
Assessment of the Using Patterns of Pesticides and Its Impact on Farmers Health in the Jhenidah District of Bangladesh

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Abstract: Unreasonable utilization of pesticides is progressively debilitating our biological community, well-being and environment. The main objectives of these studies were to examine the pesticide using pattern and its impact on farmer's health. Kaligonj and Jhenaidah sadar upazila of Jhenaidah districts were selected as a study area, where agriculture is the main sources of livelihood. Data were collected from randomly selected 80 farmers through a defined questionnaire. Study finding indicates that most of the farmers used insecticide (80%) in their agricultural fields and about (75%) farmers were could not read the level of the pesticides packet/bottle as a result they applied in a high dose. About seventy-seven percentage (77%) farmers used hand derived sprayer machines for pesticide application and during that time 80% farmers were not taking any types of protective measures. Gastro- intestinal diseases (84%), eye diseases (64%), skin diseases (60%) and urine and sexual diseases (54%) were the most common diseases in the study area. Farmers who were engaged in agricultural practices during 15-19 years they were suffering most from various types of health problem. Intensive awareness training of farmers on safety measures regarding the application of pesticides and its rational use is necessary to avoid potential health hazards.

Keywords: Pesticides, Using Patterns, Health Impacts, Farmers, Bangladesh

1. Introduction

Pesticides are used in agriculture in order to control pests and disease attacks of plants for improving productivity. It has different types such as molluscides, rodenticides, fungicides, herbicides, insecticides and plant regulators [1]. Though it is beneficial for crop production, but it has a great negative impact on environment and health [2, 3, 4]. During 1970s negligible amount of pesticide were used in Bangladesh but at present time Pesticide use levels have increased from 2,200 metric tons in 1980–82 to 6,500 metric tons in 1992–94 and modern rice cultivation increased from 20.3 percent of total rice area to 49.0 percent during the same

period [5].

Mostly Bangladeshi farmer is used insecticides and a little amount of herbicides, fungicides, acaricides and rodenticides in their agricultural field in the forms of granules, liquid and powder [6]. In modern aged most of the farmer are gradually depends on chemical pesticide including toxic chemicals than traditional method and IPM [7, 8]. In a developing country like Bangladesh, more than 90% of farmers used pesticide without knowing its actual requirements and they used pesticide unnecessarily, indiscriminately and excessively at high concentration and more frequent due to their ignorance and unconsciousness about the use, for example 150 sprays in a crop season in brinjal in Bangladesh [9, 10].

In Bangladesh many farmers spray pesticides without

taking any safety measures (wearing masks, gloves and other proper clothes) in the crop field that are highly vulnerable to suffer from various diseases because they absorb the toxic item unaware in different ways, including inhalation, dermal contact etc. [6]. Even farmers also clean the spraying pipe through their mouth [11]. Over 87% farmers report to openly admit of using little or no protective measures while applying pesticides and 92% of them do not take any protective measures during use, storage, transport etc. Pesticides can enter into human body during and after application through its different parts. The rate of dermal absorption of pesticide residues varies with the parts of body such as scalp (3.7%), forehead (4.2%), ear canal (5.4%), abdomen (2.1%), forearm (1.0%), palm (1.3%), genital area (11.8%) and ball of foot (1.6%). For these reason they are suffer from various types of health problems such as abdominal pain, dizziness, headaches, nausea, vomiting, as well as skin and eye problems [12]. The World Health Organization (WHO) and the United Nations Environment Program estimate nearly 4.0 million people suffer from severe pesticide poisoning and its rate is 2-3 per minute, with approximately 20,000 workers dying from exposure every year, the majority in developing countries [13, 14, 15]. The main objectives of these were to examine the pesticide using pattern and its impact on farmer's health.

2. Methodology

2.1. Research Approach

Survey method is adopted to determine the pesticide using pattern and the impact of pesticide on farmer's health based on proposed objectives.

2.2. Study Area

Kaligonj and Jhenidah sadar upazilla¹ in Jhenidah district² were selected as study area. Detail informations about study area are presented in table 1.

Table 1. Description of selected study area [16].

Selected criteria	Kaligonj Upazilla	Jhenidah Sadar Upazilla
Population	Total= 252443 Male = 130716, Female = 121727	Total= 394152 Male = 204256, Female = 189896
Literacy rate	Average literacy = 46.2%; Male = 51.1%, Female = 51%	Average literacy = 47.4%; Male = 52.3%, Female = 42.1%
Main Sources of income	Agriculture = 64.40%	Agriculture = 60.12%

2.3. Sampling Technique and Sample Size

The technique of stratified random sampling was used to obtain cross-sectional data for these studies. The farms were

selected randomly from within the selected areas. As a result, a total of 80 farmers were selected randomly (40 from each upazilla).

