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# Knowledge, Attitude and Practice on Health Effects Pertaining the Use of Tomato Pesticides in Agricultural Practices at Ilula and Nyalumbu Wards in Kilolo District

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**Abstract**
It has been shown that farmers with limited knowledge of the use and safe handling of pesticides may suffer exposure which results in adverse health effects. The statistical evidences of Ilula and Nyalumbu wards (found in Kilolo district of Iringa region) show that small-scale and large scale tomato farmers who are 97.2% use pesticides for pest control, and only 2.8% do not use. Information was obtained from those tomato farmers to determine extent and types of pesticides and knowledge, attitude and practices on the use of such pesticides, and potential harms or effects from pesticide use. Standardized interview guides as well as observational checklists were employed. The number of respondents used in the study was 120. Many farmers (60.8%) do not monitor wind while spraying. The study shows that 43.1% of farmers store their pesticides in the special store that store the agricultural equipments while 1.0% store in kitchen. Moreover, study shows that 55.9% of farmers do wash their hands without using soap and water after spraying rather 34.3% among 55.9% wash their hands using ripened tomatoes. Also, only 35.3% immediately change their clothes after spraying and only 4.9% take shower after spraying while 3.9% do none. The study indicates that, farmers use Personal Protective Gear(PPG)- (coat, long pants, boots or closed toed shoes, gloves, masks, and a hat), with the majority (88.2%) of farmers wearing no or partial PPG. It shows that 88.2% wear coat, while only 3.9% wear masks. The findings revealed that large and small-scale tomato farmers lack adequate knowledge on the safe and good use of pesticides. Knowledge deficits include the use of PPG when applying pesticides, the proper handling and disposal of pesticides, and the possible individual, family and community health impact on exposure of pesticide use. The goal of this study is to promote awareness of the risks associated with pesticides usage even in small-scale farming practices. It is a hope that the policy formulators will become aware for the need of interventions to be developed which can educate and support the farming communities, the general populations and the environment in Ilula and Nyalumbu wards.
**Keywords:** Knowledge, attitudes, practices, potential harms

## 1. Introduction

As the world population is expected to grow 50 percent from 2000 over the next 50 years to 9 billion people. This population growth, combined with the diet demands of a wealthier population, is expected to double world food demand by 2050. Assuming production, regulation and innovation trends of the past several decades continue, global pesticide production will be 2.7 times higher in 2050 than in 2000, exposing humans and the environment to considerably higher levels of pesticides (Food and Agriculture Organization [FAO], 2000). The World Health Organization and the UN Environment Programme estimate that each year, 3 million workers in agriculture in the developing world experience severe poisoning from pesticides, about 18,000 of whom die. Miller (2004), Owing to inadequate regulation and safety precautions, 99% of pesticide related deaths occur in developing countries that account for only 25% of pesticide usage. One study signifies that, 25 million workers in developing countries may suffer mild pesticide poisoning yearly (Jeyaratnam, 1990).

The frequent exposure to tomato pesticides results in both short-term (acute) and long-term (chronic) illnesses. Scientist confirmed tomato pesticide related acute illnesses include: headaches, stomach pains, vomiting, skin rashes, respiratory problems, eye irritations, sneezing, seizures, and coma (Antle&Pingali, 1994). The chronic illnesses include: cancer, asthma, dermatitis, endocrine disruption, reproductive dysfunctions, immunotoxicity, neuro behavioral disorders and birth defects (Horrigan et al., 2002; Alvanja et al., 2004; Kamel et al., 2007). These problems can arise from misuse of the pesticides or over–reliance on them, particularly if the users are not aware of these potential problems (William &Ntow, 2006). Adequate knowledge on how farmers perceive pests, their attitude, and practices to crop protection problems are required to implement successful pest control programs (Ajayia, 2000).

In Tanzania, 68% of farmers reported episodes of feeling sick after routine application of pesticides and their pesticide-related health symptoms including skin problems and neurological symptoms (Ngowi, Mbise, London &Ajayi, 2001).

