

## A Cross Sectional Analysis of Farmer Behavior about Pesticide, Insecticide and Fertilizer Use

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**Abstract:** This study analyzes the farmer behavior about the use of pesticides, insecticides and Fertilizers. The study was carried out in district Charsadda, Khyber Pakhtunkhwa, Pakistan. A sample size of 210 respondents was interviewed through simple random sampling technique. The collected data were coded and entered to SPSS software used for its analysis. A Chi-square test was used to measure the relationship between independent (behavior of respondents about pesticides, insecticides and fertilizers use) and dependent variable (harmful effect on environment). The Cronbach alpha test was used to check the reliability which was stood at 0.75. The results found a highly significant ( $p > 0.005$ ) association of use of pesticide for suicide and permanent or temporary disability from pesticide poisoning with harmful effects on environment, any worker from your village/home died from insecticides and pesticides and harmful effects on environment, loss of human/died from insecticides and pesticides due to mix-up with food items and knowledge about the side effects of pesticides and insecticides on human health with harmful effects on environment, knowledge about the effect of pesticides and insecticides on animals, knowledge about insecticides and pesticides effect on external organs i.e. skin, eye etc. and harmful effects on environment, insecticides and pesticides effect on internal organs i.e. Heart, kidney etc. and harmful effects on environment, killed wild life such as birds, flees, etc. and harmful effects on environment, insecticides and pesticides direct use danger for marine life and over dosing of insect and pest is dangerous for crops. The study concluded that today modern facilities like the use of insecticides and pesticides are helpful for the development of human being. But majority of the people cannot use it properly due to the illiteracy and lack of awareness about the use of insecticides and pesticides which make them vulnerable to many dangers which might affect them directly and indirectly. The study recommends that awareness session should be given to farmers to identify environmental friendly chemicals in (Pesticides and insecticides) and train them to use modern machinery as well as safety measurements.

**Key words:** Pesticide • Insecticide • Fertilizers • Environment • Farmers

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### INTRODUCTION

Agriculture is really a significant sector that produces food for humanity. However, due to an expansion of industrial sector and urban growth and the expansion of communities, lands for agricultural activities have a tendency to reduce by time. An increase of uses of high technology and pesticides to accelerate productivity of crops to meet population demands is also another factor

that worsens the cause of soil damage [1]. Agriculture plays a vital role as a sector providing foods in the world. In a country where most of the citizens eat rice in daily life, In this case, imported rice to maintain food security is one of the most serious challenges [2]. Agriculture is a major source of livelihood throughout the world, especially for the majority of poor people living in rural areas in developing countries, like India. A key challenge for the majority of those farmers is - access to finance.

Lack of access to finance is a key impediment to farmers in improving the efficiency of their productions and socio economic status because they both are inter- related with each other [3]. Socio-demographic and/or economic factors, contingent and external factors, values, beliefs and cultural orientations have been suggested to explain unsafe pesticide handling practices. Given the variety of factors which potentially influence farmers, knowing which ones are relevant in a specific context is essential to develop elective intervention strategies to foster safer pesticide-handling practices [4].

Technology can be reached farmers through technology transfer. Technology transfer refers to the general process of moving information and skills from information or knowledge 'generators' such as research laboratories and universities to clients such as farmers. The outcome of new technology transfer is the farmers' adoption and bringing this into practice and further diffusion to other individuals in the community [5]. Awareness is psychological approach integrated with behavioral science. Awareness is expression of feeling or perception, opinion, mindfulness of individuals; a state in which an individual has ability to understand and evaluate particular conditions or events, where the individual's experiences of those particular conditions or events and length of time engaged are the factors of having awareness [6]. Human Behavior is the range of actions or reactions and mannerisms of a person in response to external or internal stimuli. Human behavior may occur as a result of external stimuli or internal stimuli (Such as hunger and thirst) or a mixture of two [1].

Pesticides can be chemical or biological agent, used for attracting, seducing, destroying or mitigating any pest or insects. These include pesticides which have a qualification of accelerating or delaying growth of plants and crop products and protecting plants from damaging influences such as weeds, plant diseases or insects. Pesticides also mean chemicals used before and after harvest of crops with a purpose of preserving and transporting [7, 21]. Corresponding of the sample, reported having experienced at least one of the symptoms on occasion of pesticide-handling. The most frequently reported symptom was skin irritation, which is due to the chemicals entering into contact with the farmer's bare skin. Dizziness, headaches, difficulty in breathing and tightness in the chest were also reported by more than a fifth of the interviewed farmers. Sixty-nine farmers reported having never visited a doctor to be tested for traces of pesticide in the body [4].

