Food and Agriculture Organization of the United Nations

ROTTERDAM CONVENTION

# Field Survey:

# Collection and Analysis of Data on pesticide poisoning incidents in farming communities in Suriname

**Paramaribo, 28 March 2023**

## Contents

## Foreword

This is the final report for the project “Field survey: Collection and analysis of data on pesticide poisoning incidents in farming communities in Suriname” summarizing the main project outcomes achieved. This project was carried out in collaboration with the Food and Agricultural Organization of the United Nations (FAO), Ministry of Agriculture, Animal Husbandary and Fishery (LVV) and Anton the Kom University of Suriname (AdeKUS). As we know, most of the farmers in developing countries used pesticides without taking the necessary safety measures. However, these chemical compounds play a crucial role in maintaining high agricultural productivity in Suriname. Several cases of unsafe pesticide use among farmers in five districts of Suriname have been documented. The Anton the Kom University of Suriname stands firmly committed and ready to support the government of Suriname to introduce policies to reduce pesticide poisoning incidents and promote more sustainable agriculture systems. Moreover, Pesticide safety education is necessary to induce protective behavior among farmers in Suriname.

# 1 Introduction

## 1.1 General introduction

Suriname has been part of the Coordinating Group of Pesticide Control Boards of the Caribbean (CGPC) for more than a decade. During a regular virtual CGPC meeting in 2021, Mr. Michael Ramsay, Rotterdam Convention Specialist, presented the results regarding pesticide incident surveys of Jamaica, Trinidad and Tobago and Belize with the title *'More info from Pesticide Poisoning Survey 2020 Jamaica'*. The question rose whether other countries in the Caribbean would like to conduct this survey in their country, in order to obtain information about pesticide poisoning incidents that could result in policies for reducing pesticides poisoning for a more sustainable agriculture and a reduced rural poverty. This can be achieved by:

- Providing in-depth data on the identified pesticides that were a significant health hazard under the conditions of use as reported;
- Providing guidance for the development of training programmes in pesticide safety for farmers and farmers' community.

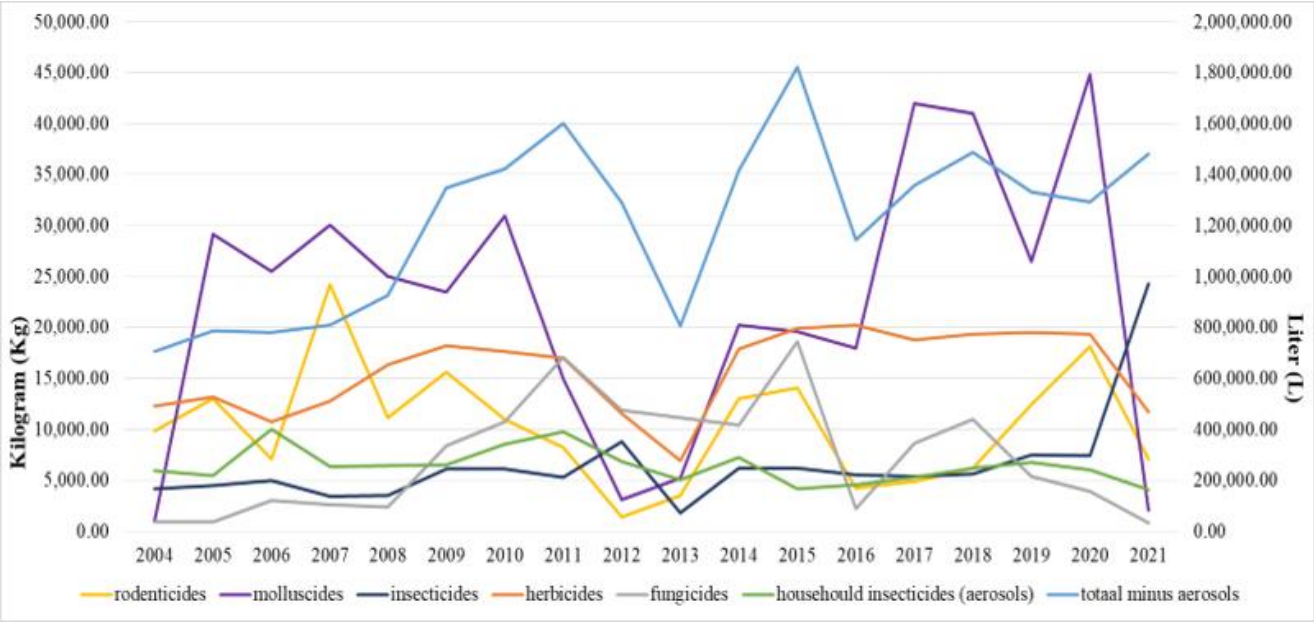
Suriname showed interest, because of its large amount of the import and use of pesticide. In 2021, permission was granted and the FAO contacted the Ministry of Agriculture, Animal Husbandry and Fisheries (MAAHF) to conduct this survey in association with the Anton de Kom University of Suriname as the executing body, in Suriname.

