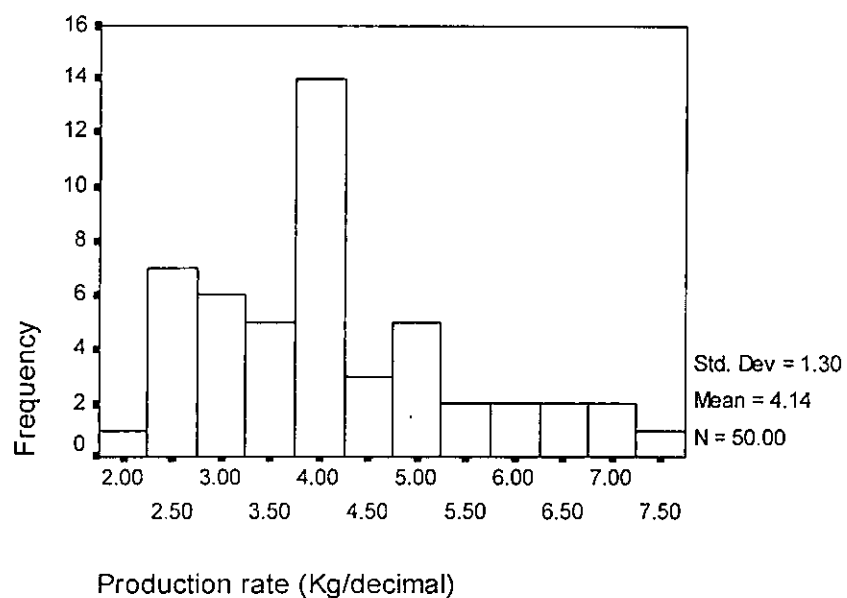


Fig-4.19: Production rate (before training) of the men farmers.

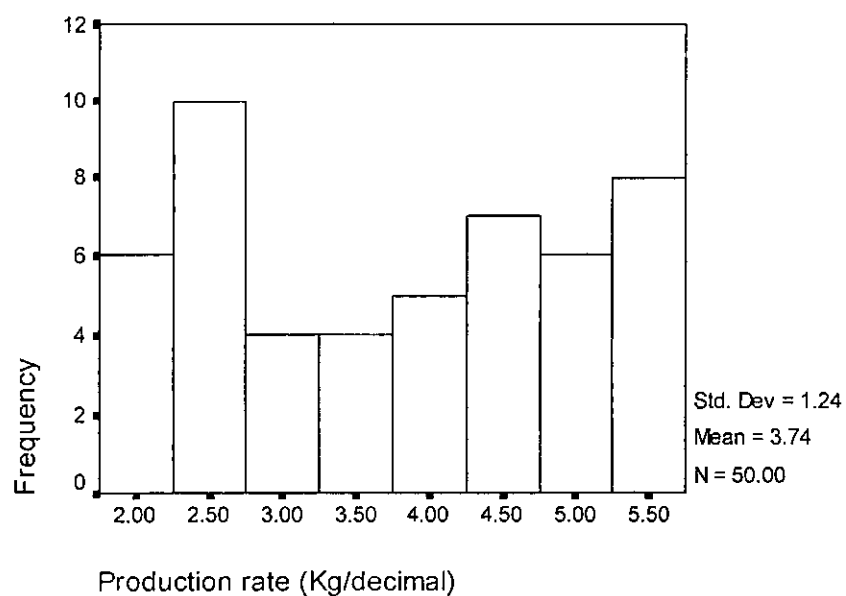


Fig-4.20: Production rate (before training) of the women farmers

4.2 The degree of adoption of training messages in small scale aquaculture

Men farmers

As shown in table 4.9, among the trained men farmers, De-weeding was fully adopted by the highest proportion (68%) of farmers that was followed by the farmers (22%) with either no adoption or not applicable for their ponds and 10 percent with adoption partially. The results further indicated that 66 percent farmers have adopted the dike repairing followed by 22 percent farmers with not adoption at all the given training message and only 12 percent farmers have adopted this training message partially. It was found that De-weeding and Dike repairing were not applicable for some farmers. The highest number (54%) respondents have fully removed the predators/unwanted species from their ponds that was followed by 30 percent have not removed the predators/unwanted species from their ponds and 16 percent respondents removed partially. Lime was used fully by 52 percent respondents that was followed by 30 percent respondents have not used lime and 18 percent respondents have used lime partially in their ponds. The highest number (40%) of respondents have fertilized fully in pre-stocking management for their ponds that was followed by 36 percent have fertilized partially and 24 percent respondents have not fertilized according to recommendations of training session. The highest (44%) respondents have selected species partially that was followed by 40 percent respondents have selected species fully and only 16 percent respondents have not selected species according to recommendations of training. In case of stocking ratio and numbers, the highest (46%) have maintained partially that was followed by 30 percent respondents have not maintained and only 24 percent respondents have maintained fully as they learnt from training. In post-stocking fertilizing, the highest (42%) numbers of respondents have followed partially the recommendations that was followed by 30 percent respondents have not followed and only 28 percent respondents have followed fully the recommendations as they learnt from training. The highest (42%) numbers of farmers have not used feed that was followed by 34 percent respondents have partially followed the messages for feeding and only 24 percent respondents have fully followed the feeding messages from the training conducted. Partial harvest was done by the highest (82%) numbers of the respondents that was followed by 18 percent respondents have done it partially. The highest (38%) of respondents have not re-stocked after partial harvesting that was followed by 34 percent have re-stocked fully; while 38 percent

have not re-stocked after partial harvest. Final harvest was followed fully by 86 percent respondents that was followed by 14 percent respondents have followed partially as they learnt from training.

In case of hazards management during culture of fish, the same numbers (38%) of respondents have applied partially and not applied that was followed by only 24 percent respondents have applied the action during hazards faced (Fig-4.22).

Women Farmers

As shown in table 4.9, among the trained women farmers, De-weeding message was adopted by the highest proportion (64%) of farmers that was followed by the farmers (20%) with either no adoption or not applicable for their ponds and 16 percent with partial adoption. Dike repairing was fully adopted by the highest number (46%) that was followed by the farmers (32%) with either no adoption or not applicable for their ponds and only 22 percent respondents with partially adopted. It was found that De-weeding and Dike repairing were not applicable for some farmers. The highest number (46%) respondents have fully removed the predators/unwanted species from their ponds that was followed by 42 percent have removed partially and 12 percent respondents have not removed the predators/unwanted species from their ponds. Lime was used fully by 48 percent respondents that was followed by 38 percent respondents have not used lime and 14 percent respondents have used lime partially in their ponds. The highest number (38%) of respondents have fertilized partially in pre-stocking management for their ponds that was followed by 36 percent have fertilized fully and 24 percent respondents have not fertilized according to recommendations of training session. The highest (40%) respondents have selected species partially that was followed by 38 percent respondents have selected species fully and 22 percent respondents have not selected species according to recommendations of training. In case of stocking ratio and numbers, the highest (46%) have not maintained that was followed by 36 percent respondents have maintained partially and only 18 percent respondents have maintained fully as they learnt from training. In post-stocking fertilizing, the highest (42%) numbers of respondents have not followed the recommendations that was followed by 36% respondents have partially followed and only 22 percent respondents have followed fully the recommendations as they learnt from training. The highest (52%) numbers of farmers have not used feed that was

followed by 30 percent respondents have partially followed the messages for feeding and only 18 percent respondents have fully followed the feeding messages from the training conducted. Partial harvest was done by the highest (76%) numbers of the respondents that was followed by 16 percent respondents have done it partially and only 8 percent respondents have not followed the training message of partial harvest. The highest (46%) of respondents have not re-stocked after partial harvesting that was followed by 28 percent have re-stocked fully; while 26 percent have re-stocked partially after partial harvest. Final harvest was fully followed by 84% respondents that was followed by 16 percent respondents have partially followed as they learnt from training.