Intensively used pesticides, despite their ability to protect crops, threaten the environment and human health. These "poisons by design" are prevalent and serious occupational hazards are faced by agricultural workers and farmers. The high levels of occupational exposure to pesticides are correlated with low educational levels, which would preclude the ability of farmers to follow the hazard warnings developed by the chemical industries and agencies [8]. Tragedies such as acute and chronic intoxication and in some extreme cases, suicide, have frequently been reported, especially in rural regions. The lack of a legislative framework regulating the use of pesticides also contributes to the high incidence of poisoning in developing countries [9].

Pest and disease infestations are common occurrences in agricultural production. Productivity of crops grown for human consumption is at risk due to the incidence of pests, especially weeds, pathogens and animal pests. Crop losses due to these harmful organisms can be substantial and may be prevented, or reduced, by crop protection measures [6]. The use of synthetic pesticides in agriculture is the most familiar way to minimize potential crop yield loss due to pest. Although uses of chemical inputs like pesticides make an increase in agricultural production and productivity, they produce a lot of externalities like the negative effects of human health and the ecosystem [10]. A farming system is the result of a complex interaction of a number of interdependent components; soil, water, crops, livestock, labor and other resources within an environmental setting. The total environment can be divided into two elements: technology and human. Technology determines the type and physical potential of livestock enterprises and includes the physical and biological factors that can be modified through technology development [5].

Pesticides have a qualification of accelerating or delaying growth of plants and crop products and protecting plants from damaging influences such as weeds, plant diseases or insects. Pesticides also mean chemicals used before and after harvest of crops with a purpose of preserving and transporting [8]. Pesticides are grouped into the following groups: Insecticide used to kill insects; Herbicide known as weed killer used to kill unwanted plants; Fungicide which is biocidal chemical compound used to kill fungi or fungal spores; Bactericide which is a substance used to kill or prevent bacteria; Rodenticide, a rat poison categorized as a pest control chemical and classified by fast and slow- reacting substance; Molluscicide used to control snails or

mollusks; Acaricide used to kill members of Acari, an arachnid subclass which includes ticks and mites; Nematicide, a type of chemical pesticide used to kill plant-parasitic roundworms. Pesticides in other groups include, for instance, Avicide or a chemical substance used to kill birds [1].

Pesticide exposure can cause a range of neurological health effects such as memory loss, loss of coordination, reduced speed of response to stimuli, reduced visual ability, altered or uncontrollable mood and general behavior and reduced motor skills. These symptoms are often very subtle and may not be recognized by the medical community as a clinical effect. Other possible health effects include asthma, allergies & hypersensitivity and pesticide exposure is also linked with cancer, hormone disruption and problems with reproduction and fetal development [11]. Acute ingestion of organochlorine insecticides can cause a loss of sensation around the mouth, hypersensitivity to light, sound and touch, dizziness, tremors, nausea, vomiting, nervousness and confusion. Later research found that these effects could be reproduced in animals and the US government required that organophosphates be tested for delayed effects during the registration process. The human toxicity of organophosphates caused a decline in their use and spurred the search for new alternatives [7]. Herbicides are generally less toxic to mammals than insecticides. Most herbicides interfere with plant hormones or enzymes that do not have any direct counterpart in animals. The most serious human health concerns have been related to chemical contaminants in the active ingredient. The present study aiming to investigate the view/behavior of respondents about pesticide, insecticides and fertilizers use and its harmful effect on environment was carried out in district Charsadda, Khyber Pakhtunkhwa, Pakistan.

## **MATERIALS AND METHODS**

The present study aiming to investigate the view/behavior of respondents about pesticide, insecticides and fertilizers use and its harmful effect on environment was carried out in district Charsadda, Khyber Pakhtunkhwa, Pakistan. The researcher arranged a pilot survey, in this pilot survey the researcher gather data of the entire union council which stand (400) 380-430. So this became population for the study. According to Sekaran [12] for this purpose a sample size of 210 is enough, furthermore, a random sampling procedure was used for

data collection among the said population. The primary data were collected through a well thought out and wide-ranging interview schedule. This schedule was designed, encompassing all the basic characteristics of the study. The collected data were coded and SPSS software was used for its analysis; Bi-variate analysis was carried out to measure the relationship between independent (Behavior of respondents about pesticide, insecticides and fertilizers use) and dependent variable (Harmful effect on environment). To assess the level of association Chi square test was used by indexing the dependent variable [13]. Cronbach alpha test was used to indicate the underlying dimensions of the items consisting of an index. The coefficient of reliability was stood at 0.75, thus indicating the reliability of the data.