## 1.2 General pesticide import

Data provided by the pesticides department of the MAAHF showed that from 2004 to 2021, the average import of pesticides, with the exception of 2013, consistently exceeded 1,000,000 liters and/or kilograms per year (red curve in Fig. 1). Additional data obtained from the MAAHF, indicated that the average number of planted agricultural areas from 2014-2019 was around 69,000 hectares (ha), including approximately 60,000 ha of rice fields in Nickerie and Coronie. Consequently, a high usage of pesticide in the agricultural communities is to be expected. Therefore, it is of great importance to gain in-depth knowledge about whether people on one hand actually use pesticides in a responsible way or on the other hand their health is affected through wrong use of or accidental exposure to pesticides.

**Figure 1**

*Pesticide import in liters and/or kilograms from 2004 to 2021*




*Note.* Annual report Pesticide Division 2021 (van Dijk, 2021)

### 1.3 Historic information on pesticide poisoning incidents

Recently, no study has been conducted on unintentional incidents with pesticides in Suriname by any authority like the MAAHF or the Ministry of Health (MoH). Jules de Kom PhD, PharmD analyzed data obtained from the emergency departments (ED) of the Academisch Ziekenhuis Paramaribo (AZP) in Paramaribo and Mungra Medisch Centrum (MMC) in Nickerie, regarding intentional and unintentional pesticide poisoning from 1986 till 2012. The type of pesticides as well as the frequency of unintentional poisoning reported at the ED-AZP and ED-MMC in the period of 2010-2012 are presented in the following table 1.

In 1984, the Ministry of Health in Suriname began a multifaceted surveillance effort on intoxications with paraquat and other pesticides. The ultimate purpose of this effort was to inform and encourage policy makers to regulate the distribution and use of agricultural pesticides. In 1984, bottles of paraquat could be seen standing on shelves in general stores, often

next to groceries, as well as in convenience store shelves, often close to groceries. Moreover, without any warnings or usage guidelines, Paraquat was sold in soft drink or beer bottles. In addition, a retrospective investigation was conduced on paraquat poisoning patients who were hospitalized to Paramaribo's Academic Hospital in 1983. There had been 70 such cases. Just one of the six paraquat poisoning incidents that were known to be unintentional was deadly. Yet, nearly every other cases (55 of 64) resulted in death (Pan American Health Organization, 1986).

Another study conducted by Wahid et al. (2017) in Suriname assessed the presence of pesticide residues in locally grown and often consumed vegetable and fruits in Suriname. Thirty-two insecticides (organophosphates, organochlorines, carbamates, and pyrethroids) and 12 fungicides were evaluated for their levels in nine types of produce. In this study, Pesticide residue levels exceeding MRLs were found for cypermethrin (0.32 μg/g) in tomatoes (USA MRL 0.20 μg/g), lambda-cyhalothrin (1.08 μg/g) in Chinese cabbage (USA MRL 0.40 μg/g), endosulfan (0.07 μg/g) in tannia (EU MRL 0.05 μg/g), and lindane (0.02 and 0.03 μg/g, respectively) in tannia (EU MRL 0.01 μg/g). Just a few pesticide residues were detected, however they contained two widely banned pesticides (endosulfan and lindane).

Using a face-to-face questionnaire and the determination of the international estimated short-term intake (IESTI), Shirley and Spanoghe (2015) conducted a research to evaluate the application, safety procedures (usage of PPEs), and potential risk of pesticide use. The applied pesticide dosage was compared to the recommended level for the European Union (EU) and the label. The findings revealed that most farmers (58–100%) apply doses that are between 0–100% of the prescribed amount (label and EU). In this study the results indicated that farmers do wear PPE’s to protect themselves. There were no significant difference between the various age groups, educational levels, or PPE use in this study.

**Table 1**

*Overview of unintentional pesticide poisoning cases reported in ED-AZP and ED-MMC from 2010-2012*

| | | | | ED-AZP | | ED-MMC | | Total | |
|---|---|---|---|---|---|---|---|---|---|
| **Type** | **Common name** | **Trade name** | **WHO Classification** | **N** | **%** | **N** | **%** | **N** | **%** |
| Fungicides | Chlorothalonil | Bravo | U | - | - | 1 | 0.4 | 1 | 0.4 |
| Insecticides | Carbofuran | Furadan | Ib | 8 | 3.1 | - | - | 8 | 3.1 |
| | Diazinon | | II | 2 | 0.8 | 1 | 0.4 | 3 | 1.2 |
| | Lambda-cyhalothrin | Karate | II | 2 | 0.8 | 3 | 1.2 | 5 | 1.9 |
| | Malathion | | III | 29 | 11.2 | 3 | 1.2 | 32 | 12.4 |
| Herbicides | 2,4-D-amine salt | | II | 1 | 0.4 | 3 | 1.2 | 4 | 1.5 |
| | Alachlor | Lasso | II | 1 | 0.4 | 1 | 0.4 | 2 | 0.8 |
| | Fluazifop-p-butyl | Fusilade | III | - | - | 1 | 0.4 | 1 | 0.4 |
| | Glyphosate | Roundup | III | 19 | 7.3 | 9 | 3.5 | 28 | 10.8 |
| | Paraquat | Gramaxone | II | 137 | 52.9 | 15 | 5.8 | 152 | 58.7 |
| Molluscicides | Fentin acetate | Brestan | II | - | - | 1 | 0.4 | 1 | 0.4 |
| Rodenticides | | Klerat | Ia | 8 | 3.1 | 1 | 0.4 | 9 | 3.5 |
| Unknown | | | | 11 | 4.2 | 2 | 0.8 | 13 | 5.0 |
| **Total** | | | | **218** | **84.2** | **41** | **15.8** | **259** | **100.0** |

