USE AND IMPACTS OF PESTICIDE IN HAI HAU DISTRICT, NAM DINH PROVINCE

Results from Community-Based Pesticide Action Monitoring (CPAM) in 2024

November 2024

Research Center on Gender, Family and Environment in Development (CGFED)

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INTRODUCTION

Community-Based Pesticide Action Monitoring (CPAM) is the systematic, participatory method to documenting the impacts of pesticides on health and the environment at the community level. CPAM is conducted directly by local farmers, with the primary objective of providing evidence to support policy decisions, including the restriction or ban of hazardous pesticides and the transition to agroecological practices. Through CPAM surveys, the types of pesticides, especially highly hazardous pesticides (HHPs), used by local farmers are identified and documented. Additionally, the study examines best agricultural practices and highlights the health issues faced by farmers in the community.

Since 2010, **Research Centre for Gender, Family and Environment in Development (CGFED) and Pesticide Action Network Asia Pacific (PANAP)** have carried out extensive awareness-raising activities in Hai Hau District, Nam Dinh Province. These initiatives have specifically targeted the general population and female farmers to promote pesticide risk reduction strategies and women's leadership in agroecology. With the support of the Women Union (WU) of Hai Hau District, a pioneer group of female farmers was established. Concerned about the adverse effects of pesticides in their community, this female group has actively participated in multiple CPAM studies since 2015.

The table below summarizes CPAM activities conducted by the pioneering female farmer group:

Year	Pioneering female farmer group	Survey sample size
2015	30 key farmers from 10 communes	300 farmers (126 males và 194 females) and 10 pesticide vendors
2016	10 key farmers from 3 communes	100 farmers (32 males và 68 females) and 3 pesticide vendors
2018	20 key farmers from 2 communes	200 farmers và 100 students in Primary and Secondary Schools
2022	5 key farmers from 1 commune	100 farmers và 98 students in Secondary Schools

By 2024, the CPAM report was further expanded by the pioneering female farmer group, surveying 201 farmers in Hai Xuan Commune and Hai Cuong Commune, Hai Hau District, Nam Dinh Province.

This survey was conducted as part of the initiative:
"Enhancing Community Capacity in Monitoring Pesticide Use and Observing Biodiversity to Promote Ecological Agriculture in Hai Hau District, Nam Dinh Province – For a Toxin-Free Environment."
Supported by Agroecology Learning Alliance in Vietnam

ABBREVIATIONS

Agroecology Learning Alliance in Vietnam	ALiSEA
Community-Based Pesticide Action Monitoring	CPAM
Research Center on Gender, Family, and Environment in Development	CGFED
Pesticide Action Network Asia Pacific	PAN AP

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I. BACKGROUND

1.1. Research location and methodology

Research location

Hai Hau is a coastal plain district in the Red River Delta in the southeast of Nam Dinh Province. The district covers an area of 226 km2 and has a population of over 260,000 residents. Currently, the Hai Hau district consists of 3 townships and 21 communes.[1]

Hai Hau also is one of the key rice-producing regions of Nam Dinh and the Red River Delta. It was among the first districts to achieve a rice yield of 5 tons/hectare.[2] In recent years, Hau Hau district has maintained 19,878 hectares of annual rice cultivation area and 7,308 hectares of vegetable and other crops area.[3]

Hai Cuong Commune, located in the southern part of Hai Hau District, spans an area of 6,78 km^{2,} with its residents primarily engaged in fishing, aquaculture, and rice cultivation.[4] In July 2024, the Hai Cuong Commune was merged into the Hai Xuan Commune. Therefore, Hai Xuan Commune now has a total land area of 15,12 km² and a population of 23,263 people.[5]

Source: Hai Hau District Electronic Information Portal

Hai Xuan Commune and Hai Cuong Commune were selected as the research sites. Notably, Hai Cuong Commune previously participated in the 2022 CPAM study, which involved 100 farmers and 98 students in secondary schools.

Research methodology

The study utilized the CPAM questionnaire, which is standardized for use across all PANAP member countries conducting similar research. To ensure accessibility for local farmers, the CPAM questionnaire was translated into Vietnamese to facilitate interviews and data collection.

1.2. General information on the survey sample

Sample size: A total of 201 farmers participated in the survey, comprising 95 men (47.3%), and 106 female (52.7%). The proportion of female participants was higher in Hai Cuong Commune than in Hai

[1] Hai Hau District Electronic Information Portal. Accessed on November 15, 2024.
[2] https://vi.wikipedia.org/wiki/H%E1%BA%A3i_H%E1%BA%ADu. Accessed on November 15, 2024.
[3] https://daibieunhandan.vn/huyen-hai-hau-tinh-nam-dinh-hinh-thanh-nhung-mo-hinh-san-xuat-nong-nghiep-sang-tao-hieu-qua-post382088.html, access on November 2024. Accessed on November 15, 2024.
[4] Electronic Information Portal of Department of Natural Resources and Environment, People's Committee of Nam Dinh province. Accessed on November 15, 2024.
[5] Nam Dinh Province Electronic Information Portal. Accessed on November 15, 2024.

Xuan Commune (53% và 51.9%), whereas the proportion of male participants was higher in Hai Xuan Commune than in Hai Cuong Commune (48.1% và 47%).

The majority of survey participants had an educational background ranging from primary to high school. Only 1% had attended kindergarten or college/university, and 0.5% had received vocational training.

Table 1. Education level of survey participants

Education	***Samples***	***%***
Kindergarten/preschool	2	1.0
Primary school	60	29.9
Secondary school	49	24.4
High school	87	43.3
Vocational training	1	0.5
College/University	2	1.0
Total	201	100

Regarding the age distribution of survey participants, 55.2 % were within the working-age population, while the remaining 44.8% were aged 60 to 79. The middle-aged group (40 to 59 years old) accounted for nearly half of the survey sample, comprising 49.2% of participants.

