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Farmers Knowledge, and Practices of Pesticide Health Problems in vegetables in Rural Area

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Abstract

For vegetable growers many developing countries there a wide spread of use of synthetic pesticides as effective and urgent agent with low time and costs demands to control weeds and insects as compared to labor methods. This is motivated by the increase in yield incurred by use of pesticides to face the demand of increasing population, but very less emphasis was given to the negative impact of using pesticides on environment and health. Hence, this study is directed to assess the levels of knowledge, attitude and practices of vegetable farmers in urban areas of Karari-Omdurman-Sudan regarding the safe use of pesticides, to aid planner to develop practical measures to protect the environment. Findings of 250 interviewed respondent farmers revealed that nearly 60% of the farmers had medium level of knowledge of plant protection practices. The majority of the farmers acknowledged that pesticides were harmful to their health (71%) and the environment (65%). Over 85% of the farmers did not read or follow pesticide label instructions, and 75% did not use any personal protective equipment when handling pesticides. Farmers' knowledge of pesticide hazards was low, the reported safety measures were poor, and they lack extension services and awareness on safety handling, disposal or storage of pesticides. Education, income, farming experience and social participation were positive and they can be significantly used by planners to develop extension programs to improve farmers' knowledge and their behavior on safe pesticide use. In contrast age and family size of farmers had showed no relationship with the knowledge level of pest management. Consequently, comprehensive intervention measures to reduce the health and environmental risks of pesticides are needed, including pesticide safety training programs for farmers, stringent enforcement of pesticide laws, and promoting integrated pest management and non-synthetic methods of pest control for managing pest problems (IPM) in crop production.

Keywords

Pesticide Handling, Knowledge, Attitudes, Risk, Health Hazards, Smallholder Farmers

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1. Introduction

Use of pesticides has become an integral part of present day farming, and plays a major role in increasing agricultural productivity. They are extensively used on vegetable cash crops due to higher susceptibility to pest and diseases and relatively higher economic returns from these crops. However, use of pesticides widely spread in vegetable producing farms nearby large cities to feed their steadily

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growing population. For most farmers, vegetable production, especially in open field or even in greenhouse environments, is not possible without intensive use of chemical pesticides due to farmers' lack of access to non-synthetic or other environmental friendly methods of pest control (e.g. integrated pest control methods IPM).

Usually, liquid formulation and wet-table powders are applied as spray mixture while granule and powders are broadcast simply by hand.

Most of the reported symptoms of pesticide use are considered to be common manifestations of acetyl cholinesterase-inhibiting insecticides [3, 20]. These findings require urgent prevention, intervention, and protection to prevent the risk of these symptoms. The organophosphate and carbamate insecticides such as methamidophos and methomyl were commonly used and these are classified as highly hazardous [22]. Restriction in the use of highly toxic pesticides has been considered by some scientists in order to decrease intoxication events [11, 15]. It was observed that more than 75 percent women are involved in activities like winnowing, and weeding. However, the indiscriminate and extensive use of pesticides represents one of the major environmental and public health problems all over the world [3, 1, 23], and the United Nations Environment Program estimate pesticide poisoning rates of 2-3 per minute, with approximately 20,000 workers dying from exposure every year, the majority in developing countries [4, 23].

Farm workers' exposure to pesticides has been associated with adverse health effects like cancer and birth defects resulting in hundreds of fatalities, the majority of which occur in developing countries [5, 9]. Farmers, and their families who are directly or indirectly involved in the handling of pesticides, are at a high risk of exposure to pesticides through contact with pesticide residues on treated crops, unsafe handling, storage and disposal practices, poor maintenance of spraying equipment, and the lack of protective equipment or failure to use it [9, 5, 10]. Improper use of pesticides for crop production is reported to lead to: secondary pest outbreaks, destruction of non-target species [3], soil, water, and air contamination [15], and residues in primary and derived agricultural products [5] that endanger both the environment and human health.