Research done in Arusha by Bohlen, 1978., Swai et al., 2000., Kaoneka et al., 2004., ICUPE, 2005 &Ekesi

 

et al, 2010, which displays the most commonly encountered tomato diseases experienced by the farmers during wet and dry seasons and 57% of health effects to the farmers exposed.

Just like in other areas, farmers in Tanzania are known to applying different types of fungicides, insecticides and herbicides to secure tomatoes from pests and diseases without considering the effects of the pesticides on environment or human health (Mdegela, Mosha, Ngowi, &Nonga, 2013; Ngowi et al., 2007).

Since Iringa is the leading tomato producing area in Tanzania with an acreage of 4,248 ha, followed by Tanga (1,289 ha), Kilimanjaro (900 ha), Mbeya (380 ha), and Dar es Salaam (Temeke district) (353 ha) (MAFS, 2002). Other regions with significant tomato production include Morogoro, Arusha, Mwanza and Dodoma (Mvena, Msuya, Nyamba, Mlozi, Busindi, Kilima, Kiranga&Gjotterud, 2013), that is why the study dealt with large and small scale tomato farmers found in Ilula and Nyalumbu wards found in Kilolo District of Iringa region where tomatoes are mostly cultivated.

The health effects of pesticide use have become one of the major public health problems worldwide. In developing countries, frequent exposure to tomato pesticides by farmers and farm workers is very common (Antle et al., 1998; Maumbe & Swinton, 2003; Garming &Waibel, 2009). Therefore, due to different studies been conducted show that there is increased number of cases in effects of pesticides to the farmers , that is why it's important to assess their knowledge, attitude as well as practices during exposure to different pesticides during the agriculture activities.

## 2. Materials and Methods

### 2.1 Study design and Approaches

Cross-sectional design was used. The study used such descriptive study design simply because the study aimed to assess the knowledge, attitude and practice on health effect pertaining on the use of pesticides in agricultural practices. Furthermore, the study aimed to get information based on data gathered for specific area in time in order to remove assumptions. The study used qualitative and quantitative approaches

### 2.2 Study population

The study population of the study was large and small scale farmers from six (6) villages among thirteen (13) villages found in Nyalumbu and Ilula wards.

### 2.3 Area of the study

Kilolo District shares borders with Mpwapwa district ( Dodoma Region) in the North, Kilosa district (Morogoro Region) in the North East, Kilombero district (Morogoro region) on the East, while Mufindi district is on the south and Iringa rural district on the west. In terms of international identification, the district lies between 70 and 8030'south of the Equator and between 340 and 370 east of Greenwich with a total surface area of 6,804 sq. km where mostly are mountainous with steep hills, ridges, valleys and escarpments. The arable land available for agricultural production is 4,181.8 sq. km. Out of the arable lands in the district only 1,278.9 sq. km is actually cultivated annually for agricultural activities. The main tribes found within Kilolo district are mixed, though the main tribes are Hehe, Bena and Kinga. A main economic activity is agriculture. According to Census conducted in 2012, population of Kilolo district was 218,130 whereby 108,415 were females and 109,715 were males. Specifically, the study dealt with two wards that is Ilula and Nyalumbu which are composed with 13 villages, 5 from Ilula ward(Ikokoto, Madizini, Igunga, Itunda and Masukanzi) and 8 from Nyalumbu ward (Itabali, Sokoni, Matawale, Ngelango, Mwaya, Mtua, Dinginayo and Ikuvala).

### 2.4 Sampling procedure and Data collection methods

The sampling procedure used was probability sampling specifically simple random sampling so as to minimize bias in order to obtain representable data. The data were collected through interview and observation methods.

### 2.5 Data analysis and presentation

The data was double entered in Microsoft Excel data sheets, cross checked and transferred, and analyzed using SPSS version 22 and Windows version 7. The data obtained is presented in the form of tables and charts.

## 3. Results and Discussion

### 3.1 Farmers attitude and practice regarding handling, storage and use of pesticides

#### 3.1.1Types of pesticides used

Tomato is among the leading crop which needs the use of huge pesticides since it is prone to many bacteria, fungi, herbs and insects. The findings show that 98% of the respondents use pesticides throughout their production and only 2% does not use any chemical pesticide. Some of common pesticides used are like prophe crone, Comfu, karate and Ninja as shown in table 1 below.

