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Assessment of Knowledge, Beliefs, and Practices of Pesticides among Small Household Farmers, In Quara District Of West Gondar, Ethiopia

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Abstract: ***Background***: *Ethiopia is Africa's second-most populous country, with 85 % of the population living in rural areas (currently 96.6 million people), and is largely dependent on agriculture. Farmers use pesticides extensively for several purposes, which is one of the world's most important public health and environmental problems.* ***Methods***: *A community-based cross-sectional study was conducted among 387 small householders in Ethiopia. Participants were chosen using a simple random sample procedure, using structured and semi-structured questionnaires, as well as focus group discussions (FGD) and key informant interviews (KII) was implemented.* ***Results:*** *The study revealed that 76.2% of the study population are found to be non-get pesticides training at all. 50.6% of farmers did not know the names of pesticides they used and purchase without reading the label. Non-formal education respondents had 12.4 times less knowledge than high school respondent farmers (OR: 12.431, 95% Cl 5.792-26.679, p-value 0.001). Pesticides poisoning humans was reported to be 60.2% believed in the study areas, male respondents were three times more likely than females (OR: 3.679; % Cl: 1.537-8.802, P-value 0.003) to believe pesticides intoxication of humans and 66% of those polled said they didn't wear personal protective equipment (PPE). Of 57.1% of farmers used empty pesticide containers for drinking water and 9.8% of participants used for food storage.* ***Conclusion***: *Even though farmers in the Quara district are increasingly using pesticides, there are numerous gaps in practice and knowledge. To reduce farmers' exposure and illegal use of pesticides, the study suggested that the government should improve farmers' education level, strengthen agricultural vocational training, and improve farmers' occupational skills so that farmers can operate according to good agricultural practices.*

Keywords: Knowledge, Belief, Practices, Pesticides, Ethiopia

南方醫科大學

埃塞俄比亚西贡达尔夸拉区小农户对农药知识，信念和作法的评估

硕　士　　学　　位　　论　　文

Assessment of knowledge, beliefs, and practices of pesticides among small household farmers, in Quara Distri of West Gondar, Ethiopia.

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List of Abbreviation

WHO ----------World Health Organization

KAP ----------Knowledge, attitudes, and practices

PPE----------Personal protective equipment

SPSS----------Statistical Package for Social Sciences

FGD----------Focus group discussion

KII----------Key informant interview

OR----------Odd ratio

IPM ----------Integrated Pest Management

LSGH----------Large-Scale closed Green Houses

EHPEA----------Ethiopian, horticultural producer and exporters association

Assessment of knowledge, beliefs, and practices of pesticides among small household farmers, in Quara District of West Gondar, Ethiopia.

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ABSTRACT

Background: Ethiopia is Africa's second-most populous country, with 85 % of the population living in rural areas (currently 96.6 million people), and is largely dependent on agriculture. Farmers use pesticides extensively for several purposes, which is one of the world's most important public health and environmental problems.

Methods: A community-based cross-sectional study was conducted among 387 small householders in Ethiopia. Participants were chosen using a simple random sample procedure, using structured and semi-structured questionnaires, as well as focus group discussions (FGD) and key informant interviews (KII) was implemented.

Results: The study revealed that 76.2% of the study population are found to be non-get pesticides training at all. 50.6% of farmers did not know the names of pesticides they used and purchase without reading the label. Non-formal education respondents had 12.4 times less knowledge than high school respondent farmers (OR: 12.431, 95% Cl 5.792-26.679, p-value 0.001). Pesticides poisoning humans was reported to be 60.2% believed in the study areas, male respondents were three times more likely than females (OR: 3.679; % Cl: 1.537-8.802, P-value 0.003) to believe pesticides intoxication of humans and 66% of those polled said they didn't wear personal protective equipment (PPE). Of 57.1% of farmers used empty pesticide containers for drinking water and 9.8% of participants used for food storage.

Conclusion: Even though farmers in the Quara district are increasingly using pesticides, there are numerous gaps in practice and knowledge. To reduce farmers' exposure and illegal use of pesticides, the study suggested that the government should improve farmers' education level, strengthen agricultural vocational training, and improve farmers' occupational skills so that farmers can operate according to good agricultural practices.

Keywords: Knowledge, Belief, Practices, Pesticides, Ethiopia

摘要

背景：埃塞俄比亚是非洲第二大人口大国，人口达到 9660 万人，85%的人口生活在农村地区，国家经济主要依靠农业。农民广泛使用杀虫剂，造成了严重的公共卫生和环境问题。在发展中国家进行的各种研究表明，农药导致的非致命性健康危害占到住院 50%，尤其是在埃塞俄比亚。缺乏适当的农药使用、储存和处置使广大农民面临巨大的健康风险。

目的：本研究旨在评估埃塞俄比亚西贡达尔夸拉区农户对农药的知识、信念和实践。

方法：对埃塞俄比亚夸拉区 387 户农民进行社区横断面调查。采用简单随机抽样方法选择受访者，采用结构式调查问卷进行入户调查、焦点小组讨论（FGD）和关键线人访谈（KII）。采用 SPSS 统计软件版本 25 应用软件对数据进行描述性分析和多因素 logistic 回归统计分析。

结果：76.2%的研究受访者完全没有接受有关农药的培训，50.6%的农民购买时不看标签，不知道自己使用农药的名称。高中水平受访者了解农药知识的人数是接受非正规教育的受访者人数的 12.4 倍 (OR: 12.431, 95% Cl 5.792-26.679, p=0.001）。60.2%的受访者相信农药对人体有毒，其中男性受访者是女性的三倍（OR: 3.679; % Cl: 1.537-8.802, P=0.003）。61.5%的受访者未采用推荐的农药防治方法，66%的受访者表示在使用农药时没有佩戴个人防护装备，45.5%的受访者在清洁农药容器时不使用个人防护装备。57.1%的农民使用农药容器装饮用水，9.8%的受访者用空的农药容器储存食物。45.7%的受访者家里存放有农药容器、喷雾器、个人防护用品，54.8%农民将空农药容器烧毁。

结论：尽管夸拉区的农民越来越多地使用农药，但过半的农民存在不使用农药防护装备、无法阅读说明书和标签、不当使用空农药容器等问题。为了减少农民的暴露和不正确使用农药，建议政府应提高农民收入、提高教育水平、加强农业职业培训，提高农民职业素质技能，使农民能够按照良好农业规范操作。

关键词：知识、信仰、实践、农药、埃塞俄比亚

Chapter 1: Introduction

1.1 Background

Pesticides have become an important part of modern farming, and they help to grow agricultural productivity. However, the widespread and indiscriminate use of pesticides is one of the world's most serious environmental and public health challenges[1]. Pesticides were first used in Ethiopia in the mid-1940s, it wasn't until after the early 1960s that commercial farming became more widespread. Pesticide use has increased dramatically as a result of recent economic growth. Pesticide usage is changing now as part of the government's plan to intensify and diversify agriculture by encouraging high-value export crops like flowers and vegetables. In Ethiopia, for example, more than 212 different pesticides with various active ingredients are used to produce flowers[2].

Generally, Pesticides were widely used in Ethiopia for a variety of purposes. The incidence of contamination and intoxication for farmers was highly described due to unsafe handling practices and their usage. The storage and disposal of the pesticide were believed to be weak due to lack of knowledge and the poor practice among Ethiopian farmers in the past. Therefore, it was important to assess the community's knowledge, beliefs, and practices of pesticides in small household farmers regarding the health risks of the unrestricted use of pesticides, so, we are compelled to study this in Quara district farmers. There are numerous instances of excessively polluting and poisoning households, farmworkers, and participants all over the world that are inappropriate and unreasonable. These pesticide chemicals have posed public health and food safety risks in recent years[3].

Ethiopia is the second most populated country in Africa, with 85% (currently 96.6 million people living in rural areas) and is reliant on agricultural needs [4]. One of the biggest challenges in many African countries, including Ethiopia, is the imbalance between population growth, and food insecurity. Thus, the use of pesticides is an effective way to increase crop yields or to protect crops from pests and weeds to improve production. This is evident in the fact that in Ethiopia, the use of pesticides to improve productivity, and food security is perceived in the community [5]. Pesticides are an effective tool for preventing crop damage and increasing yields, and their use has increased in recent years in developing countries, with developing countries now accounting for roughly 20% of global pesticide expenditure[6]. However, the widespread use in bulk without choosing pesticides has become one of the major public health and environmental threats all over the world [7].

According to the WHO report, pesticide poisoning affects 500,000-1,000,000 people worldwide each year in developing countries using 80% of the world's pesticides [8, 9]. Pesticide exposure deaths approximately 200,000 – 300,000 people worldwide annually, with the majority of these deaths occurring in developing countries [6]. In other words, emerging states use 20% of the world’s Agrochemicals, but they go through 99% of deaths happening from poisoning[10]. Studies in developing countries show that up to 50% of hospital admissions, especially in Ethiopia, are due to a wide range of pesticide, and non-lethal health risks. In most cases, Ethiopian smallholder farmers spend their time using family labor to remove weeds, and insect pests[11].

Therefore, Ethiopia is one of the developing countries that have various growth and transformation strategies planned to join low-income countries by 2025 to feed the rapidly growing population and supply agricultural products to agro-industrial as raw materials[12]. However, when it comes to pesticide usage, practices, storage, and removal, most Ethiopian farmers fall short in all regions. As a result, poor practice, lack of knowledge, improper storage and disposal of pesticides can lead to serious health problems. In general, the widespread and unrestricted use of pesticides is known to be harmful, affect their health, and gradually contaminates the soil, water, and surrounding areas [13].

This study focuses on the use of various pesticides in the fight to increase the production and productivity of farmers in Quara district, Ethiopia. It’s a research study that is designed to address the lack of knowledge, storage, and disposal of applications. It is a study of how pesticides are being used by the community to address the shortcomings of the farmers, and the government to ensure that

pesticides are used properly. This study determined to assess the knowledge, beliefs, and practices of pesticides corresponding to storage and removal of pesticides, as well as related issues. Among farmers in the Northwestern Gondar Quara District, of Ethiopia, knowledge, and practices of pesticides used by smallholder farmers in Ethiopia.

The significance of this study was the use of pesticides, which are not supported by knowledge, training, and the need to eradicate pests or weeds causes serious health problems for the community and the environment. Since there has been no previous study on the knowledge, belief, and related to application, practices of pesticides in the study area of Quara district.

1.2 Statement of the problem

In recent years, various types of pesticides had been widely used in Ethiopia to modernize agriculture and ensure food security[14]. Particularly, the issue in Quara district was very sensitive in the case of public unawareness, miss-use, practicalities, and disposals of pesticide habit is not very good. The use of pesticides, which is not supported by knowledge and training, has recently been widespread in the overall population. Farmers use pesticides not only for pests and weeds but also for fishing and different pest control at home purposes. And also, the extensive use of pesticides in household appliances and their disposal system is one of the key concerns, and the negligence of the retailer, the farmer, and the government in solving this problem is a starting point for this study. Some pesticides are generally banned and not used in developed countries, but are used in many African countries. Developing countries now cover about 20% of the world's agricultural chemicals, but about 99% of those who die from poisoning. Toxins can be a major problem in developing countries, mainly due to harmful pesticide application and handling practices[10]. However, illiteracy and poverty are exacerbated by illiteracy and poverty in most developing agricultural groups in the developing world.

Many farmers in developing countries are still exposed to pesticides, both in or near their homes, or inadequate or safe practice practices. In general, most farmers are unaware of pest categories, levels of poisoning, safety, and health and environmental issues. In general, the study to know the knowledge, belief, and practice of the farmers regarding pesticides, and their experiences with a pesticide in connection with handling pesticides.

Chapter 2: Literature reviews

The use of pesticides currently plays a major role in ensuring the world's food supply, commonly used to remove and prevent many pests and weed/herbs, especially in agriculture, and widely used in agriculture for crop protection purposes and in public health to control vector-borne diseases[15]. Pesticides are inadequately used in Africa and other developing countries for several reasons, including a lack of knowledge, application equipment, and trained agricultural extension staff, as well as inappropriate agricultural infrastructure and control and pesticide resistance[16].

These pesticides have a significant impact not only on farmers and consumers but also on the community as a whole. At the same time, the evidence shows that direct and indirect risks are involved in the use of these pesticides, which indicates that they are harmful to both people and the environment[17]. However, most pesticides are toxic to other living species, including humans, and the environment. Unintended and self-imposed (suicide) acute poisonings with pesticides are a serious public health problem in several parts of the world, with ingestion of pesticides being one of the most common approaches to suicide deaths and suicide attempts. However, small-scale farmers frequently farm without the correct means or the knowledge to use pesticides appropriately.

Incorrect dosage, improper timing and targeting, poorly upheld equipment, mixing with bare hands, lack of personal protective apparatus (e.g., mask, boots, gloves, long-sleeved shirt, overalls, hat)) and hygienic protections during and after spraying (e.g., Not blowing or sucking nozzle, wash body after spraying, change clothes after spraying) can all outcome in acute pesticide poisoning. Without proper handling of pesticides, not only the health of farmers but also of their families is threatened.