The [23], and the United Nations Environment Program estimate pesticide poisoning rates of 2-3 per minute, with approximately 20,000 workers dying from exposure every year, the majority in developing countries [4, 23]. These risks may be increased by lack of knowledge on pesticide hazards [10], the perception and attitude of farmers regarding danger from pesticide exposure [15], and lack of education and poor knowledge and understanding of safe handling, use, storage, and disposal [12].

Higher levels of education is expected to give pesticide users better access to information and more knowledge of the risks associated with pesticides, and how to avoid exposure. While illiterate or less educated farmers are assumed to be slow adapter to improved protection measures and less capability to understand the hazard warnings on pesticide labels, and guidelines of safe application and use of personal protective equipment [3, 14]. Following the above review of pesticide use the assumed hypotheses of this study are: Good knowledge is positively associated with the safe use of pesticides among farm workers; Education will be the major factor to practice correct method while using pesticides; Agriculture background will be significant factor to practice correct method while using pesticides.

According to [5] each year, about 3,000,000 cases of pesticide poisoning and 220,000 deaths are reported in developing countries. About 2.2 million people, mainly belonging to developing countries are at increased risk of exposure to pesticides. Besides, some people are more susceptible to the toxic effects of pesticide than others, such as infants, young children, agricultural farm workers and pesticide applicators [23].

In order to help agricultural planners and decision maker to develop informed strategies for crop protection in general and for using pesticides and protecting health of population in particular, the objective of this study is to determine the level of knowledge, attitudes, field practices and awareness of health problems of vegetable producing farmers regarding pesticides use, handling, storage and experiences with acute pesticide poisoning.

2. Methods

2.1. Study Area

Goz Navissa village located at Karari locality at 70 Km of Omdurman District in the Khartoum State of Sudan, was selected for this study because of the following reasons: Nearly 500 acre of land is being cultivated with vegetable crops such as potato, onion, beans, and other small vegetables, using pump lift irrigation from the Rive Nile. The study area supply vegetables to the main cities of Omdurman and Khartoum the country capital. The selected study area is a typical smallholder agricultural area threatened by high pesticide use.

2.2. Questionnaire Development and Data Collection

Research approach is adopting a cross-sectional study using

various survey methods to determine the level of knowledge, attitudes, awareness of health problems and field practices concerning the safety use of pesticides of the farmers based on proposed objectives. Due to homogeneity and social integrity of study area the technique of random sampling was used to obtain cross-sectional data for this study.

Diagnostic surveys, formal interviews, and field observations were used to gather information on farmers' knowledge of pesticides and safety practices. Data were collected through face-to-face interviews with 250 farmers (farm managers and their employees directly involved in pesticide use and management). Following [24] the sample size is taken out of the 2500 smallholder farms in the area and determined using the Leslie Kish formula to provide a good estimate of the sampled population. Cropping systems are mainly based on open field. Secondary data was extracted from the reports of the Department of Agriculture [5].

Keeping in view the objective of the study, socio-economic variables like farmers' age, education, family size, occupation, and experience in farming, operational holding, annual income, extension contacts and social participation were collected as independent variables. Farmers' knowledge on pesticides use practices and their awareness about the negative effects of pesticides on their health and environment were computed as dependent variable. Interview schedule was developed for this study based on the [5] questions related to safe pesticide use. A pilot study was carried out for 30 farmers and necessary modifications are carried out.

The questionnaire contained four sections. The first was the demographic section, which contained questions regarding age, and education level. The second section was designed to assess participants', knowledge on safety use of pesticides and their source of information and consultation of extension office, if there is one in the area.

