

**KNOWLEDGE, ATTITUDES AND PRACTICES (KAPS) OF WORKERS IN  
VEGETABLE GREENHOUSE TOWARD PESTICIDES IN BAHRI LOCALITY.  
KHARTOUM STATE, 2015. SUDAN**Ekram A. Eldoom\*<sup>1</sup>, Ali Mohieldin<sup>2</sup>, Adam A. Mater<sup>3</sup> and Manofal Abdalla M. Adam<sup>4</sup>

Khartoum North, Faculty of Public Health, Alzeim Alazhari University, Sudan.

**\*Correspondence for Author: Dr. Ekram A. Eldoom**

Khartoum North, Faculty of Public Health, Alzeim Alazhari University, Sudan.

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**ABSTRACT**

This is a descriptive cross sectional study carried out among workers of vegetable greenhouses in Khartoum state of Sudan (Bahri locality). The use of pesticides poses serious public health hazards to both farmers and consumers of vegetables, in addition to the serious environmental damage it In this study, the knowledge, attitudes and practices regarding to pesticide usage and the levels of exposure of vegetable to pesticides were evaluated. A questionnaires were completed by 100 farm workers aged  $\geq 15$  years. The study showed that (61%) of responders hasn't any training on how to use and handle pesticides this lead to the harmful effect of pesticides. Just (49%) of responders were know the pesticide residue may be found in vegetables and fruits. Previous studies showed that farm workers in the Khartoum state (Bahri locality) used pesticides extensively. Despite their knowledge about the adverse health impact of the pesticides, the use of protective measures was poor. It would be useful to minimize the use of pesticides and encourage alternative pest control measures. Prevention and intervention programmes regarding the use of protective measures and monitoring the KAP of farm workers should be implemented. KAP study; pesticide; greenhouse; vegetable; Khartoum.

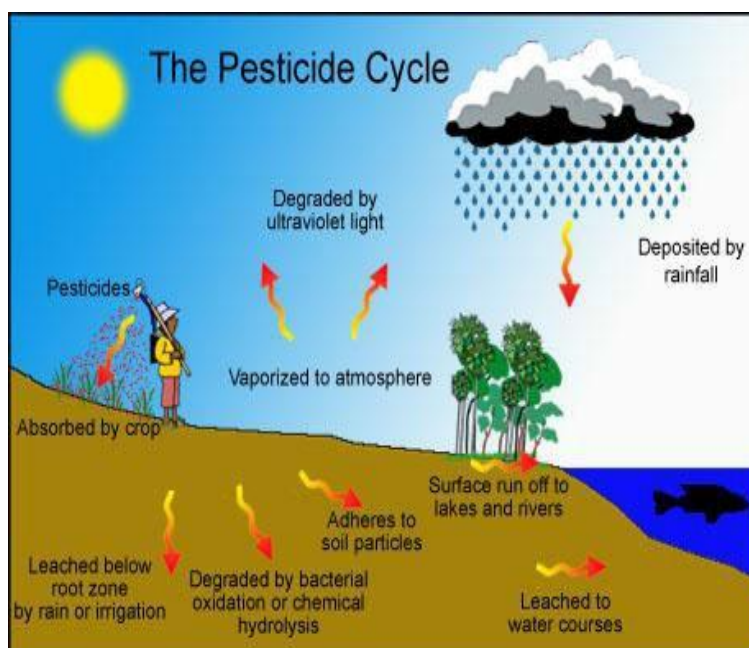
**KEYWORDS:** KAP study; pesticide; greenhouse; vegetable; Khartoum.**INTRODUCTION**<http://www.biggerkeywaterfilters.com/blog/pesticide/pesticides-implicated-as-source-of-human-norovirus>

Problems that can result from pesticide use include: contamination of water, soil, or food. Harm to non-target plants, poisoning of people or animals, harm to fish, birds, bees, or other animals, failure to control the target pest and damage to the crop.<sup>[1,2]</sup>

The term pesticides include all chemical, natural or artificial substances used to fight carriers of illnesses, parasites on crops and against domestic insects.

Pesticide residue refers to the pesticide that may remain on or in food crops. Population Exposure of these residue most commonly occur through consumption of treated food with pesticides in greenhouses and farms.

