# INTEGRATED ASSESSMENT OF SELF-REPORTED PESTICIDE TOXICITY, FARMER'S KNOWLEDGE AND PRACTICES, AND OCCUPATIONAL HEALTH SAFETY

## A DUAL PERSPECTIVE STUDY IN FARMING COMMUNITIES

Scientific report

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## Acknowledgement

We, at Médecins du Monde (MdM) France Nepal, are proud to lead the study titled *Integrated Assessment of Self-Reported Pesticide Toxicity, Farmer's Knowledge and Practices, and Occupational Health Safety: A Dual Perspective Study in Farming Communities* in Banke district, Nepal. We extend our heartfelt gratitude to our HQ team—Clemence Arceluz, Hugo Alvarez, Julie Grammont, Pauline Bignon, and Aurore Camier—for their invaluable feedback and guidance. This project was made possible through the relentless efforts of our Nepal mission team members, Mr. Basanta Thapa, Ms. Sandhya Subedi, and Mrs. Shreelata Rana and Mr. Ganesh Karki whose dedication and expertise were pivotal in achieving our objectives.

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*Médecins du Monde (MdM) France, Nepal mission*

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*Graphic design: Christophe Le Drean*

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## ACRONYMS

| | |
|---|---|
| **ERB** | Ethical Review Board |
| **IPM** | Integrated Pest Management |
| **KG** | Kilo Gram |
| **NHRC** | Nepal Health Research Council |
| **OHS** | Occupational Health and Safety |
| **PPE** | Personal Protective Equipment |

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# EXECUTIVE SUMMARY


## BACKGROUND

Nepal, mainly an agricultural country, used a considerable amount of chemical fertilizer (227,836 metric tons) in 2020/2021, with Banke district contributing significantly (4,582 metric tons). Banke also uses 142 gm of pesticides per hectare, totaling 40.14 kg of active ingredients. Pesticide overuse is a major health concern in Nepal despite the Integrated Pest Management program. Farmers, including those in Banke, still improperly and excessively apply pesticides.

## METHODOLOGY

A mixed methods study was applied where self-reported health effects were obtained by the quantitative method and knowledge and practice of pesticide and IPM use was assessed by qualitative method. The study was focused on the Banke district, especially in Nepalgunj, Khajura, and Duduwa. The total sample size was 300 in the quantitative part whereas in the qualitative one 15 farmers were taken for the study-related knowledge and practice related to pesticide use and 8 of the health workers were taken who conducted Occupational Health Safety (OHS) consultation with the farmers to understand the occupational and farmer's dynamics.

## FINDINGS

The study found that headaches affected the largest portion of participants (20.93%), followed by muscle and back pain, which both affected the same percentage of people (20.33%). Hypertension was the most common chronic condition reported, affecting 13.33% of participants, followed by neuropathic pain (11.4%) and chronic obstructive pulmonary disease (COPD) (10%). Qualitative findings revealed that while participants were aware of the harmful effects of pesticide use on health and the environment, they tended to ignore minor health issues after pesticide application. Although participants used personal protective equipment (PPE) and spray tanks, disposal of these items was often done haphazardly, though some were recycled. Most participants were familiar with integrated pest management (IPM) tools like sticky traps, pheromone traps, and how to prepare jholmol, a neem-based pesticide. From the OHS consultation data, it was evident that while on the farm most of the farmers had back pain.

## CONCLUSION

In conclusion, nearly half of the farmers experienced health issues, with headaches, muscle pain, back pain, and paresthesia being common acute problems, while hypertension, COPD, and neuropathic pain were prevalent chronic issues. Farmers exhibited good knowledge of IPM and organic farming, leading to improved health, crop quality, and reduced pesticide exposure. Additionally, farmers demonstrated awareness of PPE usage, pesticide bottle color coding, and proper pesticide disposal practices.

## RECOMMENDATION

Awareness and education on safe pesticide handling and disposal, engaging pesticide retailers as key knowledge providers, expanding Integrated Pest Management (IPM) and organic farming training across regions. For which, ensuring collaboration, resource allocation, and feedback mechanisms are crucial for minimizing environmental and health risks while enhancing occupational health and safety (OHS) initiatives in rural communities.

# INTRODUCTION

## BACKGROUND

Nepal, primarily an agricultural country, dedicates around 4121 hectares of land to farming. In the fiscal year 2020/2021, the nation used a substantial amount of chemical fertilizer—approximately 2,27,836 metric tons—to boost agricultural yields. Notably, Banke, a district within Nepal, contributed significantly to this figure, accounting for about 4,582 metric tons of chemical fertilizer usage (MoALD, 2023). Additionally, Nepal consumes 142 gm per hector pesticide within this Banke almost consumes 40.14 active ingredients KG pesticide (PRMS, 2014). This highlights Banke's active participation in the consumption and sales of pesticides. The widespread pesticide exposure has become a significant public health concern in developing countries, especially in Nepal. Excessive and improper use: Improper use encompasses practices such as using pesticides without following recommended guidelines, leading to potential health and environmental risks. This includes instances where farmers deviate from recommended dosage, timing, or application methods which includes waiting time as well the term 'excessive use' in our context refers to the comparison with the recommended dosage for pesticides within the agricultural practices of Banke, Nepal.

We aim not to compare the absolute quantity of pesticide use with other countries but rather focus on the deviation from the recommended application guidelines. This could be influenced by specific factors such as the types of crops cultivated, unique agricultural practices, and variations in pest prevalence and resistance within the region. Pesticides have numerous immediate and long-term negative effects on health (Pathak et al., 2022). The Nepalese government has introduced the Integrated Pest Management (IPM) program to reduce pesticide usage nationwide. Nevertheless, farmers in the agricultural sector still engage in the improper and excessive application of pesticides (Kafle et al., 2014).

### Rational/justification

This study is prompted by the critical need to address challenges linked to pesticide use in Nepal's agriculture. The rising awareness of alternative farming methods like integrated pest management (IPM) and organic farming highlights the importance of assessing their adoption and effectiveness. By exploring farmers' perceptions and practices related to pesticide use, the research aims to offer insights crucial for promoting sustainable and safe agricultural approaches. Additionally, the qualitative analysis of Occupational Health Safety (OHS) consultations in Nepal's health facilities will deepen our understanding of occupational health risks in agriculture, guiding the development of targeted safety measures for the local farming community. In response to the various challenges posed by pesticide use, this study focuses on the integrated assessment that delves into the toxicity of pesticides, the knowledge and practices of farmers, and the occupational health safety (OHS) measures in farming communities.

# OBJECTIVES

## GENERAL OBJECTIVE

The overall objective of this task is to understand the perceived health effects of chemical pesticides used among farmers of Banke district and capitalization.

## SPECIFIC OBJECTIVES

1. To assess the self-reported toxicity of frequently used pesticides used by farmers, especially among vegetable pockets.

2. To assess knowledge and practice of pesticides among farmers and their coping mechanisms.

3. To analyze the situation of alternative farming methods like IPM/ Organic among projects.

4. To collect and analyze Occupational Health Safety (OHS) consultation data carried out by respective Health facilities.

# METHODOLOGY

## STUDY DESIGN

A concurrent mixed-method study design was used for the study. Both Qualitative and Quantitative methods were used to understand the health effects of chemical pesticides used among farmers of Banke district and capitalization.

## STUDY SETTING

The study was conducted in Nepalgunj Sub-Metropolitan City and Khajura and Duduwa rural municipalities' farmers through the recognition of pesticide-related health issues and the integration of risk mitigation measures, contributing to reduced pesticide exposure for the farmers, concerned communities and local consumers with two outcomes.

## STUDY SITES

The study was conducted in three local municipalities of Banke district (Nepalgunj Sub-Metropolitan City and Khajura and Duduwa rural municipalities).

## STUDY DURATION

The duration of the study was 2 months and 20 days (i.e., 28th December 2023 to 20th March 2024).

## NUMBER OF PARTICIPANTS AND JUSTIFICATION

### Quantitative Sampling

The calculated sample size for the quantitative component of the study was approximately 299 participants. This determination was based on a 95% confidence interval with a 5% margin of error, considering a finite population size (N) of 33349, a level of significance of 5%, and a standard normal deviation (Z) of 1.96. The formula used accounted for the proportion of farmers using pesticides (P = 26.7%) and its complement (Q = 73.3%). This sample size ensured a statistically sound representation of the larger population of farmers utilizing pesticides, allowing for reliable generalizations within the specified confidence interval and margin of error.

### Qualitative sampling

In the qualitative component, the study conducted a total of 23 in-depth interviews, divided into two groups. Fifteen farmers were interviewed to gain insights into their knowledge, practices, and experiences with pesticide use. Another 8 participants, working in health facilities, were interviewed to collect data related to Occupational Health and Safety (OHS) consultations. This sample size was deemed sufficient to achieve data saturation in our study.

**Table 1: Probability Proportionate sampling**

| Place | Total population above 18* | Percentage | Required sample (n) |
|---|---|---|---|
| Duduwa-6 | 8458 | 25.36 | 76 |
| Khajura-2 | 10124 | 30.35 | *91* |
| Nepalgunj-20 | 14767 | 44.09 | 132 |
| Total | 33349 | 100 | 299 |

* source: census 2021.


**Figure 1: Study sites**

## STUDY PARTICIPANTS

The study population was the farmers of the respective study site utilizing the pesticides and health workers who are providing OHS consultations through local health facilities.

## DATA COLLECTION TOOLS AND TECHNIQUES

Structured questionnaires were developed to collect quantitative data from the farmers. Data was collected on the sociodemographic variables such as Age, sex, Caste, Literacy Status, Educational Status, and Marital Status. Likewise, quantitative data was collected to assess the self-reported toxicity of frequently used pesticides used by farmers, especially among vegetable pockets, and for the situational analysis of the alternative farming methods like IPM / organic among projects while In-depth Interview Guidelines were developed to the knowledge and practice of pesticides among farmers and their coping mechanisms. Moreover, documents were reviewed and key informant interview guidelines were developed to collect and analyze Occupational Health Safety (OHS) consultation data carried out by respective Health facilities. Data collection tools were developed through rigorous literature review and consultation with the content expert.