In case of hazards management during culture of fish, the highest (54%) numbers of respondents have not applied that was followed by 28 percent respondents have partially applied and only 18 percent have fully applied the action during hazards faced.

From the above discussion, an average of 47.85 percent trained men farmers; while 41.69 percent trained women farmers have fully adopted all thirteen (13) indicators extended in training session held, which were set for the study. Partial adoption was found in trained men farmers (27.38%) and trained women farmers (27.69%) respectively while no adoption was found in 21.85% of trained men farmers and 30.62% of women farmers respectively. (Fig-4.22)

Table 4.9: Status of adoption of Training messages by fish farmers

SL #	Training perform Indicators/ training massages	Status of adoption of Training messages by fish farmers							
		Men				Women			
		Fully adopt	Partiall y adopt	Do not adopt	Adopti on index	Fully adopt	Partiall y adopt	Do not adopt	Adopti on index
1	De-weeding	34 (68)	5 (10)	11 (22)	146	32 (64)	8 (16)	10 (20)	144
2	Dike repairing	33 (66)	6 (12)	11 (22)	144	23 (46)	11 (22)	16 (32)	114
3	Removal of predator/unwante d species	27 (54)	8 (16)	15 (30)	124	23 (46)	21 (42)	6 (12)	134
4	Liming	26 (52)	9 (18)	15 (30)	122	24 (48)	7 (14)	19 (38)	110
5	Pre-stocking fertilization	20 (40)	18 (36)	12 (24)	116	18 (36)	19 (38)	13 (26)	110
6	Species selection	20 (40)	22 (44)	8 (16)	124	19 (38)	20 (40)	11 (22)	116
7	Stocking ratio and numbers	12 (24)	23 (46)	15 (30)	94	9 (18)	18 (36)	23 (46)	72
8	Post-stocking fertilization	14 (28)	21 (42)	15 (30)	98	11 (22)	18 (36)	21 (42)	80
9	Feeding	12 (24)	17 (34)	21 (42)	82	9 (18)	15 (30)	26 (52)	66
10	Partial harvest	41 (82)	9 (18)	0 (0)	182	38 (76)	8 (16)	4 (8)	168
11	Restocking	17 (34)	14 (28)	19 (38)	96	14 (28)	13 (26)	23 (46)	82
12	Final harvest	43 (86)	7 (14)	0 (0)	186	42 (84)	8 (16)	0 (0)	184
13	Hazards management	12 (24)	19 (38)	19 (38)	86	9 (18)	14 (28)	27 (54)	64
	Total	311 (47.85)	178 (27.38)	142 (24.77)	123.08	271 (41.69)	180 (27.69)	199 (30.62)	111.08

Figures in the Parenthesis indicate percentage of total

4.2.1 Adoption index

The summary of result of adoption index between selected training perform indicators (training messages) is shown in table-(4.9). It was found that training perform indicators such as dike repairing, liming, feeding, fertilization were depends on economic condition of farmers. On other hand species selection and hazards management were depended on aquaculture knowledge of farmers.

Adoption index of men farmers varies from 82 to 186 and 64 to 184 for women farmers against the possible range of 0 to 200. Adoption index of final harvest was highest 186 and 184 for both men and women farmers respectively which indicated that both men and women farmers adopted technological messages equally irrespective of sex and there was no significant ($P>0.05$) differences between them (Fig.-4.21).

On the other hand, adoption index of hazards management was lowest for both men and women farmers (82 and 64) respectively (Fig.-4.21). This means that both men and women fish farmers were not acquainted to adoption of hazards management message in small- scale aquaculture. Here sex differences had little effect to adopt hazards management practices in their farm.

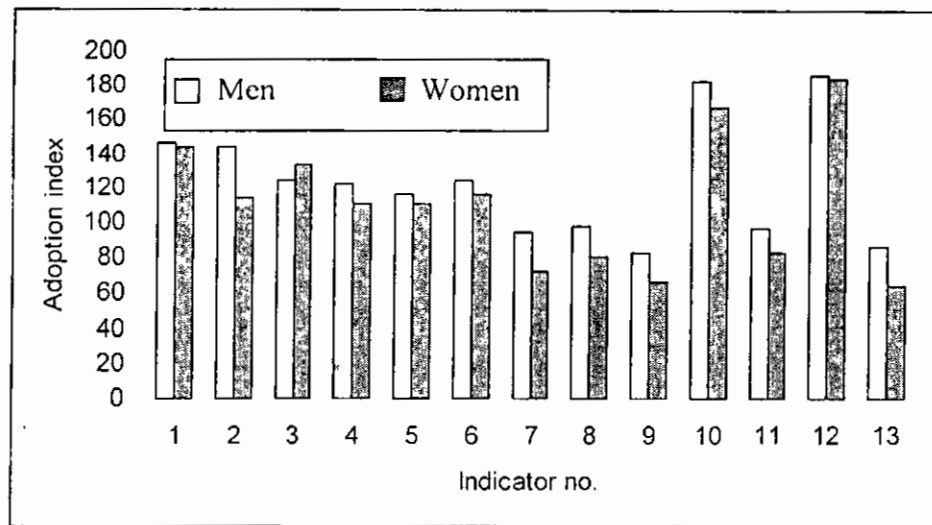


Fig-4.21: Adoption Indicators/ training messages.

- | | | |
|---|--------------------------------|------------------------|
| 1. De-weeding | 5. Pre-stocking fertilization | 9. Feeding |
| 2. Dike repairing | 6. Species selection | 10. Partial harvest |
| 3. Removal of predator/unwanted species | 7. Stocking ratio and numbers | 11. Restocking |
| 4. Liming | 8. Post-stocking fertilization | 12. Final harvest |
| | | 13. Hazards management |

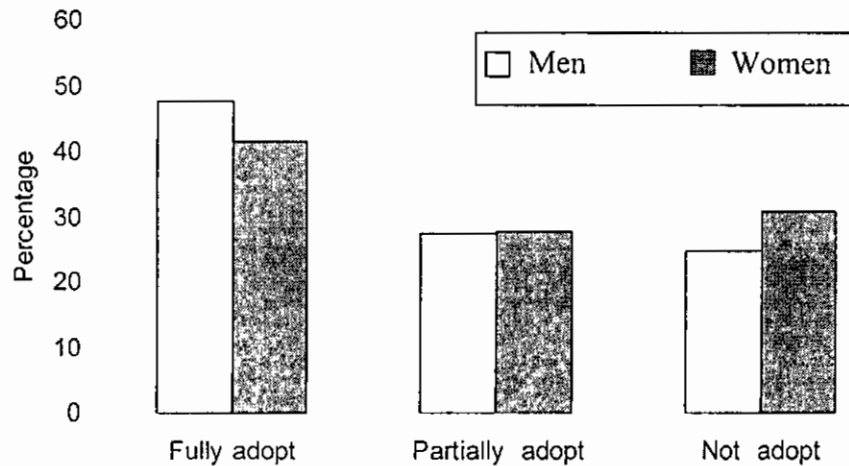


Fig-4.22: Comparison of men and women farmer's adoption level.