2.4. Data Collection Technique

Face-to-face key informant interviews with farmers were conducted for data collection. On the other hand discussions also conducted with the consultants and specialist doctors of skin, eye, medicine, urology, cardiology, neurology and cancer in order to understanding the potential effects of pesticide on farmer's health. Date of data collection was 15th March'2016 to 30th March'2016.

2.5. Study Tool

Survey questionnaires containing both structured and non-structured questions about duration of cultivation, types of pesticides use, pre-cautionary measures practice, health symptoms of the farmers due to pesticide exposure etc.

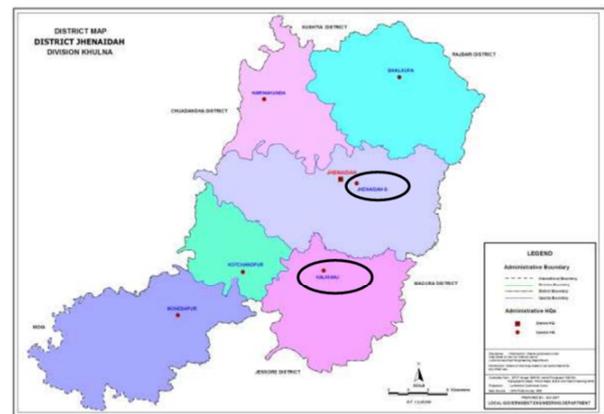


Figure 1. Map of selected study area (Kaligonj upazilla and Jhenidah sadar upazilla) in Jhenidah district of Bangladesh).

2.6. Data Analysis

All data were coded, entered, and then analyzed using the Statistical Package for Social Sciences (SPSS) program, version 16 and MS excel 2010. Descriptive results were expressed as numbers, and percentages for categorical variables.

3. Results and Discussion

3.1. Demographic Profile of Farmers

Table 2 summarizes the characteristics of farmers interviewed and showed that all of the farmers were male (100%). Also, nearly 36% farmers were within 31-40 year old, 31% farmer were 41-50 year old, 19% farmer were 20-30 year old, 11% farmer were 51-60 and only 3% farmer were over 60 year old. Data shown in Table 1 also indicated education status where 42% of the farmers had attained primary level, 26% secondary level, and 16% higher secondary, 10% illiterate and only 6% farmer were graduate. This is an indication that farming is not attractive to tertiary

1 Upazilas are the second lowest tier of the administrative unit of local government in Bangladesh.

2 Districts are the first tier of the administrative unit of local government in Bangladesh.

education graduates. Majority percentage (45%) of farmer family income within 3000 TK/ month, 30% family income 3001-5000 TK/month, 20% family income 5001-10000

TK/month and 5% family income above 10000 TK/month (Table 2).

Table 2. Demographic profile of farmers in the study area.

Selected Characteristics	Categories	Number (n=80)	Percentage (%)
Gender	Male	80	100
	20-30	15	19
	31-40	29	36
Age (years)	41-50	25	31
	51-60	9	11
	60 above	2	3
	Illiterate	8	10
	Primary	33	42
Educational Level	Secondary	21	26
	Higher secondary	13	16
	Graduation	5	6
Monthly Income (Bangladesh Taka)	less 3000 TK per month	36	45
	3001-5000 TK per month	24	30
	5001-10000 TK per month	16	20
	Above 10000 TK per month	4	5

3.2. Pesticide Using Pattern in the Study Area

3.2.1. Types of Pesticide Applied by Farmers

Many economically important vegetable crops are cultivated in the study area. Among them brinjal (*Solanum melongena* L.), chilli (*Capsicum annum* L.), long bean (*Vigna unguiculata* L.) and okra (*Abelmoschus esculentus* L.) are the major cultivated vegetable crops. In the study area pesticide users reveals that all farmers use insecticides with the high percentage (80%) compared to others pesticides. The order of dominance used in the study area are insecticides > fungicides > herbicides while such order by class is organophosphates > synthetic pyrethroids > carbamates. The

farmers of this area use fungicides and herbicides with the percentages of 8% and 12% (Table 4). The vegetable farmers use more than 10 type's pesticides to control pest infestation and minimize crop losses. It was also found that, pesticides were applied without adequate knowledge of pest ecology, economic injury levels and type of pesticides to control specific insect pest, their quantities and method of application, pre harvest interval and protective measures. Farmers want to solve pest problems for this purpose they spray more frequently and using different types of pesticides (Table 3).

Table 3. Product name and chemical group of pesticides used in the study area.