Face-to-face interview techniques were used to collect both the qualitative and quantitative data. Quantitative questionnaires were developed in the Kobo toolbox.

## DATA COLLECTION PROCEDURE

Qualified and competent field enumerators were hired to collect the quantitative data. Field enumerators were provided with comprehensive training on the objectives, and methodology of the research projects including the data collection process using the Kobo toolbox.

## DATA MANAGEMENT AND ANALYSIS

Quantitative data were cleaned by the investigators involved in the study and the Stata MP 13 version for analysis purposes. Descriptive analysis of the quantitative data was calculated: the frequency, percentage, and mean value of the data were calculated.

While the investigators themselves were engaged to collect the qualitative data. Qualitative information was first recorded and then transcribed and translated into the English Language. NVivo was used to analyze the qualitative data and a thematic analysis of the information were done.

## ETHICAL CONSIDERATION

The Nepal Health Research Council's (NHRC) Ethical Review Board (ERB) provided ethical approval (Reg. No.760/2023). The study's goal and methods were properly described, and the respondent provided informed consent before the interview began. Participants were also told that their participation were optional and that they may quit at any time. Participants were promised privacy and confidentiality when providing their replies. Participants' personal information is kept secret, and permission papers are coded for anonymity.

# FINDINGS

The following findings are derived from a mixed methods approach that includes quantitative analysis, qualitative exploration, and desk review, followed by triangulation. The quantitative section delves into self-reported health effects and Integrated Pest Management (IPM) practices. Qualitative findings shed light on pesticide knowledge and practices, as well as IPM usage. A document review of Occupational Health and Safety (OHS) consultation data was conducted, and the resulting data were triangulated for presentation.

## PART 1: QUANTITATIVE FINDINGS

### Section 1: Socio-demographic of participants

The Socio-Demographic Information section of the report presents data from a sample of 301 participants. The analysis reveals a fairly balanced representation in terms of sex, with 45.51% identified as male and 54.49% as female. Regarding age distribution, the participants span a range of groups. The largest proportion falls within the 50-54 age bracket (14.62%), followed closely by those aged 30-34 (13.62%) and 35-39 (11.96%). The distribution is relatively uniform across other age groups, ranging from 3.99% to 7.64%.

A significant portion of the participants, comprising 47.48%, were categorized as illiterate. Conversely, 52.16% of participants were identified as literate.

The distribution of educational attainment varied widely among participants. The largest subgroup, representing 43.52%, reported having no formal education. Following this, 21.26% reported less than primary education, while 19.93% had completed primary school. A smaller proportion of participants reported higher levels of education, with 9.63% having completed SEE/SLC, 3.99% completing +2, and only 1.00% having completed a bachelor's degree. A mere 0.66% had completed a master's degree or above. The participant pool reflected diverse caste backgrounds. Madeshi constituted the largest group at 24.25, followed closely by Chhetri at 20.93%. Other significant groups included Janajati (15.95%), Dalit (11.96%), and Madeshi Dalit (8.97%). Brahmin, Muslim, and Others each represented smaller proportions, at 8.64%, 1.99%, and 7.31%, respectively. The overwhelming majority of participants, accounting for 97.67%, reported being married. A small fraction, comprising 0.66%, reported being unmarried, while 1.66% fell into the "Others" category.

Participants were classified based on the nature of their farming activities. The majority, constituting 84.72%, engaged in non-commercial farming. Conversely, 15.28% reported involvement in commercial farming endeavors.

On average participants worked on the farm for almost 16.8 years. While they are exposed to pesticides for almost 7 years that is (6.9 years).

Wheat emerges as the most commonly treated crop, with 67.44% of participants reporting its use. Paddy closely follows, with 65.45% of participants utilizing pesticides on this crop. Vegetables also rank high, with 70.76% of participants engaged in that sector. Other frequently treated crops include Maize (44.85%), Potato (46.18%), and Mustard (37.21%). Some crops, such as Barley, Buckwheat, and Cotton, exhibit lower usage rates, each representing less than 1% of participants. Additionally, 37.87% of participants reported using pesticides on crops categorized as "Others," indicating a diverse range of crops treated. Although participants, comprising 90.37%, reported not experiencing any signs of sickness after pesticide use. On further queries, it was evident that slightly more than half of the participants (52.83%) had acute health problems.

### Section 2: Self-reported health problems

Out of the total study, participants, the majority of the participants (20.93%) experienced Headaches, followed by Back pain 20.33%), and Muscle pain (20.33%). 14.33 % of the participants experienced Paresthesia, while a smaller number of the participants (3.01) experienced vomiting followed by excessive sweating (0.67%).

## Table 2: Socio-demographic Information of Respondents

| Socio-Demographic Information (n=301) | Frequency | Percentage |
|---|---|---|
| **Sex** | | |
| Male | 137 | 45.51 |
| Female | 164 | 54.49 |
| Others | | |
| **Age group** | | **Mean 44.50** |
| 20-24 | 12 | 3.99 |
| 25-29 | 23 | 7.64 |
| 30-34 | 41 | 13.62 |
| 35-39 | 36 | 11.96 |
| 40-44 | 36 | 11.96 |
| 45-49 | 36 | 11.96 |
| 50-54 | 44 | 14.62 |
| 55-59 | 23 | 7.64 |
| 60-64 | 22 | 7.31 |
| 65-69 | 16 | 5.32 |
| 70-74 | 12 | 3.99 |
| **Educational Status** | | |
| No formal education | 131 | 43.52 |
| Less than primary | 64 | 21.26 |
| Primary school completed | 60 | 19.93 |
| Completed SEE/SLC | 29 | 9.63 |
| Completed +2 | 12 | 3.99 |
| Completed Bachelor | 3 | 1.00 |
| Completed master and above | 2 | 0.66 |
| **Caste** | | |
| Brahmin | 26 | 8.64 |
| Chhetri | 63 | 20.93 |
| Dalit | 36 | 11.96 |
| Janajati | 48 | 15.95 |
| Madeshi | 73 | 24.25 |
| Madeshi Dalit | 27 | 8.97 |
| Muslim | 6 | 1.99 |
| Others | 22 | 7.31 |
| **Marital Status** | | |
| Unmarried | 2 | 0.66 |
| Married | 294 | 97.67 |
| Others | 5 | 1.66 |
| **Type of farming** | | |
| Non-commercial | 255 | 84.72 |
| Commercial | 46 | 15.28 |

| Socio-Demographic Information (n=301) | Frequency | Percentage |
|---|---|---|
| **How long have you been working on the farm(n=301)** | | **Mean 16.8 yrs** |
| 1-4 | 38 | 12.62 |
| 5-9 | 65 | 21.26 |
| 10-14 | 65 | 21.59 |
| 15-19 | 31 | 10.30 |
| 20-24 | 41 | 13.62 |
| 25-29 | 9 | 2.99 |
| 30-34 | 19 | 6.31 |
| 35-39 | 12 | 3.99 |
| 40-44 | 7 | 2.33 |
| 45-49 | 4 | 1.33 |
| 50-54 | 8 | 2.66 |
| 55-59 | 2 | 0.66 |
| >60 | 1 | 0.33 |
| **How long have you been using pesticides (n=301)** | | **Mean = 6.9 yrs** |
| 1-4 | 176 | 58.47 |
| 5-9 | 35 | 11.63 |
| 10-14 | 26 | 8.64 |
| 15-19 | 26 | 8.64 |
| 20-24 | 16 | 5.32 |
| 25-29 | 9 | 2.99 |
| 30-34 | 7 | 2.33 |
| 35-39 | 1 | 0.33 |
| 40-44 | 3 | 1.00 |
| 45-49 | 2 | 0.66 |
| **In which crop do you use pesticide (multiple choice) (n=301)** | | |
| Paddy | 197 | 65.45 |
| Maize | 135 | 44.85 |
| Wheat | 203 | 67.44 |
| Mustard | 112 | 37.21 |
| Barley | 2 | 0.66 |
| Buckwheat | 1 | 0.33 |
| Vegetables | 213 | 70.76 |
| Cotton | 1 | 0.33 |
| Oilseed | 9 | 2.99 |
| Potato | 139 | 46.18 |
| Others | 114 | 37.87 |
| **Have you experienced any signs of sickness after using pesticides within the last month? (n=301)** | | |
| Yes | 20 | 6.64 |
| No | 272 | 90.37 |
| I have been ill but I'm uncertain whether it's related to the use of pesticides. | 3 | 1.00 |
| Don't know | 6 | 1.99 |

Table 4 elucidates the Chronic Health Effects reported by the study participants. Out of the total participants, most of the participants had Hypertension (13.33) followed by neuropathic pain (11.41%), Chronic Obstructive Pulmonary Disease (10.00%), whilst diabetes and birth defects were in minimal percentage with 4.33% and 0.67% respectively.

## Section 3: Knowledge and Practice related to the IPM or Organic farming

Table 5 displays the information on Integrated Pest Management. Almost three out of four of the participants (74.42%) did not hear about Integrated Pest Management. More than half of the participants (63.33%) were currently used in vegetable cultivation. Almost one-third (27.74%) had taken IPM training. The main source of the training provider were any projects (41.46%) followed by fellow farmers (23.17%). A very small percentage (1.22%) of training providers were pesticide retailers.

The majority of the study participants (73.13%) applied Jholmol as a pesticide in their farms, followed by Crop Rotation (59.76%) and pheromone traps (37.80%).

Around one-third (74.39%) of the participants had observed crop yield or quality benefits from practicing IPM or Organic Farming. The benefits observed by the participants were: Improved Crop Quality (73.77%), and less use of chemicals (57.38%) while (9.84%) of the participants observed Improved Water Quality. 21. 95% of the participants faced challenges or barriers while adopting IPM OR Organic Farming. Almost 44% of the participants observed Limited availability of organic output, and 33.33 % faced challenges in the cost of purchasing organic output. A very small percentage of the participants (4.88 %) were satisfied with the support and resources provided by the IPM/Organic Farming.