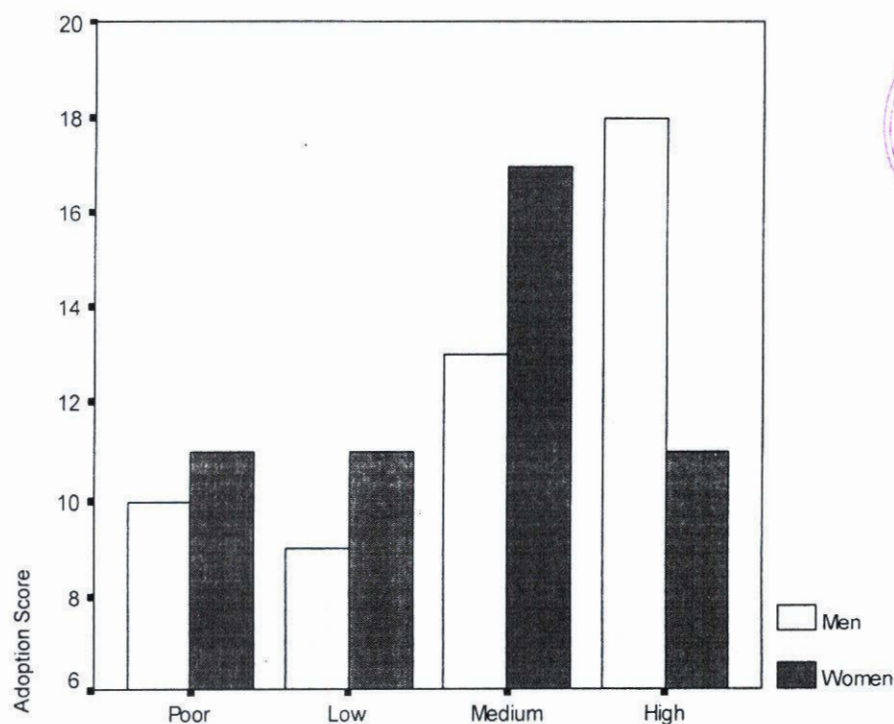
4.2.2 Adoption Score

Adoption scores were categorized into four levels such as poor (below 8), low (8-14), medium (15-20) and high (>20).

As shown in Table-4.10 the highest number of men farmers (36%) achieved high adoption score that was followed by 13 percent, 10 percent and 9 percent achieved medium, poor and low adoption score respectively. On the other hand, the highest number of women farmers (34%) achieved medium adoption score that was followed by 22 percent achieved high, poor and low adoption score.(Fig-4.23).

Table 4.10: Adoption score of the fish farmers.

Gender	Adoption score				Total
	Poor (Below 8)	Low (8-14)	Medium (14-20)	High (Above 20)	
Men (%)	20	18	26	36	100
Women (%)	22	22	34	22	100



4.23: Comparison of men and women farmer's adoption score.

4.3 Fish production of trained farmers' ponds (Post-training)

The production rate of fish was recorded from selected men and women farmers after the adoption of training messages. The fish production rate varies from 3.5 kg/decimal to 11 kg/decimal. In case of man farmers, the average fish production rate was recorded 7.80 ± 2.4 kg/decimal (Fig-4.25). On the contrary, it was found that the fish production per decimal was 6.60 ± 2.3 kg/decimal in woman farmers operated ponds (Fig-4.26). As shown in Table-4.11, the production rate of most of the man fish farmers (50%) was above 8 kg/decimal that was followed by 28 percent had 3-6 kg/decimal and 22 percent had 6-8 kg/decimal production rates. On the other hand, 32 percent woman farmers had above 8 kg/decimal production rates and it was found that there was 42 percent women farmers who had 3-6 kg/decimal production rate (Fig4.24). Ahmed and Gupta, 2001 reported that the fish farmers produced fish 9.89 kgs/decimal after training than the base line production was 2.2 kgs/decimal. He also concluded that targeting farmers who already have water bodies (pond and ditches) through extension services can push up aquaculture production and benefits significantly.

Table-4.11: Post training fish production rate.

Gender	Production rate (Kg/decimal)				Total
	Below 3	3-6	6-8	Above 8	
Men (%)	0	28	22	50	100
Women (%)	4	42	22	32	100