Pesticides	Product names	Generic name	Dose		Crop being treated	Target pest/weed/ disease
			Per hector	Per litter		
Insecticide	STATER 40 EC (lq)	Dimethayet	1.12L		Rice, sugarcane	Pamari breetel
	FYNAEN 57 EC (lq)	Malatheon	450ML	25ML	Rice, mango	Gange breetel
	GREENBA 1.8 EC (lq)	Abamectin	600ML	240ML	Brinjal, rice, tree cotton	Red spider, grass hopper
	CARATE 2.5EC (lq)	Lamdacyhalotrin	50ML		Potato, mango	Katui beetle, hopper beetle
Fungicide	SCORE 250 EC (lq)	Difenoconagel	500ML	1 ML	Rice, chili, banana	Blast
	AMISTER TOP (lq)	(Azoxystrobin+Difenoconagel)	200ML	1ML	Rice, potato	
	HINOSAN 50EC	Edifenfos		3.8 L		
Herbicide	KNOWIN 50 WP (gr)	Carbendazim	5.48 KG		Rice, sugarcane, banana	Sheath blight
	BUSTER (gr)	Pyridine carboxylic acid			All vegetable	Grasses, broadleaved weeds
	SIMAZINE (gr)	Turbuthylazine			All vegetable	Grasses, broadleaved weeds

(Gr = granular, lq = liquid; multiple answers considered)

3.2.2. Level of Pesticide Used

Only about 20% of applicators can able to read the level which are written on Bottles or Packets while 75% can't read the level of pesticide Bottles or Packets (Table 4). They are depend on pesticide sellers opinion. Generally, pesticide sellers are not properly trained up, they learn about pesticide from the representative of the company orally. Moreover,

farmers complained that block supervisors or agricultural officials are rarely seen and do not provides proper suggestions about pesticides using dose.

3.2.3. Methods of Pesticide Application

In the study area majority of farmers (77%) reported that they applied pesticide with hand drive spray machine. Few farmers about 14% used pesticides through injection process.

About 9% farmers used both spraying machine and injection during pesticides application (Table 4). The hand drive spray machine are available in our country and it's comparatively cheap than others modern machine but it has a demerit, where pesticide are not apply properly.

3.2.4. Adoption of Protective Measures

The study area farmers are unaware about protective coverings at the time of handling, transporting, storing and spraying. Although 15% users take partial safety measures (wearing shirt and trousers, gloves, mask etc.) during pesticides application. Around 80% don't wear protective measure (hand gloves, mask, goggles, full pant or shirt etc.) before going to spray and cleanse hands and face with soap after finishing. About 5% take bath after pesticide use for getting rid of odor (Table 4). This area farmer said that pesticide spraying is a regular work for them so it is not necessary to take any protective measure and they also said that they are habituated with this activity.

3.2.5. Storage and Disposal of Pesticide Packets or Battles

About 80% of the farmers throw the battles or packets in their agricultural field after used and 20% farmers return pesticide battles in their home for further purpose (Table 4). They have no concern about this things after use as a result they thrown it here and there. But it has a negative impact on health and environment.

3.2.6. Smoking, Drinking and Food Consuming During Pesticide Applications

Majority percentages of respondents reported that they consume something during pesticides application in the fields. Among them the highest proportion of respondents said that they often smoke cigarette 80% and drink water 15% and 5% take rice or other food during the period of pesticide application which makes them more vulnerable in terms of user's health (Table 4).

Table 4. Pesticide use Patterns and precautionary measures taken by farmer.

Variables	% of the respondent
1. Types of pesticides use	
a) Insecticides	80
b) Herbicides	12
c) Fungicides	8
2. Level of pesticide used	
a) Read the level of packet/battle	20
b) Don't read the level of packet/battle	75
c) Understand the level of pesticide	5
3. Methods of pesticide application	
a) With hand derived sprayer machine	77
b) Injection	14
c) Both with sprayer machine and injection	9
4. Protective measures taken during and after using pesticide*	
a) Partial safety measures	15
b) No protective measures	80
c) Wash hand or taking bath after spraying	5
5. Storage and dispose of pesticide packet or battle*	
a) Returned to the company or distributor	0
b) Through it to the open field	80
c) Burnt	0
d) Carry in home	20
6. Smoking, drinking and consuming food*	
a) Smoke cigarette	80
b) Drink water	15
c) Take rice others food	5

(*Multiple-answer considered).

3.3. Impact of Pesticides on Farmers Health

3.3.1. Skin Diseases

During the handling, transporting and processing pesticides can come into contact with and enter the body causing various types of skin diseases. Pesticide users in the study area are often exposed dermally; about 60% reported suffering from skin diseases including irritation and itching (Table 5). According to Kaligonj Upazila health officers, the number of patients with skin diseases is increasing day by

day, among them most of the farming community.

