

Assessment of pesticides handling Practices and Health and Environmental Impacts on Khat Growing Farmers: in Haro Maya Woreda, Eastern Ethiopia

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Abstract— Methods were designed to evaluate the handling practice and the effect of pesticides on environment and human health. The data were collected by participating mainly Khat growing farmers and further supported by interviewing health and agricultural professionals, field observation and focal group discussion with Khat chewers. 97.1 % of farmers used pesticides for pest control. The survey revealed that, 95.2% confirmed that they using DDT. The pesticide treated khat is harvested and consumed starting from the same day of treatment. Farmers were not taken measures while spraying whether children and other people are in the field or not. Majority of farmers i.e. 84.1% have no experience of taking bath, 42.85 % of farmers do not change clothes right after spraying; and 86.93% do not wash the contaminated clothe separately. Majority of farmers doesn't have knowledge about labelling, dosage and expiry date mentioned on pesticide container. Farmers used protective devices rarely, except 73.3% who used scarf to protect the uncomfortable smell of pesticides. Farmers store their pesticides where they sleep, where they eat, prepare their food, where the cattle feed, hut in the field. Majority of farmers experienced headache, dizziness, difficult to breathe and vomiting, itching or burning of different parts of body as the main symptom filling during application of pesticides. Liver case, kidney and stomach are the most common healthy problem realized; and significant number of farmers and health professionals are confident enough that, chewing of pesticides treated khat and unsafe use khat are the case. The care of for the environment is very low in that spray pesticides near water bodies like well water and ponds, disposing the leftover and empty pesticide containers in the field. Number of pollinating insects like, butterfly, and bee are decreasing. The care of livestock not to eat residue of Khat treated by pesticides and graze near treated was small.

Keywords— pesticides, khat forming, survey, health issues etc.

I. INTRODUCTION

The term pesticide includes chemicals used as growth regulators, defoliants, desiccants, fruit thinning agents, or agents for preventing the premature fall of fruits, and substances applied to crops either before or after harvest to prevent deterioration during storage or transport [1]. Obviously productivity of agriculture sector largely depends on substantial inputs of chemical pesticides. As a result of this farmers use a wide range of pesticides to prevent crop losses from pest attack, to improve yield as well as quality of the agricultural products. Besides agricultural use, chemical pesticides are also being used in domestic, health and industrial sectors. These benefits of pesticides have led to their widespread use in controlling agricultural pests and disease vectors [2, 3].

The environmental pollution and poisoning due to the widespread use of pesticides in pest control may be detrimental to the health of handlers, non-target organisms and consumers. Environmental pollution by pesticides depends on several variables, including the type and quantity of the pesticides employed. Physical, chemical, biological properties and the capacity of pesticides degradation influence the transport of these compounds to surface waters [4]. Pesticides are poisons and can be dangerous when misused. Pesticides are a threat to the environment by losing from areas of application to non-target sites [5]. Many pesticides highly toxic to insects like honeybee, birds, aquatic organisms and fishes [6].

There are many routes of exposure to pesticides. However, people can be exposed to pesticides in three major ways: breathing (inhalation exposure), getting it into the mouth or digestive tract (oral exposure), and contact with the skin or eyes (dermal exposure). These

paths are frequently referred as routes of entry [7, 8]. Exposure to pesticides depends on the intensity, frequency and duration of contact between the body like mouth, nostrils or skin surface and any pesticides [9, 10]. Similarly the respiratory tract provides a very efficient surface for the absorption of substances, whether they are in the form of vapours, particles or droplets [11]. Exposure to pesticides can cause healthy problem in humans, ranging from irritation to severe illness or death [12 and 13].

The Ethiopian economy is supported by agricultural sector, which is a fundamental instrument for poverty alleviation, food security, and economic growth. Due to its high and stable market prices and its resistance against drought and frost, farmers in the study area have a more secure and higher income from khat than from other crops. As a result of these many farmers have abandoned other crops and started growing a more profitable crop, khat. In Ethiopia, the region of Hararghe particularly Haro Maya Woreda, where the international market of khat know as Awaday is found, international khat market, is considered to be the main area for cultivation and trade khat.