 

| | Users | | | | | Non users |
|---|---|---|---|---|---|---|
| | Ninja | Profecrone | Komfu | Karet | Wiltigo | Use no pesticides |
| **Frequency** | 66 | 81 | 83 | 76 | 53 | 2 |
| **Percent** | 64.7 | 79.4 | 81.4 | 74.5 | 51.9 | 0.02 |

Table 1: Show most of pesticides used (Source: findings, 2018)

As the findings in table 1 above signify, pesticides use in tomato production to reduce the food loss which results from occurrence of resistant pests and diseases is inevitable in increasing productivity. During data collection the study revealed that tomato is among the leading crop that use a lot of pesticides and should be applied in a frequency of once a week during summer season and twice a week in rain season. That complements with the study done in Arusha by Bohlen, 1978., Swai et al., 2000., Kaoneka et al., 2004., ICUPE, 2005 &Ekesi et al., 2010, which displays the most commonly encountered tomato diseases experienced by the farmers during the wet and the dry seasons and 57% of health effects to the farmers exposed. There is eruption of new pests in every season which give doubt to farmers to see that there is something relating to so called business between pesticide producers and pest researchers. Once a certain disease erupts there is already a pesticide. For example, as soon as a tomato disease called KANTANGAZE occurred, the medicine was already in agrimedical shops.

Most of pesticides used were prophecrone, comfu, carate and ninja. Ninja causes health problems to many users since it has a tendency of itching when comes into contact with skin. This makes some of the farmers even to wash their face with milk so as to reduce or remove itching. Ngowi, Mbise, Ijani, London &Ajayi (2001) found that 68% of farmers reported episodes of feeling sick after routine application of pesticides and their pesticide-related health symptoms including skin problems.

**3.1.2 Attitude and practice regarding wind monitoring**

The farmer's health risks were further increased because farmers were not aware of the need to monitor wind directions when spraying and even smoked and ate while spraying. The findings show that 60 % of farmers do not monitor wind direction while spraying and only 40% farmers do monitor. Also, 91.2 % of tomato growers can talk while spraying, 4.9% smoke while spraying and 8.8% can eat while spraying.

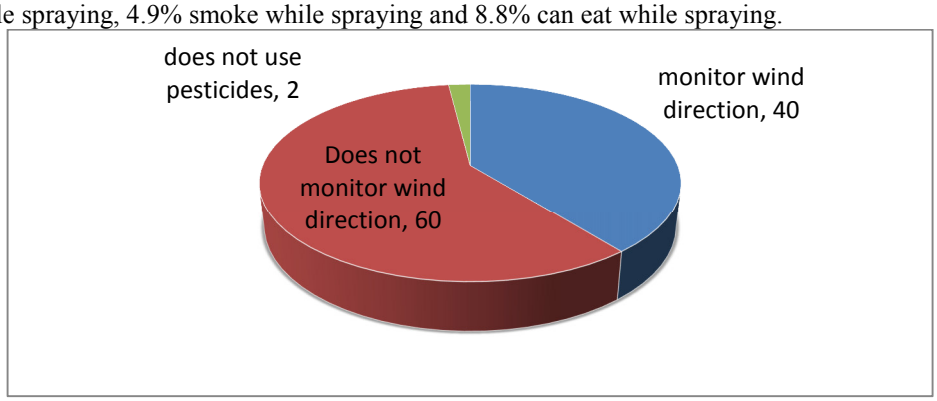


Figure 1: Show knowledge on monitoring wind direction while spraying (Source: findings, 2018)

Figure 1. above shows that, more than half tomato farmers from Ilula and Nyalumbu wards do not monitor wind while spraying so as to reduce the exposure with pesticides. Similarly, Tinyami et al.(2014) noted that 55.5% of farmers expressed no concern regarding the wind direction (pesticide drift) during spraying. This study revealed that the tomato farmers have high exposure to pesticides secondary to inadequate knowledge of the safe and careful use of pesticides.

