

# Health Risk Behavior and Use of Safety Precaution among Pesticide Handling Farmers of Duhabi-Bhaluwa Region, Sunsari, Nepal

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## Abstract

**Background:** Widespread use of pesticides in agricultural farms foster increasing concerns regarding its negative effects on farmers health as well as in the public. Pesticide exposure remains one of the great challenges among farmers of developing countries including Nepal. The objective of this study was to access health risk behavior and use of safety precaution among agricultural farmers of Duhabi-Bhaluwa region, Sunsari, Nepal.

**Methods:** Cross sectional study was carried out in Duhabi-Bhaluwa region of Sunsari district, Nepal from September 2015 to February 2016. Three hundred farmers were enrolled in the study using non probability sampling technique. Data was collected by face to face interview with farmers using pre-tested semi structured questionnaire from 15<sup>th</sup> September 2015 to 15<sup>th</sup> December 2015

**Results:** Study reveals that 93.3 percent farmers usually lock pesticide container and stored the pesticide, disposal of pesticides throwing in open place of household premises, irrigation canal and farms were 38%, 21% and 9.3 percent respectively. Ninety percent farmers usually follow instruction on pesticide label, more than half (50.3%) of the farmers were not using any kinds of personal protective equipments while spraying pesticide. Study reveals that 6 percent of the farmers enter the field before 24 hours of pesticide application

**Conclusions:** Study found health risk behaviour among agricultural farmers. Thus, recommends for behaviour change program on safety precaution that should be taken while spraying pesticides which could be beneficial for the promotion of farmer's health.

## Keywords

Agricultural farm, Farmers, Health risk bhaviour, Safety precaution

## Introduction

An estimated 1.3 billion workers in worldwide are engage in agricultural production.[1] South Asia is one of the densely populated region where communities living in close to agricultural area are relatively higher risk of pesticide exposure[2]. Eight percent of the pesticide poisoning occurred in the South East Asia region are work-related.[3] Study among vegetable farmers in Nepal showed that more than 50% percent farmers reported about discomfort immediately after spraying pesticides.[4] The objective of this study was to access health risk behavior and use of safety precaution among agricultural farmers of Duhabi-Bhaluwa region, Sunsari, Nepal.

## Methods

Community based cross-sectional study was designed to access health risk behavior and use of safety precaution among farmers who handle pesticides in their agricultural farms of Duhabi-Bhaluwa region, Sunsari, Nepal. The duration of the study was six months. Study population was the farmers of Duhabi-Bhaluwa region of Sunsari district, who handle pesticide in their farms. Individual farmer was the unit of study. Duhabi-Bhaluwa region as municipality was formed with combination of Bhaluwa VDC and Duhabi Municipality, which consists of 14 wards. Bazaar (market) area of the municipality includes 6, 7, 8 and 9 wards. Farmers who handled pesticides were residing in places other than that of bazaar area. Non-Probability sampling technique was used to enroll the 300 subjects from the dwellings of the farmers. Random walk technique enrolled 30 study subjects from each of 1, 2, 3, 4, 5, 10, 11, 12, 13 and 14 ward of the region. First, Irrigation canal (running North to South direction) to the ward number 1 was identified and the right direction of canal was followed to enroll the 30 study subjects, considering the inclusion and exclusion criteria of the study. Similarly, the study subjects were enrolled from 2, 3, 4, 5, 10, 11, 12, 13 and 14 wards. Farmers with age of 20 years and above, male or female and who handled the pesticides either his or her own or in cultivated land of others were included in the study and those farmers who are not giving consent were excluded from the study. Pretested Semi-structured questionnaire was used for data collection. Data was collected by face to face interview method using semi-structured questionnaire with the farmers who handle the pesticides by home to home visit. Semi-structured questionnaire was maintained through extensive literature review. The questionnaire developed in English was translated into Nepali language by two experts and back to English language with the help of third expert. Pretesting of questionnaires was done by taking 30 farmers (10% of total sample of the study) in Samariya VDC which is nearby the study site. Data was coded and entered into Excel sheet and Statistical Package for Social Science (SPSS) 16. Version was used for data analysis. Univariate analysis: Frequency and percentage were calculated. Ethical clearance was taken from Institutional Review Committee (IRC) of B.P. Koirala Institute of Health Sciences. Informed consent was taken from the respondents and confidentiality was maintained throughout the study, in this study health risk behaviour includes the behaviour of farmers which threatens their health such as unsafe storage practices of pesticides such as lack of storage of pesticides without tight lead, storage of pesticides other than original container, pesticides storage in home. Unsafe pesticides mixing practices such as no follow of instruction of pesticides level, no use of devices, no use of personal protective equipment during pesticides application such as face masks, long boots, rubber gloves, hat, goggles, long sleeve shirt, long Pant. Activities during the pesticide application like; no determination of wind direction, eating food, drinking water, non alcoholic beverage and smoking, activities after pesticides application such as no bathing, no change of clothes, no hand washing practices immediately, entering the field without care of time period for risk of pesticide application.