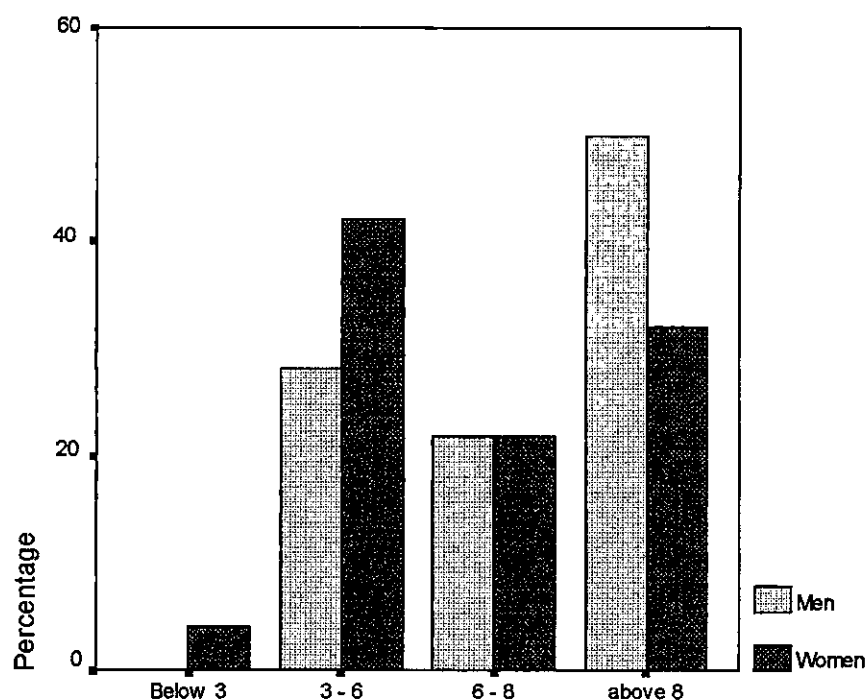


Fig-4.24: Comparison of men and women farmer's post-training fish production

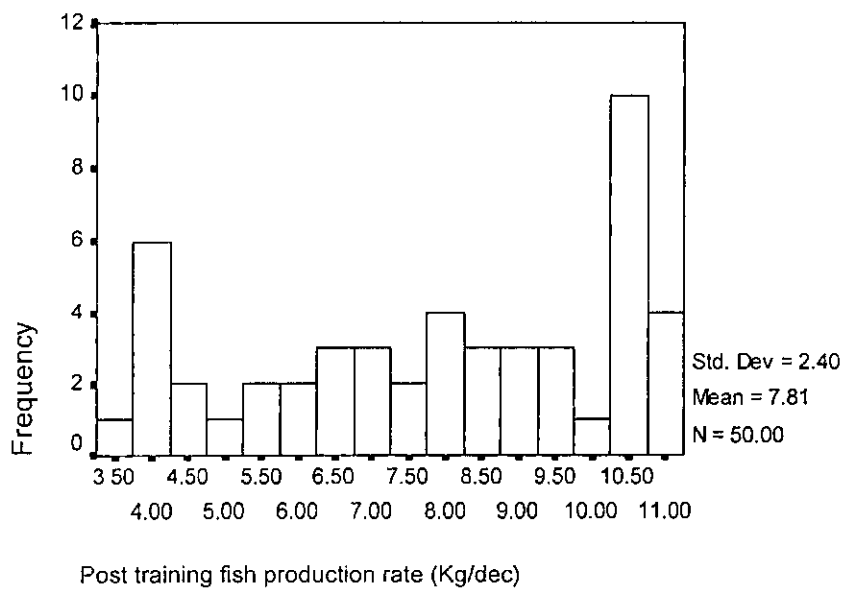


Fig-4.25: Post training fish production rate of the men farmers.

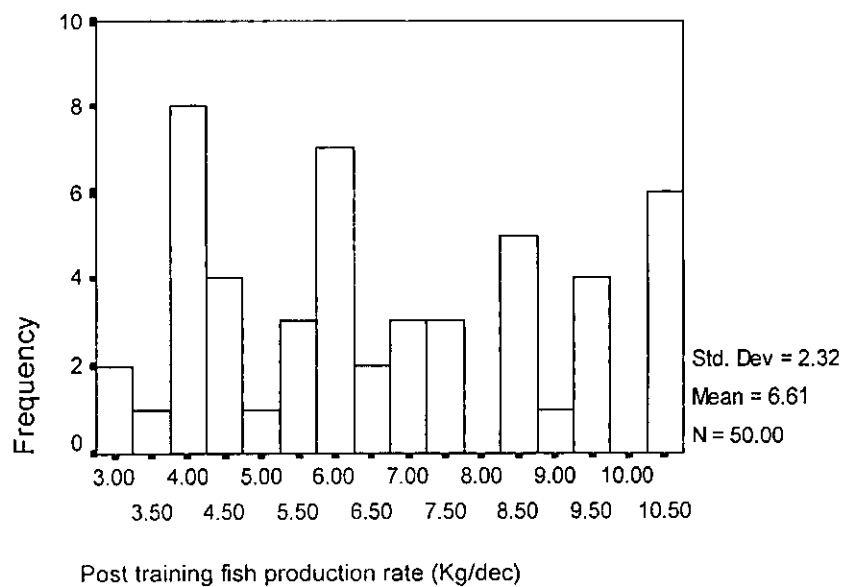


Fig-4.26: Post training fish production rate of the women farmers

4.4 Effects of socio-economic profile on adoption score

4.4.1 Effect of age of the farmers on adoption of training messages

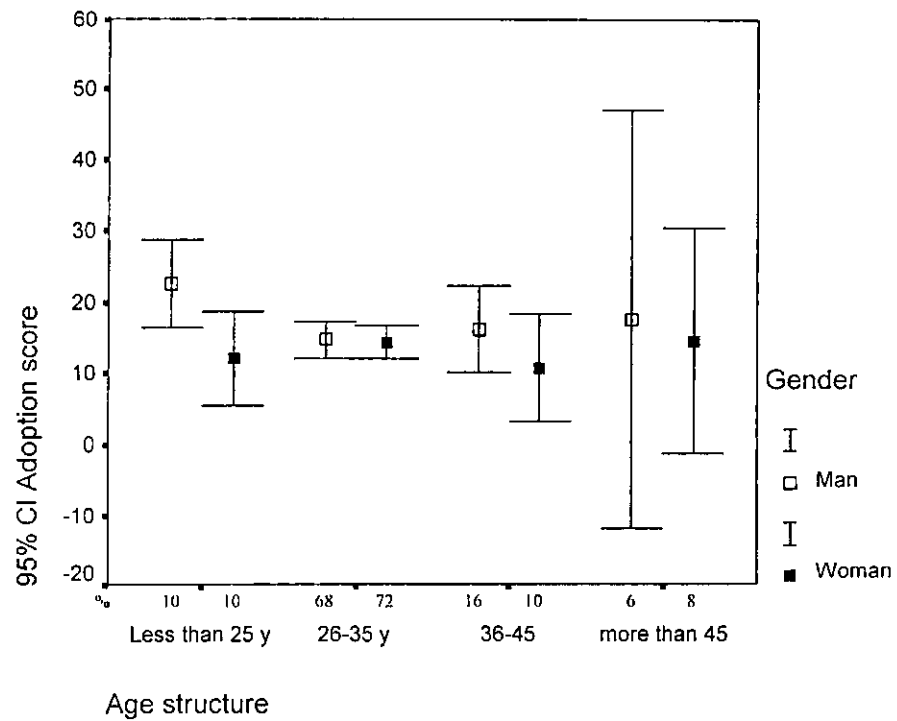
Fig- 4.27 shows the relationships between age structure of the farmers and their adoption score in training messages. This indicates highest proportion of farmers (68% men and 72% women) having age group 26-35 years adopted the training messages in equal level (mean 14.41 for men and 14.77 for women). The adoption score of the farmers of the age group less than 25 years (10% men and 10% women), age group 36-45 years (16% men and 10% women) and age group more than 45 years is moderately different level. The mean adoption score of men and women are 22.6 and 12.0 for the age group less than 25 years, 16.25 and 10.80 for age group 36-45 years and 17.67 and 14.50 for the age group more than 45 years respectively (Table-4.12). The significant adoption score for the age group 26-35 years of farmers (both men and women) is due to the reason that they are usually venturesome, innovative and energetic having a modern outlook and potentiality to provide leadership in the society. On the other hand aged people lack of energy and enthusiasm due to decline in health and having a traditional outlook and also dependent upon other members of family.

Regression analysis (Fig-4.28) shows the relationship between men and women age structure with the adoption score was negative. The value R-square is 0.0019 for men and 0.0055 for women which is indicated that significant difference between age and adoption score. Here it is concluded that there no significant difference between men and women age and their adoption score.

There was an interesting feature in that adoption score of the farmers was not significantly related to gender (man and woman).

Table-4.12: Mean adoption score of training messages to age of farmers

Gender	Age (years)			
	Less than 25	26-35	36-45	More than 45
Men	22.6	14.41	16.25	17.67
Women	12.0	14.77	10.8	14.5



4.27: Relationship between age structure and adoption score.

