KNOWLEDGE AND PRACTICES OF USING PESTICIDES AMONG FARMERS IN KIM BANG DISTRICT, HA NAM PROVINCE, VIETNAM

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Abstract

This cross-sectional study aimed to assess the knowledge and practices of using pesticides of agricultural workers at Le Ho and Hoang Tay commune, Kim Bang District, Ha Nam province, Vietnam. 323 pesticide applicators experienced at spraying pesticides at least once in open fields in the past three months were selected in this study. Face to face interviews using a structured questionnaire and a checklist were utilized to assess the knowledge and previous practices of participants

The findings revealed the average age of sprayers was 46.2 ± 8.8. Most of them (77.4%) were females. The percentage of sprayers who had appropriate knowledge was 40.9%; meanwhile, 59.1% of them had inappropriate knowledge. These figures for appropriate practices and inappropriate practices were 38.1% and 61.9%, respectively. 33.7% of respondents knew the negative impacts of pesticides on the environment and ecosystem. Noticeably, 73% of them disposed of empty pesticide packages at the fields after spraying. Only 29% of applicators frequently wore all necessary kinds of personal protective equipment (PPE) when spraying.

This study indicated that sprayers had inadequate knowledge of safe using pesticides, and they were at risk of being exposed to pesticides due to their poor practices. It is, therefore, necessary to carry out multidisciplinary intervention programs to address this issue. If applicator's practices are improved, the negative impacts of their pesticide application will be eliminated, which will promote environmentally sustainable agriculture later.

Keys words: *pesticide, practices, knowledge, Vietnam*

1. Introduction

Agriculture has been the main economic activity in Vietnam over decades, contributing significantly to the country's GDP. The emergence and re-emergence of pests in the sector (agriculture) have resulted in the increasing use of pesticides across the nation. Though they have contributed considerably to agricultural outcomes, their accumulation in the environment has led to environmental issues. As the world population is predicted to grow to more than 9 billion and double need for food by 2050, farmers must intensify crop production to satisfy the diet demands. Because of that trend, global pesticide production will be 2,7 times higher in 2050 than that in 2000, exposing human and environment in the risk of a high level of pesticides [1]. The studies have shown that the trend of using pesticides in developing countries will continue increasing quantities because of the lack of an alternative to pesticides, ignorance of the sustainability of pesticide use, and the weak enforcement of regulations and laws on pesticide use [2]. Famers and workers in developing countries are lack of access the information and protection to safeguard their health, their families, and nearby communities. Furthermore, pesticides cause poisonings and are linked with chronic diseases in the countries that have not invested enough significant resources in pesticide regulatory infrastructure and enforcement.

Vietnam is known as an agriculture-based nation and pesticide is a big challenge. Vietnam is presently paying a high cost for its reliance on pesticides. With just a few active ingredients produced domestically, pesticide imports into Vietnam are approximately US £ 500 million each year at present. However, the indirect cost is much higher (social and environmental costs, the loss of export opportunities due to high pesticide residues in products, and unstable agricultural productivity associated with a degraded agroecosystem). In 2002, more than 7000 cases (involving 7647people) of food poisoning by pesticide residues were reported, causing 277 deaths in 37 out of the 61 provinces. Besides, acute poisoning due to direct and indirect exposures to pesticides, chronic pesticide poisoning could affect 2 million Vietnamese farmers

[3]. The compensation costs for domestic human health and loss of export opportunities for vegetables and fruits in Vietnam are estimated at US 700 million, and in that figure, the environmental costs are not yet included [4].

To reach friendly pesticide usage, there is a need to improve the practices of using pesticides among users. This article is to assess the level of knowledge and practices of using pesticides among applicators in Kim Bang district where agricultural activities are the main job to support local's living.

2. Methods

2.1. Study site

We conducted this study in 2 communes (Le Ho and Hoang Tay) in Kim Bang district, Ha Nam province, located in the North of Vietnam. The data was collected in 17 villages characterized by important agricultural activities.

2.2. Research design

This is a cross-sectional study conducted from September 2015 to December 2015 on 323 farmers in research locations. Farmers with at least one pesticide spraying in the open field in the past three months were chosen for this study. Also, they were the persons who usually did almost jobs related to pesticides in their households from year to year.

2.3. Data collection

Face to face interview method using a questionnaire was used to study about the knowledge and practices of respondents. A pilot study was carried out on 30 famers and necessary modifications were made if needed before the official data collection.