## Section 4: OHS Consultation Data

OHS Consultation data was taken among 144 participants where their general examination, past medical history, and ongoing health problems were taken the following table provides the data more in detail

The study participants predominantly consisted of females (75%) compared to males (25%). When examining exposure to various factors, the majority of participants did not report exposure to

**Table 3: Self-Reported Health Effects of Respondents**

| Self-Reported Health Effects (n=301) | Frequency | Percentage |
|---|---|---|
| Headache | 63 | 20.93 |
| Muscle pain | 61 | 20.33 |
| Back pain | 61 | 20.33 |
| Paresthesia | 43 | 14.33 |
| Dizziness | 41 | 13.67 |
| Blurred Vision | 36 | 12.08 |
| Weakness | 35 | 11.78 |
| Eye Burning | 34 | 11.33 |
| Eye irritation | 30 | 10.00 |
| Extreme Tiredness | 30 | 10.07 |
| Respiratory Difficulties | 20 | 6.69 |
| Dry Mouth | 19 | 6.35 |
| Abdominal pain | 18 | 6.02 |
| Trembling Hands | 11 | 3.67 |
| Nausea | 9 | 3.00 |
| Vomiting | 9 | 3.01 |
| Loss of appetite | 9 | 3.01 |
| Others | 7 | 2.71 |
| Excessive sweating | 2 | 0.67 |

**Table 4: Chronic Health Effects**

| Chronic Health Effects (n=301) | Frequency | Percentage |
|---|---|---|
| Hypertension | 40 | 13.33 |
| Diabetes | 13 | 4.33 |
| Thyroid | 18 | 6.00 |
| Chronic Obstructive Pulmonary Diseases | 30 | 10.00 |
| Abnormal menstrual cycle (If Women) | 23 | 7.64 |
| Neuropathic pain | 34 | 11.41 |
| Asthma | 16 | 5.37 |
| Birth Defects | 2 | 0.67 |
| Others | 4 | 1.57 |

## Table 5: Integrated Pest Management

| Integrated Pest Management (IPM) | Frequency | Percentage |
|---|---|---|
| **Have you heard about IPM (n=301)** | | |
| No | 201 | 66.77 |
| Yes | 82 | 27.24 |
| Don't Know | 18 | 5.98 |
| **Primary Farming Methods currently used in vegetable cultivation (n=301)** | | |
| Chemical based | 190 | 63.33 |
| IPM or organic farming | 110 | 36.67 |
| **Taken IPM training (n=301)** | | |
| No | 219 | 72.76 |
| Yes | 82 | 27.24 |
| **If Yes (Source of training Provider) (n=82)** | | |
| Any Project | 34 | 41.46 |
| Fellow farmers | 19 | 23.17 |
| Family Members | 7 | 8.54 |
| Pesticide Retailers | 1 | 1.22 |
| Others | 30 | 36.59 |
| **IPM practices applied in the field (82)** | | |
| Bio-fertilizers | 32 | 39.02 |
| Jholmol | 60 | 73.13 |
| Bio-pesticides | 23 | 28.05 |
| Pheromone traps | 31 | 37.80 |
| Soil amendment | 14 | 17.07 |
| Soil Solarization | 14 | 17.07 |
| Bagging | 12 | 14.63 |
| Grafting | 7 | 8.54 |
| Crop Rotation | 49 | 59.76 |
| Others | 21 | 25.61 |
| **Observed any crop yield or quality benefits from practicing IPM or ORGANIC farming (n=82)** | | |
| No | 20 | 24.39 |
| Yes | 61 | 74.39 |
| Don't Know | 1 | 1.22 |
| **If yes, what could be the benefits (n=61)** | | |
| Less use of chemical | 35 | 57.38 |
| Cost-effectiveness | 17 | 27.87 |
| Improved Crop Quality | 45 | 73.77 |
| Improved Water Quality | 6 | 9.84 |
| Improved Soil Health | 22 | 36.07 |
| Good Health | 42 | 68.85 |
| Others | 5 | 8.20 |

| Integrated Pest Management (IPM) | Frequency | Percentage |
|---|---|---|
| **Challenges or barriers while adopting IPM or organic farming Practices (n=82)** | | |
| No | 59 | 71.95 |
| Yes | 18 | 21.95 |
| Don't know | 5 | 6.10 |
| **If, yes what are the challenges (n=18)** | | |
| Lack of knowledge and awareness | 1 | 5.56 |
| Limited availability of organic output | 8 | 44.12 |
| Cost of purchasing organic output | 6 | 33.33 |
| Family, social, and community pressure to use chemical fertilizers | 3 | 16.67 |
| Others | 8 | 44.44 |
| **Satisfaction with the support and resources provided by the IPM/Organic farming (n=82)** | | |
| No | 25 | 30.49 |
| Yes | 4 | 4.88 |
| Not sure | 53 | 64.63 |
| **Consideration on expanding the practice of IPM/organic farming in the future (n=82)** | | |
| No | 5 | 6.10 |
| Yes | 55 | 67.07 |
| Don't Know | 22 | 26.83 |
| **Recommendation on the current IPM/organic farming practice to others (n=82)** | | |
| No | 5 | 6.10 |
| Yes | 69 | 84.15 |
| Not sure | 8 | 9.76 |

**Table 6: OHS Consultation Data**

| Variables | Frequency (n) = 144 | %/mean |
|---|---|---|
| Age | | 44.93 |
| **Sex** | | |
| Male | 36 | 25 |
| Female | 108 | 75 |
| **Average working on the farm** | 133 | 15.73 |
| **Average working hours per day** | 79 | 6.36 |
| **OCCUPATIONAL RISKS** | | |
| **Exposure to animal** | | |
| Yes | 18 | 11.11 |
| No | 126 | 88.89 |
| **Exposure to heavy charges** | | |
| Yes | 83 | 57.64 |
| No | 61 | 42.36 |
| **Exposure to heavy metals** | | |
| Yes | 50 | 34.19 |
| No | 94 | 65.81 |
| **Exposure to air pollution** | | |
| Yes | 4 | 2.78 |
| No | 140 | 97.22 |
| **Cut by a sharp object** | | |
| Yes | 16 | 11.11 |
| No | 128 | 88.89 |
| **Have bitten by animal** | | |
| Yes | 17 | 9.72 |
| No | 127 | 90.28 |
| **Exposure to High noise** | | |
| Yes | 3 | 2.8 |
| No | 141 | 97.92 |
| **PAST MEDICAL HISTORY** | | |
| **Having allergies** | | |
| Yes | 31 | 21.53 |
| No | 113 | 78.47 |
| **Family members have been ill or not** | | |
| Yes | 22 | 15.28 |
| No | 122 | 84.72 |
| **Have conducted surgeries** | | |
| Yes | 17 | 9.72 |
| No | 127 | 90.28 |
| **Ongoing health problem** | | |
| No | 94 | 65.28 |
| Yes | 50 | 34.72 |
| Most of it was pain of all kinds like arm, leg, epigastric pain | 22 | 44 |
| **Smoking** | | |
| Yes | 35 | 24.31 |
| No | 109 | 75.69 |
| **Chewing** | | |
| Yes | 4 | 3.33 |
| No | 104 | 96.67 |

| Variables | Frequency (n) = 144 | %/mean |
|---|---|---|
| **Alcohol** | | |
| Yes | 9 | 6.25 |
| No | 135 | 93.75 |
| **Depression** | | |
| Yes | 4 | 2.78 |
| No | 140 | 97.22 |
| **Stress** | | |
| Yes | 12 | 8.33 |
| No | 132 | 91.67 |
| **BMI** | | |
| Underweight | 9 | 6.25 |
| Normal | 56 | 54.86 |
| Overweight | 49 | 38.89 |
| Abnormal vision in both eyes | 2 | 1.38 |
| **HEALTH PROBLEMS** | | |
| **Skin** | | |
| Yes | 17 | 11.76 |
| No | 127 | 88.24 |
| **Teeth** | | |
| Yes | 17 | 11.76 |
| No | 127 | 88.24 |
| **Gum** | | |
| Yes | 15 | 10.45 |
| No | 129 | 89.55 |
| **Chest** | | |
| No | 144 | 100 |
| **Heart Sound** | | |
| Yes | 1 | 0.69 |
| No | 143 | 99.31 |
| **Thoracic** | | |
| Yes | 4 | 2.78 |
| No | 140 | 97.22 |
| **Oedema** | | |
| Yes | 1 | 0.69 |
| No | 143 | 99.31 |
| **Abdomen** | | |
| Yes | 11 | 7.64 |
| No | 133 | 92.36 |
| **UTI** | | |
| Yes | 13 | 8.33 |
| No | 131 | 91.67 |
| **Treatment given** | | |
| No | 128 | |
| TD | 144 | |
| Albendazole | 5 | 31.25 |
| Hep B | 5 | 31.25 |
| **Medicine prescribed** | | |
| Yes | 92 | 63.89 |
| No | 52 | 36.11 |
| **Referred participants** | | |
| Yes | 33 | 22.92 |
| No | 111 | 77.08 |

animals (88.89%), heavy charges (42.36%), heavy metals (65.81%), air pollution (97.22%), sharp objects (88.89%), high noise (97.92%), and bites by animals (90.28%). In terms of past medical history, the majority did not have allergies (78.47%), nor did they have family members who had been ill (84.72%). Similarly, the majority had not undergone surgeries (90.28%). However, one-third of the participants report an ongoing health problem, with a notable prevalence of various types of pain, including arm, leg, and epigastric pain.

The majority of participants did not engage in smoking (75.69%), chewing (96.67%), or consuming alcohol (93.75%). Similarly, a significant majority did not report experiencing depression (97.22%) or stress (91.67%). When considering BMI, the majority fell within the normal category (54.86%), with smaller proportions categorized as underweight (6.25%) and rest of them fell into normal category Among health problems, the majority of participants did not report issues related to abnormal vision in both eyes (1.38%), skin (88.24%), teeth (88.24%), gum (89.55%), chest (100%), heart sound (99.31%), thoracic (97.22%), edema (99.31%), abdomen (92.36%), or urinary tract infections (UTI) (91.67%). Surprisingly, the majority of the participants did require medicine prescriptions (36.11%), almost 22.92% of them were referred and almost half of them were referred to Bheri hospital (45.45%).

