

## An Assessment of Pesticides Disposal Practices and Their Adverse Effects on Vegetable Farmers in Keumbu Ward, Kisii County, Kenya

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### Abstract

The study assessed pesticides disposal practices and their adverse effects on vegetable farmers in Keumbu ward, Kisii county, Kenya. Pesticides in Kenya are extensively used for pest control in agriculture. Kenya's economy heavily depends on agriculture for the provision of food, employment and creation of wealth. In this regard vegetable production is found to gain great importance which translated to increased pesticide use among vegetable farmers in boosting the production, their usage and unsafe handling practices may potentially result in high farmer exposures and adverse health effects. However over the years, little attention has been paid to the plight of vegetable farmers in terms of; how they handle pesticides and whether they suffer health effects as a result of handling the pesticides. The study sought to evaluate the best practices employed in storage of pesticides and disposal of pesticide containers among vegetable farmers. Kisii being the preferred area of study due to its accessibility and the farmer's dependence of the scarce land for farming that only allowed them to practice small vegetable farming this has been occasioned by the high population in the area which has led to land fragmentation in order to have every household to be accommodated. The study had employed a descriptive case study research designed. This study was conducted in Kisii county where a total of 270 respondents were from a target population of 821 farmers. This sample size was obtained through simple random selection. Data was collected through personal and face-to-face interview using structured interview schedule, observation and focus group discussion. Simple descriptive statistics and cross tabulation was used in the analysis. The data was analyzed for relationships between the variables and the influence of farmer's level of education on pesticide use, storage and disposal of pesticides and effects on human health due to pesticide handling for the 270 questionnaires. The study concluded that; Practices of pesticides storage in the study area were inappropriate as majority of the farmers stored them either in their bedroom or in the granary. It was established that tomato farmers suffered overtime adverse effects while handling pesticides that included effects on skin and eyes and general effects like headaches and dizziness. The study's findings recommended for the need for comprehensive intervention measures to reduce the health and environmental risks of pesticides, including pesticide safety training programs for farmers, stringent enforcement of pesticide laws, and promoting integrated pest management and non-synthetic methods of pest control in Kenya. It is recommended that educational programs be introduced targeting to improve knowledge on proper handling of pesticides among vegetable farmers especially on increasing the literacy levels of farmers.

### Introduction

Kenya's economy heavily depends on agriculture for the provision of food, employment and creation of wealth. Under the Economic pillar of the Kenya Vision 2030 (2007), the agriculture sector is identified as one of the priority sectors which promise to raise Gross Domestic Product (GDP). Among agriculture sub sectors identified were industrial crops that contribute 17% of GDP and 55% of Agriculture exports. Among the industrial crops listed tomato is one of the specific objectives of The Kenya Vision 2030 to raise the yields of key crops to standards recommended by research institutions. In this regard vegetable production is found to gain great importance which translates to increased pesticide use among vegetable farmers in boosting the production, their usage and unsafe handling practices may potentially result in high farmer exposures and adverse health effects. However over the years, little attention has been paid to the plight of vegetable farmers in terms of; how they handle and dispose pesticides and whether they suffer health effects as a result of handling the pesticides [1].

### Statement of the Problem

The prevalence of the problems caused by insect pests and diseases has resulted in high demand for pesticides in Kenya. For most farmers, vegetable production is not possible without intensive use of chemical pesticides due to farmers' lack of access to non-synthetic methods of pest control. The annual consumption of pesticides in Kenya was about 4.5 (kg ai)/ha per year in 2007, and by 2015 this figure has

increased to 12.8 (kg )/ha per year [2]. This excessive amount of pesticide use does not translate into increased crop yields for the farmers, but rather increases the potential to adversely affect human health and the environment. Pesticide use is further complicated by farmers' not perceiving these chemicals as hazardous or that they have to be handled correctly. There are no studies, more specifically in the study area done on farmers' knowledge and practices with respect to pesticide handling and disposal among vegetable farmers [3]. It was against this background this study focused on understanding farmers' knowledge of pesticides disposal practices and safety practices for identifying exposure situations and knowledge gaps, but also to provide valuable information that can contribute to educational and policy recommendations aimed at preventing or reducing the health and environmental hazards

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associated with pesticide use and disposal among vegetable growing farmers in Kisii County and come up with practical recommendation options [4] (Table 1).