3.3.2. Eye Diseases

The present study found that almost all of the farmers spray pesticides without wearing protective eye glasses. About 64% of total respondents reported having eye problems such as-itching, irritation, pain, cataract, and pupil problem and diminished eye sight, either temporarily or permanently (Table 5). It is shown that the farmers cultivating vegetables as well as using pesticides for a long time (15-19 years) have been suffering from eye diseases

more severely. Sobuj (age 30), a vegetable farmer in Kaligonj upazila, said that “one day I sprayed pesticides in the vegetable field against wind direction and some droplet fell on my eyes which resulted in pupil problem (white spot) and suffering till today”.

3.3.3. Gastro-intestinal Diseases

The survey study also found that 84% of applicators are suffering from gastro-intestinal diseases such as stomachache, digestion problems, and loss of appetite and vomiting during and after pesticide application (Table 5). Among these, appetite problem is found at a very high rate (78.33%). About 16.75% found that they are suffering from digestion problem due to pesticide application. Salam (45) a farmer from Jenidah sadar upazilla, who has been using pesticide desperately for nearly 30 years explained: “now-a-days I do not feel any appetite for food; even I think I can pass few days without taking any food. I strongly believe that this is the result of unsafe and indiscriminate process of applying pesticides”.

3.3.4. Urine and Sexual Diseases

About 54% of pesticides users report suffering from various types of urine and sexual diseases such as kidney problems, reduction of urine control and less sexual urge. Although farmers interviewed felt shy to speak about such kind of problems, 29.4% confess that they have lost their sexual urge gradually after being introduced to pesticide application in the field (Table 5).

3.3.5. Others Diseases

Analyzed data also show that, almost all pesticides used by the farmers are of organophosphate chemical group that are found in different trade names and have been suffering at least one disease while some of them exhibited multi diseases categorized under short term diseases such as- physical weakness, dizziness, chest pain, uneasiness and long term diseases such as- breathing problem, excessive sweating and fatigue. Moreover, 46.6% report that the physical weakness and uneasiness is experienced during or after their applying pesticides even for a short period of time (Table 5).

Table 5. Impacts of pesticide on farmer's health in the study area.

Disease patterns	% of respondent (cultivation period in year)					Total
	<15 year	15-19 year	20-24 year	25-29 year	>30 year	
1. Skin diseases*						60.0
a) Body itching	8.5	9.3	6.5	2.0	8.4	34.7
b) Body irritation	10.36	20.5	11.56	13.11	9.77	65.3
2. Eye diseases*						64.0
a) Eye pain	3.73	4.15	0.0	1.34	1.34	10.46
c) Eye irritation	2.31	5.36	4.95	1.32	2.63	16.57
d) Cataract	4.0	5.23	0.0	3.95	7.26	20.44
b) Little vision	4.63	9.89	17.84	6.57	9.11	48.04
3. Gastro- intestinal disease*						84.0
a) Digestion problem	0.93	4.95	0.98	4.94	4.95	16.75
b) Loss of appetite	15.76	26.57	13.5	6.81	15.69	78.33
c) Vomiting	0.0	0.0	4.92	0.0	0.0	4.92
4. Urine and sexual diseases*						54.0
a) Kidney problem	0.0	0.0	0.0	2.6	0.0	2.6
b) Urine control problem	17.0	19.0	19.0	10.0	4.0	69.0
c) Reduction of sexual urge.	3.0	13.0	5.4	3.0	5.0	29.4
5. Other diseases*						
a) Physical weakness	10.2	9.8	7.3	7.8	11.5	46.6
b) Dizziness	3.25	4.5	1.4	1.4	4.0	14.55
c) Breathing problem	1.7	2.3	0.8	0.0	2.5	7.3
d) Uneasiness/ trouble	9.5	7.25	4.0	4.25	6.5	31.5

(*Multiple-answer considered).

4. Conclusions and Recommendations

Jhenaidah districts are the major vegetable producing area in the southern part of Bangladesh. In the study area farmers used heavy dosages of pesticides with regular intervals in order to protect their vegetable crops. They are mostly used insecticides of organophosphate chemical group rather than other types of pesticides. Generally, they are not much aware of pesticide toxicity and never take any protective measures during the time of handling, carrying, mixing, storing or any other type of contact and disposal of pesticides. Most of the farmers use pesticides higher level than the recommended level because they use only chemical pest control method and

they are not able to read the pesticides bottles/packets recommended level. On the other hands pesticides user is committed various types of activates such as smoking, drinking and consuming something during application which has a negative impacts on health. Gastro- intestinal diseases, eye diseases, skin diseases and urine and sexual diseases were the most common diseases in the study area. These studies also mention that higher level of sufferings was found of those farmers, who have been cultivating crops for 15-19 years. After completing this study it suggest that, farmers should take training on safety measures regarding the application of pesticides and its rational use and always wear protective clothing (masks, hand gloves, glasses, full shirt, full pant etc.) before pesticide application for reducing health impact.

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