Participants were asked with nine questions viz. Information Source, Pesticide Selection Criteria, Form of Pesticide to Use; Long Term Negative Heath Impacts of Exposure to Pesticides; Number of Spray per Season; Information Source for Determination of Pesticide Spray Doze; Types of Available Extension Methods for dissemination of Knowledge on dangers of miss-using Pesticides; Time to transfer Sprayed Vegetables to The Market; and Negative Impact of Non-adoption of Recommended Pesticide Dose. The third section of the questionnaire consisted of eight questions related to farmers Attitudes, and Practices. In particular they are related to: assessment of Farmers Adoption & Strict Use of Recommended Dose; Respondents Care to Read and Use Tags and Directions of Use; Types of Utensils used in Mixing Pesticides; Disposal Method of used Utensils; Methods Used to Transport Pesticides To and from the Farm; Clothes used for personnel protection during pesticide mixing and application; Attitudes and Practices Adopted as Precaution When Mixing Pesticides; and where to Store Pesticide. The last fourth section was designed to record self-reported health symptoms of the farmers due to pesticide exposure. The respondents were interviewed on: Frequency of occurrences of accidents due to pesticides misuse; Protocol used in case of using Pesticides accidents; Adherences to Safety Period before using sprayed vegetables; Putting Sign to Indicate That The Fled is Sprayed; and Types of Diseases and Problems Occurred Due to Pesticide Miss-use.

2.3. Data Analysis

All data were coded, entered, and then analyzed using SPSS version 20 (SPSS Inc., Chicago, IL, USA) and Microsoft Office Excel 2010 (Microsoft Corporation, Redmond, WA, USA). Descriptive statistics using SPSS software was used to analyze the data. Tabular and graphical format was used for presentation of data and results. Descriptive results were expressed as frequencies, percentages for categorical variables, and as means ± SD for continuous variables.

3. Results and Discussions

3.1. Demographic Characteristics and Profile of Vegetable Cultivating Farmers

Analysis of the data collected on socio-economic variables of vegetable cultivators in Goz Navissa village indicated that all farmers are young males (Half of farmers age is 25 to 44 years) with 84% of respondents' age of less than 55 years and average age of 27 years. They are of 75% married with average number of experience in farming of 16 years (Table 1). Only 16% of farmers are of more than 55 years age which may be interpreted as presence of small old group with resistance to change with long duration in work field. This indicates that domination of young generation help to easily introduce new knowledge and practices and change in farmers' behaviour.

Formal education was high with 75% graduated from secondary and higher schools and only 25% are illiterate. About 3% had university education. Agriculture training was low in the area as only 20% of farmers attended an agriculture-training program conducted by the Department of Agriculture [5]. From the researcher point of view, according to this current study the farmers were at high risk for health hazard on the long ran and dangers of poisoning from unsafe use of pesticides due to lack of training.

Table 1. Age and Education Demographic Characteristics of Vegetable Farmers.

a) Age Profile:

Age year	Frequency	%
25-34	95	38
35-44	55	22
45-54	60	24
>55	40	16
Total	250	100
Average	63	

b) Education Profile

Education Level	Frequency	%
Illiterate	63	25
Primary School	85	34
Secondary School	95	38
University	8	3
Total	250	100
Average	63	

3.2. Farmers Knowledge on Safety Uses of Pesticide

Generally the experience of the farmer shows their maturity, work functioning and perfectness which certainly contribute quality and perfectness in work. Hence, experience of the farmer in pesticide application has been taken into consideration to know its contribution on knowledge and practice of safety use of pesticides. Therefore, farmers Knowledge on safety uses of pesticide consist of: Knowledge of selection and using pesticide, long term negative impacts of continuous uses, personal protective equipment, Knowledge on proper uses (doze and number of Spray per Season), and Knowledge dissemination methods on dangers of miss-using Pesticides; and Knowledge on proper marketing of sprayed vegetables.

a Knowledge on Source for Pesticide selection and Use:

Table 2 indicates that the main source of information for 49% of the respondent is their relatives, which is considered as unreliable source while only 20% consulted extension office; while only 31% of the study farmers got information from mass media, neighbors. This indicates that farmers are egger to look for other source of information.

A similar result was reported by [2], for grower in vegetables in rural areas; also [19] in their study in Uganda mentioned that most farmers received information about pesticide from their neighbors and only minority from agricultural extension officers. From researcher point of view this may be due to the decline in the role of the governmental agricultural guides as well as decline in the role of state local channel in spreading agricultural awareness, that lead to poor in knowledge and practice regarding the safe usage of pesticides.