# PART 2: QUALITATIVE FINDINGS

## Section 5: Knowledge and practices of pesticide use

### *Understanding the term pesticide*

The term "pesticide" was commonly equated with poison among the interviewed participants. They recognized pesticides as harmful substances sprayed on crops to eliminate insects.

> *"Pesticide means poison we used to use pesticides a lot in our cotton farming. It is a poison that kills insects and is mostly used in crops."*

Participants defined pesticides as substances primarily designed to kill insects, emphasizing their detrimental effects on human health and other living organisms.

> *"Pesticide means poison which is used to kill insects as well and it affects human health in the short term as well as in the long run. That's why it is called poison."*

Nominee Gold emerged as a popular choice among participants, indicating its widespread use in agricultural settings.

> *"In this locality, Nimini gold is mostly used."*

Additionally, the presence of Rogor and malathion was noted, suggesting its availability and potential application in pest management.

> *"I have heard about Robber, and Malathion rest I don't know that much."*

Participants primarily relied on Urea and Dap, with limited use of other pesticides, highlighting a preference for these particular chemicals.

> *"I have used Urea and Dab mostly and besides that, I haven't used any other pesticides."*

Some participants displayed limited knowledge of pesticide names, indicating a potential gap in understanding.

> *"No, I don't know the names."*

Despite this, participants mentioned various pesticides such as Robber, Malathion, Nuban, Thyrone, Pharsa, Indrine, and Antracal, showcasing the diverse array of chemicals utilized in agricultural practices.

> *"Nuban, but nowadays we don't use pesticides that much. I have heard about Pharsa, indrine. One used in potato called Antracal."*

### *Pesticide Procurement practice*

Participants described their interactions with pesticide retailers, highlighting a common pattern of seeking advice and obtaining pesticides for crop protection.

> *"We usually go to the pesticide retailer and tell them the problem regarding our farming and they give us the pesticide and we bring it."*

They visited pesticide retailers to discuss their farming challenges, such as pest infestations or crop diseases. The retailers would then provide the appropriate pesticide, along with instructions on its usage. Participants typically followed these

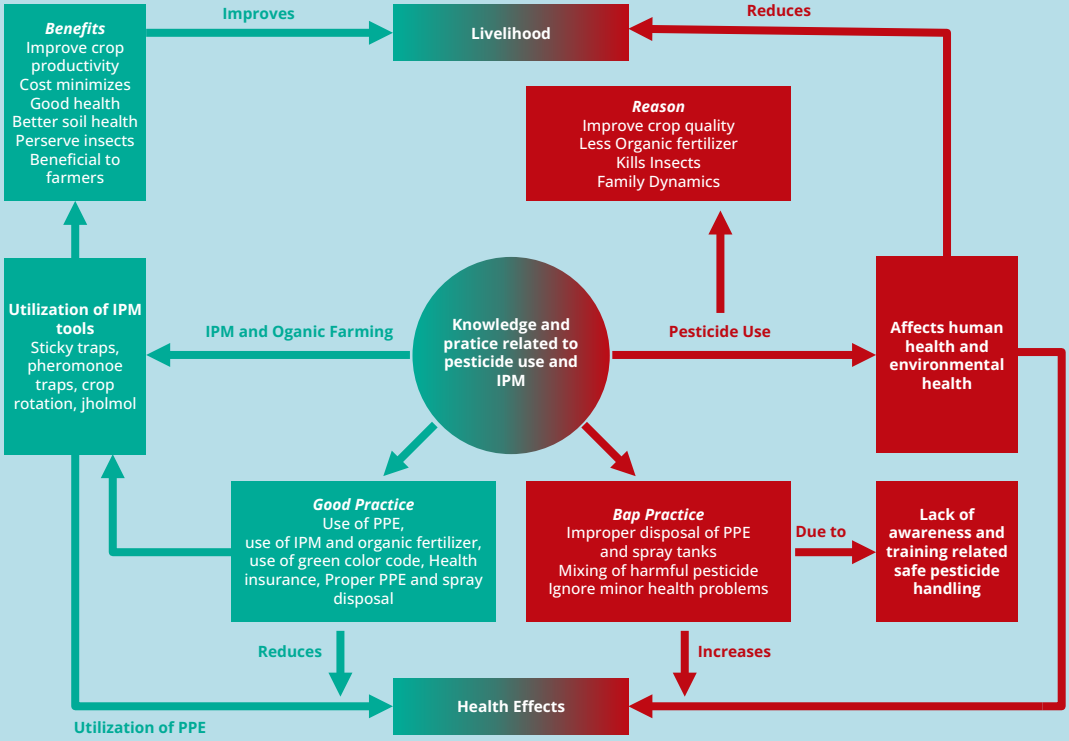


**Figure 2: Mind map of Qualitative findings**

instructions and applied the pesticide to their fields.

> *"We used to go to the pesticide retailer and tell them about our problems and they gave us the pesticide to use. They used to tell us how much amount we need to pour on the water and then use other things they didn't used to tell us."*

### *Cross Border Procurement practice*

Participants described their practices of acquiring pesticides from neighboring regions, particularly from Rupaidiha, located in India.

> *"We buy pesticides from Rupaidiha as the pesticide is very cheap there."*

While some participants purchased pesticides from both Nepalgunj and Rupaidiha due to factors like convenience and cost-effectiveness,

> *"Since we are staying near the border side, we usually buy them from India and the pesticides are also kind of cheap and it is also near to us."*

others expressed concerns about the quality and safety of pesticides obtained from India compared to those from Nepal.

> *"In Nepal, they make pesticides by keeping in mind about health of people. But in India, they don't care if pesticides harm people's health or not."*

Participants residing near the Nepal-India border faced challenges related to the importation and usage of pesticides, with banned pesticides from India still accessible and used due to limited enforcement of regulations.

> *"Yes. It does because we live in same village, same place. The pesticide brought from India is illegal to use here. But nobody goes to everybody house to check it. It is an illegal activity and nobody observe*

*this. That is the main problem. And if people go to Nepalgunj to buy it the they cannot buy because it is ban. So, they bring it from India and use it."*

Additionally, participants advocated for increased security measures at the border to prevent the importation of harmful pesticides into Nepal, suggesting the implementation of stricter regulations and training for border patrol officers to identify hazardous pesticides effectively.

*"We should increase the security at the border for such products and need to be banned from entering Nepal. We should also teach at least the color coding to the border patrol officers so that they will know which are harmful chemical pesticides and which are not in this way we can minimize the import of harmful chemical pesticides."*

### *Effects of pesticide on human health.*

The study findings reveal significant concerns regarding the impact of pesticide exposure on human health. Participants reported experiencing various symptoms, such as dizziness, memory lapses, headaches, and skin irritation, indicating adverse effects on cognitive and physical well-being.

*"It causes paresthesia, skin burning, and eye problems because we used to spray the pesticide haphazardly without considering the time and wind because of that we faced many health problems.*
*But during the night it caused me headaches, nausea, and vomiting."*

Both short-term discomforts and long-term health issues, including cancer and respiratory problems, were highlighted, prompting worries about the overall quality of life and life expectancy.

*"Yes, it affects a lot it causes eye problems, headaches, gastric, makes the body sweaty, hand and leg pain. In the long run, it causes cancer and skin diseases. Pesticides have also affected the life expectancy of people I guess cause in the past people used to live for 100 years but now people die between the age of 60 and 70."*

To address these concerns, some individuals have turned to protective measures like using personal protective equipment and adopting organic farming practices.

*"It causes paresthesia, skin burning, and eye problems because we used to spray the pesticide haphazardly without considering the time and wind because of that we faced many health problems but now we are using PPE and organic farming I haven't faced such health conditions."*

Moreover, there's growing awareness about the broader environmental and societal implications of pesticide use, including pollution and potential links to disabilities in newborns.

*"Yes, it affects water and air pollution as well as living organisms even human beings like when a new baby is born they are already disabled I think it's because of the use of pesticide."*

### *Effects of pesticide on Environmental Health.*

The findings from the study suggest a widespread acknowledgment among participants regarding the adverse environmental impacts of pesticide usage. Participants highlighted various detrimental effects, including pollution of air, water, and soil, which ultimately affect both humans and ecosystems.

*"Yes, it affects the environment like it affects soil, water, and air which then affects other living organisms like humans, plants, domestic animals, and other insects which are both beneficial and harmful to the environment."*

Pesticides were observed to disrupt the delicate balance of beneficial organisms, such as earthworms, leading to decreased soil productivity.

*"It degrades the quality of the soil, it also kills the insects that are beneficial to the farmers like (earthworms)."*

Moreover, concerns were raised about the evolving resistance of insects to pesticides, necessitating the use of stronger chemicals, exacerbating environmental degradation.

*"Of course, it affects the environment it pollutes the air which indirectly affects living organisms like humans and plants as well as it degrades the quality and productivity of the soil. I do think because of the use of pesticides insects are also evolving and need stronger pesticides to kill them so the use of pesticides is very bad for the environment, I guess. For instance, insects called rato khapatey come even though we kill them regularly."*

Additionally, participants noted a decline in bird populations, particularly eagles, attributed to pesticide exposure. The indiscriminate use of pesticides was further linked to the dwindling presence of essential organisms like earthworms, crucial for soil health.

> *"There is also a decrease in the number of birds flying in the sky like eagles. It decreases the soil productivity and kills the earthworm which is very beneficial to the farmers."*

### *Pest Infestation*

Participants in the study area reported significant damage to rice crops caused by an insect locally known as "Fauji kira," which quickly spread from one area to another, necessitating extreme measures like cutting down affected plants.

> *"There was one insect named Fauji kira which destroyed my rice plant very much. Every used to say that insects are seen in some places and it will spread to another place overnight. At that time, I cut all my rice plants even if I had to pay other people to cut them. Insects started destroying the cut plants as well so it was very hard to prevent the crops from the insects."*

Additionally, various insect pests were identified, with "lai kira" and other green insects particularly prevalent during the months of Chaitra and Baishakh, affecting crops like ladies' fingers.