Table 2. Age distribution of survey participants

Age	*Samples*	*%*
20 – 29	1	0.5
30 – 39	11	5.5
40 – 49	33	16.4
50 – 59	66	32.8
60 – 69	70	34.8
70 – 79	20	10.0
Total	201	100.0

Marital status*:* 93% of respondents were married and living with their spouse; 5.5% were widowed; and 1.5% were single or divorced.

Household size: The majority of rural households consisted of 2 to 5 members, with the most common household being: 4 members (28.9%); 2 members 25.9%); 3 members (20.9%); and 5 members (14.4%). Households with 6 members and households with 7 members were less common (2% and 6.5% respectively). Only one surveyed individual reported living alone.

Number of children under 18 per household: The highest proportion of households had one child (26,4%), 25,9% of households had no children under 18; 11.9% of households had two children; and households with three or four children were minimal.

Occupation: 95.5% of respondents were self-employed or engaged in agricultural activities in their area. Only 4.5% of respondents were wage laborers.

- Among 4.5% of respondents engagined in wage labor, 33.3% were employed by companies; 22,2% worked as independent contractors, and the remainder were engaged in other types of work, such as domestic work, land management, and general labour for various local employers. Only 22.2% of them had formal employment contracts.
- Employers in these areas included individuals in need of labour, household owners, and other community members. 33.3% of wage labourers had been in their current works for more than 10 years. 44.5% had worked in their position for 1 to 4 years. And 22.2% had beem emplyed for 6 months to 1 year. Nearly half of wage laborers (44.5%) worked in operators with 1 to 5 employees. 33.3% of them worked in operators with 6 to 10 employees. No respondents worked in workplaces with 10 to 15 employees and the numbers of respondents worked in workplaces with 16 or more employees were minimal.
- 44.5% of wage labourers were engaged in sesonal or irregular employment. Other employment types, including full-time, part-time, contract-based, and seasoanl work acounted 11.1% of respondents for each.
- Nearly half of employees (44.5%) worked less than 10 hours per week. 33.3% of them worked more than 50 hours per week. 11.1% worked 20 to 30 hours per week. And another 11.1% worked 30 to 40 hours per week.
- The reported hourly wage ranged from 17,000 VND to 43,750 VND. 88,9% of wage labourers considered their wages to be in line with Vietnam's minimum hourly wage standards.

***Land ownership*:** 97.5% of survey participants owned agricultural land. Among them:

- 44.3% used their land primarily for household consumption. 37.3% engaged in commercial farming. 18.4% combined both household and commercial farming.
- The majority of cultivated land was used for rice farming, vegetable production (onions, garlic, cucumbers, beans, and so on), and flower cultivation. A smaller proportion was allocated for poultry farming (chickens) and plantation.

Reasons for choosing their current occupation: Nearly half of respondents (48.8%) chose their occupation based on personal preference. 30.3% of them followed family traditions or parental occupations. 11.4% chose their occupation due to a lack of alternative job opportunities. Other reasons were negligible.

Current occupation of spouses: The majority of spouses were engaged in small-scale farming (31.3%) and commercial agricultural production 29.9%).

***Household annual income**:* 33.8% of households had an annual income between 2000 USD - 3000 USD/year (approximately 50 - 76 million VND/year); 28.9% earned 3000 USD - 4000 USD/year (approximately 76 -101 million VND/year); 28,9% earned more than 5000USD/year (over 126 million VND/year); 7,5% had an annual income of 4000 USD - 5000 USD/year (approximately 101 - 126 million VND/year); only 1% of households had an income bellow 3000 USD/year..

Table 3. Annual household income

Annual income	*N*	*%*
Less than 500$	1	0.5
$ 1000 - $ 2000	1	0.5
$ 2000 - $ 3000	68	33.8
$ 3000 - $ 4000	58	28.9
$ 4000 - $ 5000	15	7.5
More than $ 5000	58	28.9
Total	201	100.0

***Proximity of residence to pesticide-sprayed fields*:** 71% of households lived within 1 km from agricultural fields where pesticides were sprayed; 13% of households lived 2 km away; 5% of households were located 3 km away.

II. RESULTS OF CPAM REPORT 2024

2.1. Farmers' knowledge of pesticides

According to the survey results, 48.8% of the farmers surveyed had received training on pesticides. Among them, 6.1% obtained information from vendors at local ships (100% of whom were female), while 93% acquired knowledge through participation in conferences or workshops (38.8% male and 61.2% female).

The number of farmers attending training sessions in 2024 remains consistent with 2022 (41%) but has significantly declined compared to 2018 (92%). Notably, the proportion of male participants in pesticide training sessions in 2024 (40% male and 56.6% female) has nearly doubled compared to 2022 (24.4% male and 75.6% female) and is also higher than in 2018 (37.1% male and 39.6% female). Additionally, there has been a sharp decline in the percentage of farmers obtaining pesticide-related information from vendors in 2024 compared to 2022 (6.1% and 88% respectively).

Table 4. Proportion of participants attends pesticide training by gender (%)

Proportion of participants attends pesticide training	*Male*	*Female*
Attended training	40	56.6
Obtained inforation from vendors	0	5.7
Acquired knowledge through participation in conferences, workshops	40	50

When using pesticides, 96,5% of surveyed farmers reported having seen the products labels, and 91% stated that they read or occasionally read the labels. Notably, the percentage of women who read the labels was higher than that of men (53% vs.47%). This indicates continued improvement in labeling and design compared to previous surveys, as the proportion of farmers who observed labels written in Vietnamese increased significantly (99.5% in 2024 vs. 75% in 2022 and 67.8% in 2018). Additionally, 77.6% of respondents noted that the label information was printed in a sufficiently large font for readability.