2.4. Questionnaire

The questionnaire included four sections. The first one is the demographic section. The second consists of 24 questions about knowledge about safe using pesticides. The third section consists of questions in terms of practices of using pesticides in the open field. The fourth section figures out the symptoms of acute pesticide poisoning after spraying and the first aid of participants in that case. The last one is a checklist to observe the practices of storing pesticides at home. The range of the knowledge score (in the second section) was 0 to 24 and was

categorized as <12 = inappropriate knowledge, and ≥ 12 = appropriate knowledge. The total score of the third and fourth section demonstrated the practices of participants. The range of the practice score was 0 to 22 and was classified as <11 = inappropriate practice, and ≥ 11 = appropriate practice.

2.5. Statistical analysis

Data were coded and entered by EpiDATA version 3.1 software, and analyzed by the Statistical Package for Social Sciences (SPSS) program, version 20. Descriptive results were expressed as frequencies, percentages for categorical variables, and as means ± SD for continuous variables.

3. Results

3.1. Demographic characteristics

The mean age of participants was 46.2 ± 8.8 years with the highest percentage belonged to the 30 – 59 age group. The majority (77.4%) was female. 69.7% of farmers had secondary education while 18,6% of participants hold primary level. 0.9% of them were illiterate. About working experiences of praying pesticide in open fields, none of them had less than 1 years of spraying pesticide, and the majority (63,8%) of them had more than 20 years of spraying pesticides in cultivation time.

3.2. Knowledge of using pesticides

The results revealed that 20.4% of respondents aware of the negative effects of pesticides on animals (ducks, buffaloes…), and only 33.7% of them acknowledge that pesticides can impact the environment. When farmers were asked about the route that pesticides can enter into the body, the majority (74,0%) of farmers answered inhalation, 26,3% of them answered by skin/eyes, and 13,9% knew pesticides can enter through the mouth. The results also showed that a large percentage (89,5%) participants didn't know about the colour coding and pictograms warn (how toxic a product is and how you can protect yourself and the environment from the hazards). (9%) participants knew the meaning of a red colour code in pesticide containers (a product is highly toxic and must be handled with extreme care). A similar of 6% of participants had the correct answers about yellow colour code (quite toxic) and the blue colour band (caution) and the green colour band (handled carefully).

3.3. Practices

Following the instruction: a large number of applicators (78%) applied pesticide as the label instruction while 5% of them increased the dose. A little of them (1.2%) reported they reduced the dose and 11,5% of them practiced as their experiences. Noticeably, 18,6% of applicators said that they followed the recommendation of retailers as spraying.

Mixing a cocktail of pesticide: was common in the research place. About 78.0% of respondents reported they mixed four or five pesticides for one spraying.

Disposal of empty containers: when asked how they disposed of empty containers, 78.3% of applicators said that they throw them on the field, 22% collected them and throw into the recommendation place of local government, and 0.6% reused them for domestic storage.

Personal protect equipment (PPE):