## **RESULTS AND DISCUSSION**

### **Association Between Pesticides, Insecticides and Fertilizers Use and its Harmful Effect on Environment:**

Table 1 showed a highly significant ( $p = 0.009$ ) ( $p = 0.012$ ) association of use of pesticide for suicide and permanent or temporary disability from pesticide poisoning with harmful effects on environment. In addition, also a significant ( $p = 0.007$ ) relationship was found between any worker from your village/home died from insecticides and pesticides and harmful effects on environment. These results are in line with the report of WHO [14, 23] that stated roundly 3 million cases of pesticide poisoning occur each year in the world, causing more than 250,000 deaths. This mortality rate accounts for a significant portion of the nearly 900,000 people who die from suicide every year in the world. In the case of attempted suicide more frequently than completed suicide, pesticide poisoning leads to temporary or permanent disability [14].

Moreover, again a significant ( $p = 0.002$ ) ( $p = 0.005$ ) association of any loss of human/died from insecticides and pesticides due to mix-up with food items and knowledge about the side effect of pesticides and insecticides on human health with harmful effects on environment was found respectively. Khoj Society for People's Education's research found that pesticides are often stored in living rooms, among cookware and plates and the bags in which they are sold are sometimes reused and seen into quilts or floor covering. Utensils used to mix pesticides are often also used for cooking. They found that because women are not involved in the decision making around pesticide use and work both in the fields and in the home where pesticides are stored, they are at

Table 1: Showing Relationship between pesticides, insecticides and fertilizers use and its harmful effect on environment

Statements (independent variable)	Dependent variable	Statistics
Someone in your home or your village used pesticide for suicide	Harmful Effects on environment	$\chi^2=7.172$ (0.009)
Someone in your home or village have permanent or temporary disability from pesticide poisoning.	Harmful Effects on environment	$\chi^2=6.422$ (0.012)
Any worker from your village/home died from insecticides and pesticides.	Harmful Effects on environment	$\chi^2=9.596$ (0.007)
Any other from your village/home died from insecticides and pesticides due to mix-up with food items	Harmful Effects on environment	$\chi^2=47.843$ (0.002)
You observed any loss of animals due to insecticides & pesticides.	Harmful Effects on environment	$\chi^2=53.483$ (0.005)
You know about the side effect of pesticides and insecticides on human health.	Harmful Effects on environment	$\chi^2= 14.561$ (0.007)
You know the effect of pesticides and insecticides on animals.	Harmful Effects on environment	$\chi^2=46.535$ (0.002)
You have observed that insecticides and pesticides affect external organs i.e. skin, eye etc.	Harmful Effects on environment	$\chi^2= 46.734$ (0.001)
You have observed that insecticides and pesticides effect internal organs i.e. Heart, kidney etc.	Harmful Effects on environment	$\chi^2=55.124$ (0.005)
It killed wild life such as birds, flees, etc.	Harmful Effects on environment	$\chi^2=14.765$ (0.005)
Its direct use danger for marine life.	Harmful Effects on environment	$\chi^2=14.619$ (0.006)
Over dosing of insect and pest is dangerous for crops.	Harmful Effects on environment	$\chi^2=12.338$ (0.002)

increased risk of poisoning [15]. More than 77% of farmers produce one or more health effects when spraying, many of whom have multiple symptoms. However, 22% of them never had any health problems during or after spraying, or they did not know [16, 20].

Similar to the above, knowledge about the effect of pesticides and insecticides on animals were also found significant ( $p = 0.002$ ) with harmful effects on environment. Similarly a significant ( $p = 0.001$ ) association was found between knowledge about insecticides and pesticides effect on external organs i.e. skin, eye etc. and harmful effects on environment. Cotton and tobacco are important cash crops for Pakistan, their cultivation involves the heaviest pesticide use. Hence pesticide poisoning especially affect farmers involve in an investigation in Swabi, Pakistan, showed that 55% of tobacco farmers has depressed, mild headache and skin allergies. But more grimly increase risk of developing several hormone-dependent cancers [10].