Accessible data is too limited to estimate the overall global health impacts of pesticides. But, most pesticide poisonings happen in low- and middle-income countries, where highly hazarded pesticides are accountable for a high proportion of occurrences and many farmers are unable to meet the safety requirements for highly hazarded pesticides[18]. The widespread and bulk use of these products in agriculture can lead to occupational diseases and toxins for humans. Furthermore, pesticide use harms agricultural land, livestock, and plants, as well as overall agricultural and environmental sustainability. Although the use of pesticides by farmers not only increases crop yields, it is also believed to have side effects on health. According to the World Health Organization, pesticides cause cancer, infertility, and liver damage in between 500 and 1,000 people [19].

Despite these facts, there was in Ethiopia a lack of strict regulatory mechanism on the importation of hazardous chemicals; the absence of well-established institutes to provide farmers with the knowledge of pesticide application and about safety issues, and the extension of non-licensed vendors increase the importance of establishing and the need to withstand the proliferation of unlicensed sellers. Effective guidelines for reducing the negative effects of pesticides on health. This the first significant step in establishing a program to decrease the negative influence of pesticides. assessing farmers' knowledge, attitudes, and practices regarding agricultural pesticides[11]. Such information was generally limited in Ethiopia and the study, especially in our research area.

Although Ethiopia has issued numerous proclamations in recent years to reduce and control occupational and environmental hazards in general, as well as pesticides (in particular, Pesticides Registration and Control Proclamation No. 674/2010, Labor Proclamation No. 277/2003, and Environmental Pollution Control Proclamation No. 300/2002), studies in the field of pesticides, knowledge, attitudes, and practices (KAP) in Ethiopia as a result, security measures are indeed weak[4, 20]. When making use of personal protective equipment (PPE), during spraying of pesticide, can reduce contact and breathing of pesticide droplets. Potentially, it reduces the acute and chronic health threats of pesticides to the sprayers. Knowledge, attitudes, and practices of people who spread pesticides The health hazards of pesticides are not well evaluated in Ethiopia[21].

The purpose of the study is to gain knowledge and practice in pesticide application. Recently, the most extensive research has been done around the world on the practice of pesticides to understand working conditions and occupational diseases[22].

2.1 **Pesticides' effect on human health and the environment**

Agricultural pesticides are undeniably important in developing countries. However, human health and environmental threats, on the other hand, have been described as a major concern for these countries[2]. According to the World Bank (2008), unintentional pesticide poisoning kills 355,000 people worldwide each year. Chronic effects for which there is significant evidence of association with pesticide exposures include cancer, neurodevelopmental and behavior effects, other neurological effects, including neurodegenerative diseases, birth defects, and other adverse birth outcomes, and respiratory diseases. More recently, health-related problems have emerged with pesticides. Evidence suggests, for example, that obesity, type 2 diabetes, and metabolic disorders are becoming a global problem now [23].

Pesticides are extremely hurtful to human health, especially reproductive and developmental effects, cancer, kidney and liver hurt, endocrine disruption. Pesticides are inhaled, consumed in contaminated water, or come into contact with pesticide-treated areas, exposing people to them, used as grasslands, parks, lakes, and more children are especially susceptible. Children are more likely to keep their hands on the floor and put their infected hands in their mouths and carry pesticides in homes and kindergartens as well as in schools and playgrounds. Various studies show that babies are even exposed to pesticides in the womb. One of these pesticides, chlorophyll, has been found to cause irreversible brain damage in children during exposure to insecticides [24]. Over the past three decades, the inequitable use of pesticides in agriculture has caused serious health and environmental problems in several emerging countries.

Pesticides are widely used in plant, fruit, and vegetable growing areas around the world, according to various studies, raising the issue of potential health risks. Pesticides are chemicals that harm not only human health but also other ecological resources such as soil and groundwater, micro and macro-plants, and animals [25]. Because of the toxic nature of pesticides, there will always be some danger associated with their use. Farmers and their families are the most vulnerable, as pesticides can easily come into contact with them while mixing chemicals or applying them to crops. Pesticides are accountable for hundreds of poisoning cases in the developing world, where knowledge and training on the possible negative health effects of these chemicals are often lacking. It contributes to a global public health problem that kills up to 300,000 people each year [26]. Many pesticide chemicals are known to cause impairment or suppression of the immune system, which has brought into focus pesticide-induced immune toxicity in recent years [27].

More recently, evidence has begun to emerge of associations with obesity, type 2 diabetes, and metabolic disease [28]. It's a major contributor to world diabetes disease and it might be connected with different illnesses, including leukemia, malignancies, and asthma [26]. The pesticides are assumed to disorder weight-regulatory hormones and compassion to the neurotransmitter’s dopamine, noradrenaline, and damage nerve and muscle tissues. Several epidemiological studies published in the last two decades indicate that pesticides may have adverse effects on health, along with an association between pesticide use and cancers like non-lymphoma, Hodgkin's leukemia, and various forms of solid tumors [29].

In another case, pesticides have been revealed to be involved in the pathogenesis of Parkinson’s and Alzheimer’s diseases as well as numerous disorders of the respiratory and reproductive tracts [30]. Certain pesticides reveal men and women adequate doses may increase the risk of sperm abnormalities, decreased fertility, erroneous abortions, fetal death, birth defects, and fetal growth retardation[31, 32]. Fetal exposure to these chemicals during sexual differentiation can result in congenital defects. Because the growth of androgen-dependent structures continues during the second and third trimester of pregnancy, continuous exposure to low levels of endocrine-active pesticides continues to interfere with genitalia development[33]. Maternal exposure during gestation is the most serious time for exposure, and pesticides also affect the fetus during or after pregnancy.

The presence of pesticides in the maternal bloodstream confirmed that pesticides were passed from mother to fetus during the gestation period, and this may increase the risk of cancer[34]. The assessed yearly frequency rate of agricultural laborers in emerging countries was observed to be 18.2 per 100,000 all-day workers and 7.4 per million younger students, which has caused health problems and fatalities in various parts of the world, albeit as a result of occupational exposure and accidental or intentional poisonings[18, 35].

2.2 Route of Pesticides

Health effects consequential from pesticide exposure vary according to the specific pesticide involved and may be the result of exposure. Pesticides can come in the body in three ways: through the skin (contact), the mouth (ingestion), and the lungs (inhalation). A liquid or gas product can enter the body through all three routes of entry, but solids have a lower fortuitous of entering through the lungs. However, dermal exposure is the most relevant route of exposure for pesticide applicators [36]. Here are four regular ways pesticides can move in the human body: dermal, oral, eye, and respiratory pathways. The fundamental courses of human introduction to pesticides are through the food chain, water, air, soil, fauna, and flora. Pesticides are distributed all through the human body through the circulatory system but can be discharged through the skin, urine, and exhaled air[37].

2.3 Protection Measurement of pesticides

Numerous strategies have been planned as critical to preventing pesticide exposure in households. These include protection against pesticides, safe practices for the effective use of PPE, understanding of labels, and properly storing and removal after using it. We have to assess the knowledge, beliefs, and practices of small-scale farmers related to health issues caused by pesticides in the study area of Ethiopia[3]. More than 95 % of all exposures are dermal. Dermal absorption may happen as the result of a splash, spill, or drift or during washing or fixing equipment. Wearing a liquid-proof apron or rain suit is recommended when mixing and pouring concentrates or when using highly toxic products [38], dermal exposure to farmers was reduced by 65% when both gloves and coveralls were used[15]. A study found the hazard of acute pesticide poisoning was reduced by 55% in farmers who approved extra personal protective measures and were educated about both protective apparatus and pesticide exposure risk. Using chemical-resistant gloves has been exposed to reduce contamination by 33–86%[39].

In Ethiopia, certain studies show that almost all households use pesticides with 98% of 45% of those purchased pesticides being from the open market and lack of training and knowledge regarding the safe use of pesticides in all farming systems. Only 30% of them read the instructions on the pesticide containers and less than 48% of the respondents did not know the type of pesticides they used. There is a mismatch between the level of promotion of pesticides by development agents and the level of supply of pesticides[11]. Specifically, a study in Gondar town shows that the study subjects, 63.8% of them, had poor pesticide handling and storage practice[40] In addition, according to a study conducted in southwestern Ethiopia, 80% of farmers spray pesticides while wearing standard clothing. Washing 40% of the spray equipment in the yard; Dispose of 23% of pesticide containers in the open field and reuse 32% of pesticide containers for other purposes[11].

The use of personal protective equipment is difficult in developing countries. In large-scale farming, labor rights are more strictly controlled, and employees are encouraged to wear personal protective equipment. However, studies undefined show that high-income farmers use pesticides commonly. They also have better access to information that explains the importance of personal protective equipment (PPE) and how to make the best use of it. Nevertheless, some workers on large farms may still feel uncomfortable, so they do not wear personal protective equipment, and the employer is not responsible for making use of the workers. In small operations, farmers often do not follow the manufacturer's safety recommendations to control and implement pesticides and cannot purchase or use adequate protective clothing or equipment. They may want to avoid using PPE for cultural reasons because they are uncomfortable or unable to breastfeed properly for reuse. Employees who want to use PPE on large or small farms are

strongly urged by employers to provide it. In addition, a recent study concluded that the actual effectiveness of Personal protective equipment (PPE) is essential in the prevention of chemical risks in agriculture. PPE includes skin and eye-protective equipment (gloves, coveralls, safety shoes, helmets, and goggles) and respiratory protective equipment (respirators). Personal protective equipment is critical to occupational safety interventions in many countries[41].

Generally, all pesticides have the potential to be hurtful to humans, animals, alternative living organisms, and also the environment if used wrongly. The main to reducing health risks after chemical mistreatment is to constantly limit your exposure by wearing PPE and using a low-toxicity pesticide when available. Therefore, we proposed that the hypothesis of pesticide users was a gap of knowledge, beliefs, and practices of pesticides among respondents in the study area.

To confirm this hypothesis and study, a community-based structured questioners survey was conducted among farmers using a cross-sectional study design, with data analyzed using SPSS version 25 and Microsoft Office Excel 2019.

2.4 Significance and innovation point of the study

There is unequivocal evidence of a significant lack of education, knowledge, and unintentional application errors such as inattentive pesticide handling, which can pose serious health risks to farmers and workers. Due to this, concerns about the hostile effects of pesticides on health are increasing in emerging countries, particularly because of low educational levels and unfavorable working environments. Therefore, the study was very important to significantly improve the level of knowledge of farmers' pesticides to prevent exposure to pesticides.

The study's importance was critical for serious community awareness mobilization about pesticide awareness, practices, and precautions. The study was used as a preliminary document by numerous researchers and government agencies for a variety of purposes, including as a reference and as baseline data for researchers.

Provide information to the agricultural department, health office, and collaborative for planners, programmers, and stakeholders to inform the community that the existing pesticide misuse needed to be managed and controlled by the government.

2.5 Objectives

2.5.1 **The General objective**

To assess knowledge, belief, and practices of pesticides in small household farmers, in Quara District of West Gondar, Ethiopia.

2.5.2 Specific objectives:

To assess knowledge, belief, and practices of pesticide use in study areas

To evaluate the storage and disposal of pesticides in the study area.

To assess the protective measurement of pesticides taken in the study area

2.6 Research Questions

1. What are the knowledge belief and practices of farmers' use of pesticides in the study area?
2. What is the protective measurement of pesticides taken in the study area?
3. What are the measures of precautions for the storage and disposal of chemicals?

Chapter 3: Methodology

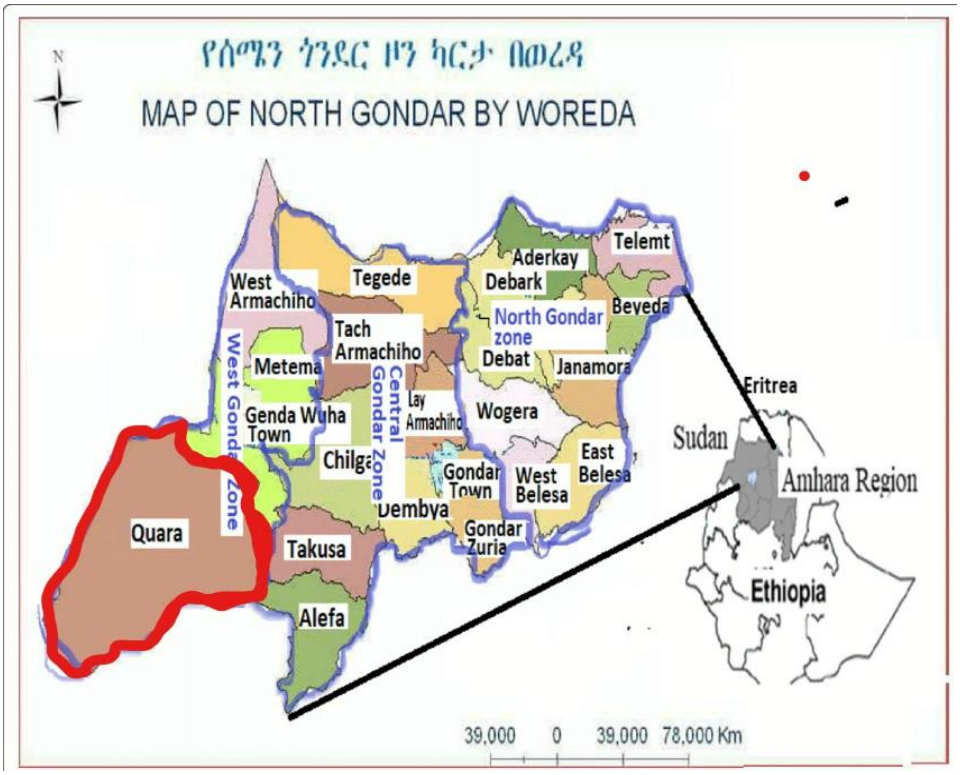
3.1 Study area and period

The study was decided to be conducted in Quara district, which is located in Ethiopia's northwestern lowlands and has a high crop production rate. Quara is a district situated 1,380 kilometers from Addis Ababa, Ethiopia's Federal Capital. Natural resources abound in the area, as well as a major infrastructure challenge. The District covers an area of 858,580 square kilometers and is bordered by another area[42] with Metema District in the North, Benishangul Gumuz Regional State in the South, Alefa and Achefer Districts in West Gojjam in the East, and Sudan in the West.