Table 2. Source of information and Consultation of extension office.

Information Source	Frequency	%
Agric. Extension Office	50	20
Television	45	18
Radio	33	13
Relatives	123	49
Total	250	100
Average	62.5	25

b Criteria for selecting type of pesticides to use:

Table 3 shows the farmers response in selecting type of pesticides to use. It is given in table 3 that almost 43% of the farmers select pesticide primarily on its efficacy judged by their past trials and experience rather than considering its safety. Table 3 exhibits that the experience has shown significant influence on famer knowledge as well as the practice and knowledge of farmers in the surrounding area (35% of the respondent). Such knowledge is positively associated with their own experience that influenced their practice. In contrast they give no much consideration to seek advice from the agricultural extension Agent (10% of the respondent). The questionnaire revealed that 64% of the farmers prefer to apply pesticide mixture of liquid and powder or liquid form (43%) only due to ease of application of liquid as spray by the farmers themselves with minimal labour costs.

Table 3. Selecting type of Pesticides to Use.

Pesticide Selection Criteria	Frequency	%
Type of Pest or Disease	100	43
Accumulated Experience	83	35
Recommendations of Agric, Extension Agent	10	4
Information and Recommendation of Surrounding Farmers	43	18
Total	235	100
Average	59	

c Farmers Knowledge on Long Term Negative Heath Impacts due to Exposure to Pesticides:

With reference to Table 4 low to medium level of knowledge of the Long Term negative impacts of exposure to pesticides is reported by almost half of the farmers (58%) and others illiterate do not know (23%) while the educated one shows high knowledge level (19%). This result is in agreement with that reported by [18, 21] for farmers in Kuwait, and Sri Lanka respectively

Table 4. Knowledge on Long Term Negative Health Impacts of Exposure to Pesticides.

Knowledge of long term negative impacts of Exposure to Pesticides,	Frequency	%
High Knowledge level (with high education level)	48	19
Medium Knowledge level (secondary schooling)	88	35
Low Knowledge level (primary schooling)	58	23
Do not Know (illiterate)	58	23
Total	250	100
Average	63	

d Knowledge on Number of Spray per Season

As reported and recommended by [5] and department of protection of Ministry of Agriculture of Khartoum State the optimum effective number of sprays not to be less than 6 times to eradicate the heavy infestation of insects especially white fly in the study area. As shown in Table 5, (70%) of the farmers do not spray the vegetables more than 6 times per season. This may be attributed to economical reasons.

Table 5. Knowledgeon Number of Spray per Season.

Number of Spray per Season	Frequency	%
Two	8	3
Three to Six	175	70
More Than Six	68	27
Total	250	100
Average	83	

e Information S: ources on determination of Pesticide Spray Doze: it is Negative Impacts of improper uses

Table 6. Knowledge and Information Source for Determination of Pesticide Spray Doze.

Information Source of Spray Doze	Frequency	%
Reading Pesticide Tags	80	32
Agric. Extension	30	12
Depend on Personal Past Experience	118	47
Both Reading Tag& using experience	23	9
Total	250	100
Average	57	

Table 6: shows the Knowledge and Information Source for Determination of Pesticide Spray Doze and table 7 state the Types of Available Extension Methods for dissemination of Knowledge on dangers of miss-using Pesticides while table 8 shows the level of knowhow of the farmers on negative consequences of non-adoption of recommended Pesticide Dose.

As stated in table 6 only 48% of the farmers had good level of knowledge towards the recommended doze for Plant protection measures. Moreover, Table 8 confirms that 57% of the farmers do not understand the long-term ill effects of pesticides on their health and environment. As shown in Table 6 nearly 50% of the farmers had medium level of knowledge of plant protection practices. The average percentage of farmers' with awareness about ill effects of pesticide on humans' health and the environment was 9% (Table 8).