Khat is subject to a wide range of insect pests, diseases which results to destruction of the plant but mostly the damage is to the quality of the harvested material, which affects the economic gains from the crop. Lowering of pest damage is associated with increased yield and higher quality of product that improve the income of farmers. The rise in level cultivation of khat and the pest attack may develop into another unexpected problem in pesticide practice. Even though, pesticides are essential in agriculture and household pest controls, they are recognized as potential hazard to non-target organisms and the environment [5]. The efforts to increase food production and protection should be in a way that does not affect public health the environment adversely. This study, therefore, aimed at assessing the pesticide use practice and hazards in Hara Maya woreda, eastern part of the Ethiopia, focusing on khat growing rural communities.

II. MATERIALS AND METHODS

2.1. Description of the study area

This study was conducted in Haro Maya Woreda, East Hararghe Zone, Oromia region of Ethiopia. Haro Maya Woreda is known for its extensive production of different varieties of *Khat*. Survey study indicates that farmers are using pest control chemicals to protect *Khat* plant from pest and to increase the yield of production. Recognizing all these facts Haro Maya woreda is selected as research site and high attention was given to these Awaday surrounding kebeles in this study.

2.2. Sampling methods

A questionnaire containing open and closed ended questions was designed and used to obtain data through face-to-face interviews with sampled farmers. Five months before the data collection, the questionnaires were pre-tested on 20 farmers and four other expertises of health and another four agricultural workers who were living and working in study area but not included in the main data collection area. In addition to the structured questionnaires the data collection was supported by semi-structured interviews and observation to validate the study.

Kebeles in the woreda were clustered into five mutually exclusive geographical zones to make data collection simple and economical. Depending on the size of clusters a total of seven kebeles were sampled from 33 kebeles of the werada for the data collection. After selection of kebeles by multistage sampling method an exhaustive list (sampling frame) of all members of *Khat* owning house hold was prepared by the help of kebele agricultural development office. After determination of sample size (the number of *Khat* producing house hold), sites and elevation factor (quotient between the size of the population and the size of the sample) the first unit was selected randomly. After selection of the first unit, systematic sampling method was applied to draw sample at regular interval from the list. Accordingly, two hundred and forty-five farmers were selected randomly from these kebeles. Representative number of agricultural workers and healthy professionals were made to participate in the interview to evaluate the training status of farmers on the safe use and handling, and alternative use of pesticides.

For the validation of the data from khat growing farmers different concerned bodies were participated. There are two to three agricultural workers per kebele to guide farmer in agricultural practice. In the same way there are 9 agronomists and one environmental protection worker at woreda level. All the agricultural workers in the sampled kebeles and all the agronomists were made to participate. In the same way, there are one hospital and six healthy centres in the woreda. Up on discussion with the woreda health office three health centres are selected depending on the geographical location to represent the whole health centres. Almost all the physicians in the hospital are participated. After selection of healthy centres data was collected by participation of all the health professionals. Focal group discussion also took place with khat chewer to see the health impact of chewing pesticides treated khat. Almost all the woreda health expertises were participated.

III. RESULT

3.1. Socio-Demographic Characteristics of the Participants

The age of the farmers, participated in data collection covers the age between 21 and 61, a wide range of age. Analysis of educational levels also revealed that significant number of the respondents, 33.1% is at no schooling level that means they are illiterate. However, nearly to half of the respondents (48.97) % were at basic education (reading and writing local or national language), primary education, secondary education, and diploma level accounts about 10.3 and 6.2% and 2% respectively. But there is no participant at education level of first degree and above. Therefore; most of the farmers who participate in data collection are illiterate or at the level of basic education.

Almost all (96.7%) of the participant are married and head of the family. The number of members with in each family ranges from one to more than eleven, and near half of the participants have family member from six to ten. Majority of respondents 95.3 % of the respondents have lived in the study area for more than ten years; and about 93.20 % of the respondents have worked on *Khat* crop for more than six years having experience in *Khat* farming. This shows the duration of the stay in the study area is highly correlated with the number of years in participating *Khat* cultivation in the

study area. In the same manner the health professionals, agricultural workers are at different educational levels starting from diploma.