Pesticides have helped to increase crop yields and food security. However, pesticides used in developing countries do not meet international quality standards.<sup>[3][4]</sup>



<http://grocerynews.org/health/94-pesticide-residue-on-food-becoming-problematic-organic-contamination>

Uptake of pesticides by plant as well as the transfer into the edible plant parts is an obvious phenomenon. The amount found in the edible parts depends on pesticide and plant types. A large amount of

evidence shows the association between pesticides and illness of different types.<sup>[5]</sup> The presence of residues in fruits and vegetables can be a significant route to human exposure (EC 1990).



[http://www.rimping.com/product\\_safety\\_testing](http://www.rimping.com/product_safety_testing)

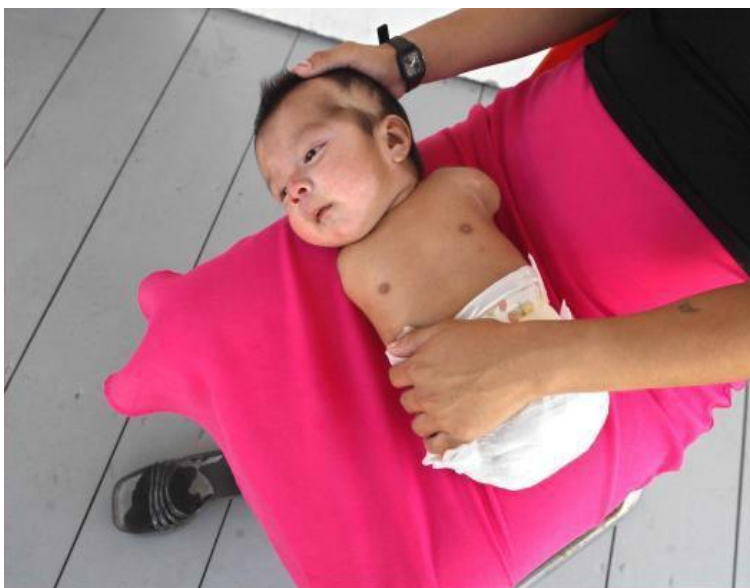
Governments and international organizations are regulating the use of pesticides, setting the acceptable

Maximum Residue Limits (MRLs) in foods. When

pesticides are applied according to good agricultural practices, MRLs should not be exceeded. Incorrect application may leave harmful residues, leading to

possible health risk and environmental pollution.<sup>[6]</sup>

Pesticide exposure has been linked to birth defects.



<http://permaculturenews.org/2008/08/13/pesticides-and-you/>

Especially in developing countries, residue problems are gaining increasing importance, due to the lack of government inspections and awareness of the producer and consumer. As a consequence, food consumers are faced with food products which might have high residue levels.<sup>[7]</sup> Residue levels of organochlorine pesticides (hexachlorocyclohexane, aldrin and DDT) have been determined in raw fruits, vegetables and tubers from markets, e.g. in Nigeria.<sup>[8]</sup> Similar types of residues have also been found in a range of vegetables (carrots, lettuce, radish and cabbage) and food products (milk, bread menus and coffee) from other countries e.g. Romania.<sup>[9]</sup>



<http://daniwalker.com/toxin-free/>

Vegetable production in Khartoum is seriously affected by pests attack. Now the number of compounds in the market as pesticides is more than 1300. Persistent chemical can be magnified through the food chain, detected in products ranging from meat, poultry and fish, to vegetable oils, nuts, and various fruits and vegetables. A company that intends to market a pesticide in a country

must register the product with the appropriate authorities, before putting it on the market. Pesticide sprayers are regularly engaged in spraying pesticides that are applied at different growing stages of a particular crop. The health hazards associated with pesticide handling are little understood by the sprayers.<sup>[10,11]</sup>



<http://earthuntouched.com/bed-tea-bad-tea-pesticides-tea-production-rtr>

While vegetables and fruits with pesticides residues are taken by human, if in large amount, it can result in severe poisonings. Workers who handle pesticides may also unintentionally ingest the substance when eating or smoking if they have not washed their hands first.

If enough pesticide gets into the mouth, it may cause serious illness, severe injury, or even death. Pesticides may be consumed through carelessness or they may be

consumed by individuals who are intent on personal harm. The most frequent cases of accidental oral exposure are those in which pesticides have been transferred from their original labeled container to an unlabeled bottle or food container, frequently by someone other than the person who is eventually poisoned. Cooking oil kept in pesticide containers suspected in death of 23 Indian school children.



<http://www.nydailynews.com/news/world/23-indian-children-killed-eating-pesticide-tainted-oil-article-1.1403941>.