> *"Yes there is one kind of insects which is kind of lai kira which flies which is in white color and it damages the crops and is mostly found in Chaitra and baishak. It is mostly found in ladies finger. There is green color insects which also affects the crops."*

Participants also noted the emergence of new pests, such as swarming worms damaging mustard farming and red-colored insects impacting cucumber plants.

> *"No, it didn't used to come in the past but nowadays swarming worm which is in green color comes in a massive number destroying our mustard farming. When we farm cucumbers scratched insectswhich is in red color they also come in large numbers."*

Regional differences were observed in pest presence, with some areas experiencing dominance of pests like locusts, while others remained unaffected.

> *"In our place, we didn't have such a thing but I have heard that new insects like locust were dominant in another part of Nepalgunj but it didn't come here."*

participants highlighted an increase in insect populations over time, particularly of pests like "fauji kira" and "fatangro kira", leading to heightened pesticide usage.

> *"Fauji kira, fatangro kira, lai kira these insects were present in the past as well but currently, it is in large numbers, I guess."*

Despite efforts to control pests using methods like "jholmol", challenges in effective management persisted, with significant losses reported, including entire maize fields destroyed by pests like "fauji kira".

> *"This insect known as fauji kira was just prevalent 3 or 4 years back it wasn't found before that time but it is prevalent nowadays. Because of this also we need to use pesticides more and more as there will be sometimes massive pest infestations 2 years ago, I think all our maize was destroyed by these insects. And utilizing jholmol to these insects isn't that much effective."*

Furthermore, there was a notable evolution in insect pest knowledge, with insects like "fauji kira" being previously unheard of but now prevalent, while others like "rato khaptey" have historically affected crops and continue to do so.

> *"During our childhood, we never heard of the insect's name Fauji Kira but it is prevalent nowadays. There are other insects as well like (rato khaptey it is usually found in the climbers, food flight these are prevalent from the past)."*

### *Modes of information*

Participants rely on a variety of sources to gather agricultural information, with fellow farmers and the internet being primary channels for knowledge exchange.

> *"We receive information from the fellow farmers especially."*

Peer-to-peer interactions play a crucial role in sharing practical insights and experiences within the farming community, while online resources supplement traditional knowledge channels. Additionally, participants access information from formal institutions such as agriculture organizations, pesticide retailers, government sectors, and agriculture co-operatives, benefiting from expert advice, training, and new technologies related to pest management and agricultural practices.

> *"From the organization, and fellow farmers, and when we visit pesticide retailers, we also ask them about the new tools, and from there we will be up to date on the information regarding pesticide use."*

The frequency of information updates is notable, as participants often visit pesticide retailers every 1 to 2 weeks to inquire about new tools or pesticides for insect control, indicating a dynamic approach to staying abreast of agricultural developments.

> *"From the organization, and fellow farmers, and when we visit pesticide retailers, we also ask them about the new tools, and from there we will be up to date on the information regarding pesticide use."*

### *Knowledge of color code used in pesticide bottles.*

Participants in the study exhibit a strong preference for green color-coded pesticides, as revealed by multiple respondents.

> *"We use green color pesticides."*

This preference is rooted in the belief that green-coded pesticides are less toxic compared to other colors like red, yellow, and blue. Some participants explicitly mention opting for green-coded pesticides due to their perceived lower toxicity levels, indicating a deliberate choice towards safer pesticide options.

> *"They are red, yellow, blue and green. If you have to use then less poisonous i.e., green spray it."*

Moreover, there is a growing awareness among participants regarding the significance of color-coding in pesticides. This awareness reflects a shift towards more informed and cautious pesticide usage practices among participants.

> *"But now we are aware that we just need to put the green color code pesticides and avoid the use of other color codes like red, yellow, and blue."*

### *Monitor health after using pesticides.*

Many participants tended to brush off what they considered minor symptoms, like dizziness, without seeking medical help.

> *"Yes, I had dizziness and used to ignore it thinking it was just a minor health problem, and didn't visit the health institution as well."*

Instead, they often chose to deal with these issues at home rather than going to a doctor.

> *"We used to stay at home and ignore the problem and didn't go to the hospital."*

What's interesting is that a lot of them didn't realize that pesticides could be behind their health problems, so they didn't connect their symptoms to their environment.

> *"We didn't know at that time that it was due to the use of pesticides so we didn't have much thought on that."*

However, we also noticed a change in attitude among some participants. They began to recognize the importance of seeking medical care for serious symptoms or when they suspected pesticide exposure. This shift suggests a growing understanding of the need for professional help in dealing with health issues, especially those related to chemical exposure.

> *"Previously, we didn't use monitors but nowadays we go to the medical if something minor happens."*

### *Guidance from the pesticide retailers*

Many participants recounted receiving inadequate guidance from retailers regarding the safe handling of pesticides. While retailers provided instructions on pesticide dosage for specific land areas, they often neglected to emphasize the importance of wearing protective gear, such as masks, during spraying.

*"Yes. They sell this is enough for this area of land. But they don't tell us about wearing mask while spraying. They give pesticide bottle and tell us this amount of pesticide is ok for this amount of land."*

This lack of comprehensive information left participants unaware of the potential health risks associated with pesticide exposure. Additionally, participants heavily relied on retailer guidance when purchasing and using pesticides, yet retailers frequently failed to educate them about the harmful effects of pesticides or the necessity of using personal protective equipment (PPE).

*"They used to tell us the amount of pesticide that needed to be dissolved in the water but they didn't tell us we needed to use PPE."*

Some participants even reported instances where retailers prioritized sales over farmer safety by providing potent pesticides without considering the potential health implications.

*"The retailer used to give us the strongest pesticide the retailer didn't care about our health."*

### *Some practices on pesticide use*

While some participants rely on instructions from sellers for pesticide application,

*"Those who spray, spray according to instructions given by sellers."*

others lack formal training in pesticide handling but are aware of its potential hazards and try to store the pesticide far from children

*"I haven't taken any training related to the pesticide use. But we always make sure the child doesn't reach there and we always try to keep it separate from the food storage."*

Additionally, many participants admit to neglecting instructions on pesticide labels and express a lack of awareness about their potential health effects.

*"We didn't know how to read the labels on the pesticide bottles."*

However, some participants take proactive measures like considering wind direction during spraying to minimize risks.

*"Since I considered the direction of the wind before spraying the pesticide, I didn't get any health issues."*

Nonetheless, inadequate information on pesticide labels regarding human health effects remains a concern.

*"It used to write that it is used to kill insects but it didn't write anything about its effects on human health and we also didn't know at that time."*

### *Complexities and challenges in pesticide use*

Despite concerns about the effects of pesticides on crops and soil, participants feel compelled to use them to ensure successful crop growth, driven by the emergence of flowers and seeds as indicators of pests.

*"Now we use it. It has become compulsory. Flowers have started to bloom in this plant and seeds are also growing. We have to put pesticides at least one time in it. Even though it affects our health."*

The limited availability of organic fertilizers further prompts reliance on pesticides to kill the insects.

*"Since we don't have enough organic fertilizer, we use pesticides additionally they are used to enhance the growth of the crops as well."*

Additionally, household dynamics play a role in pesticide management decisions, with some spouses expressing reservations about usage but being unable to prevent it.

*"I tried to convince my husband to bring the green color pesticide but I haven't seen the pesticide bottle yet because he always tries to hide it and I haven't used it as my husband uses it all the time. Knowledge and practice related to PPE."*

### *Knowledge and practices related to PPE*

Initially, many participants admitted to spraying pesticides without wearing adequate protection, only realizing the potential risks after experiencing symptoms like dizziness.

*"No, we didn't used to wear that much. People who spray pesticide started to feel dizzy. From that, I know that it may affect me also. So, I started to wear a mask."*

However, there's a noticeable shift towards the adoption of PPE sets, driven by increased accessibility and knowledge. Some participants acknowledge past ignorance about the harmful effects of pesticides and express regret for not using protective gear.

*"Yes, it has affected us not that seriously but it has affected headaches, and a little vomiting so we shouldn't use jholmol haphazardly we need to use a proper PPE set to avoid such health problems."*

Despite challenges like discomfort during hot weather, most participants prioritize safety and now consistently utilize PPE sets while handling pesticides.

*"No, we didn't used to wear that much. People who spray pesticide started to feel dizzy. From that, I know that it may affect me also. So, I stared to wear mask."*

This transition reflects a growing awareness of the importance of protective measures in safeguarding against pesticide-related health risks among agricultural workers.

### *Seasonal Factors on pesticide use*

The research findings highlight the seasonal patterns and factors influencing pesticide usage among participants. Pesticide application tends to peak during specific months, such as Chaitra and Baishakh, coinciding with increased pest infestation due to minimal water availability.

*"Mostly in the months of the Chaitra and Baishakh pesticides are used more because the water is minimal and pest infestation is more in this month like lai kira."*

Participants commonly spray pesticides during harvesting seasons, particularly for crops like paddy and mustard, occurring once or twice a year.

*"We usually used it when we were harvesting paddy and mustard so it was like once or twice a year."*

Additionally, the presence of insects varies across seasons, with summer witnessing higher infestations of pests like the red color and white butterfly.

*"In winter there aren't insects mostly in the summer season insects like (rato khapatey) are found more in the summer season. (White butterfly) are also seen during that time."*

Despite these practices, participants often lack formal education on optimal pesticide application timings, leading to suboptimal outcomes such as reduced effectiveness due to sunlight exposure. Factors like weather conditions, time of day, and direction of airflow influence spraying decisions, with evenings preferred to minimize crop damage and maximize insect eradication.

### *Utilization of spray tanks and disposal of them*

*"Nobody taught us we used to spray the pesticide in the daytime which was wrong because in the daytime most insects would leave the field and because of the sunlight pesticide effects would last very much these things were never taught by anyone."*

Methods of pesticide usage vary, with many employing spray tanks to apply the pesticides.