## Results

Study reveals that 93.3 percent farmers usually lock pesticide container and stored the pesticide, 38 percent of the farmers dispose pesticide container by throwing in open place of household premises, and 21.3 percent dispose by throwing in irrigation canal. 15 percent use in house, 13.3 percent dispose by buried, 9.3 percent by throwing in farming land whereas 3 percent dispose by burned. Most of the farmers (97.6%) store pesticide in their home and 97.3 percent of the respondents were usually keep pesticide in original container (Table 1).

**Table 1.** Storage practice of pesticides among farmers (n=300)

Characteristics	Categories	Number	Percentage (%)
Usually locked pesticide container		280	93.3
Disposed pesticides by	Burned	9	3.0
	Used in house	45	15.0
	Thrown in open place	114	38.0
	Buried	40	13.3
	Throwing in farming land	28	9.3
	Throwing in irrigation canal	64	21.3
Place of storage of pesticide	Home	293	97.6
	Farm	7	2.4
Usually keep pesticide in original container		292	97.3
Total		300	100

Among the total respondents, 90 percent respondent's usually follow instruction on pesticide label, 16.3 percent respondents usually read instruction on pesticide label. Only 27.3 percent of the respondents usually use device for mixing pesticide, 6.1 percent of the respondents mix pesticide with water using plastic bag, 18.3 percent use pump to mix the pesticides with water, 75.6 percent use stick for mixing pesticide with water (Table 2).

Study reveals that more than half (50.3%) of the respondents were not using any kinds of PPE while spraying pesticide. Among those who were using personal protective equipment (PPE), 79.2 percent usually wear mask, 40.9 percent usually wear long sleeve shirt, 40.3 percent usually wear long pants, 8.7 percent usually wear hat, 2.7 percent usually wear rubber gloves, 2.0 percent usually wear goggles where as 0.7 percent usually wear long boots (Table 3).

Two percent respondents usually drink water or non-alcoholic beverages while spraying pesticide, 1.3 percent respondents usually eat while spraying pesticide, only 31.7 percent bath immediately after pesticide application, 61.3 percent usually change their clothes after pesticide application, whereas 93 percent respondents wash their hand immediately after pesticide application.

**Table 2.** Practice of mixing of pesticides among farmers (n=300)

Characteristics	Categories	Number	Percentage (%)
Usually follow instruction on pesticide label according to shopkeeper says		270	90
Usually read instruction on pesticide label		49	16.3
Usually use device for mixing pesticide		82	27.3
Mix pesticides with water using	Plastic bag	5	6.1
	Pump	15	18.3
	With stick	62	75.6
Total		300	100

**Table 3.** Use of personal protective equipment among the farmers

Characteristics	Number (n=300)	Percentage (%)
Use of Personal Protective Equipment*	149	49.7
Use of PPE**		
Usually wear face mask	118	79.2
Usually wear long boots	1	0.7
Usually wear rubber gloves	4	2.7
Usually wear hat	13	8.7
Usually wear goggles	3	2.0
Usually wear long sleeve shirt	61	40.9
Usually wear long pants	60	40.3

\*=Use of personal protective equipment included the use of any one of the PPE, face mask, long boots, rubber gloves, hat, goggles, long sleeve shirt and long pants.

\*\*=Multiple response

Study reveals that 6 percent of the respondents enter the field before 24 hours of pesticide application, 44.7 percent of the respondents enter the field after 24 hours of pesticide application, and 6 percent of respondents enter the field after 48 hours of pesticide application while 43.3 percent respondents enters the field after 72 hours of pesticide application (Table 4).