3.2. The Practice of Handling, and Environment and Healthy Impact of Pesticides

Some of the pests which are identified by this study area are commonly known as '*Bararo*' '*Hudhoo*', '*Mancaroo*' and '*takudhofu*' in local language. The study result is indicating that '*Bararo*' is the most common pest in attacking khat. Farmers were asked whether they used pesticides or not to protect khat from pest attacks. 97.1% of farmers confirmed that they used pesticides. Less than 10% of farmers indicated that they used alternative methods like smoking, using ash and pepper in addition to pesticides. About 95.1 % of farmers responded that they are using DDT. The table shows that malation, seven, '*Wuhagar*' (used for water treatment) are some of the pesticides used by farmers in addition to DDT.

From 21 respondents of agricultural workers only one person (4.8%) denied the use of pesticides on the Khat farm. Those who responded that pesticides were used on the Khat farm were made to respond on the types pesticides of used on the khat farm. About 91 %, 60%, 45%, 39 % of agricultural workers responded that farmers were using DDT malthion, sevin and wuhagar respectively. In the same way 70 % healthy professional agreed on the use of pesticides in the khat plant. The same trend responded on the type of pesticides. They responded as follows 70%; 86.6% DDT, 53.3% malthion, 33.3 % sevin and 20% wuhagar. More than 90% of the farmers indicated that they buy pesticides from the nearby markets. About 8% of farmers pointed out agricultural office and union are the source of these pesticides.

Table.1: Types of pesticides used and its collection by formers

No	Variable	frequency	%
1	How did you control these pests mainly		
	Apply pesticides	238	97.1
	Using traditional methods	19	8
2	What pesticides chemical are you using at present on khat ?		
	DDT	233	95.1
	Malathion	138	58
	Seven	119	50.2
	Wuhagar	42	17.2
	Others(Actellic, Thiroxin,)	39	15.91
3	Where do you purchase/collect pesticide(s)?		
	From local market	220	89.9
	From nearby agricultural office	20	8.1
	From local health bureau	-	-
	From illegal venders through smuggling	31	12.61

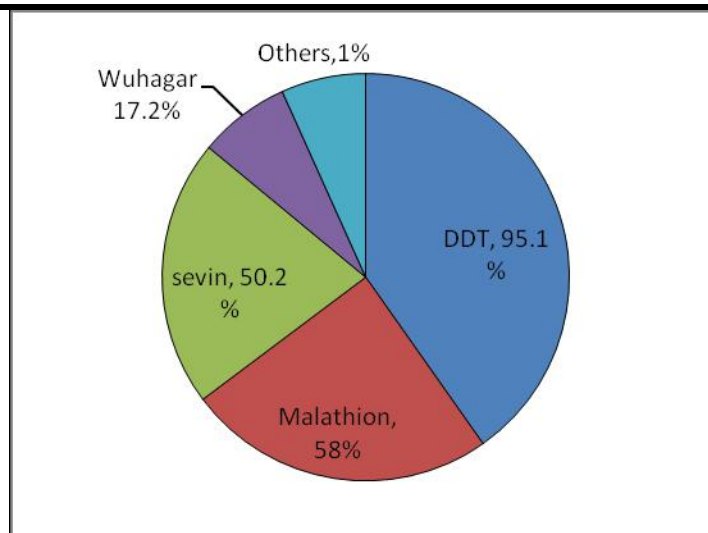


Fig.1: Type of pesticides using on khat

Table.2: Criterion of farmers to purchase pesticides

Criterion	Very important		Important		Not so important	
	Freq.	%	Freq.	%	Freq.	%
Prices of the pesticides	23	9.4	97	39	125	51
Efficiency of the pesticides	102	41.6	132	53.9	11	4.5
The easiness to manipulate	13	5.3	67	27.34	175	71.42
The quality of the explanation	7	2.9	25	10.1	213	86.93
The legality to use in Ethiopia	8	3.3	12	4.8	235	95.91

As can be seen from Table 2, almost all the farmers (95.5%) are efficient in the usage of pesticides to control pests as no criteria for purchasing. Very few farmers (4.05%) used the legality of pesticides in Ethiopia as a criteria for purchasing. These pests' incident is more common in rainy season particularly in autumn and spring months. Thus, application of pesticides to the *Khat* plant is more common and regular in these months.