*Note.* Data retrieved from PPT Presentation of Pesticide Suicide in Suriname, a perspective Jules de Kom, May 24, 2013 (de Kom, 2013)

Noticeable is that the unintentional incidents reported by both hospitals in this period were mostly caused by Paraquat (58.7%), followed by Malathion (12.4%) and Glyphosate (10.8%).

## 1.4 Concepts of research

In this section the concepts related to the research will be discussed.

### *1.4.1 Farmer*

A person is considered a farmer if the person cultivates crops, fruit, trees on an area or raises animals (FAO, 2023).

### *1.4.2 Bystander*

Besides the farmers who are exposed to pesticide during and/or after application, there are also other residents living at short distance of the agricultural fields. Within the farmers' community, residents who live nearby the agricultural fields may also unintentionnaly be exposed to the pesticide, during and/or after applications like when spraying from aircrafts. They are also known as 'bystanders' who are included in the population sample, taking the selection criteria into consideration (Ryberg et al., 2018). Exposure means '*contact between a living organism and a pesticide, which may or may not lead to a poisoning*' (FAO/WHO, 2009, p.5; Personal communication, M. Ramsay, July 22nd, 2022).

### *1.4.3 Pesticide*

According to FAO (2021), a pesticide is '*a substance or a mixture of substances of chemical of biogical ingredients intended for repelling, destroying or controlling any pest, or for tegulating plant growth. The term pesticide applies to insecticide, herbicides, fungicides, rodenticides, molluscicides, wood preservatives and various other substances used to control pests. Pesticides also include plant growth regulators, defoliants and desiccants.*'

### *1.4.4 Pesticide poisoning incident*

Pesticide poisoning incident is an event leading to exposure or potential exposure to a pesticide(s), where the involved substance can cause damage or disturbance, leading to injury or dead (FAO/WHO, 2009, p.5).

### 1.5 Aim

Hence, cases where pesticide poisoning incidents occur in Suriname and related impacts on the health regarding unintentional exposure to pesticide, have been not fully studied yet. This may result lack of information, which can lead to taking incorrect policy decision-making. To address this issue, this research aimed to provide detailed data from 150 poisoning incidents involving various pesticides. Based on the study's goal, the following sub-questions are formulated:

1. What are the characteristics of respondents in the farmers' communities who were involved in a pesticide poisoning incident?
2. Which pesticides are currently used by farmers and farmers' community?
3. In which way were the respondents involved in the pesticide poisoning incident?
4. How were the respondents exposed to the pesticide during the pesticide poisoning incident?
5. What health issues were identified during or after exposure to the pesticide?
6. What (self)treatment was applied for the identified health issue?
7. What was the main cause of the pesticide poisoning incident?
8. What method was used to apply the pesticide?
9. Which training did the respondents receive regarding safe use of pesticide?
10. What are the perceptions and experiences of doctors within the farmers' community regarding pesticide poisoning incident?

### 1.6 Methods

After approval of FAO to conduct a study in Suriname on pesticide poisoning incidents in 2021, a team of experts from the AdeKUS and MAAHF was involved in the execution of the research. Five districts in Suriname where agricultural is the main productive activity, were identified as the research area. Those are from east to west Commewijne, Paramaribo, Wanica, Saramacca and Nickerie (Fig. 2). The population consists of farming communities. To get more medical insights regarding pesticide poisoning cases, doctors from these research areas were interviewed. To collect data, quantitative and a qualitative research were conducted, through a survey and interviews.

**Figure 2**


*Map of Suriname*

*Note.* Retrieved from De West. Dagblad uit en voor Suirname (2022).

# 2 Material and methodology

## 2.1 Methodology

The FAO, the MAAHF, and the AdeKUS found it necessary to conduct a national survey in order to gain in-depth data on the problem of pesticide poisoning in Suriname. Accurate and comprehensive data regarding pesticide poisoning incidents are of vital importance to safeguard farmers and to keep dangerous products out of the commercially available market. In this chapter, the study area, data sources, and sampling techniques are presented. The survey was conducted between July and October 2022.

## 2.2 Study area

In close cooperation, MAAHF and AdeKUS selected the survey regions on the basis of their agriculture characteristics. These included agricultural areas cultivating rice and vegetables in 5 districts in Suriname. In Table 2 an overview is provided of the regions per district.