The results depicted in combining tables (Tables 6, 7 and 8) shows that the main source of knowledge and Information for determining Pesticide Spray Doze is farmer past experience (47%); but few of them who realized the danger of miss - use of pesticides on health (9%) and 43% believe that non-adoption of recommended spray doze results in no problem. This result is logical since it is given in table 7 that, the types of available extension methods for dissemination of Knowledge on dangers of miss-using Pesticides is mainly unreliable sources other than those usually employed by extension workers.

Table 7. Types of Available Extension Methods for dissemination of Knowledge on dangers of miss-using Pesticides.

Extension Knowledge Transfer Type	Frequency	%
Lecture	5	2
Seminar	5	2
Field Visits	2.5	1
Farmers in the Area	108	43
Nearby Friends	50	20
Personnel Past Experience	80	32
Total	250	100
Average	79	

Table 8. Negative Impact of Non-adoption of Recommended Pesticide Dose.

Negative Impact of Non-adoption of Recommended Pesticide Dose	Frequency	%
Reduced Crop Growth & Yield	120	48
Health Problems & Diseases	23	9
No Problem occurred	108	43
Total	250	100
Average	83	

f Time to Transfer Sprayed Vegetables to The Market

Results given in Table 8 express the respondent farmer knowledge and practice on the time to transfer sprayed vegetables to the market. Various policies have been designed to protect workers and minimize exposure to pesticide residues [7]. These policies regulate the time of re-entry into fields after the application of certain chemicals and rely extensively on farmers to engage in self-protective behavior such as wearing protective clothing to minimize their risk of exposure. For safety reasons for growers and consumers of vegetables the recommended rule is to re-enter or harvest sprayed field in no time less than six days. Unfortunately only half of the respondent farmers respect this rule (Table 8).

Table 8. Time to transfer Sprayed Vegetables to The Market.

Time to transfer Sprayed Vegetables to the Market	Frequency	%
Immediately at ripening and after just Spraying	88	35
After 4-days	20	8
After 6-day (minimum Safety period)	18	7
After more than 6-days	125	50
Total	250	100
Average	54	

Table 6 and 7 and 8 exhibits farmers knowledge and information source with respect to their attitudes and practices of application this knowledge in adopting safe

field practices of pesticide application. Although [16] reported the general assumption that the experience has shown significant influence on knowledge as well as on practice of farmers in which knowledge is positively associated with their experience the results of this survey shows that experience of farmers of study area did not influenced their practice much.

3.3. Farmers Attitudes and Practices

Assessment of Farmers attitudes and practices is made with reference to: their strict use of recommended dose, following its direction of use, and use safe utensils, proper mixing procedure, disposal methods, wearing safety protection clothes, and following storage and transportation safety regulations

3.3.1. Assessment of Farmers Adoption and Strict Use of Recommended Dose

Table 9 shows that 44% of the farmers adhered to and use the recommended pesticide doze. Recall that farmer knowledge on proper pesticide doze is obtained from non-authenticated sources (Table 7). This is evident from Table 10 which indicated that only 31% of respondent care even to read leaflet or tag of direction of pesticide use let alone to look for proper source of information or consulting an extension worker.

Table 9. Assessment of Farmers Adoption & Strict Use of Recommended Dose.

Adoption & Strict Use of Recommended Dose	Frequency	%
Strict Use	110	44
Some times	55	22
Low Use	45	18
No commitment	40	16
Total	250	100
Average	47	

Table 10. Respondents Care to Read and Use labels and Directions of Use; Types of Utensils used in Mixing Pesticides.

Respondents Care to Read & Use labels and Directions of Use	Frequency	%
Do Care	133	53
Do not Care	78	31
Sometimes Care	40	16
Total	250	100
Average	83	

3.3.2. Adopted Attitudes, and Practices

(Utensils used and Pesticides Processes of Mixing, Preparation and disposal):

This includes: Types of mixing utensils, mixing, preparation process, personnel protection, and disposal of used utensils

a Utensils Used: Table 11 shows that utensils made from plastic are widely used (63%) in Mixing Pesticides.

Table 11. Types of Utensils used in Mixing Pesticides.