Farmers' interest in pesticide label information is further reflected by the fact that 38.3% of those surveyed were able to provide images of product labels. While this figure is lower than in 2022 (41%), it remains significantly higher than in 2018 (4.5%).

Moreover, 74.6% of respondents reported having access to pesticide usage guidelines, and 74.1% found the instructions to be useful. However, the remaining respondents considered the information unhelpful due to excessively small font size, the absence of Vietnamese translations, or a lack of time to read the instructions.

Table 5. Information of pesticide labels

Information of pesticide labels	*N*	*%*
Having seen the production labels	194	96,5
Read or occasionally read the labels	183	91
Labels written in Vietnamese	200	99,5
Sufficiently large font for readability	156	77,6
Able to provide images of product labels	77	38,3
Having access to pesticide usage guidelines	150	74,6

In rural areas of Vietnam, many retail stores offer a variety of agricultural products, including seeds, plants, livestock, fertilizers, and pesticides. According to survey results, 77.6% of respondents purchase pesticides from retail stores.

Table 6. Places of pesticide purchase

Places of pesticide purchase	*N*	*%*
Farm supply store	9	4.5
In home store	25	12.4
Market stall	6	3
Retail shop	156	77.6
Roadside stall	6	3
Supply agent	23	11.4

Farmers typically select pesticides based on their personal experience (80.6%), recommendations from vendors (34%), and product labels (11.4%), while other factors, such as suggestions from others, play a negligible role.

Regarding household pesticide purchasing responsibility, 97.5% of surveyed farmers reported buying pesticides themselves, while 1% stated that their parents handled the purchases. The percentage of farmers personally purchasing pesticides in 2024 is 1,5 times higher than in 2022 (64%).

Among those who purchase pesticides independently (97.5%), 54.1% are women and 45.9% are men. This marks an increase in the proportion of men responsible for purchasing pesticides compared to 2022, when 71.9% of buyers were women and only 28.1% were men.

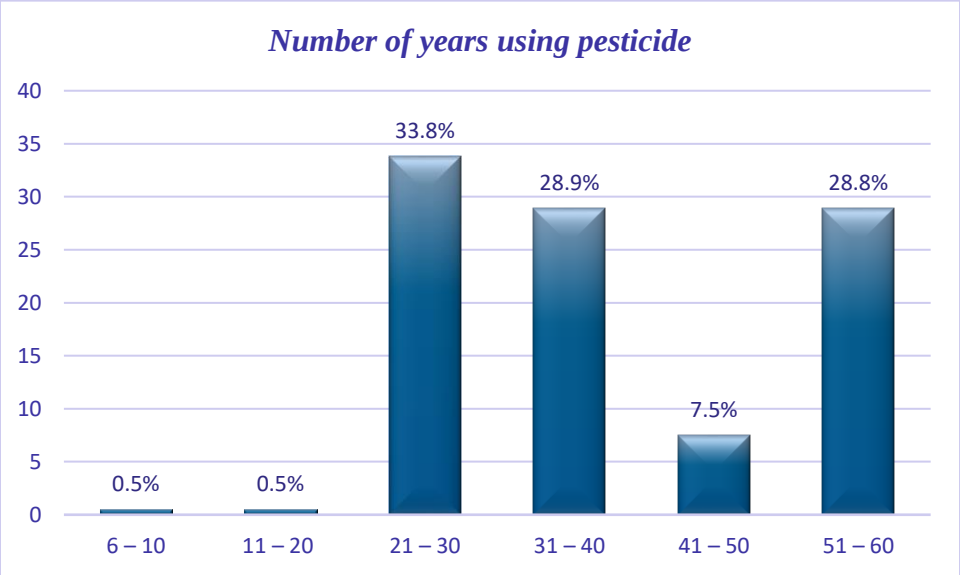
When purchasing pesticides, only 10.4% of respondents reported wearing protective gear to avoid direct contact with pesticide containers.

2.2. Pesticide usage levels

According to the survey results, a significant majority (98%) of respondents reported using pesticides. Farmers commonly apply pesticides at home, in their workplaces, and in the fields. Specifically, 62.2% use pesticides in the fields, 1% use them at home, and 36.3% apply pesticides both at home and in the fields. Women are more likely than men to use pesticides in both home and field settings. There is no notable difference in pesticide usage rates between the two surveyed communes. However, in both locations, pesticide use in the fields is significantly higher than at home or in workplaces, with 96.1% of respondents in Hải Xuân and 100% in Hải Cường reporting field use.

The duration of pesticide use among respondents ranges from 6 to 60 years. The highest proportion (33.8%) of users reported applying pesticides for 21 to 30 years, followed by 28.9% who have used them for 31 to 40 years, and another 28.9% who have used pesticides for 51 to 60 years.