**Table 4.** Safety precaution during and after pesticide application

Characteristics	Categories	Number (n=300)	Percentage (%)
Usually drink water or non-alcoholic beverages while spraying		6	2.0
Usually eat while spraying		4	1.3
Did not smoke tobacco while spraying		300	100.0
Usually bath immediately after spraying		95	31.7
Usually change clothes after spraying		184	61.3
Usually wash hands and face immediately after spraying		280	93.3
Reentry of field after pesticide application	Within a day	18	6.0
	After one day	134	44.7
	After two days	18	6.0
	After three days	130	43.3
Total		300	100

## Discussion

Our study reveals that more than half (50.3%) of the respondents were not using any kinds of PPE while spraying pesticide, which was comparable with regard to pesticide use practices among farmers of Uganda. [5] In this study, 49.7 percent of the farmers were using at least one safety device, which was less than that of a case study on Pistachio farms in Kerman, about 58% of the interviewees had used at least one safety device during their work with pesticides [6]. A study done in Bahrain shows that 94.5% of the respondents reported using personal protective equipments. [7] Mask (79.2%), long sleeve shirt (40.9%), long paint (40.3%), hat (8.7%), rubber gloves (2.7%), goggles (2.0%) and long boots (0.7%) were the PPE reported by the farmers who used them. A cross-sectional study among the farmers of Kangrali Village in Belgaum revealed use of mask by (100%), apron (16.3%), gloves (14%), goggles (8.1%) and special boots (3.5%). [8] The percentage of PPE use was found more in study of Belgaum. In this study not even a single farmer was reported of smoking while spraying pesticide. But, study done in Iran showed that some of the farmers smoked during their work (6.5%). [6] Majority of farmers neither smoked nor drink water and non alcoholic beverages or ate anything while spray-

ing pesticide which was found similar in the study done among the farmers of Kangrali Village in Belgaum and study of Bahrain. [7,8]

Our study revealed that 31.7 percent bath immediately after pesticide application, 61.3 percent usually change their clothes after pesticide application, whereas 93 percent respondents wash their hand immediately after pesticide application. Practice of pesticides use among the farmers of Kangrali village in Belgaum showed that only 67.44% took bath after spraying pesticides.[8]A study done in Bahrain showed the farmers who did not take bath after pesticide use (96.4%) and did not change their clothes before and after pesticide exposures (95.8%). [7] A study on Pistachio farms in Kerman, Iran showed that majority of farmers (94%) had washed their hands after spraying the pesticides.[6]

This study showed that, farmers usually stored the pesticide with tight covering the container(93.3%), farmers disposed pesticide container in open place around the household premises (38%), disposed in irrigation canal (21.3%), used for household purposes (15%), disposed by buried (13.3%), in farm land (9.3%), whereas burned the pesticide (3%). Most of the farmers (97.6%) store pesticide in home and only 2.4 % store pesticide in farm, 97.3 percent of the respondents were usually keep pesticide in original container. Among the total respondents, 90 percent respondents usually follow instruction on pesticide label suggested by shopkeeper, 16.3 percent respondents usually read instruction on pesticide label. Knowledge and practices of pesticide use among farm workers in the West Bank, Palestine showed that only 19.2 % farmers store pesticide in home, specific store (53%), animal house (8.7%), farm site (11.8%), buy and use it immediately (7.3%), dispose pesticide by throwing in local waste container (17.6%), Burning (50.4%), Burying (7.6%), washing and reusing at home (10%) and reuse for storage of other pesticide (14.4%).[9] Knowledge, practice and use of pesticides among commercial vegetables growers of Dhading District of Nepal shows that about one-third (33.3%) read label information before mixing pesticides with water, the percentage was higher than in our study. Only 27.3 percent of the farmers use device for mixing pesticide and 72.7 percent of the farmers were mixing pesticide with their bare hand. The percentage was higher than that of study among vegetables farmers of Dhading District where almost half of the vegetable growers mix the pesticides with their bare hands [10].

Majority of the respondents (71.7%) determined the wind direction for application of pesticide which was comparable to the study done among vegetables farmers of Dhading District of Nepal (76.6%) [10]. Re-entering the field within one day of pesticide application (6%), after one day (44.7%), after two days (6%) and after three days (43.3%) had put them at risk of ill health. Similarly, study done among the vegetables farmers of Dhading District of Nepal showed that majority of the pesticide users (76.6%) re-entered the field within interval of 0-4 days of application of the pesticide and 24.2 percent of the vegetable grower re-entered at an interval of 5-9 days [10].

## Conclusions

Study reveals that more than one tenth of the farmers usually lock pesticide container and stored the pesticide. More than one third and more than one fifth of the farmers dispose pesticide container throwing in open place of household premises and irrigation canal respectively. Nine of ten farmers usually follow instruction on pesticide label, more than half of the farmers were not using any kinds of personal protective equipments while spraying pesticide. Among every 100 farmers, 6 farmers enter the field before 24 hours of pesticide application. Thus, several health risk behavior among agricultural farmers recommends for behavior change program on safety precaution that should be taken while spraying pesticides which could be beneficial for the promotion of farmer's health.

## Disclosure of conflict of interest

None.

## Acknowledgements

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