**3.1.3 Attitude and practice regarding disposal of pesticides wastes (packets or containers)**

Handling of remains and wastes from pesticides is revealed to be a big problem since 50% of tomato growers from Ilula and Nyarumbu said they do crude dumping by discarding the pesticides containers on the farm (figure 2). Also, 19.6% of tomato growers buried their wastes and 16.7% burned as the means of disposal of pesticides waste while only 5.9% use dump sites to disposal their wastes. The disposal of used containers was further complicated, because most of the farms are located along streams which were easier to use to wash the sprayers and to discard the used water, and the study results show 7.8% do so and allows most of water runs off and the containers are swept away by rain into the streams and rivers which empty into the Ruaha river (figure 2).

 

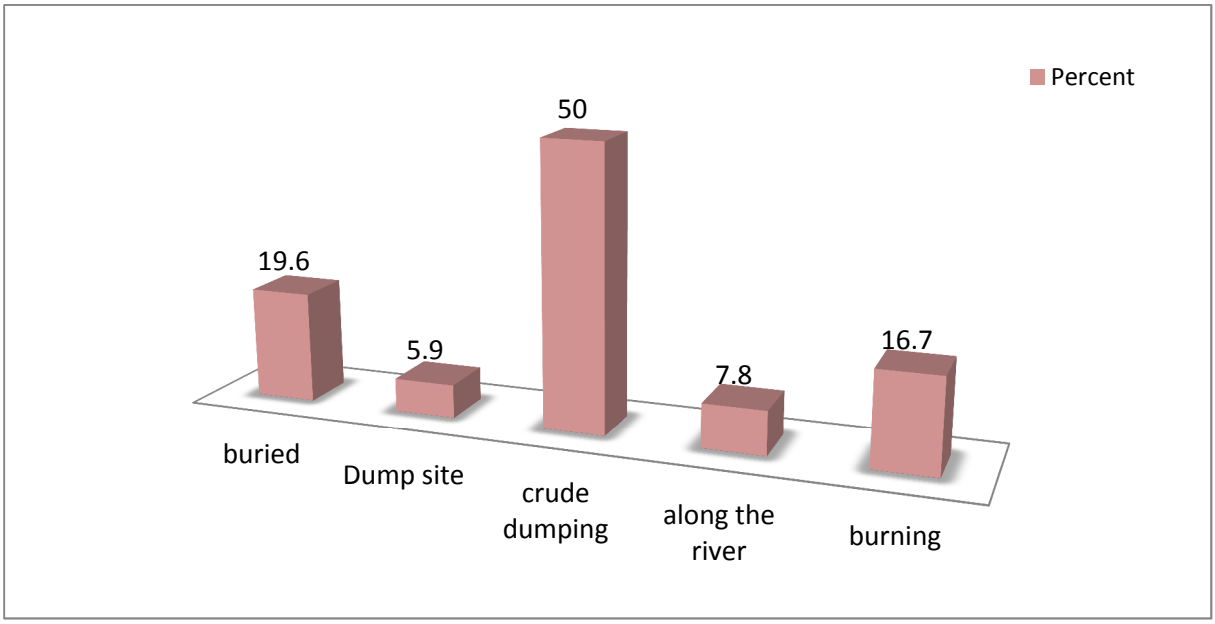


Figure 2: Show disposal means (Source: Study findings, 2018)

There is poor disposal of waste related to pesticides packets or containers after use of pesticides since most of farmers practice crude dumping of waste in their farms as shown in picture below and this cause potential pollution threat to the communities along the water way and to non-targeted fauna and flora which have a potential of destabilizing the food chain and the ecosystem at large.

Picture 1: Shows pesticide remaining packet disposed at the farm.(Source: findings, 2018)

Ngowi (2013) revealed that there is improper handling and disposal of pesticides, which lead to the possible individual, family and community health impact on exposure of pesticide use.