**Table 2**

*Regions of survey*

| Paramaribo | Wanica | Commewijne | Nickerie | Saramacca |
|---|---|---|---|---|
| Weg naar Zee | De Nieuwe Grond | Alkmaar | Groot-Henar | Jarikaba |
| | Koewarasan | Meerzorg | Oostelijke polder | Kampong Baroe |
| | Lelydorp | Nieuw-Amsterdam | Westelijke polder | Pomona |
| | | | | Wayambo |
| | | | | Tijgerkreek |

## 2.3 Eligibility criteria

The population sample needed to meet the following criteria:

- had one or more unintentional pesticide poisoning incidents in 2019 – 2022 (a maximum of 2 incidents is reported),
- experienced one or more symptoms, and,
- can name the pesticide(s) that was (were) being used when the incident occurred.

Suicide cases or intentional pesticide poisoning incidents are excluded (Personal communication, M. Ramsay, July 22nd, 2022).

### 2.4 Population

The target was to investigate approximately 150 pesticide poisoning incidents. These incidents were studied by Anton the Kom University of Suriname scientific team members in Suriname. The total sample size consisted of 267.

### 2.5 Data collection and analysis

To collect data, quantitative and qualitative research has been conducted. For the quantitative research a semi-structured questionnaire was developed, containing close-ended and open-ended questions. The questionnaire was pre-tested among the farmers community at Weg naar zee in Paramaribo district in July 2022 with the Rotterdam Convention Specialist Mr. Michael Ramsay, and was improved according to observations and findings. The closed questions were in a multiple-choice format so that the persons involved with a case had to select only the appropriate answer or answers that best described their pesticide poisoning incident. The respondents were face-to-face surveyed from July till October 2022. For the qualitative research, a topic list was developed to gain more in-depth information on the quantitative data through interviews. The data of the qualitative research was collected through interviews from December 26th 2022 till January 13th, 2023.

#### *2.5.1 Data collection of the quantitative research*

For this research a semi-structured questionnaire was developed to collect data (see ANNEX I). Th//e collected data consisted of information on sex, age, address, involvement, exposure, and health issues. The participants (n=267) were asked whether they had suffered from an acute pesticide poisoning incident in the previous years (2019-2022), and if so, what actions were taken after poisoning. The respondents were also asked to mention the pesticide associated with the poisoning incident by trade names. The corresponding active ingredient was traced through the description on the label or from the national list of registered pesticides from MAAHF. The collected data for the closed-ended questions were analyzed using SPSS version 27 (SPSS Inc.,

Chicago, IL, USA) and Microsoft Office Excel 2010 (Microsoft Coporation, Redmond, WA, USA). Descriptive results are expressed as frequencies and percentages.

*2.5.2 Data collection of the qualitative research*

To validate the data retrieved from the questionnaire, interviews were conducted with three doctors from the studied area. The collected data were coded according to the identified topics and the results were used to support the collected quantitative data. The open-ended question 18 provided in-depth information on how the incident occurred. The data where analysed and coded, and the results were used to validate the results of some of the closed-ended questions.

**2.6 Ethical consideration**

All interviews were carried out in accordance with the national as well as university rules and laws. They complied with the declaration of Helsinki (World Medical Association, 2023). The confidentiality of the respondents has been taken into consideration. Data analyzed did not include any information that could possibly lead to identification of the involved respondents.

# 3 Results

In this chapter the data, analysis and key findings from the Pesticide Poisoning Incident Survey in Suriname are presented. A total of 267 respondents participated to the survey, representing an effective response rate of 100.0% (see Table 3). The table provide an overview of responses of random persons who were asked if they had a pesticide poisoning incident that affected their health. An overview of the results of the closed-ended questions are presented in ANNEX II. The results of the open-ended questions can be found in ANNEX III and ANNEX V.

**Table 3**

*Responses if pesticide incident had health affects*

| | **All districts** | | **Paramaribo** | | **Saramacca** | | **Wanica** | | **Nickerie** | | **Commewijne** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **N** | **%** | **N** | **%** | **N** | **%** | **N** | **%** | **N** | **%** | **N** | **%** |
| **Yes** | 267 | 15.7 | 44 | 14.5 | 43 | 16.5 | 33 | 14.5 | 112 | 19.0 | 35 | 10.8 |
| **No** | 1439 | 84.3 | 259 | 85.5 | 218 | 83.5 | 195 | 85.5 | 479 | 81.0 | 288 | 89.2 |
| **Total farmers** | 1706 | 100 | 303 | 100 | 261 | 100 | 228 | 100 | 591 | 100 | 323 | 100 |

## 3.1 Demographic data and characteristics

Most of the respondents (71.2%) were male. More than half of the respondents (55.1%) were between 41 and 60 years of age, followed by respondents in the age category 21-40 years (28.8%). Most of the respondents (41.9%) were from Nickerie (see Table 4).