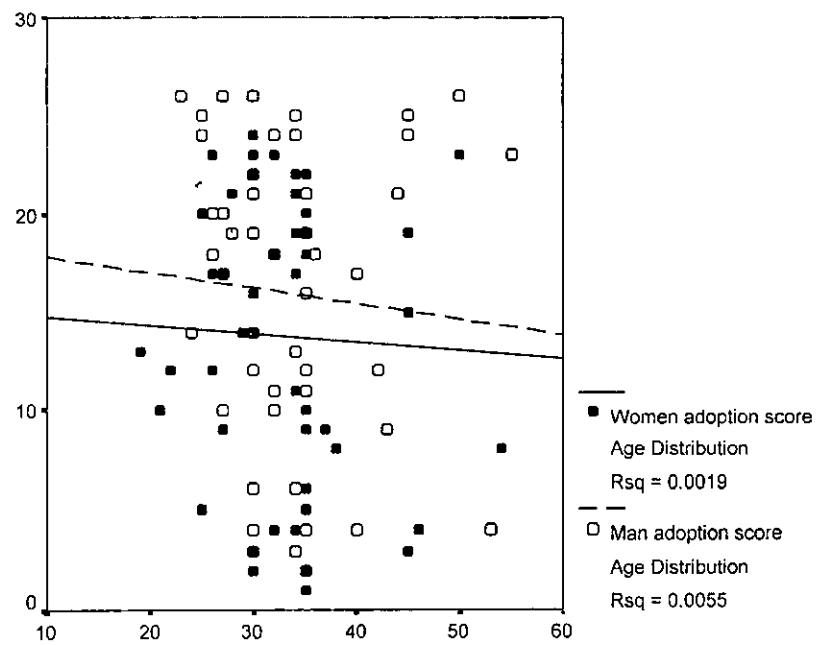


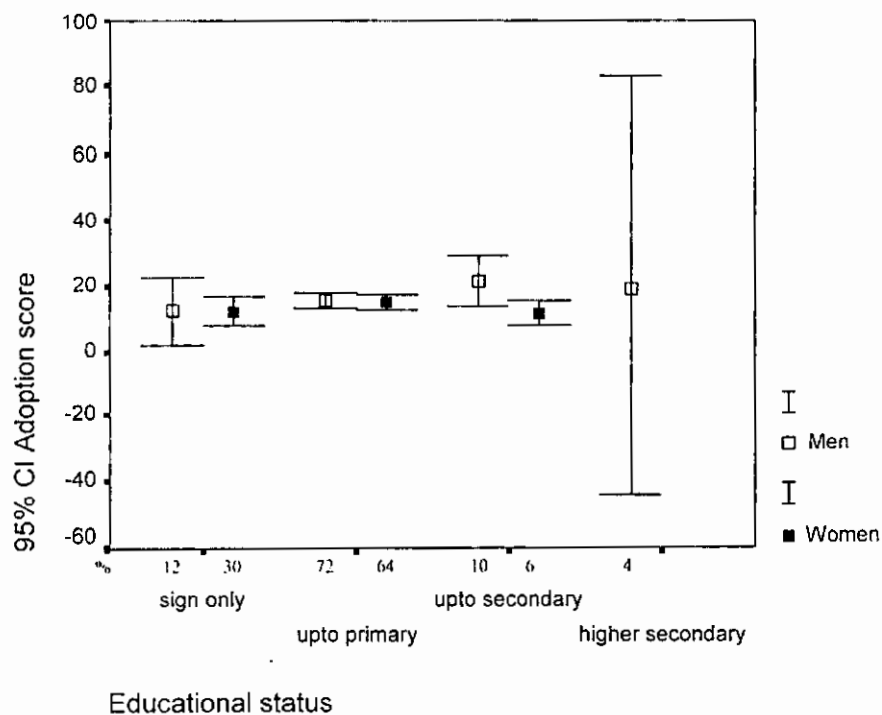
Fig.-4.28: Regression equation between farmer's age and adoption score

4.7 Effect of education levels of the farmers on adoption of training messages

Fig-4.29 indicates a strongly significant relationship between education level and adoption score in training messages. This indicates highest proportion of the farmers (72% men and 64% women) having education level upto primary and their mean adoption score was 15.65 and 14.84 respectively (Table-4.13).

Table-4.13: Mean adoption score of training messages to educational level of farmers

Gender	Education level			
	Sign only	Upto primary	upto secondary	higher secondary
Men	12.5	15.65	21.4	19.0
Women	12.07	14.84	11.67	-



4.29: Relationship between educational status and adoption score.

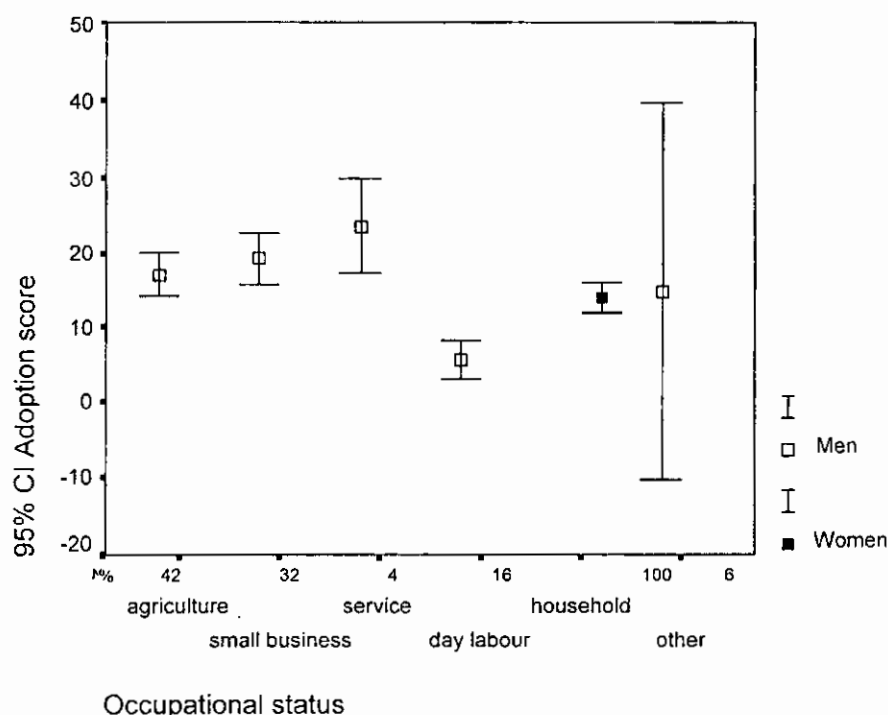
4.8 Effect of main occupations of the farmers on adoption of training messages

Fig- 4.30 shows the relationships between occupation of the farmers and their adoption score of training messages. Women farmers (100%) having household occupation achieved the score as like as highest proportion of men farmers (42%) having agriculture occupation.

There was an interesting feature in that adoption score of the farmers having productive occupation was not significantly related to the farmers having reproductive occupation.

Table-4.14: Mean adoption score of training messages to occupation of farmers

Gender	Occupation					
	Agriculture	Small business	Service	Day labour	House hold	Other
Men	17.0	19.19	23.5	5.5	0	14.47
Women	-	-	-	-	13.38	-



4.30: Relationship between occupational status and adoption score.

4.9 Effect of annual household cash income of the farmers on adoption of training messages

Fig- 4.31 shows the relationships between annual household cash income of the farmers and their adoption score in adoption of training messages. This indicates highest number (man 40% and woman 44%) of farmers who have annual household cash income 25000 to 30000 Tk achieved higher adoption score than others farmers. The mean adoption score of men and women are 6.22 and 7.0 for the income group of less than Tk.20000, 15.23 and 12.75 for the income group of Tk.20001-25000, 20.1 and 17.27 for the income group of Tk.25001-30000 respectively and only mean adoption score 23.3 for the income group of above Tk.30000. (Table-4.15). This group of farmers are able to invest high amount of capital in aquaculture.