**3.1.4Attitude and practice regarding storage of pesticides**

Moreover, storage of pesticide shows that 44% of farmers store their pesticides in the special store that store the agricultural equipments while 1.0% store in kitchen at the farmer. As shown in figure 3 below

 

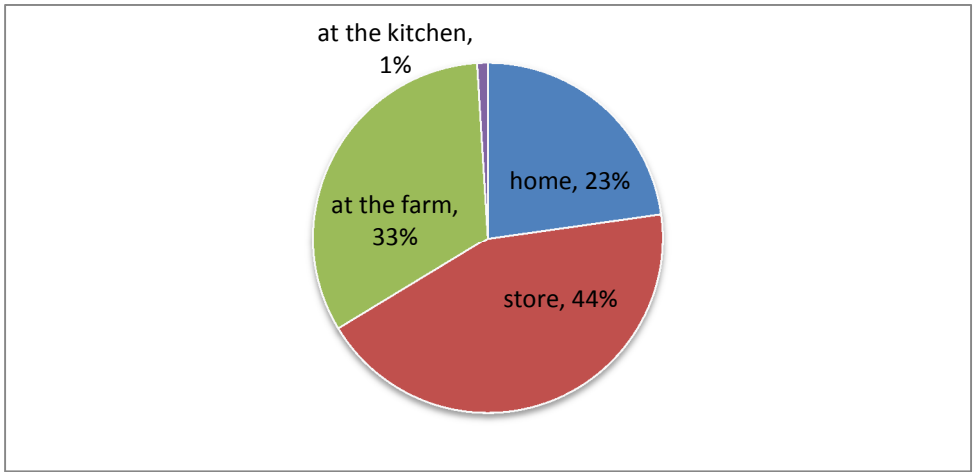


Figure 3: Show storage (Source: Study findings, 2018)

The findings in figure 3 above show that the storage of pesticide is 44% for farmers that store their pesticides in the special store that store the agriculture equipments while 33% store at the farmer in special area (either burying or temporary houses and trees) and only 23% store at home and 1.0% store in kitchen of the farmer. Lekei et al.(2014), in Cambodia,Jensen et al.(2011) and in Ethiopia, Mekonnen & Agonafir (2002), which found that unsafe storage of pesticides is common among households in many developing countries where a significant association of poisoning incidence and pesticide storage with households has been found, where some farmers reported storing the pesticides near to food commodities thus resulting to greater potential of daily unintentional exposure and further emphasized the increased risk of pesticide exposure among family members within farm homes that were detected with higher frequency of pesticide residues (Alyu, Kwasi & Sadick, 2015).

**3.1.5 Attitude and practice toward personal hygiene after spraying**

Since toxic residues on the skin and clothes can cause acute pesticide poisoning. All pesticide residues should be immediately removed from the skin with soap and water when spills and leaks occur and the use of hand sprinkling makes the farmers more prone to spill the pesticide resulting into skin exposure and inhalation. The findings show that 55.9% of farmers do wash their hands without using soap and water after spraying rather 34.3% among 55.9% wash their hands using ripened tomatoes. Also only 35.3% immediately change their clothes after spraying and only 4.9% take shower after spraying while 3.9% do none of above (figure 4).

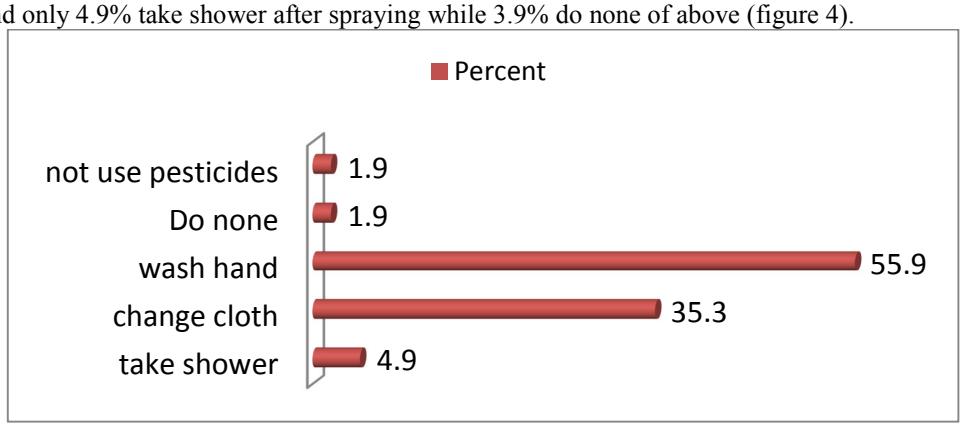


Figure 4: Show the Practices done after handling pesticide. (Source: Study findings, 2018)