**Table 4**

*Age category (in years) per district*

| | **Commewijne** | | **Nickerie** | | **Paramaribo** | | **Saramacca** | | **Wanica** | | **Total** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **N** | **%** | **N** | **%** | **N** | **%** | **N** | **%** | **N** | **%** | **N** | **%** |
| < 21 | 1 | 0.4 | 2 | 0.7 | 1 | 0.4 | 0 | 0.0 | 0 | 0.0 | 4 | 1.5 |
| 21-40 | 8 | 3.0 | 32 | 12.0 | 9 | 3.4 | 20 | 7.5 | 8 | 3.0 | 77 | 28.8 |
| 41-60 | 20 | 7.5 | 62 | 23.2 | 27 | 10.1 | 19 | 7.1 | 19 | 7.1 | 147 | 55.1 |
| > 60 | 6 | 2.2 | 16 | 6.0 | 7 | 2.6 | 4 | 1.5 | 6 | 2.2 | 39 | 14.6 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | **35** | **13.1** | **112** | **41.9** | **44** | **16.5** | **43** | **16.1** | **33** | **12.4** | **267** | **100.0** |

Table 5 present an overview of the resorts per district where the survey took place. Most of the respondents were from Westelijke Polder (17.6%) and Groot Henar (17.2%) in district Nickerie and from Weg naar Zee (16.5%) in district Paramaribo.

**Table 5**

*Community in each district where the survey took place*

| District | Resort | N | % |
|---|---|---|---|
| **Commewijne** | Meerzorg | 13 | 4.9 |
| | Alkmaar | 18 | 6.7 |
| | Nieuw-Amsterdam | 4 | 1.5 |
| **Nickerie** | Groot Henar | 46 | 17.2 |
| | Oostelijke polder | 19 | 7.1 |
| | Westelijke Polder | 47 | 17.6 |
| **Paramaribo** | Weg naar Zee | 44 | 16.5 |
| **Saramacca** | Jarikaba | 11 | 4.1 |
| | Kampong baroe | 5 | 1.9 |
| | Pomona | 4 | 1.5 |
| | Tijgerkreek | 5 | 1.9 |
| | Wayambo | 18 | 6.7 |
| **Wanica** | De Nieuwe Grond | 3 | 1.1 |
| | Koewarasan | 26 | 9.7 |
| | Lelydorp | 4 | 1.5 |
| **Total** | | **267** | **100.0** |

### 3.2 Involvement, exposure, health issues and (self)treatment

*3.2.1 Involvement*

The district, where most of the pesticide poisoning incidents occurred, was Nickerie (41.9%), followed by the other districts where the incidents ranged from 13.0% to 16.5%. The majority of the respondents (69.3%) were actively involved, working with or applying the pesticide on the farm, while 29.2% were bystanders who were indirectly exposed to the pesticide. In the Table

below an overview of the involvement of the respondents in the different districts is presented. Remarkable is that out of the 29.2% bystanders, 16.9% were from district Nickerie (see Table 6).

**Table 6**
*Involvement in pesticide usage by respondents per district*

| | Commewijne | | Nickerie | | Paramaribo | | Saramacca | | Wanica | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **N** | **%** | **N** | **%** | **N** | **%** | **N** | **%** | **N** | **%** | **N** | **%** |
| A bystander, indirectly exposed to the pesticide when other people were applying the pesticide. | 12 | 4.5 | 45 | 16.9 | 3 | 1.1 | 6 | 2.2 | 12 | 4.5 | 78 | 29.2 |
| Actively involved working with the pesticide NOT on the farm (e.g. in pesticide shop, at home, etc.). | - | - | - | - | - | - | 2 | 0.7 | 1 | 0.4 | 3 | 1.1 |
| Actively involved, but was a one-time work where a school asked him to spray some pesticides for the weeds growing in the courtyard. | - | - | - | - | 1 | 0.4 | - | - | - | - | 1 | 0.4 |
| Actively involved, working with the pesticide on the farm or applying pesticide on the farm. | 23 | 8.6 | 67 | 25.1 | 35 | 13.1 | 36 | 13.5 | 24 | 9.0 | 185 | 69.3 |
| **Total** | **35** | **13.1** | **112** | **41.9** | **39** | **14.6** | **44** | **16.5** | **37** | **13.9** | **267** | **100.0** |

*3.2.2 Pesticides used and would be a health problem*

The top 3 most frequently used pesticides out of the 98 pesticides mentioned in this survey are *Karate* with active ingredient Lambda cyhalothrin, followed by *Gramazon/Grammoxone* with active ingredient paraquat dichloride and *Malathion* with active ingredient malathion. Most farmers agreed that pesticide use posses some risk to human health (See ANNEX II Table 16). Insecticides were the commonly used pesticides since insect pests are common in the study area where rice and vegetables are mainly cultivated.