Table 3 reveals that 8.8% farmers identified that they could harvest *Khat* treated with pesticides within the day of spraying. However, majority of the respondents had habit of harvesting *Khat* within 15-30 days (98.8%) or after 30 days (87.34%) after application of pesticides. In the same way, 96.32% of farmers accepted that children play in pesticides treated field. Significant number of farmers (35.41%) indicated that children were allowed to play in field while spraying. 68.57% of farmers never considered whether other people are chewing in the field or not while spraying. As Table 3 shows majority of the farmers practiced eating, smoking, and chewing in the treated field.

All the respondents accepted that they chewed pesticide treated *Khat*. Only 3.9% accepted that they used to chew *Khat* treated with pesticide in the same day. Even though chewing *Khat* treated with pesticides is increasing after the second day only about 7.75% respondents indicated that they used to wash *Khat* treated with pesticides. Almost all of the farmers said that they never ate while spraying however relatively small number of farmers indicated that they drink while spraying. As the Table shows 3 small number farmers indicated that they used to smoke or chew while spraying. Even though the degree is relatively different almost all the respondents responded that they used to eat, drink, smoke and chew in the field which is treated with pesticides chemical. Almost all of the farmers indicated the non-chewable left over commonly known as 'garaba' used as animals' food (93%) and 88.16% indicated that it is also used as fire wood. Goats were identified as highest consumer of *khat* leftover. This practice is observed during the survey study.

Table.3: Farmer's experience on application of pesticides, exposure and its usage of *khat*

	Variable	Frequency	%
1	How many days prior to harvest were the pesticides applied?		
	The same day	21	8.8
	1-7 days	72	29.4

	8-15 days	242	98.8
	16-30days	221	90.2
	Above 30 days	214	87.37
2	Do you chew Khat from farm land treated with pesticides?		
	Yes	245	100%
	No	-	-
3	When spraying happens, are workers or family members expected to work in the field?		
	Yes	230	93.87
	No	15	6.1
4	Are children allowed to play in areas treated with pesticides?		
	Yes	236	96.32
	No	9	3.6
5	If yes, how soon after the application?		
	While applying	87	36.87
	In the same day	221	93.64
	The next day	222	94.06
	Within 3-5 days	230	97.45
	Above 6 days	229	97.03
4	Do children help working in the fields?		
	Yes	32	13.06
	No	213	86.93
5	How soon after the application entry?		
	The same day	153	62.44
	2-15 days	195	79.59
	16-30days	219	89.38
	Above one month	221	90.20
6	Do you wash the pesticide treated khat before use		
	Yes	19	7.75
	No	226	92.24
7	In the field treated with pesticide do you:		
7.1	Eat?		
	Yes	229	93.45
	No	16	6.5
7.2	Smoke?		
	Yes	103	42.04
	No	42	17.14
7.3	Drink?		
	Yes	187	76.62
	No	58	23.67
7.4	Chew khat?		
	Yes	245	100
	No		

It was observed that farmers apply pesticides to the Khat crop in a solution form. 97.95 % farmers explained that they have spraying tank equipped with stick used for mixing. As Table 4 shows farmers sometimes (86.5%) faced excess or pesticides left over during mixing. About 77.1% of farmers indicated that they continue to use the leftover pesticide, which may result to over use of

pesticide. About 26.53 % of farmers said that they dispose in the yard or soil. In the same way, 51.42 % of the farmers indicated they throw the empty container into the bush, and 91.42 % said that they leave the empty container in the field and significant number of farmers 23.26 % also indicated that they wash and use domestically.