### Objectives of the Study

The study was to achieve the following objectives;

To evaluate practices employed in storage of pesticides and disposal of pesticide containers among vegetable farmers.

To establish how farmers manage hazardous effects of pesticides on human health in vegetable farming in Kisii county.

### Methodology

#### Target Population

Kisii County has an estimated population of 8,581 persons out of which 690 are small scale farmers (Ministry of Agriculture, 2007). Crops grown in Kisii County include; maize, cowpeas, pigeon peas, mangoes, green-grams and Tomato [5].

#### Sample size and sample selection

Purposive sampling had been used to select the areas under the proposed study. Decision to select Keumbu ward was based on their high production of vegetables and the extensive use of pesticides in their production. The sample size was determined using precision criterion determination of the sample size which assumed that the dominant characteristics of the study would occur if the confidence interval set at 5% marginal error and 95% level of confidence [6].

The sample size in the study was therefore readjusted using Yamane Taro (1967) formula as quoted by Israel (2002).

$$n = \frac{N}{1 + N(e)^2}$$

Where: n= Sample size, N= Population size, e= Level of Precision.

At 95% level of confidence and e=5%

$$n = \frac{822}{1 + 821 (0.05)^2}$$

$$n = 270$$

Thus 270 respondents were used for the study.

#### Data Collection Instruments

Various instruments were used in this study for purpose of triangulation so as to ensure validity of the data. A questionnaire was administered to vegetable farmers to collect primary data (The instrument was pre-tested using five respondents who were not part of sample population and then readjusted accordingly to suit its purpose [7] (Table 2).

The questionnaire was administered through face to face interviews to minimize any bias that could arise from targeting the literate respondents only. The second instrument to be utilized in this study is a semi-structured interview for the category of Extension Service providers and medical staff who were presumed to be key informants of the study.

#### Data Analysis Techniques

Data collected from the interview schedules was analyzed using SPSS 12.0 version computer software whereby descriptive statistics such as frequency and percentage was used to obtain the general picture

of respondent's profile and general view of their understanding and use of information on pesticide. Data collected from using checklist was analyzed using content analysis. Simple descriptive statistics and cross tabulation were used in the analysis [8].

### Results and Findings

#### Acquisition of Pesticides for Use in Tomato Farming

The researcher sought to establish the source of pesticides for use among vegetable farmers in the ward and the results are as indicated in Table 3

The result indicates that majority of the vegetable farmers get pesticides from agrovets 98(42.0%), 62(26.4%) other farmers, 35(14.9%) agricultural expert, 34(14.9%) agricultural extension officer and Ministry of Agriculture. The result indicates that agrovets are the references for farmers and this gives them the legal authority among farmers. The extension officers and industries (which usually promote their chemicals) were ignored by the vegetable farmers. This might happen because the agrovets are permanently present in the local areas and have proved their efficacy on pesticides use in crops. The source for the use of pesticides seems appropriate but requires clarifications on the quality of information provided by the agrovets [9].

#### Disposal of Pesticides by Farmers

The researcher sought to find out how farmers disposed used pesticide and containers. The results are as shown in Table 3.

The results indicate that many vegetable farmers 122(52.0%) discarded the pesticides containers by throwing them in dumping pit on the farm, 38 (16.1%) disposed them by puncture and burying them, 42(17.9%) reused the pesticide containers, 33(14.0%) they were collected by pesticide suppliers. This was confirmed at the farm visits where many empty pesticide containers could be seen in clusters as one walked in the fields.

Source of information	Frequency	Percentage
Agrovets	98	42.0
Other farmers	62	26.4
Agricultural experts	35	14.9
Agricultural extension officer/MOA	34	14.5
<b>Total</b>	<b>235</b>	<b>100.0</b>

Table 1: Source of pesticide for use among vegetable farmers.

Response	Frequency	Percentage
Throw away in dumping pit	122	52.0
Puncture & bury them	38	16.1
Reuse	42	17.9
Collected by pesticide suppliers	33	14.0
<b>Total</b>	<b>235</b>	<b>100</b>

Table 2: Disposal of pesticides by farmers.

Response	Frequency	Percentage
Itching and burning sensation	143	60.9
Headache	52	22.1
Body weakness	24	14.9
Dizziness	16	6.8
<b>Total</b>	<b>235</b>	<b>100.0</b>

Table 3: Effects of pesticides on member of family experienced.