Utensil Types used in mixing Pesticides	Frequency	%
Tin	10	4
Plastic Barrel	158	63
Wood for Steering	18	7
Pump	28	11
Pump & Plastic Barrel	38	15
Total	250	100
Average	60	

b Practices Used: Table 12 shows practices adopted as precaution when mixing & preparing Pesticides, It s evident from the table although famers prepare their equipment before season star (88%) farmer attitudes with respect to the process of preparation and mixing of pesticide is negative for most of them do not mix pesticide in closed area (55%), and do not use protective clothes during mixing (63%).

Table 12. Practices Adopted as Precaution When Mixing & Preparing Pesticides.

Attitude & Practices for Preparing& Mixing Pesticide	Yes		No		Total	
	Frequency	%	Frequency	%	Frequency	%
Mixing Pesticide in Closed Area	113	45	138	55	250	100
Check quality of Sprayers	250	100	0	0	250	100
Fix all Equipment Before Season Start	220	88	30	12	250	100
Strict Use of Protective Clothes	93	37	158	63	250	100
No Use of Cigarettes During The Process	173	69	78	31	250	100
No Drink of Water During The process	210	84	40	16	250	100

c Table 13 gives types of clothes used by farmers for personnel protection during pesticide mixing & application.

d Table 13 shows that (84%) of farmers did not adopt precautionary measures using fully body covers such as mask, gloves and caps when using all chemicals. These statistics show that most of the farmers were having medium knowledge about precautionary measures while handling and spraying pesticides. This behavior is in consistent with the results of many studies conducted in many parts of the world [17, 18]. As in many developing countries, [16] the majority of pesticides users, are being

unaware of pesticide types, their mode of action, potential hazards and safety measures.

Table 13. Clothes used for personnel protection during pesticide mixing and application.

Clothes used for personnel protection	Frequency	%
Boat	18	8
Face Cover	10	4
Gloves	30	13
All Above	5	2
Do not Use any of Above	188	84
Total	223	100
Average	74	

e Disposal Method of used Utensils:

Table 14 highlights that farmers were highly negligent in the proper disposal of empty containers. It was also observed that many small boutiques display the large size empty pesticide cans. In all, the knowledge on correct disposal method implied a high knowledge gap for farmer. It is recommended that burying is the safest method, but very few farmers had adopted this practice others threw them either on field canal or dumped in bush areas adjoining their field. About 36% of the farmers were burning empty plastic bottles. This shows that most of the farmers were having low-level knowledge about disposal and storage methods of pesticide.

Table 14. Disposal Method of used Utensils.

Methods of Disposal of Used Utensils	Frequency	%
Stored to be re-used again in future	70	28
Disposal in Irrigation Canal	90	36
Burning	90	36
Total	250	100
Average	83	

3.3.3. Where to Store Pesticide

The present study was also subjected for certain function dimensions related to the storage of remaining pesticides and disposal of empty containers. The results obtained showed that the majority of farmers investigated (19%) stored remaining pesticide quantities on the farm, while only 51% store it always or sometime at home until reuse it (Table 15). The farmers in the study area do not specify particular store for disposal of used pesticide equipments or containers. These mal-practices are reported for smallholder vegetable farmers in Ethiopia [8].

Table 15. Where to Store Pesticide.

Place to Store Pesticides	Frequency	%
Inside the Farmer House	128	51
In The Farmer Field	48	19
In Ventilated Special Store	38	15
In traditional Store	38	15
Total	250	100
Average	63	

3.3.4. Methods Used to Transport Pesticides to and from the Farm

Table 14 exhibits method used to transport pesticides to and from the farm. Almost 58% of the respondent farmers reduce cost of pesticide travel by locating their stores within the farm.

Table 14. Disposal Method of used Utensils; Methods Used to Transport Pesticides To and from the Farm.