*"We used to use a spray tank to spray the pesticide."*

Additionally, some participants dispose of old spray tanks by giving them to recyclers, while others may repurpose them for other uses or burn them.

*"I have 3 to 4 tanks. One is made from brass and it is in my house. If some scrap dealer comes then I will give it."*

*"We used to give it to people from India who used to sell banana and in exchange we get banana. If it is not sellable then we throw it or put in home or otherwise burn it in fire."*

Disposal methods for leftover pesticides also differ, ranging from throwing them haphazardly to carefully rinsing and disposing of them away from livestock.

*"We dump it in the ground or sometimes we throw it in the forest."*

*"We used to rinse it with water and then throw it haphazardly but we will make sure that chicken and goats are far from them while throwing it."*

### *Knowledge and practices related to the IPM use*

The study reveals a spectrum of Integrated Pest Management (IPM) tools utilized by participants for pest control. While some participant's express unfamiliarity with IPM tools like sticky traps and pheromone traps, others acknowledge their usage.

> *"No. I haven't heard about sticky traps but I have heard about jholmol."*

> *"We have used sticky traps in the cucumber field."*

One participant mentions the use of sticky traps specifically in cucumber fields, while others affirm the utilization of IPM tools such as sticky traps and pheromone traps.

> *"Yes, I have used IPM traps like pheromone traps and sticky traps and jholmol."*

The mechanism of yellow and blue traps is elaborated, highlighting their effectiveness in attracting and trapping insects.

> *"It is yellow. There is blue also. There is one plastic and a blue thing which is put on the top and below it, we hang the plastic and put the capsule in it. It has the smell of male or female insects, so insects like butterflies go there and get trapped. If the smell of female and male insects is attracted to it both get trapped."*

The use of lure IPM tools like blue, green, and yellow traps across different crops is underscored, with considerations for their effectiveness based on usage density among participants.

### *Knowledge and practice related to jholmol*

The study findings reveal a rich tapestry of insights into the preparation, usage, and effectiveness of jholmol, a traditional organic pesticide alternative, among participants. Ingredients like neem, garlic, chili, cow urine, bitter leaves, onion, and mustard cake are commonly employed, with no fixed formula, showcasing its adaptability.

> *"We use different ingredients to make the jholmol like neem, bitter leaves, buck throne plant, Malabar nut, Schwan pepper, garlic, onion, chilly, and mustard cake, there is no fixed formula we just use our hand and then let it ferment in the container."*

Emphasis is placed on the fermentation process, with variations in duration ranging from one month to two weeks, and practical considerations such as coverage area, storage duration, and preparation methods are discussed.

> *"After combining this thing, they are pressed and let to ferment and after almost 2 weeks it will are ready then we mix it with water and then pour it in the plants."*

Jholmol's multi-functionality as both an insecticide and a urea substitute are noted,

> *"Jholmol is also different one is the alternative to pesticides and other is the alternative of the urea. It is also different one is used to kill insects and another is used to improve the productivity of the crops."*

along with its cost-effectiveness, storage capacity, and agricultural benefits, underscoring its integral role in organic farming practices and sustainable pest management strategies.

> *"Yes, we do use jholmol. We use various ingredients like spicy, bitter, and sour plants like ginger, salt, Titopatey, urine of cow and cow dung, etc are mixed and let ferment it takes almost a month to prepare and then can be used. 1 liter of jholmol is used for almost 10 aana land. Jholmol provides nitrogen and phosphorus to the plants as well."*

### *Benefits of IPM and organic farming*

One participant expressed a newfound appreciation for tomatoes grown using IPM tools, emphasizing their appealing taste and the intention to explore IPM and organic methods further.

> *"I loved the tomatoes harvested using IPM tools because they looked very tasty and I will try IPM and organic tools."*

Others noted the efficacy of IPM traps in controlling destructive pests like swarming worms and scratched insects, leading to healthier crop yields and reduced health concerns associated with pesticide use.

> *"When we farm cucumbers scratched insects which is in red color they also come in large numbers. These kinds of insects come into the IPM traps and are stuck there so now we are using those kinds of traps as well to kill those insects."*

Participants also emphasized the advantages of organic farming, citing benefits such as improved health outcomes, cost savings from reduced pesticide purchases, and enhanced soil and environmental health. Additionally, the utilization of traditional pest control methods like jholmol garnered positive feedback, with participants reporting increased crop productivity and overall well-being.

> *"We could eat healthy foods organic foods our health would be far better and since those can be developed in the home, we won't have the financial burden and our soil and environment health would also be better. And if we use organic it won't affect the surroundings as well."*

The research findings shed light on various agricultural practices and strategies employed by participants, showcasing their adaptability and resourcefulness. Additionally, crop rotation emerged as a prevalent practice among participants, exemplifying their efforts to maintain soil fertility and optimize land utilization throughout different seasons.

> *"Yes, we use crop rotation like in summer season we harvest maize, then after that we harvest mustard, then lentils, and right now we are harvesting maize."*

The utilization of organic materials, particularly cow dung, was highlighted as a cornerstone of organic farming, underscoring its significance in soil enrichment and nutrient cycling.

> *"Yes, I combine cow dung, urine, and mustard cake and then use it in the field."*

Furthermore, the incorporation of diverse crops and the use of rotational techniques were noted, reflecting participants' efforts to diversify their yields and enhance agricultural sustainability.

> *"Yes, we do use per year we harvest 3 to 4 different types of crops."*

### *Sustaining IPM and organic farming*

The research findings underscore the importance of education and awareness in promoting sustainable agricultural practices among farmers. Participants expressed a desire for guidance and training in organic farming techniques, highlighting concerns about declining productivity associated with conventional methods.

> *"Due to organic farming, our productivity is degrading so if someone is willing to teach us about the technique related to organic farming to would be better, I suppose."*

Emphasizing the need for comprehensive knowledge dissemination, particularly regarding the harmful effects of pesticide use, participants stressed the importance of making their locality a pesticide-free zone through education initiatives.

> *"First and foremost, we need to be aware of and provide knowledge related to the harmful effects of pesticide use to almost all the farmers then only this locality will be a pesticide-free zone. Providing resources like PPE and IPM tools only will not be sufficient we need to provide them with knowledge related to that."*

### *Health Insurance*

The research findings shed light on the prevalence of health insurance among participants and their varying experiences with it. While some participants expressed skepticism about the value of health insurance, citing instances where they didn't fall ill and didn't receive insurance payouts,

> *"We once did health insurance but I thought it was a waste of money because we didn't get ill and now, we don't do health insurance. And there are also cases where people didn't get the insurance money so from that period onwards, we never did health insurance."*

others highlighted the benefits and convenience of having health coverage.. Despite differences in opinions and experiences, the majority of participants reported having health insurance, underscoring its importance as a financial safety net for healthcare expenses.

> *"Yes, we have and it is also done by the same organization and to claim it we need to go to the Bheri hospital. Yearly we pay 3500 to renew the health insurance for 5 people and 700 extra for an additional two people and we get up to Rs 1,00,000 health insurance in that year per person."*

*Voices of participants*

Participants expressed a desire for increased access to information and training sessions to enhance their understanding of sustainable agricultural methods.

> *"In the future, we hope that more information will enlighten us and more farmers will be engaged in this locality in such training."*

They emphasized the need for scaling up such training initiatives to reach a broader audience of farmers in their locality.

> *"We have learned a lot about the IPM and organic farming it would be better if that training had been scaled up to other farmers as well then it would have been better."*

Concerns about the health risks associated with pesticide use were raised, with participants advocating for the adoption of IPM and organic tools as safer alternatives. Additionally, there was a call for educational programs on proper livestock management, particularly regarding the collection and utilization of cow urine, to further support sustainable farming practices.

> *"In our locality, we don't have the practice of collecting cows' urine if there were a program related to the proper management of domestic sheds then it would be much better, I guess."*

## Section 6: Knowledge and practice related to OHS consultation by Health worker

The study's findings underscore the importance of occupational health and safety (OHS) consultation, particularly in agricultural settings. OHS consultation involves educating workers about potential hazards, such as pesticide exposure, and providing practical safety measures like wearing protective gear.

> *"OHS consultation means those persons who are at risk while working and providing them safety guidelines to prevent those hazards is OHS consultation. For instance, when working on the farm worms are found on the soil and we teach farmers to wear boots to protect from the hazards not only that but also, we teach them about the harmful effects of pesticides."*

It's noted that there's a historical lack of implementation in OHS practices, but recent collaboration between NGOs and local authorities, like the Nepalgunj Municipality, has spurred action. Ultimately, OHS consultation aims to ensure the well-being of workers by minimizing occupational risks and promoting safe working environments.

> *"I think OHS consultation should have been given in the past and should be given in the future as well most people know we need to give OHS consultation but it was lacking in the implementation part. Now with the co-ordination from the NGO and Nepalgunj Municipality OHS consultation has been started. If humans need to be healthy, they must be free from occupational hazards and must have quality occupations."*

Health facilities play a pivotal role, offering comprehensive consultations tailored to the specific occupational risks faced by farmers. These consultations often include general health examinations, guidance on pesticide handling, and the importance of personal protective equipment (PPE).

> *"Whenever service seekers come to our health facility, we always take the general examination and consult them according to their health problems and occupation. For instance, if a farmer comes with certain health problems if it Is treatable then we treat them here otherwise we refer them to the other health facility."*

Despite these efforts, challenges persist, such as limited follow-up mechanisms for referred cases and difficulties in convincing farmers to seek regular health check-ups.

> *"We counsel the patients and refer them to other hospitals but there is lacking information on whether that patient got the service or not feedback mechanism is very bad because most of the patients don't have phones or most of them don't know their number so we can't get the proper feedback if those things are resolved then the feedback would be good and farmers also need to be aware of such things in my opinion."*

Additionally, there's a notable emphasis on education and awareness initiatives, ranging from flip charts and pamphlets to community dramas, aiming to inform individuals about pesticide hazards and promote safer agricultural practices.

*"Yes, we do use IEC materials, we have. mainly the information related to hand-washing techniques, and the use of PPE."*

While some areas boast regular sessions and dedicated programs aimed at educating individuals on OHS practices, others face challenges due to resource limitations.

