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*Abstract-* The intensity of aquaculture is increasing day by day in Bangladesh. To meet the increasing demand new technologies are being used to enhance production. Recently the use of fish medicines in aquaculture is also seen among the farmers of our country. In the present study, the propensity of using harmful gas controller and oxygen supplier on the basis of farmers' age, educational status and land ownership were studied. The study was conducted in six upazilas of Noakhali district, Bangladesh. Data were collected through questionnaire survey of 77 fishermen by interviewing with them and discussing with the upazila fisheries officer, retailers of fish medicines and representatives of pharmaceutical companies and market survey.

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# Propensity of using Harmful Gas Controller and Oxygen Supplier on the Basis of Fish Farmers Age, Educational Status and Landownership of Six Upazilas in Noakhali District, Bangladesh

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Abstract- The intensity of aquaculture is increasing day by day in Bangladesh. To meet the increasing demand new technologies are being used to enhance production. Recently the use of fish medicines in aquaculture is also seen among the farmers of our country. In the present study, the propensity of using harmful gas controller and oxygen supplier on the basis of farmers' age, educational status and land ownership were studied. The study was conducted in six upazilas of Noakhali district, Bangladesh. Data were collected through questionnaire survey of 77 fishermen by interviewing with them and discussing with the upazila fisheries officer, retailers of fish medicines and representatives of pharmaceutical companies and market survey. The propensity of using harmful gas controller was higher than any other medicines used by farmers of all upazilas surveyed. In the case 36% farmers showed their tendency to use, because most of the farmers had problems with harmful gases in their ponds. In case of oxygen supplier 22% farmers used oxygen in their ponds. Most of the farmers' age ranged between 26-35 and 36-45 years who showed more tendencies to apply both medicines in their ponds. It was also found that the farmers whose education level was above higher secondary school certificate (HSC) showed more tendency to apply medicines. Farmers who were rich having 6 and above acres of land showed more tendencies than poor and moderately rich farmer to apply medicines in their ponds. The study clearly showed that, there was a relationship between farmers' age, educational status and land ownership with the adoption of harmful gas controller and oxygen supplier.

Keywords: harmful gas controller, oxygen supplier, educational status, landownership.

#### I. INTRODUCTION

Bangladesh is one of the world's leading inland fisheries producers with a production of 2381916 mt, marine fish production of 517282 mt and a total production from closed water body of 1351979 mt (DoF, 2011).

In advance of fish cultivation the use of medicine is also increasing. The rationale of this study

was to find out whether there was any relationship between this increasing fish cultivation and harmful gas controller and oxygen supplier usage with that of age, educational status and land ownership of the farmers. As a model district Noakhali was selected, which is famous for its vast area of watery resources located in the Chittagong division, Bangladesh having a land area of 3600.99 km<sup>2</sup>. A number of studies did not find strong evidence to support the hypothesis that age of the farm operator has an impact on the adoption decision (Boz and Akbay, 2005; Daberkow and McBride, 2003). There are also a large body of works that documents a strong, positive correlation between education and measures of health but little is known about the mechanisms by which education might affect the adoption of new technologies as well as chemical use. So, the specific objective of the experiment was to identify the propensities of using harmful gas controller and oxygen supplier in aquaculture activities by fish farmers on the basis of their age, educational status and land ownership.

#### II. MATERIALS AND METHODS

#### a) Research approach and technique

The quantitative data were collected by structured survey while qualitative information was explored by case studies as the primary tools of data collection following Blaxter *et al.* (1996). Both types of research were important and useful although they were not mutually exclusive.

#### b) Research design

The design of the survey for the present study involved some necessary steps, which are outlined in fig.1:

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Figure 1 : Flow chart of the research design

#### c) Study area selection

There are 9 upazilas in Noakhali district, Bangladesh. 6 upazilas among them were selected due to the convenience of communication from university campus (Noakhali Science and Technology University). The selected upazilas were Begumganj, Chatkhil, Companiganj, Kabirhat, Noakhali Sadar and Subarnachar.

#### d) Sampling and data collection

77 farmers were interviewed in 6 selected upazilas. The interview was taken from farmers when

they were administering medicine in the pond, chatting with each other in different locality and purchasing medicine in fish medicine store and different fish markets. Farmers list was collected from upazila fisheries office and fish medicine companies. After that the farmers were classified in different age groups from 15 to 65 years.

e) Frequency distribution on the basis of upazila Frequency of the farmers and their percentages

distribution among 6 upazilas are shown in table 1.

Upazila name	Frequency	Percentage
Begumganj	10	13.0
Chatkhil	12	15.6
Companiganj	12	15.6
Kabirhat	11	14.3
Noakhali Sadar	26	33.8
Subarnachar	6	7.8
Total	77	100

Table 1 : Distribution of the fish farmers according to the upazila.

f) Categorization of farmers on the basis of age

According to 10 years interval the total farmers were classified into 5 categories (table 2).