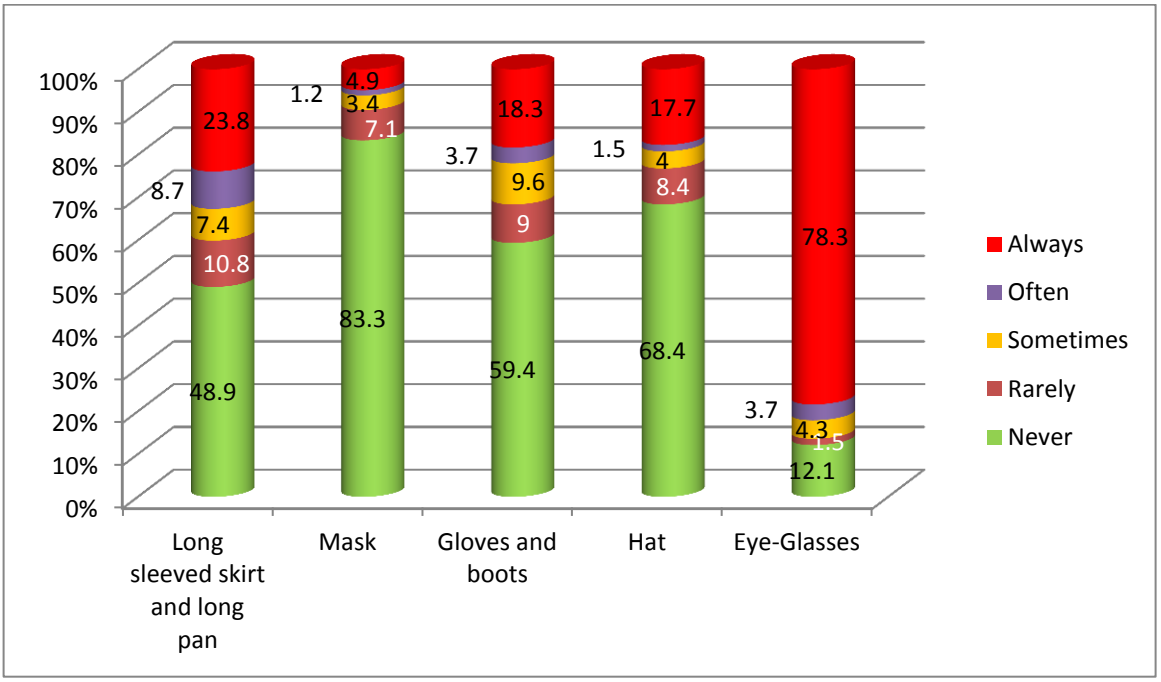

Figure 1: Practices of wearing personal protective equipment among farmers

The figure 1 displays the frequency of using PPE when applicators sprayed pesticides. The findings revealed that the percentage of respondents who always wore a mask was 83.3%, long-sleeved shirts and long pans were 68.4%, gloves and boots was 59,4%. Noticeably, just 29% of participants indicated that they wore adequate PPE items during their spraying. The number for eye-glassed was the lowest, at 12.1%.

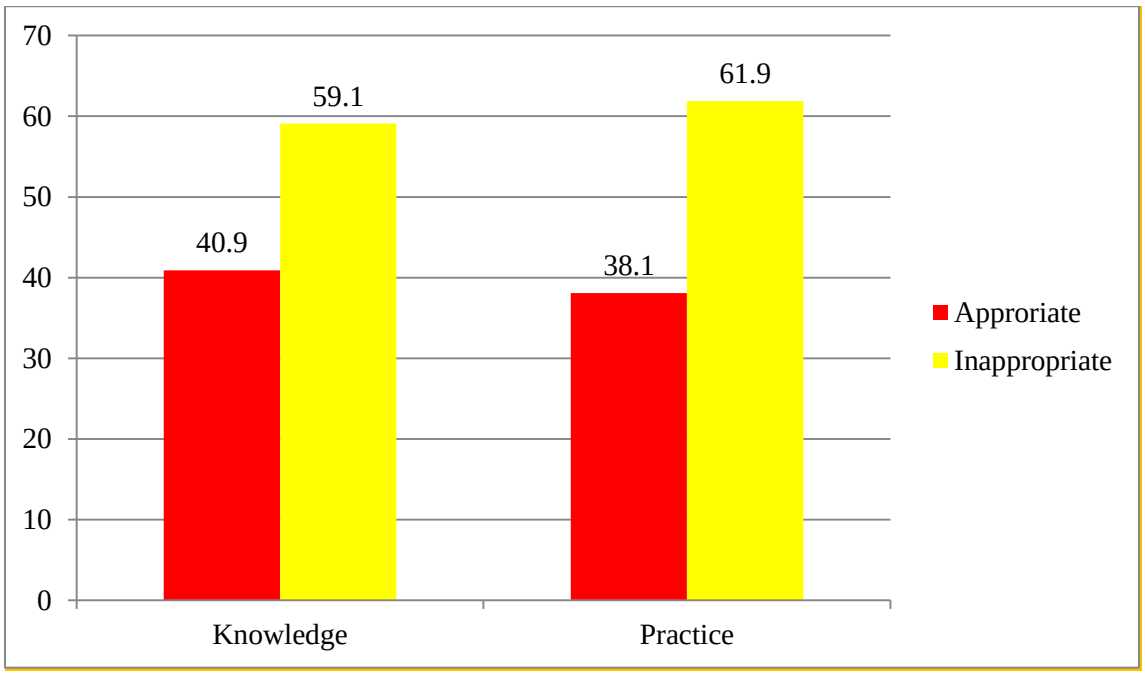

Figure 2: Distribution of knowledge and practices of using pesticides among farmers

Those who had appropriate knowledge accounted for 40.9% while sprayers with inappropriate knowledge stood at 59.1%. Those figures in terms practices were lower, at 38.1% (appropriate practices) and 61.9% (inappropriate practices) respectively.