*"In duduwa we have a special program related to the OHS in Ward 6 there they have conducted certain OHS sessions and consulted some farmers regarding the OHS. But in another part of Duduwa we haven't conducted such a program due to resource limitation. We also try to provide information related to the OHS in our monthly meeting and yearly meetings."*

In places where sessions are conducted, topics covered include the proper use of personal protective equipment (PPE) and awareness of pesticide hazards.

*"Whenever a patient comes into our contact, we provide them the OHS consultation but we haven't launched an OHS consultation session. I think we launched an OHS consultation session once where we provided them on how to use a PPE set and aware them of the harmful effects of pesticide use."*

However, there's inconsistency in the frequency of these sessions, with some reporting monthly consultations while others note a lack of ongoing programs. Despite efforts to integrate OHS consultation into routine healthcare interactions, such as patient consultations, the establishment of regular OHS sessions remains sporadic in certain regions.

*"We did an OHS consultation every month but currently, it isn't happening."*

*"No OHS consultation isn't happening regularly. But in previous days we were told to conduct an OHS consultation from this date to another date. but currently, it's not happening."*

OHS consultation tools encompass various aspects of individuals' health, including past medical history, family medical history, and current health issues, facilitating comprehensive consultations tailored to their occupational risks.

*"We look at almost everything from general examinations like BP, Sugars, height, and weight to past and current health problems so after looking at all that then we consult them accordingly."*

Despite the effectiveness of these tools in gathering relevant health data, challenges such as hesitancy in disclosing occupation and difficulty in recalling past events pose barriers to data collection.

*"There aren't challenges in the tool but sometimes some people don't try to tell their occupation, sex workers usually don't tell their occupation and at that time it's hard to consult them as we will not know the real occupation that time it's hard otherwise the tools is perfect."*

Additionally, the lack of laboratory services limits the scope of health assessments, hindering the ability to provide comprehensive care.

*"The tool is perfectly good but our service is not there because we lack lab service and we can't perform other medical examinations we just perform general examinations so that part is lacking in our health institution."*

Suggestions for improvement include simplifying questionnaires and incorporating regular follow-up mechanisms to enhance data accuracy and usability.

*"The tool was kind of hard to ask in my opinion because we are asking farmers so I think the tool should have been made in simple terms and language in my opinion."*

Despite challenges, stakeholders recognize the importance of ongoing health assessments in addressing prevalent health issues, particularly among farmers and waste workers.

Some participants express optimism about farmers' adherence to safety measures, citing observations of improved PPE usage and decreased incidence of health complaints, others highlight persistent challenges.

*"We can't say 100% that farmers are taking the consultation correctly but, in my experience, yes, they have now started correctly using the PPE set sometimes I walk in the area and I see farmers using the PPE set so yeah, I think farmers are positively taking OHS consultation, I guess."*

Lack of proper supervision and financial constraints hinder farmers' ability to access and utilize PPE effectively, contributing to skepticism regarding behavior change.

> *I don't think so. We don't conduct field-related supervision, and there's no proper system for it. Farmers even hesitate to wear masks and gloves, let alone PPE. They lack the money to buy them, and the government doesn't provide them for free*

Nonetheless, there are promising signs of positive responses from farmers, with evidence of increased awareness of pesticide hazards and the adoption of sustainable farming practices such as integrated pest management (IPM) and organic tools.

> *Yes, the farmers are very positive they now use proper PPE set while working on the farm moreover they use organic fertilizer in the field and are using less and less pesticides.*

### *Opportunities for OHS consultation in the future*

Participants emphasized the importance of adopting diverse communication strategies, such as audio-visual techniques, to convey OHS information to target audiences effectively.

> *We are just giving information through visual aids I think we need to provide information through audio-visual techniques.*

Additionally, there's a call for broader integration of OHS principles into educational curricula and policy frameworks to foster long-term behavior change and address emerging health challenges, particularly non-communicable diseases (NCDs) linked to occupational hazards.

> *Currently, we haven't as we thought that pesticides and insecticides are mostly related to the agriculture field but taking the training, I came to realize that it includes health as well since I am in the planning phase I am thinking of conducting training related to the OHS consultation and I have also planned to enlist the information related to the OHS consultation in the school curriculum as well.*

Critiques regarding the complexity and scope of OHS questionnaire tools underscore the need for streamlined, user-friendly tools that capture essential data efficiently.

> *Yes, while developing the OHS questionnaire tool it would have been better if we had been present in that session, we also would have given some suggestions as the questionnaire was too vast and the pattern wasn't good.*

Suggestions for practical interventions include incorporating occupational health sections into medical records, implementing signage to raise awareness of hazards, and fostering collaboration between government agencies, NGOs, and community stakeholders to ensure the sustainability of OHS initiatives.

> *Tools are more than sufficient but what is lacking is that in the OPD register, there are no questions related to the occupation so what we should do is we need to coordinate with the Nepal government and include that section in the OPD register then it will be much easier.*

## Section 7: Case Studies

### *Case Study from Khajura Municipality*

At the time of cotton farming our 2 to 3 fellow farmers were seriously ill and they also died. We heard that after spraying the pesticide they didn't wash their hands and consuming water from that same handle to their death. We used to spray thylon when we were farming cotton which was the most dangerous pesticide because of haphazard use of it they died. We used to buy that pesticide from the retailers and was recommended by the company which buys the cotton from us.

### *Case Study from Nepalgunj*

There were cases where people reported they had hand irritation, skin redness, and skin lumps but I didn't get those things there was an event when our neighbor sprayed the pesticide, she massively had hand irritation but she didn't go to the hospital and it was minimized in 2 to 3 days but the case of pesticide poisoning I have never heard of that.

## Section 8: Triangulation of the findings from Quantitative, qualitative, and OHS consultation data KII and document review

The predominant acute health issue among farmers appeared to be headaches, as indicated by all three data collection methods. Back pain was also prevalent, as identified in the quantitative data and OHS consultation document review. Concerning IPM tools, jholmol emerged as the most frequently used, consistent with findings from both quantitative and qualitative studies, followed by pheromone traps and crop rotation. The adoption of IPM tools resulted in various benefits such as enhanced crop quality, better health outcomes, reduced chemical usage, and improved soil health, findings corroborated by both quantitative and qualitative analyses. Notably, while the quantitative study indicated high usage of chemical pesticides, the qualitative data suggested a significant portion of farmers practiced IPM and organic methods, indicating a potential gap in training. Both quantitative and qualitative assessments underscored the necessity to expand IPM and organic training programs to reach more farmers. Moreover, qualitative interviews and OHS consultation Key Informant Interviews (KIIs) revealed that farmers currently utilize Personal Protective Equipment (PPE) while working on the farm.

# LIMITATIONS

This study has several limitations that should be acknowledged. First, the scope of the research was constrained by limited study time, geographical coverage, and the number of participants, which may restrict the generalizability of the findings. Second, the information on health effects was primarily subjective, relying on self-reported data, which can introduce bias and affect the reliability of the conclusions. Third, there was a lack of comprehensive data on occupational health and safety. Lastly, the study encountered challenges due to limited organizational expertise on pesticides, which may have impacted the depth and precision of the analysis.

# CONCLUSION AND RECOMMENDATION

## CONCLUSION

In conclusion, almost half of the farmers have suffered from the health effects, headache, muscle pain, back pain, and paresthesia were the most common acute health problems, whilst in terms of chronic health problems hypertension, COPD, and neuropathic pain were most dominant. Knowledge regarding IPM and organic farming was also good among farmers resulting in good health, better crop quality, and minimum exposure to chemical pesticides. Farmers' knowledge of PPE use and color coding used in pesticide bottles, and some of them even had good pesticide disposal practices as well

## RECOMMENDATION

1. A need for awareness and education on safe pesticide handling and disposal practices to minimize environmental and health risks associated with pesticide use in agricultural settings.

2. Retailers of pesticides should be specifically engaged to impart proper knowledge and practices regarding pesticide usage and safe disposal. They serve as the primary touchpoint for numerous farmers, making their awareness crucial.

3. Efforts to expand training on Integrated Pest Management (IPM) and organic farming should be broadened across multiple regions instead of concentrating solely on a single administrative unit.

4. Collaboration, resource allocation, and proper feedback mechanisms emerge as key factors influencing the continuity and effectiveness of OHS consultation initiatives in rural communities.

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# APPENDICES

## APPENDIX 1.1: QUANTITATIVE QUESTIONNAIRE

*Participants Information's (Circle the answer)*

| Participant Initials | Code |
|---|---|
| **Consent has been read and obtained** | |
| Yes | 1 |
| No | 0 |
| **Interview Language** | |
| English | 0 |
| Nepali | 1 |
| **Family surname** | |
| **First Name** | |
| **Phone Number if possible** | |
| **Latitude** | |
| **Longitude** | |

*Demographic Information (Circle the answer)*

| *Questions* | *Code* |
|---|---|
| **Sex** | |
| Male | 0 |
| Female | 1 |
| **Age (in completed years)** | |
| **Literacy Status** | |
| Illiterate (Those who can't read and write ) | 0 |
| Literate | 1 |
| **Educational Status** | |
| No formal education | 0 |
| Less than primary | 1 |
| Primary school completed | 2 |
| Completed SEE/SLC | 3 |
| Completed +2 | 4 |
| Completed Bachelor | 5 |
| Completed master and above | 6 |
| Refused | 99 |

| **Caste** | |
|---|---|
| Brahmin | 1 |
| Chhetri | 2 |
| Janajati | 3 |
| Muslim | 4 |
| Thakuri | 5 |
| Magar | 6 |
| Other | 7 |
| Refused | 99 |
| **Marital Status** | |
| Unmarried | 0 |
| Married | 1 |
| Other | 2 |
| Refused | 99 |
| **Family members (No of people)** | |
| **Type of farming** | |
| Non-commercial | 0 |
| Commercial | 1 |
| **How long have you been working on the farm** | |
| Number in Years | |
| Don't know | 88 |
| **How long have you been using pesticides** | |
| Number of years | |
| Don't know | 88 |
| **How many times have you sprayed in the last month** | |
| Number of times | |
| Don't know | 88 |
| **How many hours did you spray in last week (Hours/week)** | |
| Number of hours | |
| Don't know | 88 |

| In which crop do you use pesticide (Multiple choice) | |
|---|---|
| Paddy | 1 |
| Maize | 2 |
| Wheat | 3 |
| Millet | 4 |
| Barley | 5 |
| buckwheat | 6 |
| Vegetables | 7 |
| Coffee | 8 |
| Tea | 9 |
| Cotton | 10 |
| Jute | 11 |
| Oilseed | 12 |
| Sugarcane | 13 |
| Potato | 14 |
| **If vegetable, what kind of vegetables do you produce mostly (Open-ended)** | |
| **Have you experienced any signs of sickness after using pesticides within the last month?** | |
| Yes | 1 |
| No | 0 |
| I have been ill but I'm uncertain whether it's related to the use of pesticides. | 2 |
| Don't know | 88 |