Table 2 : Distribution	of fish fa	rmers acco	rding to	age.
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-	Age interval	No. of the interviewee	Percentage of the interviewee
	16-25	14	18.2
	26-35	24	31.2
	36-45	24	31.2
	46-55	9	11.7
	56-65	6	7.8
_	Total	77	100

g) Categorization of farmers on the basis of farmers' educational status

Farmers were classified into 5 different categories according to their educational status (table3).

Educational Status	No. of interviewee	Percentage of the interviewee
No education	4	5.2
Primary	27	35.1
SSC	19	24.7
HSC	14	18.2
Above HSC	13	16.9
Total	77	100

Table 3 : Distribution of fish farmers according to educational status.

h) Categorization of farmers on the basis of farmers land ownership

Farmers were classified into 3 groups according to the quantity of land they owned (table 4).

Table 4 : Distribution of fish farmers according to the land ownership.

Quantity of land owned (acre)	Categorization of farmers	Frequency	Percentag
1-2.9	Poor farmers	34	е 44.2
3-5.9	Moderately rich farmers	19	24.7
6+	Rich farmers	24 77	31.2 100.0
	Total		

#### i) Data analysis

The questions were post coded when needed, entered on the computer using Microsoft excel, checked after entry and analyzed using statistical software version (15.0) SPSS. Descriptive statistics was used for analysis and presentation of data.

## III. Results

#### a) Use of harmful gas controller

Harmful gas controller is used to control the obnoxious gas in the bottom of the pond, to develop the

environment of the pond, to save fish from the diseases. Some of the drugs used in Noakhali district were Zeolite, Gasonex, Aquamagic, Megazeo, Geotox etc.

i. Use of harmful gas controller on the basis of upazila From the study it was observed that 10% farmers of Begumganj upazila, 50% of Chatkhil upazila, 55% of Kabirhat upazila, 42% of Noakhali sadar upazila, 67% of Subarnachar upazila used harmful gas controller. However, in Companiganj upazila no farmer was seen to use it (table 5).

*Table 5* : Distribution of harmful gas controller user on the basis of upazila.

Upazila Name	-	Harmful Gas Controller				
	Non user	Percentage	User	Percentage		
Begumganj	9	90	1	10	10	
Chatkhil	6	50	6	50	12	
Companiganj	12	100	0	0	12	
Kabirhat	5	45	6	55	11	
Noakhali sadar	15	58	11	42	26	
Subarnachar	2	33	4	67	6	
Total	49	64	28	36	77	

ii. Use of harmful gas controller on the basis of age

Farmers of early ages showed higher tendency to use harmful gas controller in their ponds. Thus the farmers of age range 16-25 used more drugs in comparison to others (table 6).

Age Interval		Harmful Gas Controller				
	Non user Percentage User Percentage					
16-25	8	57	6	43	14	
26-35	15	62	9	38	24	
36-45	15	62	9	38	24	
46-55	6	67	3	33	9	
56-65	5	83	1	17	6	
Total	49	64	28	36	77	

*Table 6 :* Distribution of harmful gas controller user on the basis of age.

iii. Use of harmful gas controller on the basis of educational status

The farmers who had no education showed no tendency to use these medicines (table 7).

Table 7 : Distribution of harmful gas controller user on the basis of educational status.

Educational Status	Harmful Gas Controller				Total
	Non user	Percentage	User	Percentage	
No education	4	100	0	0	4
Primary	23	85	4	15	27
SSC	12	63	7	37	19
HSC	4	28	10	72	14
Above HSC	6	46	7	54	13
Total	49	64	28	36	77

iv. Use of harmful gas controller on the basis of land ownership

From the study it was known that 24% farmer having 1-2.9 acre land, 37% having 3-5.9 acre land and

54% farmer having above 6 acre land had tendency towards harmful gas controller using (table 8).

Table 8 : Distribution of harmful gas controller user on the basis of land ownership.

Land Ownership	-	Total			
	Non user	Percentage	User	Percentage	
Poor farmer	26	76	8	24	34
Moderately rich farmer	12	63	7	37	19
Rich farmer	11	46	13	54	24
Total	49	64	28	36	77

#### b) Use of oxygen supplier

Oxygen supplier is a medicine which supplies essential oxygen to water body. The usefulness of using this medicine is to regulate the growth of phytoplankton, save the fish from parasite, and maintain the nutrients of the water body. i. Use of oxygen supplier on the basis of upazila

It was found that no farmer used oxygen in their pond in Kabirhat upazila, whereas 20% used in Begumganj upazila, 25% in Chatkhil upazila, 8% in Companiganj upazila, 17% in Subarnachar upazila and maximum 39% farmers in Noakhali sadar upazila (table 9).

Upazila Name	Oxygen Supplier				
	Non user				
Begumganj	8	80	2	20	10
Chatkhil	9	75	3	25	12
Companiganj	11	92	1	8	12
Kabirhat	11	100	0	0	11
Noakhali sadar	16	61	10	39	26
Subarnachar	5	83	1	17	6
Total	60	78	17	22	77

#### ii. Use of oxygen supplier on the basis of age

According to the study, middle aged farmers used more oxygen supplier in their ponds (table 10).