Likewise, a significant ( $p = 0.005$ ) association was found between observed that insecticides and pesticides effect internal organs i.e. Heart, kidney etc. and harmful effects on environment while a highly significant ( $p=0.005$ ) association was exist between It killed wild life such as birds, flees, etc. and harmful effects on environment. The observation revealed that some respondents did not wear glove and mask, while some were less careful in mixing pesticides, making spills off. During use of chemical pesticides, the majority of the respondents wore long sleeve shirt, hat and mask, did not smoke, eat or drink [17]. Risk associated with human beings, Human exposure to pesticides is an important health and social issue as it usually results in serious health problems such as epilepsy, stroke, respiratory disorders, cancer, leukemia, brain and liver tumors, convulsions etc. Death has been known to occur in some places as a result of exposures to these pesticides. Risk associated with the environment: This manifests in

the disturbance of the ecosystem, principally in the form of pollution of river water, groundwater, drinking water, soil and air, reduction of fish and wildlife populations, destruction of natural vegetation [18, 21].

Moreover, a significant ( $p = 0.006$ ) ( $p = 0.002$ ) association between insecticides and pesticides direct use danger for marine life and over dosing of insect and pest is dangerous for crops with harmful effects on environment was found respectively. The selection of suitable pesticides is one of the main problems in the use of pesticides as pest control. Farmers who do not know the appropriate insecticides for the target pests consult pesticide dealers for the selection of pesticides. According to reports, because most dealers are interested in the increase in profits rather than pest control, they have chosen cheaper pesticides. In some cases, it was observed that the dealer provided farmers with pesticides that had reportedly expired. Pesticide dealers trapped most of the farmers. They did not know anything about choosing the right pesticides and they had no money to buy; they used credit to buy pesticides [19, 22]. Approximately all farmers express their view that applying pesticides pollute water. Eighty six percent of them believe that pesticide application is harmful to farm labour. More than three-fourths opined that using pesticides might pollute air. "Pesticide application is injurious to the health of other persons and animal" is expressed by over one-half of the respondents. Lastly 41 % viewed that crop might be polluted after using pesticides. Regarding water pollution and harmful to farm labour, majority of farmers believe that the effect of pesticides application is more serious compared with other effect [10].

## CONCLUSIONS

This study concluded that many of modern facilities like the use of insecticides and pesticides are helpful for the development of human being. But majority of the

people cannot use it properly due to the illiteracy and lack of awareness about the use of insecticides and pesticides which make them vulnerable to many dangers which might affect them directly and indirectly such as; environmental pollution mainly water and air, suicides attempts, chemicals is not environmental friendly and it is harmful for both human and animal, over dosing of chemicals which is dangerous for crops, direct use danger for marine life, killed wild life such as birds, flees, affect external organs i.e. skin, eye etc., can mix-up with food items and it can effect internal organs i.e. heart, lungs and kidneys. The study recommends that awareness session should be given to farmers to identify environmental friendly chemicals in (Pesticides and insecticides) and train them to use modern machinery as well as safety measurements.