During the group discussion it was established that some vegetable farmers use the empty pesticide containers for storing food items such as salt and sugar, and as containers for kerosene. This practice appears to be common among local communities in Kisii County. This result agrees with WHO (1990) that also reported a widespread re-use of containers for storing food or water for humans or livestock [10].

### Effects on Human Health in Regard to Pesticide Use among Vegetable Farmers

The research sought to find out the ill effects after spraying or handling pesticides member of family experienced on the skin.

Results from Table 2 show that, the most common pesticide poisoning side effects mentioned by the vegetable farmers were itching and burning sensation 143(60.0%), headache 52(22.1%), body weakness (14.9%) and dizziness (6.8%). Some farmers also mentioned numbness, vomiting, stomach pain, unconsciousness, itching of eyes and body pains as hazards associated with use of pesticides. The findings of this study therefore are in agreement with that of Ntow et al. who reported that the most common side effects of pesticide poisoning among farmers include skin irritations, headaches, general body weakness, difficulty in breathing and dizziness [11].

The finding from key informants and group discussions indicates that many vegetable farmers have not adopted safer pesticide application practices such as spraying against the wind direction, not eating or smoking during spraying so as to prevent respective potential dermal and oral contamination with pesticides. Besides many of the tomato farmers in Kisii County do not display warning signs after spraying so as to prevent public or any member of the family from getting to a sprayed field.

Practices of pesticides storage in the study area were inappropriate as majority of the farmers stored them either in their bedroom or in the granary. It was established that tomato farmers suffered overtime adverse effects while handling pesticides that included effects on skin and eyes and general effects like headaches and dizziness.

### Conclusion

The current results disclose gaps in understanding the use of pesticides in tomato's farms. Farmers are convinced of their good practices, whereas lots are still to do. For a community rank among the top four of the highest producers of tomatoes in Kenya, capacity building is needed. Of course, the community is doing so well, the farmers are able to transfer skills on pesticides use and a strong collaboration does exist among them. This is why more efforts from the government and the international community should be added in

order to meet the standards of chemical use in tomato farms and the quality requirements of the markets for tomato. Under this scheme, the burden of diseases will decrease in households and governments and a sustainable development will rise with healthy people consuming safe tomatoes.

The findings indicate that majority of the farmers appear to store pesticides at unsafe safe place after procurement, thereby exposing them to direct inhalation of the pesticides. The adverse effects of pesticide mentioned by the farmers were itching, headache, weakness, and dizziness. Some farmers also mentioned burning sensation, numbness, stomach pain, itching of eyes and body pains. It can therefore be concluded that the farmers are misapplying the pesticides by disregarding the dangers they cause to human health.

Various stakeholders were found to have played a major role in enhancing knowledge on safe pesticide use among tomato farmers through trainings, among the key ones were the ministry of Agriculture in partnership with various Agrochemical companies having a presence in the study area.

### References

1. Antonella F, Bent I, Manuela T, Sara V, Marco M, et al. (2001) Preventing health risks from the use of pesticides in Agriculture, International Centre for pesticide safety, Geneva.
2. Clarke EEK, Levy LS, Spurgeon A (1997) The Problems associated with pesticide use by Irrigation workers in Ghana. *Occup J Med* 47: 301-8.
3. Environmental Management Co-ordination Act (1999) The Environmental Management Co-ordination Act, Government Printers, Nairobi.
4. Ministry of Agriculture (2006) A report Compiled by Tomato Secretariat on the Status of the Tomato Industry in Kenya. Agricultural Information Centre, Nairobi.
5. Ministry of Agriculture (2007) Chuluni and Mwea County Annual, Government Printers, Nairobi.
6. Ngowi A, Maeda D, Kissio H (1992) Impact of Pesticides on human health: A case study of the coffee growing regions of Tanzania, *African Newsletter on Occupational Health and Safety* 2: 80-3
7. Pest Control Product Board (2009) Annual Report, Government Printer, Nairobi.
8. The Ministry of Planning (2000) Second report on *poverty and Social Indicators in Kenya*, Government Printer, Nairobi.
9. World Health Organisation (1985) Safe use of pesticides, Technical Report Series 720. World Health Organisation, Geneva.
10. Ntow WJ (2008) The use and fate of pesticides in vegetable-based agro ecosystems in Ghana. PhD Thesis. Wageningen University, The Netherlands.
11. World Health Organisation (1990) Public Health Impact of Pesticides used in Agriculture, World Health Organisation, Geneva.