Chart 1. Number of years using pesticide



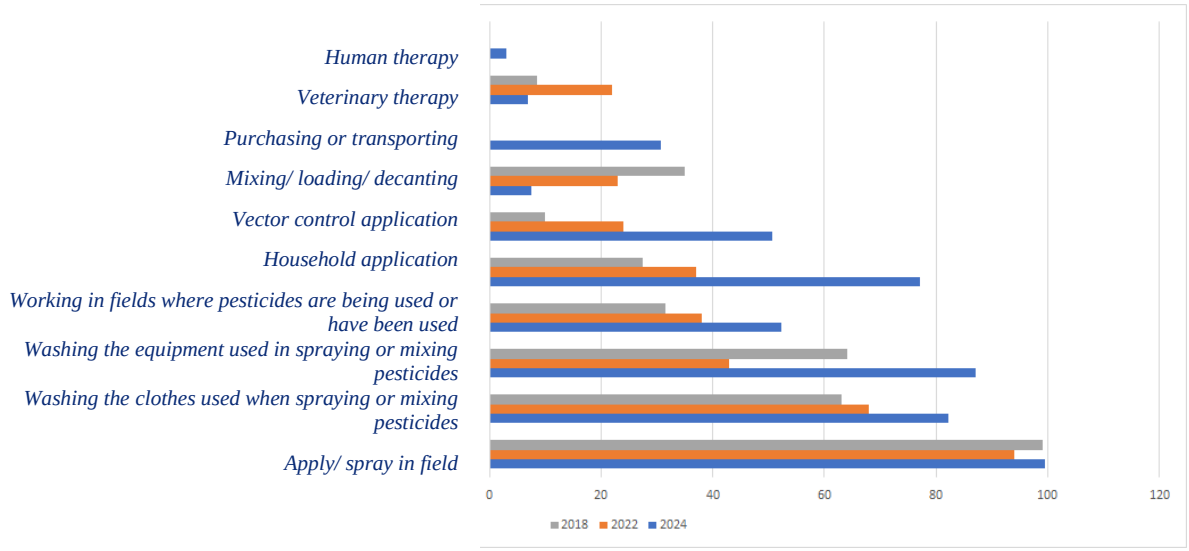
The study results indicate that 99.5% of farmers apply pesticides in the fields. Additionally, 82.1% of farmers wash their clothes after spraying or mixing pesticides, while 87.1% clean the equipment used for pesticide application and mixing. Beyond agricultural use, farmers also utilize pesticides for other purposes, including pest control (50.7%), household mosquito extermination (77.1%), and veterinary treatment (7%). Alarmingly, 3% of farmers reported using pesticides to treat human illnesses.

Table 7. Activities involved in pesticide usage

Activities	N	%
Apply/ spray in field	200	99.5
Washing the clothes used when spraying or mixing pesticides	165	82.1
Washing the equipment used in spraying or mixing pesticides	175	87.1
Working in fields where pesticides are being used or have been used	105	52.2
Household application	155	77.1
Vector control application	102	50.7
Mixing/ loading/ decanting	15	7.5
Purchasing or transporting	62	30.8
Human therapy	6	3
Veterinary therapy	14	7

Compared to 2022 and 2018, the percentage of farmers using pesticides for pest control in 2024 has increased significantly—twice as high as in 2022 and five times higher than in 2018. Similarly, the use of pesticides for household purposes has doubled compared to previous years. Additionally, there has been an increase in various pesticide-related activities, such as cleaning spraying and mixing equipment, mixing and handling pesticides, loading and unloading, purchasing, and transportation. Conversely, the percentage of farmers using pesticides for veterinary treatment has declined compared to previous years.

Chart 2. Comparison of activities involved in pesticide use in 2024, 2023, and 2018



(Data are taken from CPAM in 2018, 2022 and 2024)

Regarding the frequency of pesticide use among surveyed farmers, 60.7% reported using pesticides monthly, 17.4% used them weekly, 17% applied pesticides seasonally, and only 0.5% used them daily. The proportion of farmers using pesticides monthly has increased by 7.7% compared to 2023 (53%) and by 33.7% compared to 2018 (27%).

Table 8. Frequency of pesticide use

Frequency of pesticide use	***N***	***%***
Daily	1	0,5
Weekly	35	17,4
Monthly	122	60,7
Seasonally	34	17
Other	9	4,4
Total	201	100

When using pesticides, 99.5% of farmers take advantage of the wind direction while spraying, both to maximize the effectiveness of the wind and to minimize their exposure to pesticides. Notably, there has been significant improvement in CPAM 2024 and 2023, as opposed to 2018, when 9% of surveyed farmers still sprayed pesticides against the wind direction.

However, a considerable number of rural farmers continue to work in the fields shortly after pesticide application. The data reveals that 28.9% of farmers return to their fields one day after spraying, 33.8% after two days, 18.4% after three days, and only 0.5% wait at least five days before re-entering the fields.

Of particular concern, the proportion of farmers returning to the fields 1–2 days after pesticide application in 2024 is significantly higher than in 2023 and 2018 (4.5%). Additionally, 17.9% of surveyed farmers reported continuing to work in recently sprayed fields, a rate considerably higher than in 2023 (3%) but lower than in 2018 (31.7%).

Table 9. Comparison of percentage of farmers returning to pesticide-sprayed fields in 2024, 2022, and 2018

How soon do you enter the field after it has been sprayed	*2024(%)*	*2023(%)*	*2018(%)*
Same day	17,9	3	31.7
After 1 day	28,9	13	4.5
After 2 days	33,8	28	
After 3 days	18,4	52	49.5
Other (After 5 days)	0.5		

Returning to the fields immediately after pesticide spraying increases the risk of exposure, as chemical residues remain on crops, water, and soil.