*Self-reported health effects (Circle the answer)*

| Questions | Code |
|---|---|
| **Which of the following symptoms did you suffer?** | |
| **Dizziness** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Headache** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Eye irritation** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Eye Burning** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Blurred Vision** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Nausea** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Vomiting** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Weakness** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Muscle pain** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Paresthesia** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Trembling Hands** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Respiratory Difficulties** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Extreme Tiredness** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Abdominal pain** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Loss of appetite** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Excessive sweating** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |

| Dry Mouth | |
|---|---|
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Back pain** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Others** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Others if yes specify** | |

**Chronic Health Condition (Circle the answer)**

**Have you been told or diagnosed as one or more of the following chronic diseases (Multiple choice)**

| CHC | Code |
|---|---|
| **Hypertension** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Diabetes** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Thyroid** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Chronic Obstructive Pulmonary Diseases** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Abnormal menstrual cycle (If Women)** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Neuropathic pain** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Asthma** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Birth Defects** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Others** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Others if yes specify** | |

| Integrated Pest management | |
|---|---|
| **Questions** | **Code** |
| **Have you heard about IPM** | |
| Yes | 1 |
| No | 0 |
| Don't know | 88 |
| **Which primary farming methods do you currently use in vegetable cultivation** | |
| Chemical based | 1 |
| IPM or organic farming | 0 |
| **Have you taken IPM training?** | |
| Yes | 1 |
| No | 0 |
| If yes from whom (Multiple choice) | |
| NGO/INGO | 0 |
| Fellow farmers | 1 |
| Family members | 2 |
| Pesticide retailers | 3 |
| Others | 4 |
| Others specify | |

| What IPM practices have you applied in the field? (Khanal et al., 2020) (Do not prompt) | |
|---|---|
| Bio-fertilizers | 1 |
| Jholmol | 2 |
| Bio-pesticides | 3 |
| Pheromone traps | 4 |
| Soil amendment | 5 |
| Mulching | 6 |
| Soil solarization | 7 |
| Bagging | 8 |
| Grafting | 9 |
| Crop rotation | 10 |
| Others | |
| Others specify | |

| Have you observed any crop yield or quality benefits from practicing IPM or organic farming? | |
|---|---|
| Yes | 1 |
| No | 0 |
| Don't know | 88 |

| If yes what could be the benefits (Multiple choice) (Do not prompt)(Khanal et al., 2020) | |
|---|---|
| Less use of chemical | 1 |
| Cost-effectiveness | 2 |
| Improved Crop Quality | 3 |
| Improved water quality | 4 |
| Improved soil health | 5 |
| Good health | 6 |
| Others | |
| If other specify | |

| Have you faced any challenges or barriers while adopting IPM or organic farming practices? | |
|---|---|
| Yes | 1 |
| No | 0 |
| Don't know | 88 |

| If yes what are those (Multiple choice) (Do not prompt)(Khanal et al., 2020) | |
|---|---|
| Lack of knowledge and awareness | 1 |
| Limited availability of organic output | 2 |
| Cost of purchasing organic output | 3 |
| Family, social, and community pressure to use chemical fertilizers | 4 |
| Others | 5 |
| If other specify | |

| Are you satisfied with the support and resources provided by the IPM/organic farming program? | |
|---|---|
| Yes | 1 |
| No | 0 |
| Not sure | 77 |

| Are you considering expanding the practice of IPM/organic farming on your farm in the future? | |
|---|---|
| Yes | 1 |
| No | 0 |
| Don't know | 2 |

| Would you recommend the current IPM/ organic farming practice to others | |
|---|---|
| Yes | 1 |
| No | 0 |
| Not sure | 77 |

# APPENDIX 1.2: QUALITATIVE QUESTIONNAIRE

## Qualitative Questions related to Knowledge and practices

*Knowledge and practices*

1. How would you describe your general understanding of pesticides and their use in farming?
2. Can you name and describe the pesticides commonly used in your farming community?
3. What factors influence your choice of a particular pesticide?
4. What methods do you use to apply pesticides on your crops?
5. Have you received any training on proper pesticide application techniques?
6. How aware are you of the potential health and environmental risks associated with pesticide use and what are those?
7. How frequently do you use pesticides in your farming practices?
8. Are there specific times or seasons when you find it necessary to use pesticides more often?
9. What are the primary reasons for using pesticides on your crops?
10. Are there specific pests or diseases that commonly affect your crops?
11. Have you ever considered or tried alternative methods, such as Integrated Pest Management (IPM) or organic farming, instead of or in conjunction with pesticide use?

*Coping mechanism*

1. What safety measures do you take to protect yourself and others during pesticide application?
2. How do you monitor your health after pesticide application?
3. Are there any specific symptoms or signs that you associate with pesticide exposure?
4. Have you received any training or education on the safe use of pesticides?
5. How do you stay informed about the latest developments and guidelines related to pesticide use?
6. Do farmers in your community share information or support each other regarding pesticide use?
7. Are there community initiatives or organizations that provide assistance or resources related to pesticide safety?
8. What is the availability of healthcare services in your community in case of pesticide-related health issues?

## OHS Questionnaire

1. Can you provide an overview of the Occupational Health and Safety (OHS) consultation process in your organization/community?
2. What are the key objectives of OHS consultations?
3. Who typically participates in OHS consultations?
4. Are there specific stakeholders or groups that play a crucial role in the consultation process?
5. How often are OHS consultations conducted in your health facility?
6. Are there specific times or triggers that prompt an OHS consultation?
7. Are there specific documents, reports, or tools employed to collect OHS data?
8. Can you describe the methods used to collect OHS data during consultations?
9. What are the key metrics or indicators that are routinely assessed or monitored during OHS consultations?
10. How are these metrics selected and prioritized?
11. Have there been any challenges or obstacles encountered in the process of collecting OHS data during consultations?

12. How have these challenges been addressed or mitigated?

13. Are there mechanisms for obtaining feedback and input from workers and other relevant parties?

14. How is the data collected during OHS consultations utilized to improve occupational health and safety practices?

15. Can you provide examples of instances where OHS data led to positive changes?

16. Are there established procedures for implementing follow-up actions based on OHS consultation findings?

17. How is the OHS consultation process continuously evaluated and improved over time?

18. In your opinion, what enhancements or improvements could be made to strengthen the OHS consultation process?

19. Are there emerging trends or challenges that may require adjustments to the consultation approach?

20. Are there training programs or initiatives to enhance knowledge and skills related to OHS?

# APPENDIX 1.3: ETHICAL COMMITTEE DECISION

Government of Nepal

## Nepal Health Research Council (NHRC)

Estd. 1991

Ref. No.: 1303

11 February 2024

**Ms. Sailaja Ghimire**
Principal Investigator
Freelance Researcher

**Ref: Approval of research protocol**

**Dear Ms. Ghimire,**

This is to certify that the following protocol and related documents have been reviewed and granted approval through the expedited review process for its implementation.

| | | | |
|---|---|---|---|
| **Protocol Registration No/ Submitted Date** | 760/2023<br>29 December 2023 | **Sponsor Protocol No** | NA |
| **Principal Investigator/s** | Ms. Sailaja Ghimire | **Sponsor Institution** | NA |
| **Title** | Integrated Assessment of Self-Reported Pesticide Toxicity, Farmer's Knowledge and Practices, and Occupational Health Safety: A Dual Perspective Study in Vegetable Farming Communities | | |
| **Protocol Version No** | NA | **Version Date** | NA |
| **Other Documents** | 1. Data collection tools<br>2. Informed Consent Form<br>3. CoI Declaration<br>4. Training certificates<br>5. Role and responsibilities<br>6. Work plan | **Risk Category** | Minimal risk |
| **Co-Investigator/s** | 1. Mr. Bishal Dahal Khatri | | |
| **Study Site** | Nepalgunj Municipality, Khajura Rural Municipality, and Duduwa Rural Municipality | | |
| **Type of Review** | √ **Expedited**<br>☐ Full Board<br>**Review Date:** 11 February 2024 | **Timeline of study**<br>11 February 2024 to May 2024<br>**Duration of Approval**<br>11 February 2024 to 10 February 2025<br>**This approval will be valid for one year** | **Frequency of continuing review**<br>NA |
| **Total budget of research** | **NRs 5,41,176.00** | | |
| **Ethical review processing fee** | **NRs 10,000.00** | | |

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Government of Nepal

# Nepal Health Research Council (NHRC)

Estd. 1991

Ref. No.: 1303

**Investigator Responsibilities**

- If you do not start the project within 3 months of this letter, please contact the Ethical Review M & E Section at NHRC
- Any amendments shall be approved from the ERB before implementing them
- Submit progress report every 6 months
- Submit final report after completion of protocol procedures at the study site
- Comply with all relevant international and NHRC guidelines
- Abide by the principles of Good Clinical Practice and ethical conduct of the research

If you have any questions, please contact the Ethical Review M & E Section at NHRC.

**Thanking you,**

**Dr. Meghnath Dhimal**
**Acting Administrative Chief**

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# ALSO TREATING INJUSTICE

FEBRUARY 2025