Regression analysis (Fig-4.32) also shows that the relationship between annual household cash income and the adoption score was positive. The value of R-square is 0.3621 for men and 0.3546 for women which is indicated that significant difference between annual household cash income and adoption score for both men and women farmers.

Table-4.15: Mean adoption score of training messages to household annual cash income of farmers

Gender	House annual cash income (Tk.)			
	less than 20000	20001 – 25000	25001-30000	More than 30000
Men	6.22	15.23	20.1	23.3
Women	7.0	12.75	17.27	-

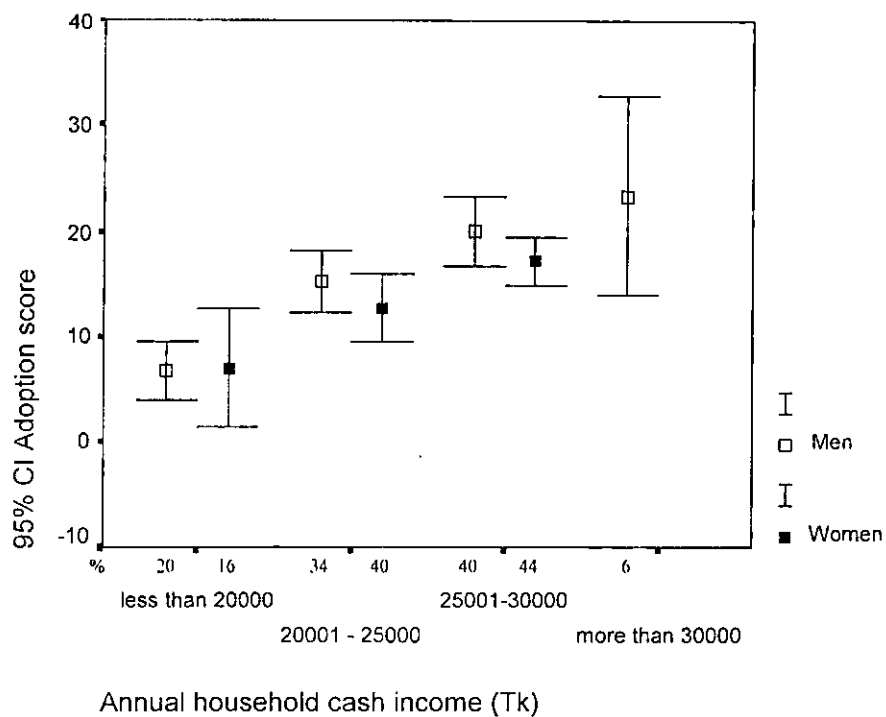


Fig-4.31: Relationship between annual household cash income and adoption score.

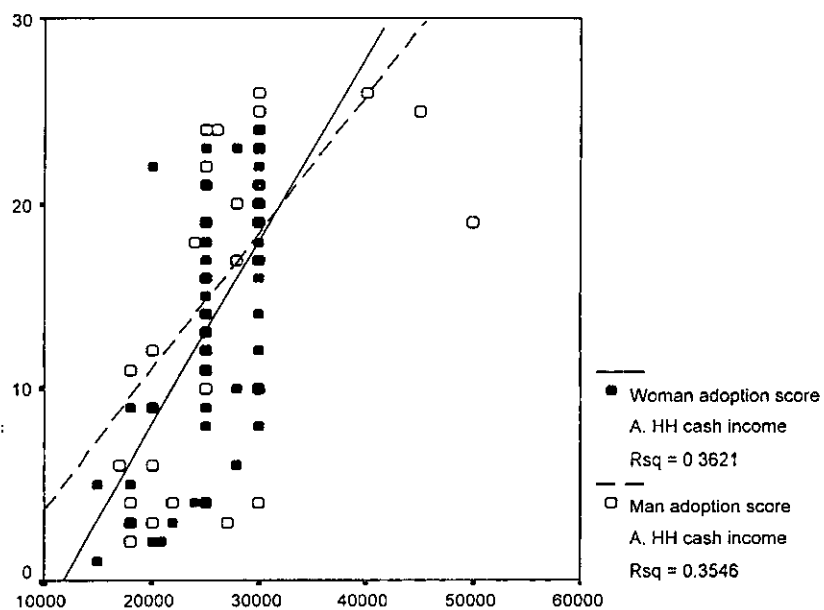


Fig.- 4.32: Regression equation between farmers household annual cash income and adoption score

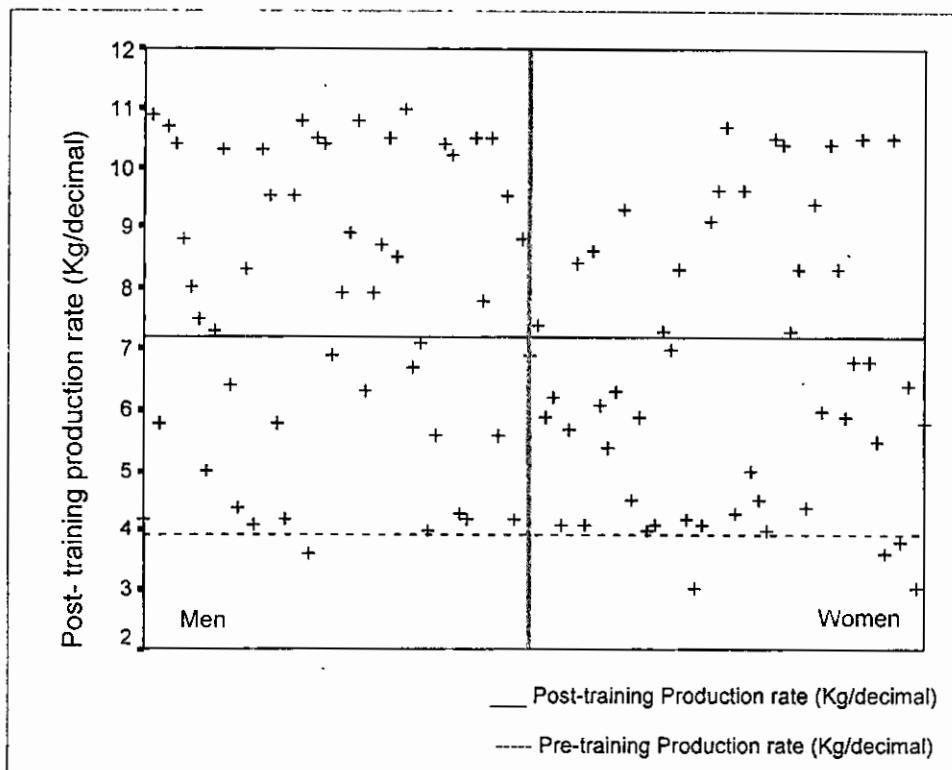
4.5 Difference between before and after training fish production rate

There are significant differences of fish production between before training and after training of the farmers both men and women (Fig-4.33). Before adoption of training messages, the overall production rate of before training was 3.93 kg/decimal but after adoption of training messages, production rate significantly increased and production rate after training reached at the rate of 7.20 kg/decimal (Fig-4.34). In case men farmers, production rate were increased from 4.13 kg/decimal to 7.80 kg/decimal and 3.74 kg/decimal to 6.60 kg/decimal for women farmers (Table-4.16). DOF (2001) reported that female farmers' performance in fish production was better than male. Trained female pond operators produced higher (average 8.4 kg/dec.) than that of trained male pond operators (average 6.7kg/dec.). Barman *et.al*, (2002) also reported that women farmers produced quite a good numbers of fingerlings from their Rice- fish plots in North-west Bangladesh.