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Age Interval		Oxygen S	Supplier		Total
	Non user	Percentage	User	Percentage	
16-25	13	93	1	7	14
26-35	18	75	6	25	24
36-45	18	75	6	25	24
46-55	6	67	3	33	9
56-65	5	83	1	17	6
Total	60	78	17	22	77

*Table 10*: Distribution of Oxygen supplier user on the basis of age.

iii. Use of oxygen supplier on the basis of educational status

Some variations were seen in case of oxygen supplier use among farmers. 25% of farmer who had no

education used these, 11% of primary educated farmer, 26% in case of SSC level, 14% in case of HSC level and as usual the 46% farmers whose education level is above HSC used oxygen supplier (table 11).

Table 11 : Distribution of Oxygen supplier user on the basis of educational status.

	Total			
Non user	Percentage	User	Percentage	
3	75	1	25	4
24	89	3	11	27
14	74	5	26	19
12	86	2	14	14
7	54	6	46	13
60	78	17	22	77
	Non user 3 24 14 12 7 60	Oxygen S   Non user Percentage   3 75   24 89   14 74   12 86   7 54   60 78	Oxygen Supplier   Non user Percentage User   3 75 1   24 89 3   14 74 5   12 86 2   7 54 6   60 78 17	Oxygen SupplierNon userPercentageUserPercentage37512524893111474526128621475464660781722

iv. Use of oxygen supplier on the basis of land ownership

Poor famers had little tendency to use oxygen while rich farmer showed more tendency to apply it (table 12)

Table 12 : Distribution of Oxygen supplier user on the basis of land ownership.

Land Ownership	-	Total			
	Non user	Percentage	User	Percentage	
Poor farmer	28	82	6	18	34
Moderately rich farmer	15	79	4	21	19
Rich farmer	17	7	7	29	24
Total	60	78	17	22	77

## IV. DISCUSSION

Aquaculture in Bangladesh is expanding rapidly with diversification, intensification and technological improvements. Around 60% of animal protein is supplied by the commercially important fisheries organisms which are also considered as the cheapest and richest source of animal protein (DoF, 2011). To increase production which is environmentally viable is the major goal of aquaculture. The aquaculture activities in Bangladesh are also influenced by a number of chemicals. As a result, different types of chemicals are used frequently in this sector. The present study identified a range of chemicals are being used in fresh water aquaculture activities in Noakhali district. For pond preparation and water quality management, farmers used lime, zeolite, fish toxin, insecticides and different fertilizers. Lime is very effective in different purposes such as pH, water color and turbidity maintaining, increase the rate of decomposition and also act as disease treatment. Most of the farmer used lime because of its low price and effectiveness in wate quality management and it also acts against different diseases. Sultana (2004) observed that, lime is very effective and widely used common chemical in Bangladesh.

It was found that the farmers in Noakhali Sadar upazila showed more tendencies to use oxygen supplier than any other upazilas surveyed. Due to the availability of fish medicine store, medical representatives, convenience of communication and for the expert of upazila fisheries office, the farmers who use fish medicine are higher in this region. However, in case of harmful gas controller farmers were seen comparatively higher in newly formed Subarnachar upazila although the total number of farmers in Subarnachar upazila is less than any other upazilas surveyed. There are some hatcheries and fish farms which use these fish medicines for commercial purpose. Probably these fish farms influenced the farmers in Subarnachar upazila to use the medicines. The less number of farmers in Companiganj upazila were found to use harmful gas controller and oxygen supplier. In accordance with Companiganj upazila, the farmers in Begumganj and Kabirhat upazila showed no or little tendency to use medicine.

It is known that age had a negative and significant relationship with adoption level. It might be because the aged persons were less change prone and reluctant to adopt new technologies in their farms. Rogers (1995) found that the younger the farmer, the more likely he/she are to adopt innovations early in his/her respective life cycle. He also said that older farmers may have a shorter time horizon and be less likely to invest in novel technologies. Present study reveals that, average rate of aged farmer were seen to use harmful gas controller and oxygen supplier. Nelson and Phelps (1966) suggested that 'educated people make good innovators' and that 'education is especially important to those functions requiring adaptation to change'. So, more educated farmers use medicine than those of illiterate and less educated farmers. This study also reveals the same pattern.

Fernandez-Cornejoet.al. (2002) found that adoption rates increased with the size of the farm operation. From the result it was found that the rich farmers who have more than 6 acres land use more medicine in their farm than poor and moderately rich farmer for commercial purposes.

# V. Conclusion

Aquaculture in Noakhali region is increasing rapidly and use of chemicals in aquaculture is also increasing simultaneously. If aquaculture is done in larger densities to enhance production and profit use of chemicals is must. However, some aquaculture chemicals appear to be relatively hazardous and on this basis their use should be curtailed. In the case, denying regulatory approval of the chemicals can be unnecessarily restrictive for the aquaculture industry but education, awareness rising of harmful effect of hazardous chemicals and enforcement of effluent quality limits are all among the possible approaches to ensure safe use.

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