The area can be found astronomically at 120 62 43 latitudes and 350 99 12 longitudes. According to the District Administration Office (2016), the population of the area was estimated to be 102,777, composed of 23,000 households. The mean annual rainfall ranges between 600 to 1000 mm. The mean minimum temperature ranges between 13.6 and 19.2 and the maximum are between 34.0 and 41.1. The district was known for the cultivation of various cereals and crops. The area was characterized by mixed farming based on crop and livestock production. The economic base of the area was predominantly agricultural. About 95% of the district's cultivated area would be covered by sorghum, sesame, and cotton, which are the district's currently important marketable crops to supply domestic and export. In addition, the district was suitable to grow other cereals in addition to these three kinds of cereal, though their quantity was small [43]. To meet the food demands of an increasing population, agriculture has been exercised in intensive ways in which the application of pesticides has become an important practice.

The research was conducted from August 8, 2020, to May 30, 2021, to assess the knowledge, beliefs, and practices of pesticides among the households in the Quara district.

Figure 1. **The map shows the respondent's District of Quara from West, Central and North Gondar Zones.**



The map shows West, Central and North Gondar Zones (Source: Amhara Regional state) http://www.amharabofed.gov.et/

3.2 Method of the Study:

The simple random sampling technique was used to select 387 farmers from 422 small households. Data collection is applied to quantitative and qualitative or mixed methods. Data collected using structured questionnaires, and face-to-face interviews could be subjected to random sampling. Formal interviews are used to collect information on farmers' knowledge (awareness), belief, and practices of pesticides. Data were collected in 11 purposefully chosen administrative Kebeles. In general, 387 respondents were randomly selected only to be interviewed for data collection purposes.

3.3 Source and Study Population

3.3.1 Source of population:

All samples were taken from smallholder farmers, families and were mainly used by farmers in the selected kebeles of Bambaho, Dubaba, Selferedi and Gelegu, Farshaho, Mugechit, Mirtgelegu, Nebs Gebiya K4, Bignagna, and Nebs, Nebs gebia K.2 and Nebs gebia K.1 etc.

3.3.2 Study population:

During the assessment study, 387 households were included. Therefore, we used the following criteria in the study: The study included those who actively use pesticides in selected kebeles, as well as their age, education level, marital status, and years of pesticides used, and monthly-income individuals were chosen at random for data collection.

3.3.3 Study design

A cross-sectional random study was used to conduct this research. Pesticides are widely used in all selected kebeles or Ethiopia, and women are less likely to be involved in this field outside of work, and men are mostly involved in these types of work experience as farmers. Therefore, they were randomly selected to participate in the study. In the study, 387 farmers participated with a response rate of 91%. Except for socio-demographic characteristics, there is no difference in general. This cross-sectional study was conducted from August 8, 2020, to June 20, 2021, to assess the current knowledge, beliefs, and practices of pesticides among the households in the Quara district.

A structured questioners survey among selected kebeles could be conducted in the community. To collect this information, 5 data collectors and 1 supervisor or coordinator were trained for 1 day and, after completing the training carefully and appropriately, the data were collected ethically. To maintain its consistency, the questionnaire can be first translated from English to Amharic (the national language) and re-translated to English by a professional translator. A pre-tested structured questionnaire was used to collect primary data near the study district of Metema district of Shinfa kebele. Farms were chosen systematically. Sampling Randomly from the study area and one individual per farm (farm worker) who is > 18 years old was requested to contribute in the study area. To undertake this study, a cross-sectional review involving both qualitative, (focus group discussion, key informant interview, and using different checklists) and quantitative (mainly using survey questionnaire) or mixed approach by giving more emphasis to the qualitative method could be completed.

3.3.4 Sample size determination:

A total of 387 small household farmers was recruited out of a total of 422 households in the study area using simple random sampling methods (lottery approaches). A total of 11 kebeles preferred to be chosen from the district's 28 kebeles using a deliberate method. The standard formula was used for calculating the sample size using the single population proportion formula since there has been no previous study on the knowledge, belief, and related to the application and practices of pesticides in the study area of Quara district.

- n= Sample size
- Z= statistics for a level of confidence of 95% (Z=1.96)
- P= Expected prevalence or proportion (p is considered 0.5)
- d= precision if the precision is 5%, then (d= is considered 0.05 to produce good precision and smaller error to estimate). n = (1.96)2 (0.50) (0.50)/ (0.05)2 = 384.

The sample size can be done by calculating a single population proportion formula using the P=50%, a confidence level 95% (1.96), and the margin error of 5% (0.5) and by considering 10% for the non-response rate, the final sample size n= (384+38) = 422. However, the actual sample was collected during the survey was 387 respondents was who taken a part in this study. For select representative samples (households) from each kebele, the proportional allocation should be used. Using a systematic random sampling technique, 387 farmers were selected from 422 households.

3.3.5 Sampling procedure:

The sampling method of the study will be used Random probability.

3.3.6 Data collection tools and procedures

The data were collected by face-to-face interviewing using a questionnaire survey which contained questions on pesticide storage and removal practice as well as socio-demographic characteristics, knowledge belief, and practices. Focus Group Discussion (FGD), interview guide for key informant interview (KII) with different government officials at different levels of expertise and well-experienced individuals for detailed information will be applied. The questionnaires were organized in English, interpreted to Amharic, and translated back to English to checked for consistency. The information was checked for wholeness and exported to SPSS version 25. Binary and multivariate logistic regression was computed to check the factors related to pesticide knowledge, belief, and practices (handling and storage) practice.

3.3.6.1 Household Questioner:

The researchers, ' questionnaires are based on the objectives and content of the study. The questionnaire was chosen because it was a convenient way to get answers from numerous respondents. The questionnaire was provided the researcher with first-hand information about working conditions. It has had also created a good opportunity to get high respondents quickly, as it was anonymous.

3.3.6.2 Focus Group Discussion

The qualitative dimension seeks to complement the semi-structured survey by allowing respondents to freely express their opinions, understanding, and feelings about pesticide use and the resulting changes in health, and the environment. A total of two focus group discussion with residents of the sample areas was performed, with positive results. The purpose was to get a better understanding of

particular practices and knowledge, as well as the underlying reasons for it. FGDs were some of the most popular methods for conducting qualitative research. FGDs allow for further probing through beliefs and information due to the similarities, the most powerful and experienced individuals, who were made to participate, and community issues at stake, providing an opportunity to involve participants in the issue. A total of participant farmers in two groups was provided, including(n=16)

- From Kebele administration leaders 4
- Farmers who were role models 8
- Agricultural experts in Kebeles 4 who assist farmers
- Pesticide retailers 2

The key reasons for selecting these participants, especially the use of pesticides and local responsibility, were to assess knowledge, beliefs, and practices in the kebele that were, directly and indirectly, important to the issue, and that the participants, ' discussion was thought to be reflective of the community. In the following questions, our participants provide a free overview of what they believed and accumulated through their work experience, as well as their day-to-day work, and life experience in general, concerning pesticides. Pesticide use, and general knowledge, beliefs, and practices regarding pesticides in your village, as well as how many people use pesticides in your village, were asked of participants. What are the most common problems or injuries in your kebele, both beneficial and negative? Explain your precautions against the use of pesticides/chemicals used in villages or areas. What types of personal protective equipment (PPE) are regularly applied or used when mixing, loading, or handling pesticides, storing pesticides, protective equipment, materials, and disposing of pesticides after using plastic bottles? What the responsibility of governments?

3.3.6.3 Key Informant Interview (KII)

We conducted key informative interviews with a variety of experts and authorities, all of whom were involved in the study of research phenomena. The key informants included the head of the district's, the agriculture office, the head of the environmental and the land use administration office, the health office, related institution officials, and experts to participate and provide information. In addition to main, data, we have included information from the Office of Agriculture and Health for the use of secondary data. A total of participant leaders and professionals in one group were provided, including 9

- District administration head 1
- Head of health offices 1 and 2 experts
- Head of agricultural office 1 and 2 experts
- Head of Land administration and use office 1 and 1 expert

According to participant KII, rural communities in the Quara district have poor pesticide practice and facts. This is due to a lack of awareness about the hazards of pesticide misuse. The study aimed to investigate the knowledge, beliefs, and practices of small-scale farmers. Between January and February 2021, one key informant interview member (9 individuals) was conducted.

Pesticide questions (issues) were divided into four categories: The society's understanding and the practice on which health and environmental impacts have you were seen in your community as a result of pesticide use, and do relate community practitioners and organizations provide community training on these topics. We have been able to exchange information with relevant stakeholders on the above issues.

3.3.7 Inclusion and exclusion criteria

3.3.7.1 Inclusion criteria:

Farmers who used pesticides in the region were randomly selected to include all of the households available for this study at the time of data collection.

3.3.7.2 Exclusions Criteria:

During the assembling, the rights of households had who refused to fill out the data were reviewed in compliance with the study law, and only volunteers were allowed to collect information.

3.3.8 Variables

3.3.8.1 Dependent Variables:

Farmers, knowledge of the pesticide belief, as well as basic questions about the pesticide application and the precaution of questions.

3.3.8.2 Independent Variables:

Sociodemographic characteristics (the gender, age, education level, marital status, monthly income, and pesticide use in kebele experiences).

3.3.9 Data quality management and analysis

3.3.9.1 Data quality management:

The data were collected from the study area will be managed in Excel, cleaned, and entered to will be analyzed by using SPSS version 25. The statistical software. The effects of different potential risk factors will be computed using logistic regression analysis. Principal investigators and supervisors have completed normal checks on the data assortment process to ensure the preparation of data collectors and supervisors will be directed to completeness and consistency of the collected information. To ensure the quality and security of the data collected, the chief coordinator was visited each kebeles and provided strong support and monitoring to the data collectors, allowing quality data to be collected in a short period. In the process, some errors were found in the field and corrected immediately. The completed questionnaire was cleaned and transferred to a computer for analysis.

3.3.9.2 Quality Control

The pretest was carried out among small household farmers in the metema district, near the study boundary area. 5 % of the total sample sizes (nearly 19 participants) were selected to standardize the questionnaires, data collection, and data processing. Identified problems during the pre-test were corrected before the start of actual data collection. The supervisor double-checked the data collection for completeness, consistency, and accuracy. The reliability of data was assured during pre-analytical, analytical, and post-analytical) quality control steps.

3.3.10 Data analysis:

Data were analyzed using descriptive statistics as well as binary and multinomial logistic regression statistics, data were collected from the study area by interviews and managed in Excel, cleaned, and entered to will be analyzed by using SPSS version 25. A statistical software. The descriptive analysis was used to calculate the percentage and frequency of pesticides in the study areas.

The frequency, distribution, and cross-tabulation of variables were used to obtain the results. The research methods used were bivariate and multivariate. Cross tabulations of two variables were analyzed using bivariate regression. A multinomial regression model was also used to account for confounding variables and improve the interpretation of the findings. Unless otherwise reported, the results were considered statistically significant at the 5% level of significance. For socio-demographic statistics, frequencies and percentages were used.

3.3.10.1 Dissemination of the research findings

The results of this study could be submitted and presented to the Southern Medical University (SMU) School of Public Health's Public Health and Environment Department. Following that, the Amhara Regional Health Bureau, including to Quara district Health and Agricultural Bureaus in Ethiopia, will be submitted for various purposes.

Chapter 4 Results

4.1 Demographic characteristics and profile of the farmers

The table shows the distribution of respondents, the sex and age, educational levels, marital status, years of pesticide usage, and monthly income of the participation. A total of 387 households were included in this study. Of which, 92.2% of the participants were male-headed, and 7.8% of the households were female-headed. The respondent's age was ranged from 18 to 70 years old, with a mean age of 2.64 years, and 1.197, years a standard deviation. Most of the respondents, 86.3% (334) were married. Based on the educational status, 29.5% (114), 31.3% (121), 22.5% (87), 16.8% (65) of the participants had no formal education, primary, junior, a high school, and above, respectively (Table 1).

The mean number of households using pesticides was 2.44, with a standard deviation of 0.593. The majority of the defendants, 192 (49.6%) had more than 6-10 years of pesticide-use agricultural experience, with 175 (45.2%) having 3-5 years. 20 (5.2%) of respondents had used pesticides in their farming practices for less than two years. The monthly incomes of respondents were less than 1,000 birrs 114 (29.5%), between 100-2000 birrs 146 (37.7%), and over 2,000 birrs 127 (32.8%) (Table 1).