Table.4: The ways of disposal leftover pesticides and empty containers of pesticides by farmers

No	Variable	Freq.	%
1	How do you dispose of <i>Khat</i> residue?		
	Burn in field after drying	5	2
	Use as fuel	141	88.16
	Use as animal feed	245	100
2	Do you make more pesticide mixture than you need?		
	Always		
	Sometimes	212	86.5
	Rarely	63	25.7
3	What do you do with obsolete (expired) pesticides in your hand?		
	I continue use it	189	77.1
	I just store it	12	4.8
	I dispose of it in the soil	65	26.53
	I ask advise of DA		
4	What do you do with empty pesticide containers/bottles		
	Dispose into the disposal pit	11	4.4
	Wash and use domestically	57	23.26
	Left in the field	224	91.42
	Destroy and burn or bury it in the soil	-	-
	Throw in to the toilet	4	1.6
	Throw in to the Bush	126	51.42

Farmers also made to respond on the possibly of body contact to pesticides during pesticide handling. Majority of farmers' 94.28% indicated that there was high possibility of body contact while mixing pesticides. As indicated in Table 5 the majority of the farmers mentioned that they faced the spray leak on their body part while refilling the tank except 9.7% who indicated never faced. Almost all the farmers who faced the problem of leak on their body replied that nothing they did rather than continuing the task until finishing spraying. More than 90 % of farmers responded that they did not consider the direction of wind during spraying of pesticides. 90.04 of the agricultural workers also confirmed that farmers are not considering the direction of wind during spraying of pesticides.

Regarding to cleaning or laundry practice, Table 5 clearly showed that majority of farmers 84.1 % have no experience of taking bath right after spraying pesticides. 42.85 % of farmers responded that they do not immediately change their clothes after application of pesticides. Only 20.86 % of farmers indicated that they wash their clothes immediately after working with pesticides. Almost all the farmers 86.93% said that there is no experience of washing pesticide contaminated clothes separately. Even though the frequency of washing the spraying tank is very small the possibility washing near the well water and in the farm is identified to be high.

Table.5: The ways of contact of pesticides after spraying on *khat* by the farmers

No	Variables	Ferq.	%
1	When you mix/use the pesticide solution, does the liquid come into contact with any part of your body?		
	Yes	231	94.28
	No	14	5.7
2	Parts of body in contact		
	Hands	214	92.64
	Feet	161	69.69
	Other parts body	67	29
3	Do you take a bath right after spraying		
	Yes	19	7.7
	No	206	84.08
	Do pesticide contaminated clothes get washed		

4	immediately after spraying		
	Yes	51	20.86
	No	84	34.28
5	Does pesticide contaminated cloth get washed with the rest clothes		
	Yes	213	86.93
	No	32	13.06
6	Do you change clothes right after spraying		
	Yes	140	57.14
	No	105	42.85

As can be seen from Table 6 significant number farmers came across pesticides containers that do not have labelling. Majority of farmers 87.7% indicated that they will not give attention and attempt to read the instruction given on the containers. Only 4.9 % of the farmers indicated that they could understand the information written on the container. Almost none (6.5%) of the

respondents indicated that they would follow the instruction. It is also observed and indicated by farmers also that the information on the container is with foreign language which is difficult to understand by farmers. Large number of farmers 59.59% responded that they do not know whether the expiry date even available on the pesticides container.

Table.6: The farmers knowledge on labelling of pesticides containers

No	Variable	Freq	%
1	Do you usually read the labels on pesticide containers?		
	Yes	31	12.6
	No	214	87.7
2	Do you understand the instructions for use?		
	Yes	12	4.9
	No	234	95.1
3	Can you always accurately follow the instructions		
	Yes	16	6.5
	No	229	93.1
4	Have you ever used chemicals with instructions in a language you don't understand?		
	Yes	235	95.5
	No	10	4.1
5	When you buy pesticides, does it happen that the container(s) has no label		
	Often	70	28.6
	Sometimes	136	55.5
	Never	36	14.28
6	Is there an expiry date on the container of pesticides?		
	Yes	32	13.03
	No	67	27.34
	I do not Know	146	59.59