### REFERENCES

1. Paiboon Jeamponk, T.T., 2014. Farmers' Awareness And Behavior Of Chemical Pesticide Uses In Suan Luang Sub-District Municipality, Ampawa, Samut Songkram, Thailand. *World Academy of Science, Engineering and Technology International Journal of Environmental and Ecological Engineering*, 8(7): 2307-2310..
2. Hariadi, D.F., 2015. Farmer Group Role On Adoption of Local Wisdom Innovation To Support Food Self-Sufficiency. *International Journal of Humanities And Social Science Invention*, 3(2): 51-57.
3. Agarwal, D.R., 2014. Challenges And Impact of Agricultural Finance On Socio Economic Status of The Indian Farmers. *The International Journal's*, pp: 1-5.
4. Henry, G.F., 2013. Pesticide-Handling Practices of Smallholder Coffee Farmers In Eastern Jamaica. *Journal of Agriculture And Rural Development In The Tropics And Subtropics*, 114(1): 59-67.
5. Yamada, T.T., 2002. Factors Affecting Farmers' Adoption of Technologies In Farming System: A Case Study In Omon District, Can Tho Province, Mekong Delta, 10(4): 94-100. 1-7.
6. Ritsema, X.Y., 2014. Farmer And Retailer Knowledge And Awareness of The Risks From Pesticide Use: A Case Study In The Wei River Catchment, China. *Science of The Total Environment*, 6(2): 1-8.
7. Reddy, P.K., 2013. Knowledge And Practices of Safety Use Of Pesticides Among Farm Workers. *Iosr Journal Of Agriculture And Veterinary Science (Iosr-Javs)*, 6(2): 1-8.
8. Akinnifesi, O.C., 2007. Farmers' Understanding of Pesticide Safety Labels And Field Spraying Practices: A Case Study of Cotton Farmers In Northern Côte D'ivoire. *Scientific Research And Essay*, 2(6): 206 -207.
9. Xiaomei Yang, F.W., 2014. Farmer And Retailer Knowledge and Awareness of The Risks From Pesticide Use: A Case Study In The Wei River Catchment, China. *Science Of The Total Environment*, 497: 172-179.
10. Molla, S.A., 2001. Pesticide Use, Its Impact On Crop Production and Evaluation of Ipm Technologies In Bangladesh. *Angladesh J. Agric. Econ.* Xxiv, 24(4): 21-38
11. Kroschel, J.S., 2015. A Cross-Sectional Study of Pesticide Use and Knowledge of Smallholder Potato Farmers In Uganda. *Hindawi Publishing Corporation*, pp: 5.
12. Sekaran, U., 2003. *Research Method For Business*. Usa, Hermitage Publishing Services, pp: 468.
13. Evaluation of Higher Distance Education Results, Madrid: International With Disabilities and Special Needs. Ed., Wijk, T.V., 1983, Washington Dc: World Bank.
14. Tai, S.W., 1978. *Social Science Statistics, Its Elements and Applications*. Goodyear Publishing Company, California.
15. WHO, 2004. *The Impact Of Pesticides On Health: Preventing Intentional and Unintentional Deaths From Pesticide Poisoning*. World Health Organization,
16. Denise Barros De Azevedo, P.J., 2012. Social Responsibility In The Use of Pesticides: The Case of Brazilian Agribusiness. *Business Management Dynamics* 2, 3, 4.
17. Khan, M., 2011. *Adverse Health Effects, Risk Perception and Pesticide Use Behavior*. Elixir Publisher, pp: 1.
18. Thipsaeng, P.J., 2014. Farmers' Awareness And Behavior of Chemical Pesticide Uses In Suan Luang Sub-District Municipality, Ampawa, Samut Songkram, Thailand. *World Academy of Science, Engineering and Technology International Journal of Environmental and Ecological Engineering*, 8(7): 2310.
19. Tijani, A.A., 2006. Pesticide Use Practices and Safety Issues: The Case of Cocoa Farmers In Ondo State, Nigeria. *J. Hum. Ecol.*, pp: 1.
20. Khooharo, R.A., 2008. An Assessment of Farmers' Level of Knowledge About Proper Usage of Pesticides In Sindh Province of Pakistan. *Sarhad J. Agric.*, 24: 533.

20. Linh, L.T., P.Q. Nam and P.C. Hieu, 2019. Assessing the Performance of Agricultural Cooperatives Using the Context-Dependent Data Envelopment Analysis: The Case of Dong Thap Province in Vietnam. *American-Eurasian J. Agric. & Environ. Sci.*, 19(3): 211-219.
21. Phumlani I. Gule, Michael T. Masarirambi, Paul K. Wahome and Lungile T. Shongwe, 2019. Effects of Organic and Inorganic Fertilisers on Growth, Yield, Nutritional Content, Quality and Shelf-Life of Irish Potato (*Solanum tuberosum* L.). *American-Eurasian J. Agric. & Environ. Sci.*, 19(4): 301-311.
22. Krishnapillai, S., P, Santhiralingam and S. Vinujan, 2018. Inter Linkages among Agriculture, Manufacturing and Service Sectors: Empirical Evidence from Sri Lanka's Provincial Economies. *American-Eurasian J. Agric. & Environ. Sci.*, 18(5): 233-238.
23. Sifiso A. Sihlongonyane, Tajudeen O. Oseni, Paul K. Wahome, Michael T. Masarirambi and Emmanuel N. Kunene, 2018. Effects of Different Media and Cultivars on the Vegetative Growth of Tomato (*Solanum lycopersicum* L.) Grown in Hydroponics. *American-Eurasian J. Agric. & Environ. Sci.*, 18(5): 282-288.