Table 1: Socio-demographic characteristics of the household/respondents in Quara district, north Ethiopia (n=387)

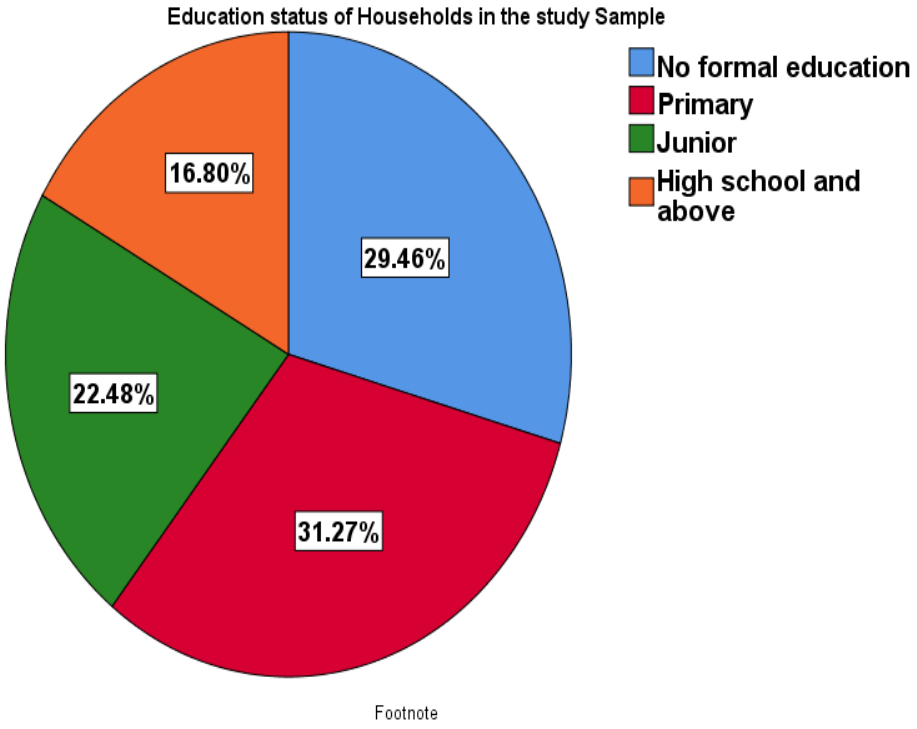
Characteristics	Variable	Frequency	Percent
Age of Household head	18-29	71	18.3
	30-39	124	32.0
	40-49	99	25.6
	50-59	59	15.2
	60 and above	34	8.8
Sex of the household head	Female	30	7.8
	Male	357	92.2
	Single	29	7.5
Marriage status	Married	334	86.3
	Divorced	24	6.2
	No formal education	114	29.5
Education status	Primary	121	31.3
	Junior	87	22.5
	High school and above	65	16.8

	Less than 2 years	20	5.2
Years of pesticides used	From 3-5 years	175	45.2
	From 6-10 Years	192	49.6
Monthly-income in	<1000	114	29.5
Ethiopian Birr	1000-2000	146	37.7
	>2000	127	32.8

Socio-demography characteristic of respondents (Sex, Age, Married, Education, Experiences, Income).

These findings are based on my own data from a 2020 homeowners' survey in Quara District.

Figure 2. ***Educational Status of Household's Farmer in Quara District.***



The knowledge of pesticide uses and safety of respondents in Quara district. Respondent's choice of pesticides was mainly due to the low cost of production in the area, with 218 (56.3%) using them, 162 (41.9%) respondents choosing pesticides / because they can control pathogens quickly, among others, (1.8%) were easily sprayed for pesticides (Table 2). 76.2% of farmers did not receive any training and 23.8% were trained. When sprayed with pesticides, most farmers touch their face and body with contaminated fingers, gloves, and bar skin, but they often wash with soap as they know, it is harmful to their health. Among the participants, washing frequently with soap was described, 190 (49.1%) and those going to the health facility (clinic), 166 (42.9%).

Approximately 49.4% of farmers know the names of the pesticides they use when bought. Of the respondents, 50.6% did not know the names of the pesticides they used. Pest control techniques help to reduce pesticide supply. According to our findings, 38.5% of the farmers were directly familiar with this technique, while 61.5% of the farmers do not practice any pest control techniques. As many as 127 (32.8%) farmers change pesticide brands every year because they believe the companies' products should be of higher quality, and 26.6% of respondents said resistance had reduced their capacity to eliminate weeds or pests. Further participants, 72 (18.6%) of them changed the price of pesticides compared to manpower, and 26 (6%) responded that they hoped that the respondent companies would produce quality pesticides if they changed their products every year (Table 2).

Among respondents, 184 (47.5%) had read, understood, and followed pesticide labels, and 203 (52.5%) did not read, understand, and follow pesticide labels. Among participating farmers, 301 (77.8%) washed pesticides and other materials equipment, as well as personal contact, daily after spraying the pesticide, while 51 (13.2%) of respondents were cleaned the pest equipment at the end of the year. Farmers who have never cleaned pesticides were, 35 (9.0%) unaware of the process. About 54.5% of farmers use any personal protective equipment when cleaning their pesticide equipment. Other 45.5% farmers did not wear personal protective equipment when cleaning pesticide apparatus. Washing the whole body, including clothes, 85.8% of respondents were known to take care of their health by washing up or showering before entering or continuing other activities. The majority of the respondents, 378 (97.7%) wash their hands often before eating, while 2.3% should not

Table 2: **The knowledge of pesticide uses and safety among small household farmers in Quara district, northwest Ethiopia, 2021**

Characteristics	Variable	Frequency	Percent
Why did you choose to use pesticides?	The product available low-Cost	218	56.3
	Efficacy of pathogen control	162	41.9
	easily sprayed	7	1.8
Reasons changing pesticides brands	It is reduced resistance	103	26.6
	It's expiring	59	15.2
	change products every year	26	6.7
	To compare price	72	18.6
	every year will improve their quality	127	32.8
Personally, clean your pesticide equipment	Never	35	9
	Annually	51	13.2
	After each spray round day	301	77.8
Do you wear any PPE to cleaning equipment?	Yes	176	45.5
	NO	211	54.5
You Know the types of pests you are using?	Yes	191	49.4
	NO	196	50.6
Use pest control techniques	Yes	149	38.5
	NO	238	61.5
Do you get pesticides training	Yes	92	23.8
	No	295	76.2

Do you read and follow pesticide labels?	Yes	184	47.5
	NO	203	52.5
What time you spray pesticides	Morning	334	86.3
	Afternoon	53	13.7
You follow the wind direction	Yes	302	78
	NO	85	22
You often wash your hands before eating	Yes	378	97.7
	NO	9	2.3
Usually taken bath or shower	Yes	332	85.8
	NO	55	15
Do you touch your face, bar skin with	Yes	161	41.6
contaminated fingers, gloves?	No	226	58.4
What your measurements injures by	Go to clinic	166	42.9
pesticides?	Washing with soaps	190	49.1
	Nothing any measures	31	8.0

In the multivariate and bivariate logistic regression analysis, farmers' knowledge of corresponding pesticides. Non-formal education respondents had 12.4 times less knowledge than high school educated, and they didn't know the names of the pesticides they used, to multivariate or bivariate logistic regression analysis (OR: 12.431, 95% Cl 5.792-26.679, *p-value* 0.001). Pest control techniques help to reduce pesticide supply. This demonstrates that farmers aged 18-29 use pest control methods to reduce pesticide use, implying that they had more than 3.7 times the number of farmers aged 60 and up (OR:3.7424.887; 95% Cl:1.492-9.386, *P-value* 0.005) to use pesticide technique methods. The youngest farmers between the ages of 18 and 29 had 10 times greater access to pesticide training than farmers over the age of 60 (OR:10.046; 95% Cl:2.812-35.886, *P-value* 0.001). Respondents with no formal education were 12 times less likely than second- and higher-level farmers to read, understand, and follow pest control labels or leaflets (OR:12.333; 95%:5.370-28.325, *P-value* 0.001). Farmers' educational distribution was limited because most farmers in the area buy and use pesticides without reading the label and instead choose based on color. Respondents aged 18-29 reported 8.7 times more spraying in the morning/evening than those aged 60 and up (OR:8.661; 95%Cl:1.649-45.495, *P-value* 0.011). This showed that most young farmers quickly adapted to the technology than the elderly. Non-formal education farmers do not follow wind direction with 21 times less knowledge than the higher-level farmers (OR:21.423; 95%:6.169-74.395, *P-value* 0.001).

The majority of the respondents, (97.7%) wash their hands often before eating. However, male farmers had three times the knowledge as female farmers after spraying pesticides and usually taking a bath or shower (OR:3.467; 95%:1.525-7.878, *P-value* 0.003). Female household respondents were less knowledgeable than male farmers and were unwashed after spraying pesticides. Contamination by pesticide was a serious problem during pesticide application, but experience or long years used had a significant advantage in reducing the risk of exposure. For many years, experienced farmers had three times more knowledge than short-skilled farmers (OR:5.593; 95%:1.985-15.762, *P-value* 0.001).

Male respondents were three times more likely than females to believe pesticides poisoned humans (OR: 3.679; % Cl: 1.537-8.802, *P-value* 0.003), whereas non-formal education participants were 17 times less likely than junior educated participants to believe pesticides have an impact on the environment (OR: 17.04795; % Cl: 7.543-38.527, *P-value* 0.001). Female respondents dissolved or mixed pesticides more than 4.5 times as much as male respondents had indoors (OR:4.547; 95% Cl: 1.452-14.236, *P-value* 0.009).

Table 3: Bivariate and multivariate analysis of factors associated with Pesticide's knowledge, beliefs, and practices among small household farmers in Quara district

Characteristics	Variables	Factors	OR	95%CI	*P value*
You know the types of pests	Yes	1			
you using?	NO	Education (Non formal	12.431	5.792-26.679	*<.001*
Use pest control techniques	Yes	Age (18-29)	3.742	1.492-9.386	*0.005*
	NO	1			
Do you get pesticides training	Yes	Age (18-29)	10.046	2.812-35.886	*0.001*
	No	1			
Do you read, follow pesticide labels?	Yes	1			
	NO	education	12.333	5.370-28.325	*0.000*
What time you spray pesticides	Morning	Age	8.661	1.649-45.495	*0.011*
	Afternoon	1			
You follow the wind direction	Yes	non-formal education	21.423	6.169-74.395	*0.001*
	NO	1			
You often wash your hands before eating	Yes	Education/primary/	0.910	0.075-10.968	*0.941*
	NO	1			
Usually taken bath or shower	Yes	Gender (male)	3.467	1.525-7.878	*0.003*
	NO	1			
Do you touch your face, with contaminated fingers, gloves and?	Yes	Years of pesticides use	5.611	1.989-15.826	*.001*
	No	1			
Do you usually take off your work materials before entering your home	Yes	Years of pesticides used	0.391	0.149-1.022	*0.055*
	No	1			
Do your beliefs pesticides any poison to humans?	Yes	Gender (Male)	2.833	1.130-7.101	*0.026*
	No	1			
You believe pesticides affect the environment	Yes	1	3.679	1.537-8.802	*0.003*
	No	Education, status, female	17.047	7.543-38.527	*0.001*
Where do you dissolve pesticides?	Indoors	Gender(female)	4.547	1.452-14.236	*0.009*
	Outdoors	1			

Reference 1 yes or no according to symbol of the comparison. Most insignificancy statically compression not including in the above table. Farmer's pesticide storage and disposal practices, such as the disposal of surplus pesticides, the use of expired pesticides, and the use of empty pesticide containers, have significant health and environmental consequences. As a result, 210 (54.3%) of the majority of farmers store their pesticides only alone. Whereas, 177 (45.7%) of them stored pesticides, and protective equipment in their homes (table. 4). More than 212 (54.8%) of the participants removed used or empty pesticide often burned, and anywhere in the surrounding area put in open places 109 (28.2%), like any other waste which may cause harm to the environment. Around, 66 (17.1%) were placed in a designated area store at the store site. Respondents washed their equipment and other materials were from flowing water nearly 364 (94.1%) of the time, with the remainder washed with pesticide sprayers, and equipment contaminated materials in houses 23 (5.9%). Most farmers, 334 (86.3%), take off their work boots, hats, and gloves before entering their homes.

*Table 4**: Farmers' knowledge about the storage of pesticides and discarding of remaining pesticide solutions, expired pesticides, and unfilled pesticide containers.***

Character	Variable	Frequency	Percent
After spraying pesticide where you put your close	It put away from the clean one	126	32.6
	Put it with in the clean	12	3.1
	Put it alone until it with a plastic bag	249	64.3
Where you washing the equipment of pesticides	Washed running water	364	94.1
	Washed it in the house	23	5.9
Do you normally take your work clothes off before getting home?	Yes	334	86.3
	No	53	13.7
Where pesticides containers, sprayers, and PPE stored	Be store in the house	177	45.7
	In container prepared for its	210	54.3
Where you removed used/ empty pesticide's containers	Burning of the containers	212	54.8
	put on open places	109	28.2
	Store at the stored site	66	17.1

According to the respondents, 58.4% claim that insects and weeds will not die unless the pesticide dosage was raised, and 41.6% of farmers believed that the increase is due to their concerns about the pesticide's efficiency. According to the farmers, beliefs who responded, 275 (71.1%) believed pesticides were very important for crop protection or crop yield. Of, 28.9% of them did not believe pesticides were important for crop protection and crop yield. Respondents, who responded to believe pesticides were more poisonous to humans, 154 (39.8%), whereas they couldn't believe, 233 (60.2%) pesticides poisoned human beings. Among the participants, 250 (64.6%) of those surveyed believed it contaminated the environment, while 137 (35.4%) did not. Farmers said they were using pesticides despite knowing they are harmful to their health because they believe it is cost-effective and time-saving 84 (54.5%), and it will help them increase crop yields and productivity 70 (45.5%). Respondents described pesticide effectiveness as follows: very effective 163 (42.1%), effective 160 (41.3%), moderately effective 58 (15.0%), and not effective 6 (1.6%).