Pesticides Transport Method	Frequency	%
Using Car	38	15
Human	55	22
Using Animal	53	21
Locate Store within the Farm	105	58
Total	250	
Average	63	

3.4. Farmers Awareness of Health

The [23] has recommended the use of pesticides only by trained people who can follow the protocol of first aid for safe practice of pesticide poisoning [23]. For safety reason [7] recommended to adopt certain spraying intervals (the period between each spray activity and the other and the period between last application and harvesting process), that vary by type of crop and pesticide used. For purpose of developing pesticides poisoning, management program for vegetable growers the severity of the problem in the study area is assessed by: quantifying frequency of occurrences of poisoning problem, identification of first aid protocol in use, adoption of interval of safe spraying and putting warning flag in newly sprayed field to protect the community.

Table 15 indicate that one quarter of the interviewed farmers infected with pesticide poisoning problem, which can be judged as sever attack. Poisoning is the dominating the health problem. As given in Table 16 the first aid of pesticide poisoning depends on resorting first to nearby hospital (34%) or use of local medicine (22%) or use them both (29%) and some farmers do not follow definite protocol of first aid.

Table 15. Frequency of occurrences of accidents due to pesticides misuse.

Frequency of Occurrences of Accidents	Frequency	%
Yes Frequent Occurrence of Accidents	60	24
No Frequent Occurrence of Accidents	190	76
Total	250	100
Average	125	

Table 16. Protocol used in case of using Pesticides accidents.

Protocol used in case of using Pesticides Accidents	Frequency	%
No protocol in Use	33	13
Use Local Medicine	55	22
Consult Hospital	85	34
Doing First Aid	5	2
Use Both First Local Medicine & then after go to Hospital	73	29
Total	250	100
Average	50	

The data of table 17 on adoption of interval for safe spraying shows that almost half of the respondent adherence to interval for safety period before using sprayed vegetables,, and these farmers (42%) are using warning flag in newly sprayed fields to protect the community (Table 18).

Table 17. Adherences to Safety Period before using sprayed vegetables.

Adherence to Safety Period before using sprayed vegetables	Frequency	%
Yes	105	42
No	103	41
Some Times	43	17
Total	250	100
Average	83	

Table 18. Putting Sign to Indicate That the Fled is sprayed.

Putting Sign to Indicate That The Field is Sprayed	Frequency	%
Yes	13	5
No	213	85
Some Times	25	10
Total	250	100
Average	83	

4. Conclusions

The appraisal of the knowledge status of the vegetable cultivating farmers towards pest management indicated that almost all the farmers were dependent on chemical pesticides for the management of insect pest and diseases and most of them were using moderately toxic pesticides but at a very high frequency and dosage. About 60% of the vegetable-cultivating farmers were having a medium level of awareness and the majority of studied farmers have low level of knowledge, negative attitude and poor practices toward safe usage of pesticides, and their ill effect. Lack of knowledge on the ill effects of agrochemicals made them to affect farmer health, sustainability of agriculture and the environment.

The study results indicated that farming experience and social participation were significantly contributed to farmers' knowledge and awareness of the ill effects of pesticide use on crops, human health and the environment with fewer roles to extension services.

Increased social participation and, effective extension programs are important to improve farmers' knowledge on proper use of pesticides and its effect on their health and environment.

Education level of farmers has showed less influence than expected on having good knowledge in safety use of pesticides, which might avoid intoxication risks but they have poor practice of safety measures. Therefore, it is strongly recommended to initiate special educational programs for the all farm worker prior to engage them for pesticide application.

Agricultural extension need to be employed to follow a systematic, well planned and coordinated approach inthe area for improving the knowledge status of vegetable growers towards pest management.

Certain efforts must be placed not only to provide additional knowledge on risks of pesticide use but on the execution of Personal Protective Measures (PPM) which also necessary to decrease the pesticide exposure of farmers irrespective of their experience in this field of agriculture. In this regard there is a need for biological and social scientists to collaborate more closely and use outcomes of this study and other relevant researches to formulate pesticides use management procedure to help farmers make better decisions regarding pesticide use. One way to help farmers to achieve proper and safe pest management is provision of personal protective devices for farmers with reasonable prices to encourage them to take safety precautions. However the wide spread adoption of IPM will be another way to satisfy public demand for safe and sustainable pesticide usage.

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