*3.2.3 The Exact Name of Pesticide (or Pesticides in a Mixture) involved in the incident*

When analyzed the exact name of pesticide (or pesticides in a mixture) involved in the incident, two hundred and eighty-nine (289) pest control products (pesticides) were recorded during the survey and a total of 21 different active ingredients were identified (Table 7a). Among them, the most frequently reported were insecticides (73.3%), followed by herbicides (19.4%) and fungicides (6.9%). Pesticides of classes U, I, II, III and IV (World Health Organisation classification (WHO)) were indistinctly used. It was found that the 4 most reported pesticides are *Karate* (39.1%), followed by *Malathion* (17.7%), *Grammoxone* (10.4%) and *Best Attack* (10.0%). Noteworthy is that none of the reported pesticides were from Class I Toxicity group (most toxic pesticides) and the top 3 were mostly insecticides and one herbicide (See Table 7a). The results also show that most of the pesticides (72.3%) were moderately hazardous (II), followed by slightly hazardous (III) (2.7%). Only (0.3%) of the pesticides were unlikely to represent any acute hazard (IV) according to WHO criteria. *Karate* with the active ingredient Lambda Cyhalothrin 2.5% (N=113, 39.1%) was the most reported pesticide involved in the incidents, followed by *Malathion*, with active ingredient Malathion (N=51, 17.7%), and *Best attack* with the active ingredient Alpha Cypermecthrin 10% EC (N=29, 10%). Herbicide with the active ingredient Paraquat Dichloride (N=835, 12.1%) is reported as the most popular pesticide involved in the incidents, followed by 2, 4-D (N=9, 3.1%), and Glufosinate Ammonium (N=8, 2.8%). Whereas, Isoprothiolane (N=8, 2.8%), Fentin acetate 45% WP (N=5, 1.73%) and Mancozeb (N=4, 1.4%) are mentioned as the most frequently mentioned fungicide active ingredients.

**Table 7a**

*Active Ingredients in Poisoning Incidents*

| Active ingredient | Name of pesticide (or pesticides in a mixture) involved in poisoning incident | Type of pesticide | Toxicity Class | Number of cases | % |
|---|---|---|---|---|---|
| 2, 4-D | 2, 4-D Amine | Herbicide | II | 9 | 3,1 |
| Abamectin | Cure | Insecticide | IV | 1 | 0,3 |
| Acetamiprid | Caprid/ Capridox, ZetaDox | Insecticide | II | 5 | 1,7 |
| Alpha Cypermecthrin | Best Attack/ Bestact | Insecticide | II | 29 | 10 |
| Bacillus Thuringiensis | Biopel | Insecticide | III | 1 | 0,3 |
| Captan | Captan | Fungicide | U | 1 | 0,3 |
| Copper Oxychloride | Copperite | Fungicide | III | 1 | 0,3 |
| Cypermethrin | Cyperbull/ Cyperkill/ Cypermethrin | Insecticide | II | 4 | 1,4 |
| Diazinon | Diazinon/ Diazinox | Insecticide | II | 6 | 2,1 |
| Fenoxaprop-P-Ethyl | Fusirore | Herbicide | III | 2 | 0,7 |
| Fentin acetate | Brestan | Fungicide | II | 5 | 1,7 |
| Fipronil | TWT | Insecticide | II | 1 | 0,3 |
| Glufosinate | Gluphosinate, Savernate, Trimmer | Herbicide | III | 8 | 2,8 |

| | | | | | |
|---|---|---|---|---|---|
| Ammonium | | | | | |
| Imadachloprid | Admajor/Atmajoor | Insecticide | II | 2 | 0,7 |
| Isoprothiolane | Fuji-one | Fungicide | III | 8 | 2,8 |
| Lambda Cyhalothrin | Karate/ Karatos/ Karatox/ Karteka/ Karatine | Insecticide | II | 113 | 39,1 |
| Malathion | Malathion | Insecticide | III | 51 | 17,6 |
| Mancozeb | Manzeb | Fungicide | U | 4 | 1,4 |
| Metsulfuron Methyl | Panally | Herbicide | U | 2 | 0,7 |
| Paraquat Dichloride | Paraquat Aleman/ Paraquat Plus/ Paraquat Super, Gramazon/ Grammoxone | Herbicide | II | 35 | 12,1 |
| Tolclofos-Methyl | Rizolex | Fungicide | U | 1 | 0,3 |
| **Total** | | | | 289 | 100 |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 289 instead of 267 and 100% instead of 100.0%) since somes respondents had incidents involving 2 or more pesticides in a mixture. Survey Q7.

Pesticide mixtures status are presented in Table 7b. Two hundred and forty-six respondents (92.1%) reported single pesticide involved during the pesticide. However, 6.4% reported mixture of two pesticides involved and 1.5% reported mixture of 3 pesticides involved.

**Table 7b**

*Pesticides mixture status*

| Pesticides mixture status | N | % |
|---|---|---|
| 1 | 246 | 92.1 |
| 2 | 17 | 6.4 |
| 3 | 4 | 1.5 |
| **Total** | **267** | **100** |

*Note.* Survey Q7

*3.2.4 Exposure*

Most respondents indicated that they inhaled the pesticide through the respiratory system (31.6%). Other respondents indicated that they got exposed to the pesticide through the skin – other than face (29.2%), through skin-face (28.1%) or eyes (10.4%).