Table 5**: *Beliefs of respondents (farmers) on the use of pesticides in Quara district***.

Character	Variable	Frequency	Percent
	Insects or weed not die	**226**	**58.4**

Do you beliefs increasing Pesticide dosage?	**Doubts of the quality 161 pesticide**		**41.6**
Do you believe pesticides use crop protection (crop yield)	**Yes**	**275**	**71.1**
	No	**112**	**28.9**
You believe pesticides poison to humans?	**Yes**	**154**	**39.8**
	No	**233**	**60.2**
If pesticides contain toxins, why use (n=154)	**It's cost-effective & time-saver**	**84**	**54.5**
	It helps to grow crops and increase yield	**70**	**45.5**
You believe pesticides affect the environment?	**Yes**	**250**	**64.6**
	No	**137**	**35.4**
farmers believe in the effectiveness of pesticides?	**Very effective**	**163**	**42.1**
	Effective	**160**	**41.3**
	Moderately Effective	**58**	**15.0**
	Not effective	**6**	**1.6**

Personal protective equipment and safety measures during and after pesticide sprays are unique ways to protect oneself. But the majority of farmers, 66.5%, do not use any PPE when mixing or spraying pesticides (Table 6). While exposure to pesticides is a major health risk factor, it is believed that taking precautionary measures during and after spraying is important to reduce this risk of pesticides. However, the knowledge of farmer's, use of Personal Protective equipment accounted for 145 (37.5%) of respondents who had practiced the use of gloves. Nonetheless, non-formal education respondents who did not use pesticide self-protection equipment had less practice applying boots than junior and high school respondents.

Among farmers who didn't know (PPE) of pesticides were reported, 141 (36%) had no awareness about the personal protective equipment (full-length trousers) of having poisoned chemical pesticides that had lowered practices. Because there have been different reasons to protect them from poisoned by Pesticides. Most farmers do not wear PPE, such as gloves 242 (62.5%), boots 241 (62.3%), eyeglasses 289 (74.7%), respirators 267 (69%), face shields 292 (75.5%), and full-length trousers 213 (55%).

A significant number of respondents stated that they did not wear personal protective equipment (PPE) for three reasons: the first was that it was not available in the community, the second was that it was uncomfortable, and the third was a lack of awareness or practice about the importance of personal protective equipment that protects us from pesticide exposure.

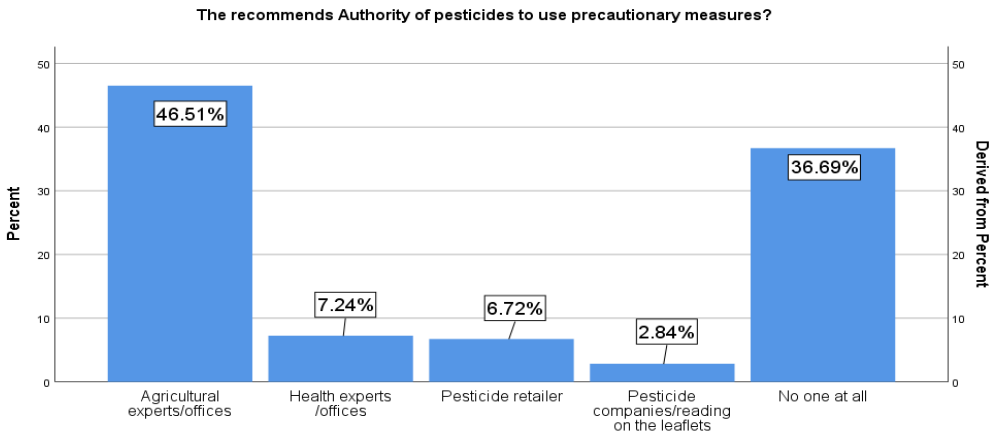
However, as an organization that advises and informs on the scientific use of pesticides, the Office of Agriculture received 180 (46.5%) of the vote, followed by the Office of Health with 28 (7.2%), pesticide retailers with 26 (6.7%), companies/on leaflets that reading and understanding with 11 (2.8%), and farmers had never been taught or instructed by anyone one with accounted, 142 (36.7%).

Table 6: ***Practices among farmers on the use of personal protective equipment (PPE)***

Characteristic	Variables	Frequency	Percent
Do you use gloves	Yes	145	37.5
	No	242	62.5

Not wear gloves	Not available	87	22.5
	Uncomfortable	6	1.6
	Not have awareness	149	38.5
Do you use boots	Yes	146	37.7
	No	241	62.3
Don't you wear boots	Not available	72	18.6
	Uncomfortable	16	4.1
	Not have awareness	153	39.5
You use eyeglasses	Yes	98	25.3
	No	289	74.7
Not wear eyeglasses	Not available	93	24
	Uncomfortable	41	10.6
	Not have awareness	155	40.1
You use face shields	Yes	95	24.5
	No	292	75.5
Not use face masks	Not available	106	27.4
	Uncomfortable	29	7.5
	Not have awareness	157	40.6
You use a respirator mask	Yes	120	31
	No	267	69
Not use a respirator mask	Not available	104	26.9
	Uncomfortable	27	7
	Not have awareness	136	35.1
Use full-length trouser	Yes	174	45
	No	213	55
Not use full-length trousers	Not available	70	18.1
	Uncomfortable	2	0.5
	Not have awareness	141	36.4

Figure 3. Pesticide recommendations are made to households in the Quara District to encourage the safe use of pesticides



The relationship between the respondents/householders, and other family members about the decision to buy and the application of pesticides among the interviewed households. The result shows that men take most of the decisions about whether to apply, when to apply and how to apply pesticides 315 (81.4%) and take other family shares in applying pesticides, 72 (18.6%). Along with a study of farming practices and safety measures, 82.2% of households use pesticides in their homes, while 17.8% should not use them in a home. We understand that farmers are more likely to use pesticides at home because they do not take any precaution measures and are unaware of the health risks.

Participants who had lived in the kebele for 5-10 years had a statistically significant higher rate of good pesticide practices and handling higher than those who had lived for less than 2 years. 57.4% of the respondents did not dissolve and loaded pesticides, while 42.6% could be dissolved and loaded. The reasons for farmers not dissolving or applying pesticides were as follows: 37.2% knew the dangers of pesticides to their family and themselves, 12.4% said they couldn't because it was difficult to load and mix, and 18.1% said the work was tedious. The main reason for mixing pesticides was 41.3% to destroy insects and herbicides and ensure pesticides worked properly, 37.5% to reduce the ability to kill pests, and 21.2% to reduce uncertainty about pesticide quality.

Generally, respondents, the reason for mixed pesticides when pest prevalence was higher. For pesticide spraying, communal personal protection material (not PPE) and ordinary clothing were critical. However, even if there was no modern (PPE) clothing in the area, it was often recommended to wear common clothes that were found in the house. However, 268 (69.3%) of the farmers who participated in the study responded that they did not change (not PPE) normal clothing when spraying pesticides. The data showed that participants were able to wear their regular clothing for more than two days without removing or changing it during pesticide spraying.

Farmers were re-using empty pesticide containers at home for a variety of purposes. The majority of respondents (57.1%) use drinking water services, 9.8% use food packages, and 33.1% are non-service providers. Non-formal education respondents were three times more likely than secondary-educated farmers to re-use empty pesticide containers for potable water. As a result, non-formal education respondents did not have more pesticide precautions than primary and junior high school farmers. Farmers with non-formal education were more likely to use potable pesticide containers than high-school educated farmers. As a result, uneducated farmers did not have more pesticide precautions or were more vulnerable to pesticides, than primary and middle school farmers.

Table 7**: Pesticide Practices and precautions measurements among farmers in Quara district**

Character	Variable	Frequency	Percent
Do you use pesticides in your home?	Yes	318	82.2
	No	69	17.8
Who decides which pesticide to buy?	The respondent	315	81.4
	Other family members	72	18.6
Do you personally mixed, applied pesticides	Yes	165	42.6
	No	222	57.4
Why you mixed, applied pesticides (n=262)	It is harmful to the household health	144	37.2
	It is difficult to loading and mixed	48	12.4
	It has to be tedious	70	18.1
Who is responsible for applying pesticides?	The respondent (Household)	313	80.9
	By hiring day laborers	66	17.1
	Others family members	8	2.1
Do you mix, more than one pesticide in a day?	Yes, often	149	38.5
	Yes, sometimes	224	57.9
	No	14	3.6
The main reason for mixing pesticides?	Uncertainty the quality of pesticides	82	21.2
	It reduces the ability to kill pests	145	37.5
	To kill Pests quickly	160	41.3
Where you dissolve or mix pesticides?	Indoors	25	6.5
	Outdoors	362	93.5
You change the dosage of pesticides per unit of land	Increased	138	35.7
	Decreased	146	37.7
	The Same	103	26.6
Utilized pesticides containers for different activities	Using for drinking water	221	57.1
	It used for food packages	38	9.8
	I have not used anything	128	33.1
Usually, you wear the same work clothes (not PPE) two or more days	Yes	119	30.7
	NO	268	69.3

Chapter V Discussion

Quara is one of the districts in West Gondar, Amhara Region, of Ethiopia, which is a large area suitable for agricultural production, and the livelihoods of farmers depend mainly on the agricultural sector. Therefore, one of the main reasons for this study was the concern for the health of the community in connection with the efforts to increase the agricultural sector (increase production and productivity) via the use of unselected pesticide chemicals for the protection of crops from different weeds and pests). The main purpose of this study was to assess the knowledge, beliefs, and practices of pesticides among small household farmers in the Quara district. This was the first study conducted in the district area of Quara.

The use of pesticides and herbicides is a controversial subject. Some of the farmers in this study knew exactly when to spray pesticides, could spray according to wind direction, washed their hands before eating and after spraying, and took a bath or shower before continuing with other activities. Most of the study's participants found that pesticides were occasionally misused (abuse and overuse), particularly when storing, mixing (dosing), and applying them, as well as when wearing gloves and discarding empty containers.

Knowledge of Pesticide uses, storage and discarding in small-scale farmers

Farmers' lack of technical knowledge, a lack of agricultural practices, a shortage of comprehension of pest control methods to minimize pesticide usage, and an absence of training on safe pesticide use were all major contributors to these issues. However, this does not mean that their understanding of pesticides has improved significantly. One of the major concerns of pesticide users was the efficient and inclusive application of pesticides, and the farmers who participated in this study detailed their reasons for using pesticides, including the product is available at a low cost, they can control pathogens quickly, and use it easily.

Personal protective equipment (PPE) use was extremely low, according to our results, and 66.5 % of respondent farmers had never worn any at all. Show similar study in Ethiopia by Gesesew, Hailay Abrha, et al. [3], the researcher reported on pesticides and health problems among Ethiopian farmers, most farmers had the most knowledge. But, 42% of farmers had never used any personal protective equipment (PPE) to guard themselves against pesticide exposure. Even though farmers are well aware of pesticide hazards, they often do not understand their protection practices due to a lack of information about pesticide education and training, or they may frequently participate in dangerous activities, or they may be more concerned with crop production, and economic return than with their health [1]. As compared to results from an Ethiopian study, the use of personal protective equipment (PPE) in our study was significantly lower.

In our study, 50.6% of households bought and use pesticides without reading the pesticide brands, types of pesticides name, and quality standards. Likewise reported in Ethiopia, 48% of households did not know the type of pesticides they used and similar work in Egypt majority of farmers (67%) did not read labels[44]. This was due to illiteracy, as well as chemical brands and pesticide names are written in a language that most families do not understand, they buy and use it only because it is a pesticide[11]. Even if respondents of younger ages were statistically more likely than those of older ages to have pesticide knowledge of information obtained from pesticide containers procedures or instructions on safety issues. Because younger people were more active in the following pesticide interaction to use them properly. So, this shows that in our assessment of knowledge, young farmers had good knowledge of pesticide spraying application.

In connection with an increase in pesticide dose, they were asked to explain why they increased the pesticide dosage. Most farmers increase pesticide doses due to the burden of insects/weeds/in most cases they respond, while others increase the pesticide amount. After all, they have doubts about the quality of the pesticide and the immediate effect because they believe that if we do not increase the dose, the pest will not die and returned. Nevertheless, these pesticides, one of the first problems is that pests are resistant to

chemicals. Therefore, farmers do not know how to deal with this issue, so, they have to spray more often and apply more, which can lead to more problems. Farmers increased pesticide concentrations to rapidly destroy pests, according to our findings. Farmers often mixed pesticides, some of them mixed pesticides on occasion due to concerns about pesticide quality, and only a few participants did not mix pesticides at all, according to the survey's findings. Other studies in Thailand were approved, approximately 40% of defendants mixed many types of pesticides to increase the effectiveness of pesticides. As a result of our research, 58% of farmers increased the dosage of pesticide concentration for chemical effectiveness.