As can be seen from Table 7; 73.5% of the respondents responded they experienced filling of different thing while handling pesticides. These who felt different things asked to explain their filling. Headache, dizziness, difficult to breathe, vomiting, and itching or burning of different parts of body is the main symptom they fill during application of pesticides. About 40% of respondents responded that they are not sure whether these fillings are related to pesticides or not. Even though the degree of confidence is different significant numbers

of respondents about 59% are sure that symptom is are related pesticides handling. Nearly half of respondents said that they take some remedial action like taking milk, using lemon after spraying to prevent poisoning or make them feel better. Even though different diseases are observed in the region about 86% of health professionals identified stomach ache, liver case, respiratory diseases, kidney case and allergic as top five diseases in the region. 63 % of professionals traced the problem to the unsafe use of pesticides and chewing pesticides treated *Khat*.

Table.7: The ways of filling while handling pesticides

	Variable	Freq.	%
1	After applying/handling pesticides, or being near an application site, have you ever felt any "different?"		
	Yes	180	73.5
	No	20	8.2
	Do not know	45	18.4
2	How sure you that the symptoms you experienced were caused by exposure to pesticides		
	Not sure (0 – 20%)/ I don't know	107	59.4
	Little (20 – 40%)	31	17.2
	Rather (40 – 60%)	28	15.6
	Very (60 – 80%)	13	7.2
	Extremely (80 – 100%)	1	.6
3	Is there anything you can do before or after you spray to prevent poisoning or make you feel better?		
	Yes	129	52.7
	No	116	47.3

Farmers made to respond whether they experienced or heard of any pesticide poisoning incident happening in the community. About 11% of khat growing farmers said that they came across pesticide poisoning incidence in their community. As indicated by these farmers chewing of khat 68% is the main case. Even though farmers were coming across different health defects like stomach ache, liver case, kidney case, cancer, long-term respiratory problems, infertility, skin disorders, birth defects only 15% of farmers are confident enough that these health defects are related to pesticides poisoning. Majority of farmers 85% indicated that the main root of exposure to pesticides is chewing khat which was sprayed.

Majority khat farmers (94%, 79%) revealed that they spray pesticides near water bodies like Well water and ponds respectively. Almost all the farmers (98.5 %) responded that the number of pollinating insects likes butterfly, bee is decreasing. 58% of farmers said that the number birds are not changing, 31% responded the number is decreasing and another one third of respondent were responded that they did not observe the change in

number. Most of the farmers (84%) do not know what happen to the number of aquatic animals. Almost all the respondents responded that there was no care of livestock not to eat residue of *Khat* treated by pesticides. However 21% of the respondents indicated that they will not allow goats to the pesticides treated khat field for short time. Almost all the farmers indicated that there was no practice of protecting animal not to graze near treated khat field. 43% farmers said that they experienced or heard the pesticide poisoning incident happening in the community livestock particularly goats. In line with farmers' response the agricultural professionals responded that, pollution of environmental by pesticides ranges from being problem (95.23%) to a very serious problem (71.42 %), almost all (90.47 %) professionals responded extent of decreasing the population of insects like bee, butterfly is very serious problem. About 57.14% and 42.85 % of professionals responded that the extent of contamination of drinking water by pesticides is serious and very serious respectively.

Table.8: Health effects of pesticide application on khat

S.No.	Symptoms shown	Freq.	%
1	Head ache	223	91.02
2	Dizziness	211	86.11
3	Chest pain or difficult to breath	187	76.33
4	Eyes/face/skin irritation /burning sensation	237	96.73
5	Vomiting	102	41.63
6	Gastric and stomach inflammation	160	65.30
7	Coughing	178	72.65