*3.2.5 Health issues*

After exposure to the pesticide, the respondents indicated that they had to deal with health problems (see ANNEX Table 18). The most common symptom reported was skin irritation/itching (21.9%), followed by headache (12.7%) and eye irritation/burning (9.7%). *Karate* and *Best attack* were the pesticides that were most frequently mentioned in serious and moderate cases of skin irritation or itching. The most often mentioned pesticides in serious and moderate cases for the headache events were *Malathion*, *Karate* and *Gramaxone*. *Karate* and *Malathion* caused the most eye irrigation/burning cases (see Table 8). Remarkable is that, although most respondents indicated that they have inhaled the pesticide, the first health problems they noticed were not on their respiratory system, but on the skin (skin irritation/itching/burning sensation).

**Table 8**

*Active ingredients involved in very serious and moderate cases of the top 3 health symptoms reported*

| Active ingredient | Skin irritation/itching | | | | Eye irritation/burning | | | | Headache | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Moderate | | Very serious | | Moderate | | Very serious | | Moderate | | Very serious | |
| | N | % | N | % | N | % | N | % | N | % | N | % |
| Lambda Cyhalothrin 2.5% | 41 | 12.8 | 19 | 14.6 | 12 | 3.8 | 6 | 4.6 | 8 | 2.5 | 1 | 0.8 |
| Malathion | 2 | 0.6 | 2 | 1.5 | 5 | 1.6 | 2 | 1.5 | 20 | 6.3 | 4 | 3.1 |
| Alpha Cypermethrin 10% EC | 6 | 1.9 | 4 | 3.1 | - | - | 2 | 1.5 | 2 | 0.6 | 1 | 0.8 |
| Isoprothiolane | - | - | - | - | - | - | - | - | 1 | 0.3 | 3 | 2.3 |
| 2,4-D | 1 | 0.3 | - | | 2 | 0.6 | - | - | 3 | 0.9 | 3 | 2.3 |
| Metsulfuron Methyl | | 0.0 | - | | | | - | - | 1 | 0.3 | - | - |
| Diazinon | 3 | 0.9 | - | | 1 | 0.3 | - | - | 1 | 0.3 | - | - |
| Paraquat Dichloride | 3 | 0.9 | 3 | 2.3 | 3 | 0.9 | 1 | 0.8 | 7 | 2.2 | - | - |
| Glufosinate Ammonium | - | - | 1 | 0.8 | - | - | 1 | 0.8 | 2 | 0.6 | - | - |
| Mancozeb Cytokinin | - | - | - | - | - | - | 1 | 0.8 | - | - | - | - |
| Acetamiprid/ Acetamiprid 20% SL | 1 | 0.3 | - | - | - | - | 1 | 0.8 | - | - | - | - |
| Fenoxaprop-P-ethyl 7.5 EW | 1 | 0.3 | - | - | 1 | 0.3 | - | - | - | - | - | - |
| Fentin acae 45% WP | 1 | 0.3 | - | - | - | - | - | - | - | - | - | - |
| Metsulfuron Methyl | 1 | 0.3 | - | - | - | - | - | - | - | - | - | - |
| Copper Oxychloride 50 % | - | - | - | - | 1 | 0.3 | - | - | - | - | - | - |
| Imadacloprid | - | - | 1 | 0.8 | - | - | - | - | - | - | - | - |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 200G/L | | | | | | | | | | | | |
| Cocktail 2 Lambda Cyhalothrin 2.5% Alpha Cypermecthrin 10% EC Acetamiprid/ Acetamiprid 20% SL | - | - | - | - | 2 | 0.6 | - | - | - | - | - | - |
| Cocktail 2 Alpha Cypermecthrin 10% EC Lambda Cyhalothrin 2.5% | 2 | 0.6 | 1 | 0.8 | - | - | - | - | - | - | - | - |
| **Total** | **62** | **19.4** | **31** | **23.8** | **27** | **8.5** | **14** | **10.8** | **45** | **14.8** | **12** | **9.2** |

*Note.* Sum of the frequent and percent does not equal to respective totals shown since only severe and moderate health issues are shown in this table.

In Table 9 an overview is given of the pesticide poisoning incidents that needed medical attention. There were two very severe health problems of skin bleeding in which one case involved the pesticide Paraquat Dichloride and the other was Fentin acetate 45% WP. In the case of Paraquat Dichloride the respondent had to stay 1 month in the hospital and for the case of Fentin acetate 45% WP the respondent visited the hospital 3 times. A bystander case was reported where Paraquat Dichloride was used and the respondent stayed 1 week in the hospital. There was an incident where the respondent had blood coughing symptoms (moderate) which involved the pesticide Best attack/Bestact with Alpha Cypermecthrin as active ingredient.