Integrated Pest Management (IPM) has been revealed to reduce the use of pesticides. IPM encourages natural pest control systems by emphasizing the importance of healthy crop growth. The use of pesticides keeps farmers balanced and reduces the risk to human health, and the environment[6]. It is well-known that pest control techniques reduce the supply of pesticides and reduce exposure to pesticides. The majority of farmers, according to our findings, do not use any pest control techniques directly instead and instead concentrate on pesticides. Pest control techniques were directly associated with the respondents whose gender, male farmers had four times more likely knowledge than females significantly related to pest control techniques. This indicates that male farmers are more likely to use pesticides to reduce pest consumption. The techniques were an important process that had a significant role in the health, finances, and environment of the respondents. The most significant explanation for not using alternative pest control methods is that farmers in the study area either don't know about or don't have access to these alternatives. As a result, considering their concerns, they are obligated to use pesticides.

The majority 76.2% of respondents have not received any training or practical support on the prudent use and safe handling of pesticides. In a similar study, in Kuwait, 64% of farmers had received no training or practical support on the prudent use and safe handling of pesticides [1] the study reported in Cuba a short level of training in the usage of pesticides is found among farmers as only 28.3% had established specific courses in pesticides [45], according to our findings, which are consistent with previous studies on pesticide training conducted in Ethiopia. Received training is very low among interviewed farmers and farmworkers, except among a few farm employees who were applicators and mostly employed by large corporations. This is due to the accessibility of a relatively vigilant institution like the Ethiopian, horticultural producer and exporters association (EHPEA) that offers training to farming workers employed in its members' greenhouses [4]. The majority of the findings indicate that farmers in Ethiopia do not receive pesticide training. This shows a need for farmers to attend pesticide training to improve their knowledge of how to use and handle pesticides.

Among the farmers polled, they changed pesticide brands because they believed the companies produced each year improved their quality, and the ability to kill weeds or pests is reduced in the case of pesticide resistance in areas where pesticides have been used for a long time. Other participants stated that changing the brand of pesticides was more expensive than the cost of pesticides with manpower and that the number of respondents changed the brand if companies changed their products every year. Since we know the exact time of pesticide spraying, it was discovered that the majority of the farmers in this study were sprayed in the morning/evening. According to Mutune, Beritah Mumbi stated that about, ninety percent of the farmers used pesticide chemicals, were commonly used pest control measures and sprayed in the morning. This was because plants absorb chemicals effectively, and the air was more still than at other times of the day. Many insects are very active in the mornings, and evenings, and it is believed that pesticides can be sprayed very often in the morning, and evening and the results are very effective [46].

One of the factors that affected sprayers if they didn't follow proper procedures when spraying pesticides was wind direction. In our study, 78% of the respondents followed wind direction, but some of them did not respect the regulation of spraying pesticide rather than based on their habits. However, the education status of respondents were high school participants who had more knowledge than non-formal education. This study was supported by Mekonnen, Yalemtsehay, and Tadesse Agonafir [21], who reported in

Ethiopia, many sprayers consider windy and sunny weather as the main problem in the area. In pesticide spraying, the wind plays a significant role. Unless it's in the opposite direction of the sprayed path, it may detract from the appropriate spraying operation and cause the chemical to be misplaced. That evaporation of chemical formulations has often been accelerated by sunny weather, which is undesirable. Farmers are familiar with spraying pesticides in the right direction and are informed of the health risks, according to our research.

In our study, the majority of the farmers who took part were personally cleaned after using pesticide equipment daily, and some of them had pesticide equipment cleaned annually, but others had no pesticide equipment cleaned at all. Damalas, Christos A., and Spyridon D. Koutroubas [15] reported, that the level of pesticide contact with the operator should depend on the type of spraying device used. However, according to our findings, clean pesticide apparatus could not wear any personal protective equipment after pesticide spraying. As a result, pesticide exposure harmed farmers' health in this study, as they had little awareness and experience of not wearing personal protective equipment while washing equipment and they were unaware that touching various parts of the body could cause health problems.

Another study found that disposing of incorrect pesticide containers everywhere is a completely unsafe process [5]. A similar study was reported in Kabar [15], which indicated that small-scale farmers in many African countries use very poor personal protective clothing to protect themselves from pesticide exposure, which is a serious problem. The statistical significance of the respondent's good practices and pesticide handling among farmers was presented in association with the experiences of pesticides used. In the current study, respondents had a longer experience of 3-10 years of pesticide use good practices and pesticide application handling than individuals who had lived for less than two years. This study confirmed Lebanon Salameh, Pascale R., et al. [47] reported that agricultural employees who had extensive experience with the pesticide application took fewer prevention measures. Among respondents with low pesticide knowledge, information was received only by oral communication and poor protecting measures were observed. Similar results were reported by Mubushar, Muhammad, et al. [48] in Saudi, states, most farmers only have 5-10 years of involvement using pesticides. More experienced farmers know more about safety measures.

One possible reason that farmers were learning on their own about the adverse effects of pesticides, leading to safety measures. One of the lessening techniques for pesticide exposure was appropriately storing and removing pesticides for community health. However, farmers, ' response to storage and disposal of various pesticides, residual pesticides, expired pesticides, and empty pesticide containers, as well as personal protective equipment, were studied in this assessment. In our study, the results show that respondents stored pesticide containers, spray apparatus, and protective equipment at various store sites. Of these, 54.3% of farmers store their pesticides in containers designated for only it. Others reported that 45.7% of them used to deposit in their homes. According to Mubushar, Muhammad, et al. [48], study in Saudi, the majority of farmers, 59.5%, store pesticides at home in a separate location, 29.7% occasionally store pesticides at home in a separate location, and 10.8% never store pesticides at home in a separate location. In contrast, a study conducted in Kuwait by Jallow, Mustapha FA, et al. [1] reported that the majority of participating farmers, or 59% of them deposited their pesticides in locked chemical stores reserved lone for pesticides. However, in our result, there was a substantial association between the storage of pesticides in the household and respondents' level of education. Hence, farmers with higher education were less likely to store pesticides in the home.

The majority of farmers 54.8 %, in the study areas burned used or empty pesticide containers, and the rest of the respondents dumps them in open places and storing at a storage site respectively. Malgie, Wasudha, Lydia Ori, and Henry Ori [49] were studied in the Netherlands, 20% of respondent farmers buried empty pesticide bottles in the ground, while 10% responded or burnt or threw them away. Others drop 8.3% into the canal and only 3.3% of respondents take these empty pesticide bottles to the farm shop for proper disposal. The communal way of disposing or removal of empty pesticide containers was placed in mostly unopened spaces.

Respondents with non-formal education levels were significantly more likely to put in open places empty pesticide containers than the primary school participants. When comparing the findings of our assessment on the removal of empty pesticide containers from other countries, farmers' burning of pesticide containers was higher in our study. This meant that farmers were unaware of chemical behavior and that when they burned and released it into the environment, it had an effect on them indirectly.

Lack of appropriate information about pesticide use resulted in inadequate pesticide handling, frequency, and timing leads to significant health implications. The research also points to the need for farmers to be educated on pesticide storage and proper disposal. Many farmers store their chemicals at home, which could result in a rise in morbidity or injury rates among farmers' families. The disposal methods are also of concern because they can affect the larger public due to pesticide leaching into water sources, which can lead to accidental exposure. The presence of people who use pesticide containers for a variety of purposes was revealed by farmer responses to the study issue. Farmers in our study were told that empty pesticide containers could be reused for a variety of household purposes, including drinking water containers and food packages.

In the meantime, for this show, non-educated farmers had less knowledge about empty pesticide containers used for drinking water. A study conducted in Tanzania by Lekei, Elikana E., Aiwerasia V. Ngowi, and Leslie London [50] reported farmers' use of empty containers to reduce pesticides and refill containers is another unsafe method. Although there are only a few issues mentioned in the recycling of empty containers for domestic use, 4.9%, and also studies in Madad Pradesh, India 49%, Tanzania and South Africa, 28% found that rural people who used empty pesticides for domestic purposes, such as domestic water conservation. [14]. Another study in Ethiopia showed that 77.2% of farmers reuse empty pesticide containers for a variety of household functions[14]. Pesticide containers are reused in other study areas were 32 % for other applications, including drinking water[11]. Correspondingly, in our study, more than 66% of respondents re-used pesticide containers for home purposes. This indicates that farmers are potentially raising their pesticide exposure. Respondents state that they always wash empty pesticide containers before reusing them and that they believe there is no chance of contamination because they do not smell the pesticides.

Beliefs of respondents (farmers) on the use of pesticides

Farmers' beliefs toward pesticide use, according to the results of this study, are as follows: Pesticides would not eliminate insects and weeds, according to 58.4 % of respondents, while 32.8 % claimed that pesticide quality had improved and that pesticides were updated every year. As a result, 56.3% of the respondents said that the product is better (lower) compared to the daily labor cost in their area, while 41.9% of the farmers said that the pesticide was effective because they had no other opportunity to use pesticides and the remaining 1.8% were farmers used pesticides because they can be easily sprayed, and they prefer it because it can easily cover many diseases and weeds during the day. However, similarly, Uganda researchers were reported [6] the most important reason for a farmer to choose pesticides was that there must be pesticide availability. The availability of pesticides must be the most important factor in the farmer's choice.

According to the majority of farmers beliefs who participated in the study area, pesticides are essential for crop protection or crop development, and farmers believe pesticides are effective. Participating farmers rated pesticide effectiveness as very effective, effective, moderately effective, and inefficient. Even though only 39.8% of farmers believed pesticides were dangerous to human health. However, according to Sudanese researchers, 85.7% of farmers were aware that pesticides were extremely hazardous to human health[51]. This demonstrated that Sudanese farmers have a better understanding of the risk of pesticide exposure that has affected them than the farmers in our samples.

The majority of farmers do not use any personal protective equipment (PPE) when mixing or spraying pesticides, according to requested about personal protective equipment and care measures taken during/after/use of pesticides indicated in (Table 4).

According to respondents' awareness of these problems, the most common explanation for not wearing PPE was a lack of availability when it was required in the field. However, according to Yuantari, Maria GC, et al., the study of knowledge about agricultural protective equipment was good, with more than 98% of farmers knowing the importance of personal protective equipment and almost all of them being able to describe which types of personal protective equipment would be used on the farm and during pesticide spraying [19].

Practices and associated precaution and protection of pesticide among farmers

Over 66% of respondents did not use PPE in various situations, according to our findings. Respondents also suggested using personal protective equipment materials such as protective boots, glasses, gloves, respirators, face shields, and full-length trousers to reduce pesticide poisoning. However, the majority of respondents stated that agricultural offices/experts/take more taught following recommendations and knowledge and follow others as retailers, and advised customers to use pesticides after reading the precautionary measures on the leaflet respectively as the main reason for pesticide recommendations. But, some of them responded that no one had ever suggested that pesticides be used properly. Still, most concerns and responses have been taken by pesticide retailers. Then farmers, on the other hand, do not receive enough information from pesticide retailers, which play an important role in the distribution of agricultural information to farmers. Even the majority of retailers are more concerned with their profits than with informing farmers about pesticide precautions and toxicity as a result of this situation, farmers in the study area had little knowledge of how to use personal protective equipment to protect themselves from pesticide exposure.

According to Gesesew, Hailay Abrha, et al. and Mengistie, Belay T., Arthur PJ Mol, and Peter Oosterveer [52] study, the majority of farmers had the most extensive knowledge of significant, and approximately 41.8% of farmers had never used any personal protective equipment. Another study on pesticides and health problems among Ethiopian farmers found that no one wore full PPE. In our study, according to the results, the use of personal protective equipment to protect against pesticide exposure was very poor in our research, which indicated that 33.5 percent of study participants used personal protective equipment to protect themselves from pesticide exposure. In a study conducted in Sudan, 100 % reported that they use personal protective equipment (PPE) while spraying pesticides and that they all wash their hands and faces immediately [51].

A study by Mengistie, Belay T., Arthur PJ Mol, and Peter Oosterveer [19] in Ethiopia, reported that farmers often spray pesticides dressed in standard T-shirts, shorts, and skates, and can verify pesticides in person. Most farmers, 81%, wear their normal clothes when spraying, while 19% of farmers spray usual clothes that do not cover most parts of the body. Most of the big sprayers were spraying for pests and carrying them during work and even after spraying pesticides, they did not take showers. A close examination at the field hone shows a few potentially dangerous enhancements. Farmers in the Neway region explain that wearing personal protective equipment is inconvenient and makes the job harder. Ugandans consider certified individual protective hardware and safety measures after using pesticide sprayers and wear mostly ordinary clothing. Meanwhile, the most popular PPE is booted, followed by long-sleeved T-shirts, and 98 % are careful when using pesticides [6]. In this study, however, personal protective equipment is often used by farmers as personal protection against pesticide chemicals; Out of these full-length truthers, boots, gloves, eyeglasses, respiratory, face mask where respectively farmers do not use personal protective equipment in the study areas. Even though the practice of PPE was very inadequate as compared with other countries studied.