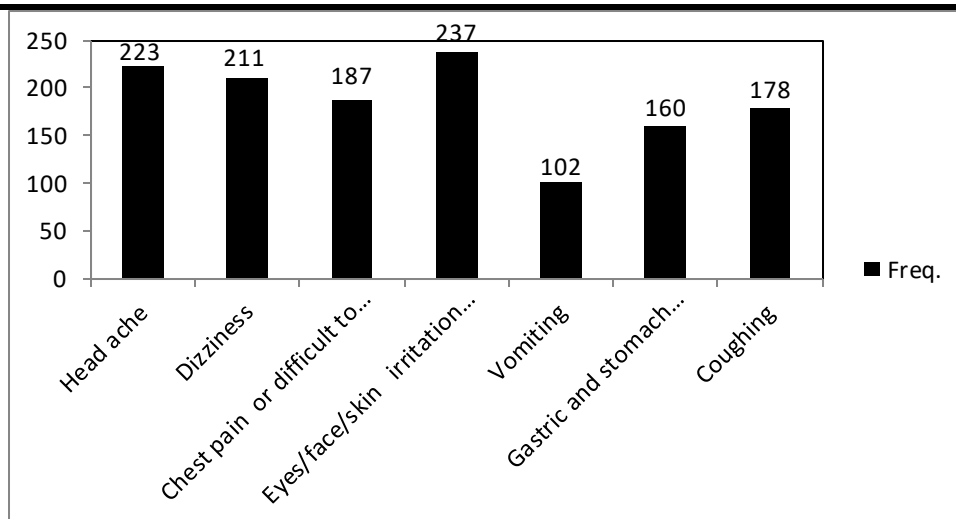


Fig. The frequency of different symptoms caused by pesticide application on khat

IV. DISCUSSIONS

Khat is by far the largest cultivated plant in the study area. Khat is exposed to different diseases and insects which create problem to Khat growers. Even though different pests and diseases are identified in the area, Barara" or „Matur" is very common in attacking khat. It is very small flying insects that migrate from one Khat plant to another. As this survey result revealed almost all the khat growers were using pesticides. The main chemical identified to be used are DDT, malathion, sevin, wuhagare. As reported by farmers and confirmed by different respondents (khat chewers, Agricultural workers and health professional) DDT was by far the most commonly used pesticides. Interviews result also indicating that khat which is treated with pesticides looks very attractive. In other way, some farmers indicated that khat which is attacked by these pests particularly barara looks beautiful appearance and costs high.

DDT is persistent, and its residues persist in the environment for long periods due to the fact that it is not readily degraded by the action of water, heat, sunlight, or microorganisms [14]. Ethiopia has signed the Stockholm Convention on Persistent Organic Pollutants. Similar to this survey study, different recent survey reports in some part of Ethiopia (rift valley and Butajira) also indicated that DDT was being used for protecting crops and animals against agricultural pests [3,15]. This study also identified some chemical like wuhagar which is supposed to be used for water treatment was used for treating khat pests. In other word farmers select to buy pesticides based on the effectiveness and being inexpensive however legality of pesticides in Ethiopia has been given a little attention.

Regularly, pesticides application takes place during summer and spring. Farmers revealed that May is the month when high incidence of barara occurs; and thus the most common month at which pesticide application is high. As khat plant is not seasonal crop application of

pesticides to the same plant or the same farm takes place regularly. Significant number of farmers indicated the amount of pesticides they use is increasing with the incidence and resistance of pests to pesticides. For farmers who use well water or irrigation the incidence and application occur any time in the year. Thus, they apply pesticides as the incidence take place. The regular application and the increasing usage of pesticides to the same plant and field may results into the accumulation pesticides, like DDT, and contamination of environment (water system and soil).

Different studies have showed, little attention to the instructions on how to use the pesticides, ignoring basic safety guidelines on the use of personal protective equipment and fundamental sanitation practices are the main elements that increases the human exposure to pesticides [16]. One of the elements of unsafe use of pesticides that have been identified by past researches was ignoring label instructions [17]. Similarly, in this study farmers in the study area confirmed that they sometimes come across pesticides containers that have no label; majority of farmers did not give attention to labelings, and no attempt to read the instruction given on the containers. The information on the container is with foreign language which is difficult to be understood by farmers. Almost all the farmers did not know whether the expiry date available on the pesticide's container or not. Even though, labels were identified as the most important source of information about pesticides safe use and precautions to be taken there was gap in using the instructions. This may lead khat growing farmers to high risk while using pesticides.