There are many cases where people, especially children, have been poisoned drinking pesticides from a soft drink bottle. In other cases, people have been poisoned after drinking water stored in pesticide contaminated bottles.<sup>[2,12,13]</sup>

Authorities in India believe that cooking oil stored in bottles that once contained pesticide is responsible for killing 23 children.



<http://www.inhabitots.com/23-children-in-india-die-after-eating-free-school-lunch-contaminated-with-pesticides/>

**MATERIAL AND METHOD**

This is a Descriptive cross sectional study carried out among workers of vegetable greenhouses Khartoum state (Bahri locality). Total greenhouses in Bahri locality were (100) with approximately 80 workers all of

them were included in the study. Data were collected by questionnaire, observation, checklist and interview, on pesticides that used by greenhouse workers in Bahri locality.

**RESULTS AND DISCUSSION**

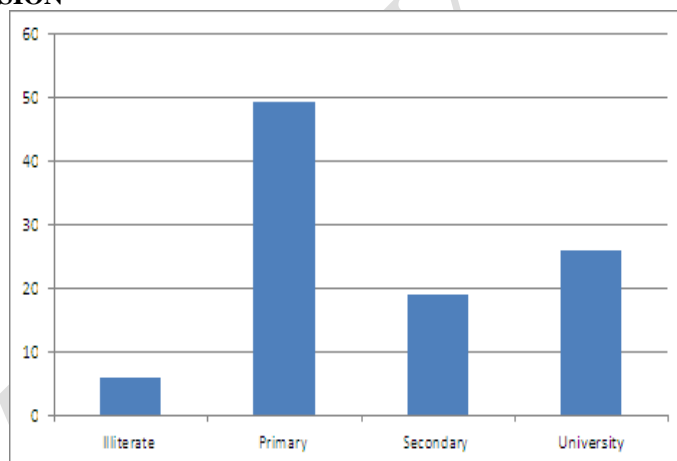


Figure. 1. Shows the education level of the greenhouse workers –Bahri locality – Khartoum state (n=80) 2015.

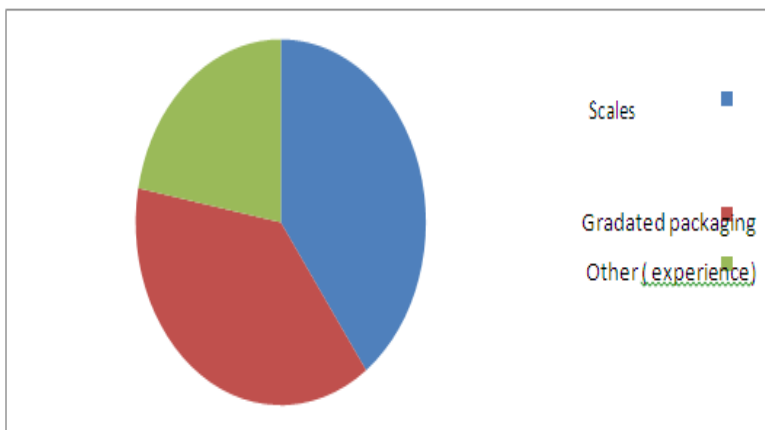


Figure. 2. Shows the instruments used by the greenhouses workers to determine the dose of pesticides – Bahri locality- Khartoum state (n=80) 2015.

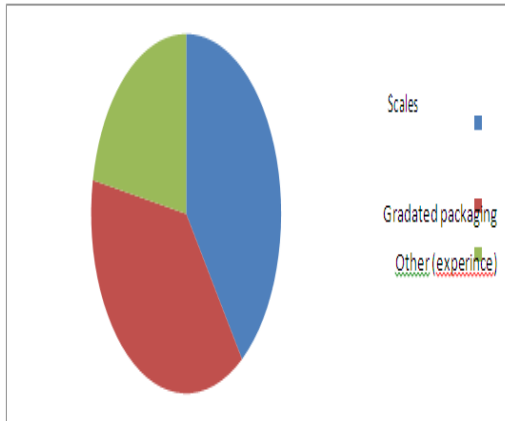


Figure. 3. shows the practices of the greenhouses workers regarding the storage of pesticides product and empty containers. Bahari locality- Khartoum state (n=80) 2015.