Bathing or showering was the main precautionary measure against pesticide intoxication, which shows the farmers have good knowledge about hygiene after they had finished spraying pesticides. The majority of respondents wash their hands frequently before eating, while others should not wash their hands before eating if pesticides are being sprayed. Mostly in this study, respondents were well known that pesticides are a threat to public health, and they can just wash their hands before eating. But, another study in Ethiopia, supports our assessment, those who know: hand-washing, bed-wetting, and smoking farmers know at least one of the

following pest control methods [3]. Similarly, studies by Mubushar, Muhammad, et al. [15] from Saudi, reported the drinking and eating behaviors of farmers to show that 61% of them eat and drink during spraying with or without washing their hands, and only 29% of respondents continuously washed their hands before drinking or eating anything. Handwashing with hand sanitizer in the field might also decrease the health risks of pesticide exposure. When handling pesticides, the majority of the participants took precautions. Before feeding, almost all respondents washed their hands, after spraying. After mixing the pesticides, more than three-quarters of the participants washed their hands. Less than half of the participants followed the product label during spraying pesticides [53]. In contrast to many studies conducted in the above-mentioned countries, our study showed that the majority of respondents were more capable of washing their hands and taking the required precautions. As a result, farmers were well-versed in washing practices.

All farmers in their kebeles use pesticides to their benefit, but the process is complicated, and using chemicals for all weeds and pests is more of a human decision than a matter of experience and practice, according to our participants requested. The majority of respondents agreed that pesticides were essential for controlling pests and weeds, but that the implementation method was problematic due to a lack of knowledge, experience, and training. Both respondents indicated, however, that farmers' use of precautionary pesticides has many issues, the majority of which are caused by a lack of knowledge and training. Pesticides have been shown to enter our bodies, either directly or indirectly, causing health issues in people and the environment, even though we are aware of the consequences. These chemicals, in particular, are absorbed through the mouth, nose, and eyes daily, causing scratching and burning sensations. In the study region, oral, and nasal masks are rarely used, which improves their pesticide exposure. Furthermore, they said that when animals eat weed, it is normal for some farmers may take pesticides and use them for a variety of purposes, including fishing and pesticide spraying for bed bugs and cockroaches in the house. Most farmers, including us, suggest there are very few farmers who use personal protective equipment when spraying or spraying pesticides. The reasons given were that most of the time, supply was absent, a lack of awareness, and a lack of emphasis on the issue.

Focus Grouping Discussion and Key Informant interview

Participants in the focus group discussion also stated that more than 95% of our population stores pesticides and materials in their homes after purchasing them, and that if they do, they store them in their backyards because they do not have their storage facilities. Most farmers explain that they are used for domestic purposes, especially for drinking water, instead of disposing of used pesticide containers and other materials accessible to pesticide spraying. It’s also clear that now the farmers' unjustified use of pesticides in the home, especially for the storage of drinking water, indicates that they were unaware of the pesticide hazards and that the government should provide more education in the future. In general, as we have seen in this Focusing Group discussion, the information and facts presented were very similar to the survey obtained information.

During the discussion, the participants told their information about what they were doing and what they were doing in their area. The use of pesticides was increasing every year and the demand and consumption of pesticides were increasing through the farmers. Governments should disassemble pesticide containers for recycling so that they are not used for domestic purposes, according to key informant interviews. According to key informant interviews conducted during the discussion, farmers use a wide range of pesticides, but the main issue is a lack of public awareness and bad practice habits in this environment. On the other hand, government departments and experts said that despite their knowledge of pesticides, they were inadequate to support and assist the community. Meanwhile, most farmers have limited knowledge and practice when it is related to pesticide use, and as a result, they use pesticide containers for a variety of household purposes, including drinking water and fishing. Due to shortages and lack of availability in the study district, almost no one used this personal protective equipment (PPE). Leaders, experts, and organizations have raised

awareness about pesticides' harmful effects on human health and the environment. We confirmed that they will continue to work on these issues in the future, particularly in collaboration with the government, retailers, and professionals to reduce risk.

5.2 Challenge and Limitation of the study

- Despite the difficulties, previous barriers include a lack of access to infrastructures, such as roads and remote kebeles.
- Respondents requested incentives for their interviews and some of them took time to explain because they were skeptical about our assessment. So, the local administrator and our data collectors explained that it was important for them to converse and after that, they were filled with understanding.
- There was a problem with the electricity (power) that delayed dealing with the questionnaires timely for collection of data with no available network.
- There is insecurity around the area, so, it is troublesome to collect free data from farmer's house to house, so, local administrations were assigned their security guards to protect them for data collection.
- Covid-19 is among the challenges of our studies to collect data freely. Most households are not happy when data collectors invite them into their homes and data collectors also hesitate to communicate with the farmers.
- We encountered available data to support our study because there was no initiation, previous studies were in the area on this title, and well-constructed secondary data could not be available from various district offices.
- Nevertheless, we had to accomplished out mission in difficult situations.

Chapter VI Conclusion

Quara district, one of the districts in West Gondar, Amhara Region, of Ethiopia, there is a large area suitable for agricultural production. Smallholder farmer's knowledge, beliefs, and practices frequently lead to dangerous activities as a result of their belief in pesticides and lack of practical application of pesticides, as well as misuse, and improper storage, disposal, and use of pesticide containers. Our research has revealed there is a lack of knowledge about the use of pesticides and their containers in the home. Pesticides are often stored in areas where children can easily access them, putting them at risk of poisoning. Pesticides and containers, spray apparatus, and protective equipment are all stored in the homes of nearly 45% of farmers. Around 57 percent of respondents were informed that empty pesticide containers could be reused for a variety of household purposes.

6.1 Recommendation

Although farmers in the Quara district are using more pesticides as a result of supplementary production for markets. There were numerous gaps in knowledge and practice. Pesticides should not be used due to inability to read and understand pesticide labels, overdosing, improper disposal, and mishandling of pesticide container protection equipment (PPE). Pesticides are often stored in/home/ the areas where children can easily access them, putting them at the risk of poisoning. As a result of the study, it was obvious that farmers need pest control training, increased knowledge, pest hazards prevented, adapted PPE, and pest-related health problems addressed at community levels.

To reduce farmers' exposure and illegal use of pesticides, the study suggested that the government should improve farmers' education level, strengthen agricultural vocational training, and improve farmers' occupational skills so that farmers can operate according to good agricultural practices. Finally, we advised researchers that the study area is home to a diverse range of domestic and international market-oriented products, so farmers use pesticides extensively in their production, and the consumer community needs to be researched to avoid health issues.

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6.3 References

1. Jallow, M.F., et al., *Pesticide knowledge and safety practices among farm workers in Kuwait: Results of a survey.* 2017. **14**(4): p. 340.
2. Mengistie, B.T., A.P. Mol, and P.J.N.-W.J.o.L.S. Oosterveer, *Private environmental governance in the Ethiopian pesticide supply chain: Importation, distribution and use.* 2016. **76**: p. 65-73.
3. Gesesew, H.A., et al., *Farmers knowledge, attitudes, practices and health problems associated with pesticide use in rural irrigation villages, Southwest Ethiopia.* 2016. **11**(9): p. e0162527.
4. Negatu, B., et al., *Use of chemical pesticides in Ethiopia: a cross-sectional comparative study on knowledge, attitude and practice of farmers and farm workers in three farming systems.* 2016. **60**(5): p. 551-566.
5. Mequanint, C., et al., *Practice towards pesticide handling, storage and its associated factors among farmers working in irrigations in Gondar town, Ethiopia, 2019.* 2019. **12**(1): p. 1-6.
6. Oesterlund, A.H., et al., *Pesticide knowledge, practice and attitude and how it affects the health of small-scale farmers in Uganda: a cross-sectional study.* 2014. **14**(2): p. 420-433.
7. Khan, M.J.T.P.D.R., *Using the health belief model to understand pesticide use decisions.* 2010: p. 941-956.
8. Sai, M.V.S., et al., *Knowledge and perception of farmers regarding pesticide usage in a rural farming village, Southern India.* 2019. **23**(1): p. 32.
9. Jayaraj, R., P. Megha, and P.J.I.t. Sreedev, *Organochlorine pesticides, their toxic effects on living organisms and their fate in the environment.* 2016. **9**(3-4): p. 90-100.
10. Sa'ed, H.Z., et al., *Knowledge and practices of pesticide use among farm workers in the West Bank, Palestine: safety implications.* 2010. **15**(4): p. 252-261.
11. Ocho, F.L., et al., *Smallholder farmers' knowledge, perception and practice in pesticide use in South Western Ethiopia.* 2016. **110**(2): p. 307-323.
12. Popa, G.L., et al., *Knowledge and Attitudes on Vaccination in Southern Romanians: A Cross-Sectional Questionnaire.* Vaccines (Basel), 2020. **8**(4).
13. Mequanint, C., et al., *Practice towards pesticide handling, storage and its associated factors among farmers working in irrigations in Gondar town, Ethiopia, 2019.* 2019. **12**(1): p. 709.
14. Karunamoorthi, K., M. Mohammed, and F. Wassie, *Knowledge and Practices of Farmers With Reference to Pesticide Management: Implications on Human Health.* Archives of Environmental & Occupational Health, 2012. **67**(2): p. 109-116.
15. Damalas, C.A. and S.D. Koutroubas, *Farmers' exposure to pesticides: toxicity types and ways of prevention*. 2016, Multidisciplinary Digital Publishing Institute.
16. Marete, G.M., et al., *Pesticide usage practices as sources of occupational exposure and health impacts on horticultural farmers in Meru County, Kenya.* Heliyon, 2021. **7**(2): p. e06118.
17. Damalas, C.A.J.S.R.E., *Understanding benefits and risks of pesticide use.* 2009. **4**(10): p. 945-949.

18. Organization, W.H., *Preventing disease through healthy environments: exposure to highly hazardous pesticides: a major public health concern*. 2019, World Health Organization.

19. Yuantari, M.G., et al., *Knowledge, attitude, and practice of Indonesian farmers regarding the use of personal protective equipment against pesticide exposure.* 2015. **187**(3): p. 1-7.

20. Jean, S., et al., *Farmers' Knowledge, Attitude and Practices on Pesticide Safety: A Case Study of Vegetable Farmers in Mount-Bamboutos Agricultural Area, Cameroon.* 2019. **10**(8): p. 1039-1055.

21. Mekonnen, Y. and T.J.O.M. Agonafir, *Pesticide sprayers' knowledge, attitude and practice of pesticide use on agricultural farms of Ethiopia.* 2002. **52**(6): p. 311-315.

22. Oliveira Pasiani, J., et al., *Knowledge, attitudes, practices and biomonitoring of farmers and residents exposed to pesticides in Brazil.* 2012. **9**(9): p. 3051-3068.

23. Watts, M.J.W.A.C.r., *Human health impacts of exposure to pesticides.* 2012. **11005**.

24. *At Community Action Works, we believe that environmental threats are big, but the power of well-organized community groups is bigger*. current online, 2020(https://communityactionworks.org/issues/pesticides/).

25. Sharma, D., et al., *Use of pesticides in Nepal and impacts on human health and environment.* 2012. **13**: p. 67-74.

26. Damalas, C.A. and S.D.J.T. Koutroubas, *Farmers' training on pesticide use is associated with elevated safety behavior*. 2017. **5**(3): p. 19.

27. Banerjee, B.J.T.L., *The influence of various factors on immune toxicity assessment of pesticide chemicals.* 1999. **107**(1-3): p. 21-31.

28. Watts, M.J.C.J.E.S.R., *Human health impacts of exposure to pesticides, WWF Australia, Contract Ref, 11005.* 2012.

29. Özkara, A., D. Akyıl, and M. Konuk, *Pesticides, environmental pollution, and health*, in *Environmental Health Risk-Hazardous Factors to Living Species*. 2016, IntechOpen.

30. Sabarwal, A., et al., *Hazardous effects of chemical pesticides on human health–Cancer and other associated disorders.* 2018. **63**: p. 103-114.

31. Kumar, S., et al., *Restoration of pesticide-contaminated sites through plants*, in *Phytomanagement of Polluted Sites*. 2019, Elsevier. p. 313-327.

32. Tawatsin, A.J.M.R.A., *Pesticides used in Thailand and toxic effects to human health.* 2015(3).

33. Khare, S.J.I.J.o.S. and T.R.i. Engineering, *Pesticide contamination in India and its health effects.* 2018. **3**: p. 8-14.

34. Serdar, B., et al., *Potential effects of polychlorinated biphenyls (PCBs) and selected organochlorine pesticides (OCPs) on immune cells and blood biochemistry measures: a cross-sectional assessment of the NHANES 2003-2004 data.* 2014. **13**(1): p. 1-12.

35. Lushchak, V.I., et al., *Pesticide toxicity: a mechanistic approach.* 2018. **17**: p. 1101.

36. MacFarlane, E., et al., *Dermal exposure associated with occupational end use of pesticides and the role of protective measures.* 2013. **4**(3): p. 136-141.

37. Kumar, V., et al., *Pesticides in agriculture and environment: Impacts on human health.* 2019. **1**: p. 76.

38. Lorenz, E., *Potential health effects of pesticides, AG communications and marketing*. 2009, Wiley, New York.

39. https://en.wikipedia.org/wiki/Pesticide_poisoning, *Pesticide poisoning.* Current online 2021.