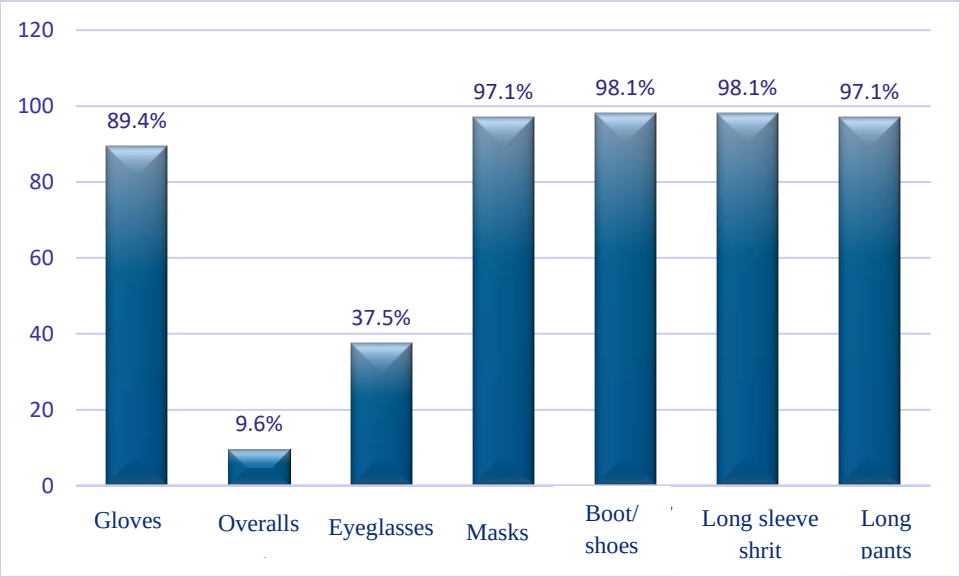
2.3. Use of protective equipment when using pesticides

When handling any type of chemical, workers must wear protective equipment to safeguard their health by preventing and minimizing direct contact with toxic substances on the skin and through inhalation. This is particularly crucial for pesticides, as they are often sprayed outdoors, where strong spray pressure and wind can easily disperse chemicals into the air.

51.7% of surveyed farmers reported wearing protective clothing when using pesticides, marking a 2.5-fold increase compared to 2022 (21%). This improvement suggests a growing awareness of personal health protection among farmers. However, the percentage of men wearing protective clothing (43.3%) remains lower than that of women (56.7%). Farmers primarily procure their protective gear independently (99%), with only one case of their protective equipment provided by their employer. Additionally, 87.1% of respondents reported reading instructions on how to use protective gear.

Most farmers' protective clothing consists of regular long-sleeved shirts, long pants, rubber boots, gloves, and face masks, rather than specialized protective gear. A smaller percentage use safety goggles (37.5%) and coverall protective suits (9.6%). Among those who do not wear protective gear, the primary reason cited is discomfort (95.9%).

Chart 3. Types of protective gear used during pesticide spraying



Among hired farmworkers, all reported that their employers were aware that they did not wear protective equipment. Only one case was mentioned where an employer promised to provide protective gear, as stipulated in the labor contract.

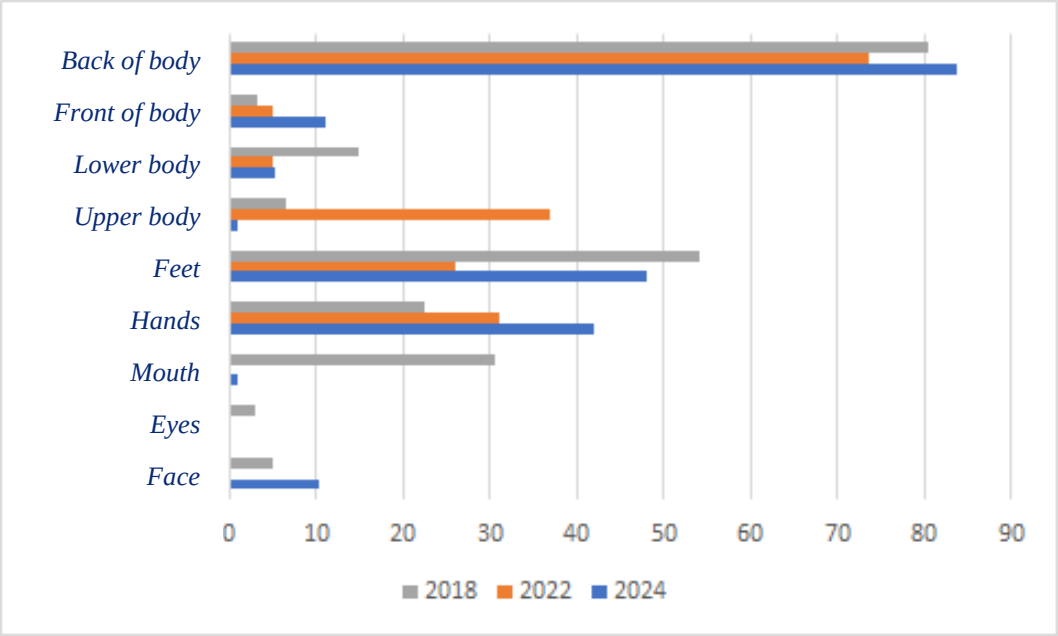
Survey participants also identified areas where they could wash clothes, hands, and bathe after using pesticides. The majority (97%) used irrigation canals and drainage ditches, while others relied on rivers (47.3%), ponds and lakes (1%), wells (10.4%), and tap water (1.5%).

2.4. Pesticide exposure levels

Pesticide exposure can occur through occupational and environmental pathways, both indoors and outdoors, as well as through food and water contamination. Experimental studies provide strong evidence that many pesticides—whether individually or in combination—act as endocrine disruptors, neurotoxic agents, immunotoxins, and carcinogens.

In practice, farmers face multiple risks during pesticide use, including accidental spills. More than half (58.2%) of surveyed farmers reported experiencing pesticide spills on their bodies, a threefold increase compared to 2022 (19%) and nearly 1.9 times higher than in 2018 (31.2%). Women were more frequently affected than men (57.3% vs. 42.7%). Among those who experienced spills, none reported eye exposure. The most commonly affected body areas were the back (83.8%), hands (41.9%), and legs (47.9%).