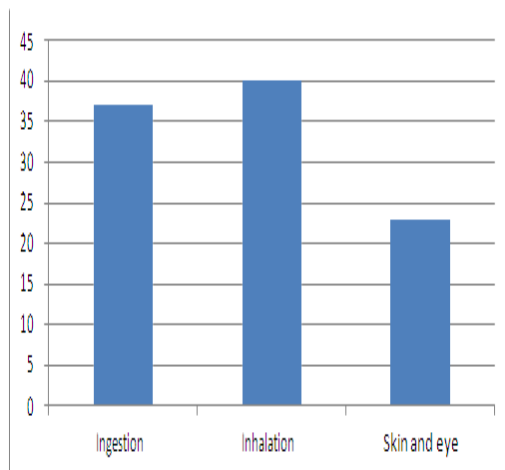


Figure. 4. Shows the knowledge of the greenhouses workers toward how pesticides enter the body-Bahri locality- Khartoum state (n=80)2015.

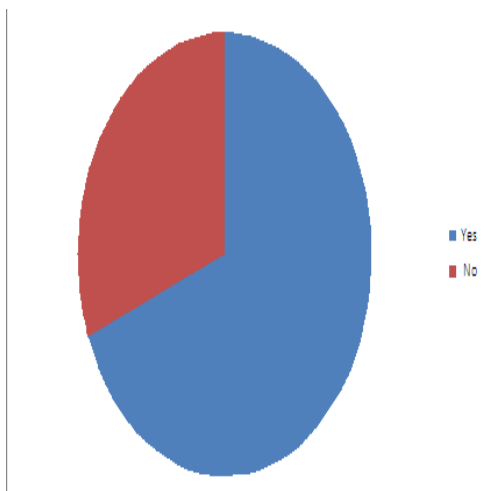


Figure. 5. shows knowledge of greenhouses workers toward safety period after pesticides spring-Bahari locality- Khartoum state (n=80) 2015.

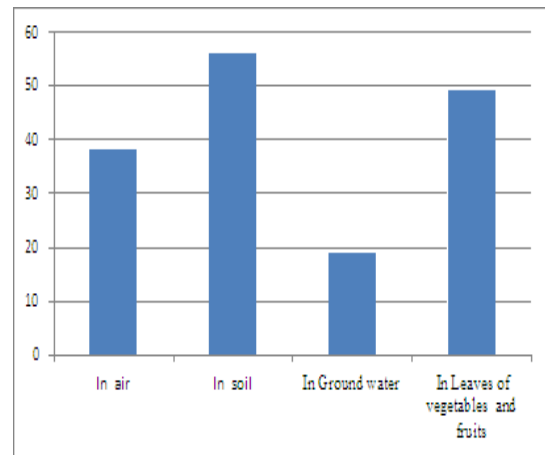


Figure. 6. Shows knowledge of greenhouses workers toward pesticides residues. Bahari locality- Khartoum state (n=80) 2015.\.

The study conducted in Bahri locality to assess the knowledge attitude and practices of greenhouse workers toward pesticide.

The study revealed that halve of greenhouse workers (49%) has finished only their primary school this may lead to poor understanding of the health impact of pesticides on human and environment and their dealing with pesticides, farm workers should be aware of the adverse effects of pesticides they use to handle them properly.<sup>[14]</sup>

The study revealed that (41%) of responder's storage pesticides and empty container inside greenhouses this disagree with (15) Read carefully and follow all directions for safe storage and disposal of pesticide products. Always keep products in the original container and out of reach of children, in a locked cabinet or locked garden shed.

(100%) of the responders believe that pesticides are necessary in the greenhouses and all of them uses pesticides in greenhouses, but none of them have knowledge about alternative methods for pest control the previous study conducted in African found that (95%) of the workers, though the pesticides are necessary in the field. In many cases without chemical control man's crops would be ravaged by diseases, insect pests and weeds hence severe loss of food production occurs Pesticides have helped to increase crop yields and food security. However, pesticides used in developing countries do not meet international quality standards.<sup>[3,4]</sup>

The study showed that (85%) of responders know the pesticides have health impact or effect on the human health and (71%) said the adverse health effect of pesticides include (Respiratory disorders, Effect on the nervous system, Weakness and dizziness, Skin and eye irritation and Infertility for women) these agree with<sup>[16]</sup> pesticide users and handlers must be able to recognize the common signs and symptoms of pesticide poisoning. More than halve (62%) of greenhouse workers believe

that all pesticides have the same adverse effect this disagree with<sup>[4]</sup> Pesticides differ in their toxicity as well as their persistence in the environment also (WHO) classified pesticides according to toxicity into (Class Ia = extremely hazardous, Class Ib = highly hazardous, Class II = moderately hazardous, Class III = slightly hazardous and Class IV = products unlikely to present acute hazard in normal use). (100%) of responders know the route of pesticides enter into the body great percentage (40%) of responders believe the inhalation is an important route of pesticides followed by ingestion (37%) then skin and eye (%23) this agree with.<sup>[16]</sup> There are four common ways in which pesticides can enter the human body through the skin, the mouth, the lungs, and the eyes. Approximately (84%) of responders able to read and understanding the pesticide label, but (33%) of them no follow the inside structure found on the label.