4. Discussions

4.1. Demographic characteristics

In this study, the average age of respondents was mostly in their forties since in today's family in rural areas, the young have a trend to travel to the city for their working or being workers in factories nearby; thus, the sprayers in the household are mostly fathers or mothers who perform manual labour job in agricultural areas treated with pesticides. Furthermore, in some rural places in Vietnam, women take the main responsibility for agriculture activities which is also proved in our study when 77,4% of pesticide sprayers were female. By contrast, others studies in our neighbour (Cambodia, China, Malaysia) pointed out that the pesticide sprayers or who doing works related pesticides were mostly men [5], [6], [7]. Almost participants in our study have rich experience in spraying pesticides since they have performed this work for a long time (more than 20 years). The parents think the agricultural activities are not suitable for the young generation, hence they don't allow their children to do this job and keep spraying pesticides from year to year.

4.2. Knowledge

Concerning the knowledge of sprayers, we found out that the participants lacked knowledge of negative effects of pesticides as they seemed to understand that pesticides have some consequence on health and environment, but they cannot give correct answers of what are the negative effects of pesticides. A study in Thailand revealed the similar issue as a small percentage (25.8%) of participants were aware of disadvantages of using pesticides, and 26% of them knew pesticides are harmful to all living things [8].

Furthermore, just a small number of respondents gave correct answers of which ways that pesticides can enter the body (inhalation, skin/eyes, and mouth). This kind of knowledge would determine whether they would wear adequate protective devices required to fully protect themselves from pesticide poisoning. These findings were relative with a study in Philippine when some thought that the only route of pesticides in entering the body was through inhalation [9]. The study in Thailand illustrated a more positive outcome as 83.3% respondents knew all of 3 routes that pesticides can enter the human body [8].

4.3. Practices

Practices of sprayers were clarified based on their usual practices, including the practices of choosing suitable pesticides for spraying, observed toxicity of the products by colour code, reading the label thoroughly, practices of mixing or applying pesticides for ground application, wearing PPE, personal hygiene practices after spraying, pesticide storage. The questionnaire was constructed based on the literature review of recent studies and "Guidelines on Good Practice for Ground Application of Pesticides" issued by WHO in 2001 [10] and EPA Guidelines for Responsible Pesticide Use [11].

The recent findings showed a worrying percentage of pesticide applicators performed inappropriate practices in terms of disposing of empty pesticides containers and pesticide leftover after their spraying. 78.3% of applicators reported that they disposal pesticides remaining and containers at the fields after spraying, leading to contaminated soil and water sources as pesticides may interfere with the operation of wastewater treatment systems or pollute waterways. An empty pesticide container can be as hazardous as a full one because of residues left inside. Furthermore, in Vietnam, ducks and buffaloes commonly use water areas such as lakes, water drain, water canals nearby treated places to play or rest. When pesticides reach water

resources, they cause harm to fish, plants, and other living things, including local ducks and buffaloes. Improper disposal of pesticide waste (containers and leftover) is the regional problem when other studies in the neighbour of Vietnam demonstrated the same issue [6], [9]. Pesticide residues in the food chain and the environment due to the excessive pesticide application and improper disposal of pesticides have been an issue that needs an urgent solution in many parts of the word since its serious consequence.

We also pointed out an issue of wearing PPE of farmers in the study as just 29% of applicators fully equipped PPE when spraying outdoor (at the open fields). This finding is in accordance with their knowledge. As they are not fully aware of the possible ways that pesticides can enter the body, so they don't follow a well PPE to protect themselves probably from pesticide exposures. This finding was similar to many studies in different parts of the world [5], [6], [7], [8], [9], [12]. Some reasons are leading to poor practices of pesticides sprayers, including high price costs, uncomfortable feelings, inadequate knowledge, low attitude. However, applicators could face very high health risks when they do not protect themselves properly through good practices.

From our findings we concluded that the pesticide sprayers have inadequate knowledge and inappropriate practice of using pesticides, leading to negative effects on both their health and the ecosystem. There has been illustrated to have a strong connection between application of pesticides of farmers and climate change such as elevated temperatures and CO2 enrichment, unbalance eco-system [13]. Pesticides residue in agricultural products can cause adverse health effects on consumers. Plus a considerable pesticide residue from the food chain (meat of chicken, duck, fish, buffalo, bird, etc) entering the human body in a long-term may increase the risks of serious health problems [14]. For sprayers, they might suffer from short – and long-term health effect (acute pesticide poisoning or chronic diseases in the long term) [15]. Hence, the overall economic loosing from pesticide use among farmers is significant (for environment degradation, negative effects on health and ecosystem). From that, we highly recommend that an urgent multidisciplinary intervention plan should be implemented to task this issue, will be one of the effective solutions to address the climate change issue in the long run.

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