Chart 4. Comparison of pesticide spillage on body parts in 2024, 2022, and 2018 (%)



(Data are taken from CPAM in 2018, 2022 and 2024)

The primary causes of pesticide spills reported by farmers were malfunctioning spraying equipment (83.7%) and falling while spraying (15.4%).

Table 10. Causes of pesticide spillage on the body

Causes of pesticide spillage on the body	***N***	***%***
Faulty spray equipment	98	83.7
Bottle cap is loose	4	3.4
Fell while spraying	18	15.4
Decanting while mixing	3	2.6
Change in the wind direction	12	10.3
Faulty packaging	1	0.9

When pesticide spills occurred, farmers primarily responded by washing their hands and affected areas (97.4%), taking a bath (17.9%), changing clothes (19.6%), and washing contaminated clothing (24%).

Only 6% of those affected sought medical care, while 2.6% opted for home remedies. Notably, women were more likely than men to seek professional medical assistance.

Table 11. Response to pesticide spillage by gender

Response to pesticide spillage by gender	*Nam (%)*	*Nữ (%)*
Washed hands or the area affected	42.7	54.7
Took a bath	7.7	10.3
Changed clothes	10.3	9.4
Washed the clothes	11.1	12.8
Did nothing	0	1.7
Sought medical attention	2.6	3.4
Applied home remedy	0.9	1.7

2.5. Pesticide use and its risk to the environment and farmer health

The use of pesticides not only impacts agricultural environments but also contaminates community water sources. Research indicates that after spraying pesticides, farmers often wash their spraying equipment in public water bodies, including irrigation canals and drainage ditches (90%), field edges (35.8%), ponds and lakes (4%), and at home (3%).

Table 12. Locations for cleaning pesticide equipment

Locations for cleaning pesticide equipment	*N*	*%*
Field edges	72	35.8
Irrigation canals and drainage ditches	181	90
Ponds and lakes	8	4
Well	21	10.4
At home	6	3

Farmers typically purchase only the necessary amount of pesticides to ensure full usage, avoiding any surplus (48.7%). In other cases, excess pesticides are stored in warehouses or storage rooms (25.3%). Pesticides are generally securely stored and kept out of children's reach (42.3%), as well as separated from other household items (41.8%) to prevent contamination.

Table 13. Pesticide storage location

Pesticide storage location	*N*	*%*
In the field	1	0,5
In the garden	2	1
In warehouse	51	25,3
Used until it’s finished	98	48,7
Other	49	24,5
Total	201	100

A total of 85.1% of surveyed farmers reported using up all the pesticides during application. In cases where there were leftover pesticides, 20.4% stored them at home, while only 0.5% discarded them in the fields, and 0.5% kept them in grain storage facilities.

Table 14. Storage of leftover or unused pesticides

Xử lý	*N*	*%*
Used until it’s finished	171	85.1
Keep at home	41	20.4
Keep in the grain store	1	0.5
Throw in the field	1	0.5

Regarding pesticide containers, bags, and packaging, 98% of surveyed farmers stated that they typically discard them rather than reuse them. In terms of disposal, the majority (46.3%) reported discarding them directly in the fields, while 33.3% placed them in designated collection bins for pesticide packaging in the fields. Observations in rural areas of Vietnam indicate that brick- or cement-built disposal pits are commonly found in fields or irrigation channels for waste collection. The percentage of farmers using waste bins has increased compared to 2022 (27.4%) and 2018 (5%).

Table 15. Disposal methods for pesticide containers and packaging

Disposal methods	*N*	*%*
Throw in the fields	93	46.3
Throw in the trashbin	55	27.4
Burned	1	0.5
Buried	1	0.5
Throw in designated collection bins	68	33.8

Scientific studies worldwide have provided substantial evidence linking pesticide use to an increased risk of hormone-related cancers, such as breast, ovarian, and thyroid cancer. Additionally, exposure to pesticides has been associated with a heightened risk of developing other cancers, including prostate, lung, and liver cancer.

Insights from surveyed farmers indicate that pesticide use has adverse effects on their health. Common symptoms experienced by respondents include headaches (86.6%), dizziness (79.1%), excessive sweating (46.3%), shortness of breath (31.8%), and hand tremors (42.3%). Other reported symptoms include blurred vision, diarrhea, insomnia, irregular heartbeat, and skin rashes. Compared to 2022 and 2018, the number of individuals experiencing these symptoms has increased significantly, highlighting growing health concerns related to pesticide exposure.

Table 16. CompariSon of symptoms from pesticide exposure in 2024, 2022, and 2018 (%)

Symtoms	*2024*	*2022*	*2018*
Staggering	26.9	1	
Diarrhea	24.4	2	
Hand tremor	42.3	3	
Skin rashes	41.3	3	
Difficulty of breathing	31.8	5	26.1
Vomiting	26.4	6	11

Blurred vision	27.9	7	53.8
Tired	0.5	9	
Nausea	20.9	15	9.6
Dizziness	79.1	39	
Excessive sweating	46.3	48	29
Headache	86.6	51	72.42
Excessive salivation	6.0	0	
Irregular heartbeat	4.5		
Sleeplessness/ insomnia	15.9		
Convulsion	1.0		
Exhauted	1.0		
None		12	

The majority of survey participants (92%) do not recall the last time they experienced symptoms related to pesticide exposure. In cases of pesticide poisoning, most individuals respond by informing family members (76.1%) or consulting a local doctor (41.3%). However, only 0.5% of respondents seek treatment at a hospital. This marks a significant decline compared to 2018, when 15% of surveyed individuals opted for hospital care, and 6.5% sought assistance from a poison control center.