40. Mequanint, C., et al., *Practice towards pesticide handling, storage and its associated factors among farmers working in irrigations in Gondar town, Ethiopia, 2019.* BMC Research Notes, 2019. **12**(1): p. 709.

41. Garrigou, A., et al., *Critical review of the role of PPE in the prevention of risks related to agricultural pesticide use.* Safety Science, 2020. **123**: p. 104527.

42. !!! INVALID CITATION !!! [42].

43. Tebkew, M., et al., *Uses of wild edible plants in Quara district, northwest Ethiopia: implication for forest management.* Agriculture & Food Security, 2018. **7**(1): p. 12.

44. Gaber, S., S.H.J.J.o.O.M. Abdel-Latif, and Toxicology, *Effect of education and health locus of control on safe use of pesticides: a cross sectional random study.* 2012. **7**(1): p. 1-7.

45. López Dávila, E., et al., *Knowledge and practical use of pesticides in Cuba= Conocimiento y uso práctico de plaguicidas en Cuba.* 2020. **21**(1).

46. Mutune, B.M., *Knowledge and practices of pesticides use against the bean fly (Ophyiomyia phaseoli) and associated health effects among bean (Phaseolus vulgaris) smallholder farmers in Kabaru location, Nyeri County*. 2020, JKUAT-COHES.

47. Salameh, P.R., et al., *Pesticides in Lebanon: a knowledge, attitude, and practice study.* 2004. **94**(1): p. 1-6.

48. Mubushar, M., et al., *Assessment of farmers on their knowledge regarding pesticide usage and biosafety.* 2019. **26**(7): p. 1903-1910.

49. Malgie, W., L. Ori, and H.J.J.A.T. Ori, *A study of pesticide usage and pesticide safety awareness among farmers in Commewijne in Suriname.* 2015. **11**: p. 621-36.

50. Lekei, E., A. Ngowi, and L. London, *Farmers' knowledge, practices and injuries associated with pesticide exposure in rural farming villages in Tanzania.* BMC public health, 2014. **14**: p. 389.

51. Mohamed, A.O., et al., *Knowledge, attitudes and practices of farmers towards pesticides use and handling in greenhouse farms, Sudan.* 2018. **6**(9): p. 520-534.

52. Norkaew, S., et al., *Knowledge, attitude, and practice (KAP) of using personal protective equipment (PPE) for chilli-growing farmers in Huarua sub-district, Mueang district, Ubonrachathani province, Thailand.* 2010.

53. Aryal, K.K., et al., *Health effects of pesticide among vegetable farmers and the adaptation level of integrated pest management program in Nepal, 2014*. 2016, Nepal Health Research Council.

ANNEX

Research Questionnaires on pesticides

Assessment of knowledge, Believes, and practices of pesticides in small household farmers, in Quara District of West Gondar, Ethiopia.

Dear respondent thanks for your voluntarism to Communicates with us. My name is Yirdaw Kassahun Ayehu and I am from the University of the Southern Medical University of China, Master of Public Health. We are currently conducting a research survey on farmers in West Gondar Quara District and the purpose of this survey is to investigate the knowledge and awareness of the Pesticide practices application, storage, disposal, and protective measures and Implication for human health and environment. The purpose of questioning these requests is to assess how you, as a stakeholder in agriculture, see the current situation of crop protection based on your experience. The personal data of the respondents will be handled under applicable data protection legislation. The personal data of the farmers may be used for interviews necessary for the survey if the farmers have authorized this use as per the data protection legislation. This Questionnaire is for research purposes only. I for myself assure you that your answers will always be kept strictly confidential and never be revealed to any other individuals. All information provided will be preserved as strictly trusted, and will only be used for public health research. If you have any questions, please Contact me at +251910134938/+8618520098552 Email **yirdaw76@gmail.com**.

Name of enumerator: _____

Interview No. _____

Part 1 General Information of the Farmer /Household/

1. Name of Kebele _____

2. Age of Household head _____

3. Sex of the household head? 0. Female 1. Male

4. Marriage condition 0. Single 1. Married 2. Divorced 3. Widowed

5. Education status? 0. No formal education 1. Primary 2. Junior 3. High school

6. For how many years have you used pesticides?

1. Less than 2 years
2. From 3-5 years
3. From 6-10 Years

7. Monthly income

1. Less than 1000
2. 1000–2000
3. >2000

Part 2. knowledge of pesticides in the study areas

8. You Know the types of Pest you are using?

1. Yes 2. No

9. Do you get pesticide training?

1. Yes, 2. No

10. Do your main reasons for changing regularly pesticides brands ----------

11. Do you read information from pesticide containers; procedures(instructions) or leaflet on safety issues?

1. Yes 2. No

12. What is the time of the day a Pesticide application has usually taken?

1. Morning/evening 2. Afternoon

13. Do you follow the wind direction when you using Pesticides?

1. Yes 2. No

14. How often do you personally clean your pesticide equipment after using it?

1. Never 2. Annually 3. After each spray round day

15. Do you wear any personal protective equipment when cleaning your pesticide equipment?

1. Yes 2. N0

16. After you finished spray pesticides, do you often wash your hands before eating?

1. Yes, 2. No

17. After you finished sprays the pesticides, do you usually taken bath or shower before continuing with other activities?

1. Yes 2. No

18. Do you usually wear the same work clothes (not PPE) when you spray pesticide during working two or more days without washing them?

1. Yes 2. No

19. After you spraying of a pesticide usually were put your clothes?

1. It is put away from the clean one 2. Put it with in the clean

3. Put it alone until it washed with a plastic bag

20. Where are you washing the covers and equipment during the spraying of pesticides?

1. Washed it near to Farms or house running water 2. Washed it in the house

21. Do you usually take your work boots, shoes, or closes them off before entering your home?

1. Yes 2. No

PART 3: Beliefs of pesticides in the study areas

22. Do you believe pesticides are more important for crop protection crop yield?

1. Yes, 2. No

23. Why did you choose to use pesticides?

1. The product is available at a low-Cost price
2. Efficacy of pest/pathogen control
3. Ease to spray

24. Do you believe pesticides are any Poisonous to human beings?

1. Yes, 2. No

10.1.If pesticides contain toxins, why use them----------

25. Do you t belief /think/ that pesticides affect the environment

1. Yes, 2. No

26. Do farmers believe in the effectiveness of pesticides?

1. Very effective
2. Effective
3. Moderately Effective
4. Not effective

PART 4: Practice of Pesticides in study District

27. Do you use pesticides in your home?

1. Yes, 2. No

28. Who are the most persons deciding which pesticide to buy?

1. The respondent/householders
2. another family member.

29. Do you personally mixed, loaded, or applied pesticides as part of your work over the years

1. Yes, 2. No

28.1 If the respondent NO, asks why? mixed, loaded, handled, or applied pesticides?

1. It harms myself and my family's health
2. It is difficult to loading and mixed
3. It has to be tedious

30. Who is the main person that responsible for applying pesticides to the target Issues?

1. The respondent (Household)

2. By hiring day laborers

3. Others family members

31. Do you mix, load, handle more than one pesticide product in a working day?

1.Yes, often

2. Yes, sometimes

3. No

32. What is the main reason why you mix the pesticides this way?

1. Uncertainty about the quality of pesticides

2. It's practicing and ability to kill is weakening

3. To kill him quickly

33. Where are you mix and dissolved pesticides concentrating?

1. Indoors 2. Outdoors

34. Do you mix different pesticides in Knapsack Hand Sprayer for a single application?

1. Yes, often
2. Yes, sometimes
3. No

35. Did you change the dosage of pesticides per unit of land compared to the dosage you used for the same unit of land for the target purpose the last year

1. Increased 2. Decreased 3. Same

36. You Know the types of Pests you are using?

1. Yes, 2. No

37. What are the main reasons for increasing Pesticide dosage?

1. Insects and herbicides do not die anymore at low dosage

2. They have doubts about the quality of the pesticide

38. Do you use pest control techniques to reduce the use of pesticides??

1. Yes 2. No

39. Is the respondent on the list of personal protective equipment listed on the table to show whether respondents use or not when applying pesticides and why?

Types of Protective equipment's wears/items/	**Do you Use it?**	**why not you do wear gloves**	**Who is recommended you to use pesticides precautions measures**
Gloves	1.Yes 2. No	1. Not available 2. Uncomfortable 3. Not have awareness	1. Agricultural experts/offices 2. Health experts /offices 3. Pesticide retailer 4. Pesticide companies/reading on the leaflets 5. No one at all
Boots/shoes	1.Yes 2. No	1. Not available 2. Uncomfortable 3. Not have awareness	
Eyes Glasses	1.Yes 2. No	1. Not available 2. Uncomfortable 3. Not have awareness	
Face shields	1.Yes 2. No	1. Not available 2. Uncomfortable 3. Not have awareness	
Respiration Protection Mask	1.Yes 2. No	1. Not available 2. Uncomfortable 3. Not have awareness	
Fulllength trousers	1.Yes 2. No	1. Not available 2. Uncomfortable 3. Not have awareness	

Part-5 Pesticides stores and disposal of pesticides containers

40. Where are pesticide containers, sprayers, and protective equipment materials are stored?

1. store in living house
2. In container prepared for its

41. Where are you removed after you used the pesticide containers?

1. Burning of the pesticide containers

2. put on open places
3. Store at the stored site

42. Have you seen or you doing pesticides containers use for different activities such as?

1. Using for drinking water
2. It used for food packages
3. I have not used anything

43. During spraying the pesticides did you touch your face, with contaminated fingers, gloves, and bar skin?

1. Yes,
2. No

44. If the respondent says often what your measurements for your health injures?

1. Go to clinic
2. I have nothing to take any measures
3. Washing frequently with soaps

FOCUS GROUP DISCUSSION CHECKLIST

INTRODUCE YOURSELF BEFORE STARTING THE INTERVIEW

My name is Yirdaw Kassahun and I am currently pursuing a master's degree in public health at the Southern Medical University of China. Therefore, for this graduation study, I am studying the understanding, knowledge, and use of pesticides by farmers in Quara District. So, thank you for volunteering to take part in this activity and I would like to ask some general questions about the use of pesticides or drugs. After the study, the study owner will be encouraged to use it effectively in government-targeted woredas and kebeles. The discussion should be no more than an hour and a half, depending on your needs and participants. Any information you provide will be kept confidential and will not be shared with others. The information you provided during the discussion will be provided along with the other answers. The discussion is voluntary and you are free to answer any or all questions or leave the discussion at any time.

Purpose: Before we begin, we would like to briefly describe the focus group discussions and why this focus group discussion with you. Focus groups are an arrangement for expressing one's feelings on a particular subject. The study owner often wants to find out how other communities feel about you, so it is important to know this for other sections of the community for this study. Therefore, we would like to hear from you from all the participants. We generally take your comments and summarize them to the researcher. You and your comments are by no means discernible.

Village_____Kebele_____District _____

Group Number _____ Date _____

1. What are the Households patterns of generally pesticide knowledge's, beliefs, and practices in your village of kebele?
    - How many households used Pesticides for their crop and pests in the villages?
    - What are some of the perspectives and trends of pesticides in your village?
    - Explain how about the household’s precaution of pesticides used in the villages?
2. What activities in the community have you seen using pesticides outside of beyond this function?
    - What kind of harm have you or others seen in the practice, use, or spraying of pesticides? List the most common problems or injuries
    - In practice, what are the immediate ways to prevent damage caused by pesticides?
3. What types of personal protective equipment (PPT) are regularly applied or used when mixing, loading, or handling and spraying pesticides?
4. Where do you store pesticides, protective equipment, and materials? And where do you get rid of pesticides after using plastic bottles?
5. What do you think is the use of pesticides in the village and in the kebele, which is often caused by carelessness and pollution in people and the environment? So, what do you think should be the role and action of governments and households in the health and environmental problems associated with the use of pesticides?

A focus group is not acting:

- ✓ A debate

- ✓ Group therapy
- ✓ A conflict resolution session
- ✓ A problem-solving session
- ✓ An opportunity to collaborate
- ✓ A promotional opportunity
- ✓ An educational session

key informant interviews
Choose key informants

Carefully select the key informants. Remember key informants must have first-hand knowledge about your community, its residents, and issues or problems you are trying to investigate. Key informants can be a wide range of people, including agency representatives, community residents, community leaders, or local business owners. The following are two common techniques used to conduct key informant interviews:

1. Telephone Interviews
2. Face-to-Face Interviews this is our conversation ways

Key Informant Interviews are high-quality interviews with people who know what is going on in the community. The purpose of key informant interviews is to gather information from a variety of people, including community leaders, specialists, or residents Admission price

These basic working times are open to those who want to read the focus group. They measure your team's level of interest and product knowledge and set the tone for a focus group discussion.

Be sure to ask the advertising professionals who will guide and drive the conversation the way you want it

The following questions about knowledge and background are required to give free thought to the fact that there is no bias or pressure.

1. What is your knowledge and experience in the community you lead and coordinate, and in your life cycle, and your beliefs about the use of pesticides in general?
2. What side effects have you noticed in the use of pesticides in public health? What side effects have you observed use of pesticides in the community?
3. Do relevant sector professionals and institutions provide training opportunities to the community on the health and environmental problems posed by pesticides and herbicides? How many beneficiaries do you believe the farmer has changed with your support?
4. Explain the idea of how the government and the community, as well as the retailers, can do their part to address the problems of pesticide and herbicides.

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