The study revealed that 55.9% of Ilula and Nyalumbu farmers do wash their hands by using ripened tomatoes or water but with no soap. So the issue of personal hygiene is poor since only 5% take shower after spraying and 36% change clothes after spraying. Likewise Tinyami et al. (2014) revealed that 82.4% of people avoided medical care on the assumption that signs and symptoms of pesticides poisoning are a normal phenomenon and need no medical attention. They believe that the only precaution that they should take is to use milk for drinking after spraying or washing their face in strong face itches.

**3.2. Use of person protective gear (PPG)**

The study table 2 shows that, farmers said, they used PPG (coat, long pants, boots or closed toed shoes, gloves, masks, and a hat), with the majority (88.2%) of farmers wearing no or partial PPG. The study shows 88.2% wear coat, while only 3.9% wear masks as shown in the table 2 below. These exposures increase the farmers' risk of

 

pesticide poisoning and possible health effects like after spraying as headache, skin itching, flue and eyes itching as well as coughing.

| Kind of PPGs used | No. of people | Percent |
|---|---|---|
| Mask | 4 | 3.9 |
| Gum boot | 84 | 82.4 |
| Groves | 6 | 5.9 |
| Coat | 90 | 88.2 |
| None | 12 | 11.8 |
| Wear(Partially) less than three kind of PPG | 74 | 72.5 |

Table 2: Show the use of PPG (Source: Study findings, 2018).

The research revealed that most of the farmers do not wear (11.8%) or partially (72.5%) wear PPG so as to protect their body to come into contact with pesticides during the direct interaction with pesticides either during mixing or spraying as shown in pictures below.

Picture 2: farmer spraying with short trouser and without groves (Source: study Findings, 2018)

Picture 3: farmer spraying without boot and gloves (Source: study findings, 2018).

Picture 4: Shows farmer mix pesticides without gloves

Picture 5: show farmer spraying without coat (Source: Study findings , 2018)

These results correspond to Tinyami et al.(2014) which shows that most farmers (83.8%) used knapsack sprayers to apply pesticides, with 76.3% using no or partial personal protective gear (PPG). The scientific handlings of pesticides include the use of protective gadgets. None of the applicators was found using the

 

suggested protective gadgets, which included a face-mask with replaceable filters, goggles, head-cover, rubber gloves, full-sleeved shirts and full pants, and boots. Jeyaratnamet al. (1987) and Sivayoganathan *et* al ;( 1995) have also reported similar situations in the case of Sri Lanka and Yassin et al.( 2002) in Palestine.

### 3.3. Awareness of the farmers regarding pesticides effects

The study results show that knowledge and awareness concerning the health effects to the exposure in pesticide is known since 82.4% confers on that and only 17.6 of respondents are not aware on that. While 91.2% already experiences some of symptoms or effects to their health. The findings show that 35% of tomato farmers experience headache, 64.7% of tomato growers experience flue, 45.1% experience coughing, 85.3% experience skin itches and rashes as well as 63.7% experience eye itching. As shown in table 5 below.

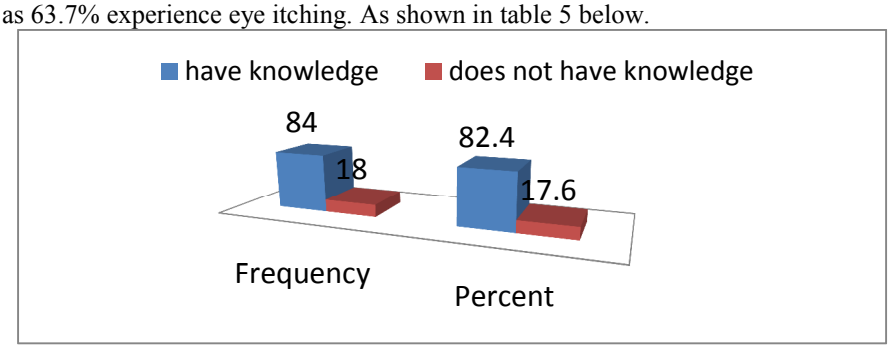


Figure 5: Shows the knowledge in the effects of pesticides (Source: Study findings, 2018)

| | Headache | Coughing | Flu | Skin itching | Eye itching |
|---|---|---|---|---|---|
| Frequency | 36 | 46 | 66 | 87 | 65 |
| Percent | 35.3 | 45.1 | 64.7 | 85.5 | 63.5 |