Use of any pesticide in any way that is not consistent with label directions and precautions is illegal. It may also be ineffective and, even worse, dangerous.

<sup>[17]</sup> The study showed that (61%) of responders hasn't any training on how to use and handle pesticides this lead to harmful effect by pesticides also more than halve (53%) of responders no wear the PPDS the reason refer to most of workers throughout the PPDS not comfortable other said not allowable or found this disagrees with<sup>[18]</sup>, By wearing protective clothing and using available safety devices such as face masks, goggles, and gloves, the danger from contamination by pesticides can be minimized. Incorrect dosage, incorrect timing and targeting, poorly maintained equipment, mixing with bare hands, lack of personal protective equipment and lack of hygienic precautions during and when spraying may result in acute pesticide poisoning (APP). The study demonstrated that most of responders don't know the name of pesticides used in the greenhouses this agree with.<sup>[11,19]</sup> Most people are not aware of the thousands of pesticide and their formulation that are used today. The study showed that (53%) of responders believe that all types of PPDS must be used when dealing with pesticides while (83%) of greenhouses thought wearing personal protective device reduce the health effect of pesticides this agree with.<sup>[14]</sup> The use of personal protective devices (PPD) when spraying can reduce contact with, and inhalation of, pesticides, thereby potentially reducing the acute and chronic health hazards of pesticides to the sprayers.

The study demonstrated that no one of responders practices smoking or eating or drinking during spring pesticides this agree with<sup>[14,20]</sup> the basic steps to reduce health effect of pesticides don't smoke or eat during spraying pesticides. The study found one third (36%) of responders no committed for any concentration of pesticides and (31%) of responders no committed the safety period of pesticides this

because some of responders aren't reading pesticides label this disagree with.<sup>[21]</sup> The chemicals are safe for use in the environment and protect human life from disease, illness and annoyance when used as recommended. Labels also tell us what poisonous being used, how to mix and measure it, how to treat poisoning, how toxic the pesticide is, and how long to wait after using it before entering fields. (17, 22)

The majority of responders (56%) knows the pesticide residue may be found in the soil followed by (49%) found in vegetable and fruits, then (38%) of them though residue may be found in the air this agree with.<sup>[23,3]</sup> the pesticide may accumulate in soil or biota. Pesticide residue refers to the pesticide that may remain on or in the food crops Population Exposure of this residue most commonly occur through consumption of treated food with pesticides in greenhouse and farms. however No one of responders believes the pesticide can cause death also, not informed by cases of death resulting from pesticide this disagree with (WHO) had estimated that a million people were being poisoned annually with 20,000 cases resulting in death.<sup>[19,14]</sup>

The majority of responders (75%) doesn't keep any first aids in greenhouses. The label explains what to do if someone is accidentally poisoned by the pesticide. The instructions are only first aid. Always call a doctor local poison center. You may have to take the person to a hospital right away after giving first aid. Remember to take the pesticide label or container with you.<sup>[14]</sup>

The study concluded that the concepts of greenhouse workers vary poor toward health effect of pesticides and more than have don't wear personal protective devices. Most of the responder's storage pesticides product and empty container inside greenhouses also a majority of responders not know any alternative methods for pest control. Most of greenhouses workers don't know the names of pesticides they use. near to half of responders don't follow the pesticide label. Also more than halve of the responders haven't any training on how to use pesticides. The majority of the responders doesn't wear the personal protective device. And a third of the responders not committed for pesticides safety period these due to lack of training and health education.

Based on the above points mentioned in the conclusion the study recommended the following intervention to improve (KAPs) of greenhouse workers toward pesticide use:

- Provide the health education programs to inform and increase awareness of responders toward the health impact of pesticides and uses of pesticides in a proper way.
- Encourage use of alternative methods for pest control (integrated pest management).

- Give the responders extensive training on how users and dealing with pesticides.
- All workers in greenhouses, most be provided with suitable enough personal protective devices to protect health from effect of pesticides.

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