Table 17. Persons contacted or actions taken in case of pesticide poisoning

Persons contacted or actions taken in case of pesticide poisoning	***N***	***%***
Local doctor	83	41.3
Family members	153	76.1
Friends	1	0.5
Hospital	1	0.5

Company	1	0.5
Use local remendies	1	0.5
Up to current situation	1	0.5

Additionally, most respondents live in close proximity to pesticide-treated fields. 37.3% of participants reside less than 1 km away, while 41.3% live exactly 1 km from agricultural areas where pesticides are sprayed.

Table 18. Distance from residence to pesticide-sprayed fields

Distance	*N*	*%*
Less than 1 km	75	37,3
1 km	83	41,3
2 km	39	19,4
3 km	3	1,5
Total	201	100

This close proximity increases the risk of exposure and potential adverse health effects associated with pesticide use.

III. CONCLUSION

The study indicates that 98% of surveyed farmers in Hai Hau District, Nam Dinh Province, have been using pesticides for at least six years. However, only 48.8% have received training on pesticide use, either from vendors or through workshops and conferences. When purchasing pesticides, 91% of farmers either always or occasionally read labels to obtain information about the chemicals they use. Compared to 2022, more farmers noted that labels are now written in Vietnamese and designed with larger fonts for easier readability. Additionally, 38.8% of respondents saved pesticide information and could provide images of the product labels.

During pesticide application, most farmers are exposed to chemicals through spraying in the fields, washing contaminated equipment, or using chemical-based household products such as mosquito repellents. Notably, household pesticide use has increased compared to 2022 and 2018, raising concerns about chemical exposure among vulnerable family members, including children, the elderly, and pregnant women.

Compared to 2022, the proportion of farmers returning to the fields immediately after pesticide spraying in 2024 has increased sixfold (from 3% to 17.9%), with a significant rise in those returning within one to two days. Meanwhile, the use of protective clothing while handling pesticides has declined from 92.5% in 2018 to 73% in 2022, and further to 51.7% in 2024. Moreover, protective clothing consists mainly of daily clothes rather than specialized gear, with common items including face masks, long-sleeved shirts, and rubber boots. Only 37.5% of farmers wear protective goggles, though this marks an increase compared to previous years. On a positive note, all surveyed farmers in Hải Hậu now spray pesticides in the direction of the wind to reduce exposure risks.

Regarding occupational hazards, the proportion of farmers who reported pesticide spills on their bodies has increased significantly, doubling or tripling compared to 2018 (31.2%) and 2022 (19%). The most commonly affected areas include the back (73.6%) and upper body (36.8%). The primary causes of pesticide spills are faulty spraying equipment (52.7%) and falls during application (31.5%).

Regarding health impacts of pesticide exposure, the most frequently reported symptoms among farmers following pesticide exposure include headaches (86.6%), dizziness (79.1%), excessive sweating (46.3%), shortness of breath (31.8%), and hand tremors (42.3%). Compared to previous years, the number of symptomatic individuals has increased significantly, with more severe symptoms such as irregular heartbeat and seizures being reported. This trend correlates with higher pesticide exposure rates and an increase in spill incidents. When experiencing symptoms, most farmers inform family members (76.1%) or consult a local doctor (41.3%), but very few seek hospital treatment.

Beyond its effects on human health, pesticide use also poses significant risks to community water sources. After spraying, farmers commonly wash pesticide equipment in public water sources, including irrigation canals and ditches (90%), field edges (35.8%), rivers and lakes (4%), and at home (3%).

However, farmers have shown increasing awareness regarding pesticide use and storage. Most try to purchase and use up pesticides completely (48.7%). Pesticide containers are not reused, but they are often discarded directly onto fields, raising environmental concerns.

Considering the health and environmental impacts of pesticide use, we propose the following recommendations for stakeholders to enhance public awareness of pesticide hazards and encourage a transition toward sustainable ecological agriculture:

For farmers:

- **Participate in training programs:** Actively engage in pesticide safety training sessions and gradually transition to sustainable, pesticide-free agricultural practices.
- **Follow usage guidelines:** Carefully read labels and adhere to application instructions. Prioritize products with clear and comprehensible labeling.
- **Enhance protective equipment:** Use full and standardized protective gear (including safety goggles, gloves, protective clothing, boots, and masks) to minimize direct exposure to hazardous chemicals.
- **Limit exposure:** Avoid returning to fields immediately after spraying pesticides and adhere to recommended waiting periods to reduce exposure risks.
- **Proper waste disposal:** Collect and dispose of pesticide containers and packaging at designated waste collection points to protect water and soil quality. Refrain from reusing pesticide containers.
- **Apply agroecological principles:** Prioritize the adoption of agroecological practices to reduce chemical inputs, protect health, and conserve the environment.

For community organizations:

- **Increase awareness campaigns to raise awareness of the harmful effects of pesticides:** Organize public education initiatives to highlight the dangers of pesticide exposure to health and the environment, particularly targeting vulnerable groups such as pregnant women, children, and the elderly.
- **Enhancing Awareness to Reduce Environmental Pollution:** Collaborate with local authorities to educate the community on properly disposing of pesticide waste and packaging in designated areas to minimize water and soil contamination.
- **Promote sustainable agriculture models:** Support farmers in adopting ecological and organic farming practices by providing training and technical assistance.

For local authorities:

- **Enforce regulations:** Develop and implement mandatory policies on the use, disposal, and storage of pesticides to safeguard public health and the environment.
- **Support educational initiatives:** Invest in educational programs and training to improve safe pesticide handling practices and promote health and environmental protection.
- **Promote sustainable agriculture:** Encourage and assist farmers in transitioning to sustainable agricultural models by offering financial incentives, subsidies, or access to organic seeds and fertilizers.