Table 4: Show the extent of the health effects (Source: Study findings, 2018)

The study in figure 5 above revealed that 82.4% of respondents have knowledge concerning the effects of pesticides and they avoided medical care on the assumption that signs and symptoms of pesticides poisoning are a normal phenomenon and need no medical attention. They believe that the only precaution that they should take is to use milk for drinking after spraying or washing their face in strong face itches. This attitude further broadens the risk of long term effects of pesticides poisoning. Although most of the farmers assumed their symptoms were from pesticide use, they thought that the symptoms were expected effects of pesticides use and should be accepted. Some farmers denied that these symptoms could be due to pesticide use, but attributed the symptoms to something other than pesticide exposure.

Similarly Tinyami et al. (2014) revealed that less than one-fourth of farmers said they used PPG (long sleeved shirts, long pants, boots or closed toed shoes, gloves, masks, and a hat), with the majority (76.4%) of farmers wearing no or partial PPG. These exposures increase the farmers' risk of pesticide poisoning and possible health effects, which could explain why 85.3% of farmers reported signs and symptoms of acute pesticide poisoning after spraying. Abdul et al.(2010) also revealed that human health effects are often caused by skin contact: handling of pesticide products, Inhalation: breathing of dust or spray and Ingestion: insecticides consumed as a contaminant on/in food or in water. Farm workers have special risks associated with inhalation and skin contact during preparation and application of insecticides to crops.

## 4. Conclusion and Recommendations

### 4.1 Conclusion

This study provides valuable information concerning the trend in pesticide knowledge, attitudes, and practices pertaining the use in a community of large and small-scale tomato farmers in Ilula and Nyalumbu wards. The study revealed that large and small-scale tomato farmers lack adequate knowledge on the safe and good use of pesticides. Knowledge deficits included the use of PPG (11.8%) do not use any kind of PPG and 72.5% wear partial PPG less than tree kind of PPGs when applying pesticides, the proper handling in which 60.8 % of farmers do not monitor wind direction while spraying and only 39.2% farmers do monitor, storage where 43.1% of farmers store their pesticides in the special store that store the agricultural equipment while 1.0% store in kitchen at the farmer and disposal of pesticides, and the possible individual, family and community health impact on exposure of pesticide use including 85 skin itching followed by flue 64%, eye itching 63.5% as well as coughing 45.1% and headache 35.3%. Therefore, since the use of pesticides has the potential to threaten the health of the people exposed as well as environment through soil, water and air pollution. A goal of this study is to promote awareness of the risks associated with pesticides usage even in small-scale farming practices. It is hoped that the policy formulators will become aware for the need of interventions to be developed which can

 

educate and support the farming communities, the general populations and the environment in Ilula and Nyalumbu.

### 4.2 Recommendations

Provision of health education which will address the multiple concerns surrounding pesticide use, including reducing health effects of pesticides exposure, safe handling of pesticides, reading and interpreting of labels, the importance of the use of PPG, and the proper disposal of used pesticides containers. Also, Increase availability of PPGs like groves, masks, gum boot as well as coats and should be available in reasonable cost so as to ensure affordability to many large and small-scale farmers. On one hand, local government authority of Kilolo district should ensure the availability of agriculture and environmental health officers so as to ensure communication and cooperation between farmers and government officers so as to improve farmer's behaviors and actions to their pesticide use provide as well as consultation and advice to farmers in order to clear some doubts. On the other hand, conducting inspection in agriculture shops so as to condemn and seizures all expired and fake pesticides so as to prevent more health and environmental effects to the community. More studies are to be done on the tomato seeds in relation to the eruption of new pests in tomato crop.

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