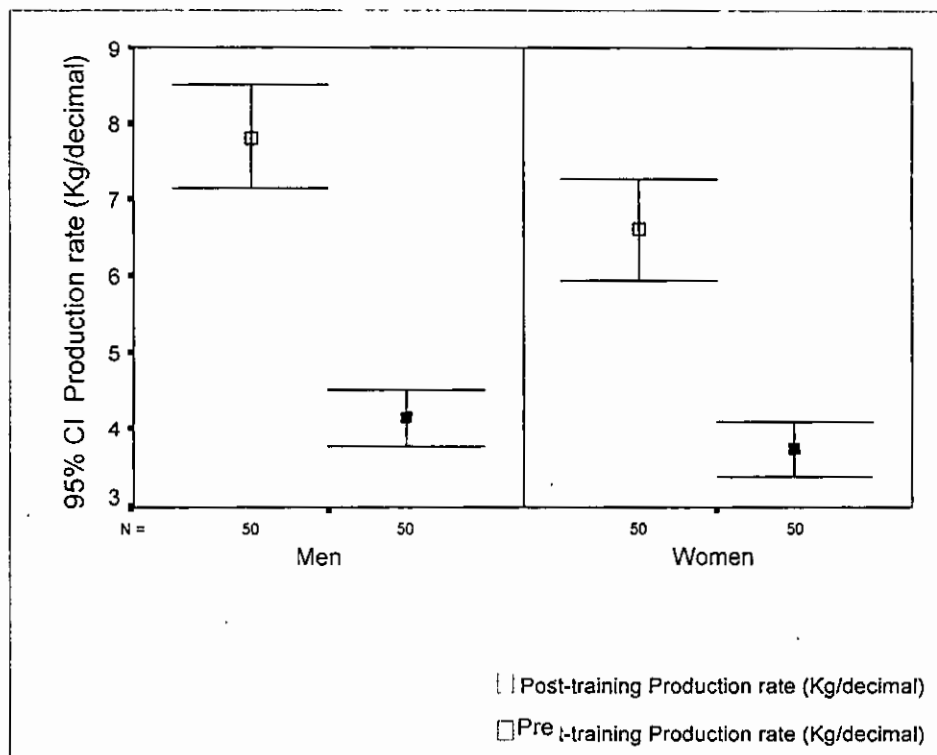
This difference indicates a strongly positive relationship between production rate and adoption of training messages. The observed phenomenon can be explained in this way, adoption of training messages helps the farmers to achieve higher production of fish.

Table 4.16: Difference of the pre-training and post- training fish production rate.

<i>Gender</i>	<i>Fish production rate before training (kg/decimal)</i>	<i>Fish production rate after training (kg/decimal)</i>	<i>Difference</i>	<i>Increment rate (%)</i>
Man	4.13	7.80	3.67	88.88
Woman	3.74	6.60	2.86	76.47
Total	3.93	7.20	3.27	83.20



4.33: Difference between before and after training fish production rate



4.34: Compare of the pre-training and post- training fish production rate

4.6 Constraints of women participation in small-scale aquaculture

As shown Table 4.17 during Focus group discussion, it was found that the highest numbers of respondents (100%) had constraints of busy with household keeping, want of productive employment and unable to contact Upazila Fisheries office DOF (2001) reported that women farmers never went to Upazila Fisheries Office.

The respondents (94%) had the constraints of Low level of education and social barrier to out side work. Miah (2000) reported the same that the old religious villagers to go out side their house discouraged the women workers. The respondents of 92 percent and 86 percent had the constraints of children nursing and bearing them in training, dependent on husband/other men members and unable to take decision respectively. Only 74 percent had the constraints of sickness and malnutrition.

Table-4.17: Constraints of women participation in small-scale aquaculture.

Sl.No.	Constraints	% of respondents
01	Dependent on husband/male members of family for inputs purchasing.	86
02	Religious taboo	78
03	Children nursing and bearing children or grand sons/daughters in training session	92
04	Household maintenance	100
05	Educational status	92
06	Social barrier to go out side specially market	92
07	Unable to take decision independently	86
08	Un-employment	100
09	Disease and malnutrition	74
10	Unable to contact Upazila Fisheries office	100

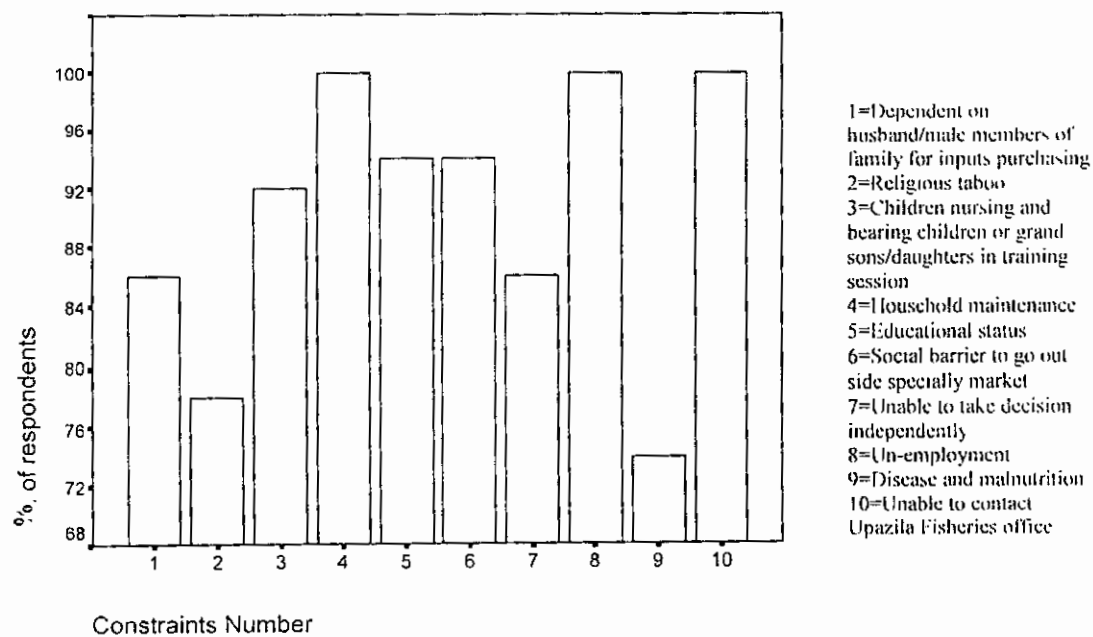


Fig-4.35: Constraints of women participation in small-scale aquaculture

CHAPTER 5

SUMMARY AND CONCLUSION

5.0 SUMMARY AND CONCLUSION

An investigation on the Socio- economic profile of adoption of training messages, assessment of fish production after receiving training and identification of the constraints of women participation in small scale aquaculture were conducted. Farmers were selected from Jheneidah Sadar Upazila under Jheneidah district.