- **Inspection and Monitoring:** Strengthen the inspection and monitoring of pesticide production and trade in accordance with legal regulations

A coordinated effort among stakeholders will help mitigate pesticide-related risks, protect public health, and advance a more sustainable agricultural sector.

IV. ANNEX

List of pesticide used in Hai Hau District, 2024

No	TRADE NAME	ACTIVE INGREDIENT
1	Siêu sâu	Permethrin 10%w/w
2	Allvin 555	Hexaconazole 50g/lít
3	Angun 5wg	Emamectin benzoate
4	Anvado 100 wp	Imidacloprid 100g/kg
5	Sufer Man 700 WP	Mancozeb 280g/kg + Sulfur 420g/kg
6	Fungicide Biobus	Trichoderma viride 16 x 10 CFU/g: 1%w/w
7	Pesticide WAMTOX 100 EC (Thay thế Cyperkill 10 EC)/Thuốc trừ sâu WAMTOX 100 EC 450ml	Cypermethrin 100g/lít
8	MOSPHA 80EC	Acetamiprid 30g/l + Alpha-cypermethrin 50g/l
9	Biological pesticide Dollar 50WG	Emamectin benzoate 5%
10	Pesticide Cua Đỏ 500	Alpha-Cypermethrin 50g/l
11	Pesticide Daconil 75WP	Chlorothalonil 75% w/w
12	Fungicide Kasu Japan	Kasugamycin 20g/lít
13	Kasumin 2SL Green water antibacterial	Kasugamycin 2% w/w
14	Biological pesticide Reasgant 3.6EC	Abamectin 36g/lít

15	Pesticide Sát trùng đan 95 WP	Thiosultap - Sodium 95% (w/w)
16	Pesticide Terin 50 EC	Permethrin 50%w/w
17	Pesticide USA Tabon 17,5WP	Pyridaben 15% + Imidacloprid 2.5%
18	Vua mèo	Cyromazine 500g/kg (50% w/w)
19	Insect spray ABS	N/A
20	Gimlet 0.2GB Premixed rat poison	Diphacinone 2g/kg
21	Plant pesticide Metman Bul 72WP	Mancozeb 640 g/kg + Metalaxyl 80 g/kg
22	Pesticide Ebato 160SC	Deltamethrin 10g/l + Indoxacarb 150g/l
23	Penalty 4 WP	Acetamiprid 20% w/w + Buprofezin 20% w/w
24	Pesticide Ranaxa 25WG	Thiamethoxam 25% w/w
25	Ruồi Vàng	Thiamethoxam 140g/lít + Lambda-cyhalothrin 110g/lít
26	Fastac	Alpha-Cypermethrin 50g/l
27	Tasieu 5WG	Emamectin benzoate 5%
28	Vin-Crop India Special treatment for dry stripes, yellow leaves, and empty grains	Hexaconazole 50g/lít
29	Cykado 250EC	Cypermethrin 25% w/w
30	Sacophos	Emamectin benzoate 10g/l + Quinalphos 240g/l
31	Rat-kill	Warfarin 2%w/w

32	Rùa Vàng	Indoxacarb 150g/l + Lambda Cyhalothrin 30g/l
32	Tiltsuper	N/A (150g/L Difenoconazole 150g/L Propiconazole) - check web
33	Virtako 40 WG	Chlorantraniliprole 200g/kg + Thiamethoxam 200g/kg
34	Checs USA	Acetamiprid25% + Imidacloprid 8%
35	Fartack	Alpha-Cypermethrin 50g/l
36	Ốc USA	Niclosamide olamine 700g/kg
37	Vua rầy USA	Thiamethoxam 35% w/w
38	Tomahawk	Metaldehyde 4%
39	Vịt trời 800	Niclosamine 745g/kg + Abamectin 5g/kg
40	Maxsect Kill ants and cockroaches	Permehtrin 0.5% w/w
41	Matoko	Pymetrozine 50%w/w
42	Rầy chúa Hà Lan	Imidacloprid 10%
43	MillerUSA	Indoxacarb 140g/l + Cypermerthrin 260g/l
44	Clever	Indoxacarb 300g/kg
45	Rat-kill Antimice	Bromadiolone 0,006%
46	A.v.t vil 5SC	Hexaconazole 5%
47	Voi Thái Sitto Bios 50WSG	Emamectin benzoate 50g/kg (Avermectin B1a 90% + Avermectin B1b 10%)

48	Kamsu	Kasugamycin 2% w/w
49	Herbicide Rồng đỏ (chai 100ml)	Glufosinateammonium 200g/l
50	Herbicide Huracan 200SL (chai 90ml)	Glufosinate-ammonium 200g/l
51	Herbicide Vinarius 500WP	Pyrazofulfuron Ethyl 50g/kg + Quinclorac 450g/kg
52	Khắc tinh	Abamectin 9g/l + Lambda-cyhalothrin 45g/l
53	Pyla Gold 170 SC	Indoxacarb 160g/l + Chlofenapry 10g/l
54	Pymeda	Pymetrozine 200g/kg + Imidacloprid 150g/kg
55	Anvil 5SC	Hexaconazole 50g/lít
56	Incipio 200SC	Isocycloseram 200g/l
57	Oman 2EC	Emamectin benzoate 2%
58	Clever	Indoxacarb 300g/kg
59	E80	Emamectin benzoate 8% (Avermectin B1a 90% + Avermectin B1b 10%)
60	Topvil 111SC	Hexaconazole 111g/lít