Farmers are believed as the most vulnerable group of people to pesticide exposure all over the world, because they are directly involved in mixing and spraying dangerous liquids [27,28]. This study result shows that headache, dizziness, difficult to breathe, vomiting, and

eyes/face irritation /burning sensation are the top five symptoms identified while handling or after handling pesticides. The study shows more than half of the respondents are not sure that the symptoms are related to the pesticides practice. Different study in different country also showed these symptoms are the common once. Different reports also showed that pesticide applicators tended to accept a certain level of illness as an expected and normal part of the work of farming and therefore do not report the symptoms in official health centres for formal medical assistance [12].

The result of this study indicated pesticide poisoning incident in the family during the last 3 years is not common. However, there were suicidal attempts in the past three years. The respondents also indicated the most common diseases in the study area were Liver disease, chronic stomach problems, and long-term respiratory adverse health problem in the study area. A pervious study conducted, in Yeman, on chewers of khat produced with more chemical pesticides cause acute adverse effects on the digestive system and chronic adverse effects such as body weakness and nasal problems which supports this study result [29]. As khat is a directly consumed leaves, the possibility that chewers catch with different diseases is high. A focal group discussion with khat chewers also indicated that they fill stomach irritation when chewing pesticides treated khat.

Environment might be strongly influenced by heavy agricultural reliance on synthetic chemical pesticides. Pesticides are a threat to the environment by losing from areas of application to non-target sites such as surface and ground water [5,30 and 31]. Pesticides can enter water via drift, surface runoff, soil erosion, leaching and, in some cases, deliberate or careless release of pesticide directly into the water. The result of this study shows farmers used pesticide like DDT, which can persistent in the environment. As the study result indicated the disposing practice leftover pesticides and empty container is poor that may cause environmental contamination. As indicated by farmers and agricultural experts the number of useful insects like honey bee is highly decreased as a result of pesticides poisoning.

OCP predominately accumulate in the lipid fractions of human food chain and hence animal fatty foods have become a major route of exposure for humans. Animals living in areas OCP contamination in the environment accumulate their residues when they eat contaminated feed and they inhale contaminated air [2,31]. It can be observed from this study result, the practice of protecting animal not to graze near treated khat field was less. Field observation and the interview result indicates that cattle particularly goats are highly exposed to pesticide that resulted to poisoning incidents into the community

livestock particularly goats. The residue of khat commonly known as 'garaba' is highly consumed by goats. Goats are used both as source meat and milk food in the study area. Thus, people who consumed the foods of these animals origin may be exposed to these persistent OCP such as DDT through food chain. Due to high solubility of DDT in fatty tissue, it can be readily absorbed through the skin into the fatty tissues of living organisms and can bio-magnify.

V. CONCLUSION

This research result has shown that the pesticides, like DDT, are used by khat growing farmers. In addition of environmental contamination, massive use of DDT on khat farm poses a potential public health threat to the consumers of khat. The pesticide use practice of farmers is not knowledge based. Farmers are not using labels on the containers as their primary source of information. Since the khat growing farmers are not using protective clothes farmers and perhaps their family members, are directly or indirectly exposed to highly hazardous, restricted, and banned pesticides. Poor storing practice and improper handling of pesticides, starting from mixing to spraying, was identified in this research work. This can present a potential risk to khat growing farmers' health and the environmental consequences. Farmers suffer from discomforts ranging from headache, chronic diseases in handling these pesticides. The care for environmental contamination is also poor that may results to contamination of soil and water and poisoning of important insects.

VI. RECOMMENDATIONS

Educational and training interventions on pesticide handling and safety precautions are recommended to change this situation. In addition, a governmental intervention is needed to restrict hazardous pesticides, monitoring of labels, and enforcement of good agricultural practices to decrease pesticide exposure of farmers. Government should discourage the use of pesticides that have been banned. Further study is also needed to analyse the extent of contamination of soil and water by pesticides in the study areas. In addition to this toxicology study is also recommended.

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