Socio-economic profiles of the selected farmers were presented in terms of age structure, Household size, educational level, household cropland holding, annual household cash income and status of previous training on management of small-scale aquaculture. It was found that age group of 26 to 35 years was the highest in case of men farmers (68%) and women farmers (72%) and less than 25 years was the lowest in both men (10%) and women farmers (10%). The largest household size was found in case of men (5-7 persons) and women farmers (5-7 persons) respectively. The lowest household size was found in case of men (above 7 persons) and women farmers (above 7 persons). Regarding educational level, most of the men farmers (74%) and women farmers (64%) are upto primary. The principal occupation of men farmers (42%) is agriculture and 100% women farmers are household work. Men farmers (60%) and women farmers (64%) have 10-20 decimal aquaculture resource (pond) ownership. Household cropland of 50-75 decimal owned by men farmers (56%) and women farmers (58%) respectively. Annual household cash income of men farmers (74%) and women farmers (64%) have Tk. 20001-25000.

It was found that 100 percent of both men and women farmers did not receive any training on management of small-scale aquaculture before this study.

Men farmers (66%) and women farmers (62%) produced 3-6 Kg/decimal fish in their ponds before training.

Age group 26-35 years of men (68%) and women (72%) adopted training messages in equal range.

This study revealed that most men (74%) and women (64%) adopted training messages gaining upto primary level education. In small-scale aquaculture, up to primary level education is enough for both men and women farmers.

In case of occupational status, men farmers (42%) involved in agriculture and women farmers (100%) involved in household work adopted the training messages in significant level.

Annual households cash income of men farmers (40%) and women farmers (44%) have Taka 25001-30000. Both farmers adopted the training messages in the same level.

After training, men farmers increased fish production 88.88 percent while women farmers increased fish production 76.47 percent from the baseline production.

Effect of Age, Main profession, Educational level and House hold cash income of women fish farmers on adoption score is significant with men fish farmers. And in case of fish production after training, fish production rate of women operated ponds is significant with men operated ponds although some constraints exist with women fish farmers. Constraints of women participation in small-scale aquaculture in the study area are identified such as Dependent upon men members of family for decision and inputs of fish culture, Religious taboo, Bearing children in training session, Low level education, want of productive job, Malnutrition, unable to contact Fisheries office etc.

According to the information gathered so far in this study it may be concluded that the performance in case of training messages adoption and fish production after receiving training of women participants in small-scale aquaculture is encouraging despite some constraints identified by this study. Age group of 26-35 for both men and women fish farmers are most potential and upto primary level education is sufficient for both men and women to operate small-scale aquaculture farm successfully. Household annual cash income plays a significant role to get good performance to operate small-scale aquaculture farm. From this study, above Tk.30000 income group adopted training messages mostly for both sexes. In order to keep fish production at optimum level from small-scale aquaculture without hampering the productive time of men members of the family (small-scale aquaculture management is a part time job), more women might be involved in small-scale aquaculture through motivating and creating social awareness within the community. If more women are involved in small-scale aquaculture, the family members are likely to obtain the following results :

- To save the productive time of male members of the family

- To get more importance the culture fish because women will be able to plan as per training without waiting for the decision of male members of the family
- To produce more fish so that income as well as consumption of fish will increase
- Wastage of kitchen and domestic cattle dung and poultry droppings will be utilized as a result production cost will reduce at minimal level.

Based on the findings of the study, the following steps may undertaken to increase participation of women in small-scale aquaculture:

- Special institutional credit system can be provided with convenient terms.
- Productive jobs should be created for those who are capable.
- Social awareness should be created in the respective community for changing the social norms that are prejudiced against women.
- Training should be provided with male earning members through group approach.
- Adult learning center at the village level should be set up.
- Primary health centre to be set up for creating health awareness and providing health service.

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APPENDICES

Appendix -1

Division _____ District: _____ Upazila: _____ Village: _____

[illegible]

Occupation Code:			Education Code:				HH Income code		Crop/land
1. Agriculture	5. Service	9. Housework	1. Illiterate	5. Secondary	1. >5,000	5. 20,001-30,000	0. None		
2. Fisherman	6. Small trader	10. Student	2. Can read only	6. Higher	2. 5,001-10,000	6. 30,001-50,000	1. <50 dec		
3. Fisherman	7. Day labour	11. Unemployed	3. keep accounts only	Secondary	3. 10,001-15,000	7. 50,001-75,000	2. 50 + dec		
4. Businessman	8. Skilled tradesman	12. Others	4. Primary	7. Above Higher	4. 15,001-20,000	8. 75,001 +			
				Secondary					

Appendix-2

Assessment format of training messages adoption

Technologies/training messages	Fully apply training messages (Nos.)	Partially apply training messages (Nos.)	NOT apply training messages (Nos.)	Not applicable (Nos.)
1. Dyke repairing				
2. De-weeding				
3. Removal of predators/ unwanted species				
4. Liming				
5. Pre-stocking fertilisation				
6. Species selection				
7. Stocking ratio and density				
8. Post stocking fertilisation				
9. Feeding				
10. Partial harvest				
11. Re-stocking (in case of perennial ponds)				
12. Final harvesting				
13. Problems & hazards management (disease, depletion of-oxygen etc)				

Fish production rate Assessment Format

Sl. No.	Farmer's name	Father/husband name	Sex M/F	Pond area (Decimal)	Production after training (Kgs/decimal)
01					
02					
03					
04					
05					
06					
07					
08					
09					
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12					
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25					

Appendix-5: Statistical Description of age structure

Sex	Mean	95% Confidence Interval for Mean		Median	Variance	Std. Deviation	Minimum	Maximum	Range
		Lower Bound	Upper Bound						
Men	33.56	31.48	35.64	32.00	53.517	7.32	23	55	32
Women	33.32	31.23	35.41	34.00	53.855	7.34	19	54	35

Appendix-6: Statistical Description of family size

Sex	Mean	95% Confidence Interval for Mean		Median	Variance	Std. Deviation	Minimum	Maximum	Range
		Lower Bound	Upper Bound						
Men	5.44	4.90	5.98	5.00	3.558	1.89	2	9	7
Women	5.60	5.15	6.05	6.00	2.490	1.58	2	9	7

Appendix-7: Statistical Description of pond size

Sex	Mean	Variance	Std. Deviation	Minimum	Maximum	Range
Men	16.4600	54.988	7.4154	5.00	40.00	35.00
Women	14.6000	35.918	5.9932	4.00	29.00	25.00

Appendix-8: Statistical Description of Cropland

Sex	Mean	95% Confidence Interval for Mean		Median	Variance	Std. Deviation	Minimum	Maximum	Range
		Lower Bound	Upper Bound						
Men	60.60	52.351	68.848	55.00	842.408	29.0243	15.00	175.00	160.0
Women	53.68	48.158	59.201	55.00	377.406	19.4269	20.00	90.00	70.00