**Table 9**

*Severe pesticide poisoning incidents needing medical attention*

| Sex | Age group | Pesticide(s) & active ingredient(s) | Cause of incident | Poisoning symptoms & severity | Private doctor/clinic/ hospital | No. of visits | Diagnosis & treatment | Days in hospital | Days unable to work |
|---|---|---|---|---|---|---|---|---|---|
| M | 41-60 | Paraquat Dichloride | Sprayer equipment leakage on skin | Skin bleeding-very serious<br>Skin burn-very serious<br>Skin irritation-very serious | Private doctor-Hospital | 1 | Desinfect the wound and treat it with oil and got an infuse with medicine to treat the inflammation | 1 month | 1 month |
| M | 21-40 | Fentin acetate 45% WP | No PPE used | Skin bleeding-very serious | Private doctor-Hospital | 3 | Used ointment | 0 | 3 weeks |
| M | 21-40 | Glufosinate Ammonium | Defect equipment (leaked into boots) | Skin burning-very serious<br>Nausea-very serious<br>Feet burn-very serious | Private doctor | 1 | Used ointment | 0 | 1 week |
| M | 21-40 | Alpha Cypermethrin 10% EC | Change of wind direction | Skin irritation/itching-very serious<br>Coughing blood-moderate | Private doctor | 1 | Forgot | 0 | 0 |
| F | 21-40 | Malathion | Bystander | Skin irritation/itching-very serious<br>Skin rash-moderate<br>Eye irritation/burning-very serious<br>Tear | Private doctor and Health center (RGD Policlinic) | 1 | Medication (paracetamol) | 0 | 0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | production/watery eye-moderate<br>Accelerated heart rate-moderate<br>Excessive sweating-moderate<br>Headache-moderate | | | | | |
| M | 41-60 | Acetamiprid 20% SL | Wind blew spraymist on the sprayman/ Not appropriate PPE | Blurred vision-very serious<br>Eye irritation-very serious<br>Tear production/watery eye-moderate | Private doctor | 1 | Eye drops | 0 | 0 |
| M | 21-40 | Paraquat Dichloride | Splashed/spilled pesticide on himself | Blurred vision-very serious<br>Eye irritation/burning-very serious<br>Excessive tear production-very serious | Private doctor | 1 | Eye drops | 0 | 0 |
| M | 41-60 | Alpha Cypermethrin 10% EC | Wind blew spraymist on the sprayman | Eye irritation/burning-very serious<br>Blurred vision-moderate<br>Excessive tear production-very serious | Private doctor | 2 | Ointment | 0 | 7 |
| F | 21-40 | 2, 4-D | Bystander | Coughing (regular)-very serious<br>Tightness of chest/asthma- | Private doctor | 1 | Medication (Paracetamol) | 0 | 0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | moderate headache-very serious | | | | | |
| F | > 60 | Paraquat Dichloride | Bystander | Coughing (regular)-very serious<br>Dyspnea-very serious | RGD policlinic-Hospital | 2 | Couldn't tell precisely but got some antibiotics | 7 | 7 |
| M | 21-40 | Alpha Cypermethrin 10% EC | Wind blew spraymist on the sprayman | Coughing (regular)-very serious<br>Laryngitis-very serious | Private doctor | 2 | Antibiotics, vitamin C & gastroresistant tablets | 0 | 3 |
| F | 41-60 | 2, 4-D | Bystander | Runny nose-very serious<br>Eye irritation/burning-moderate<br>Sneezing-very serious<br>Accelerated heart rate-moderate | Private doctor | Regularly | Cetrizine, nose spray | 0 | 0 |
| M | 41-60 | Alpha Cypermethrin 10% EC | Wind blew spraymist on the sprayman | Headache -very serious | Private doctor | 1 | Medication (losartan, amlodipine, spironolactone, bisoprolol fumarate, hydroxyl, multivatimins, vitamin C) | 0 | 7 |
| F | 21-40 | 2, 4-D | Bystander | Headache -very serious | Private doctor | 1 | Medication (paracetamol/paracof) | 0 | 0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| F | 41-60 | 2, 4-D | Bystander | Headache -very serious | Private doctor | 1 | Medication (paracetamol) | 0 | 0 |
| F | 41-60 | Isoprothiolane | Bystander | Headache -very serious<br>Dizsiness-moderate<br>Excessive sweating-moderate | Private doctor | Depending on regularity of spraying | Nose spray (beclometasone) | 0 | 0 |

*3.2.6 (Self)treatment*

After the respondents felt the effects of the pesticide, most of them applied self-treatment (37.4%) such as applying lotion/oil/Ointment to skin (26.2%), drinking milk (19.5%), or used pain medication such as Paracetamol and other allergy medication such as Cetrizine (11.3%). Other respondents continued spraying and after finishing they washed the chemical off (34.8%). Some of the respondents washed the chemical off immediately (11.3%) or did nothing at all (10.5%) (see Table 10).

**Table 10**

*What the respondent did when he/she felt the effects of the pesticide*

| **Activity** | **N** | **%** |
|---|---|---|
| Nothing/ no action | 40 | 10.2 |
| Rested/ stopped using the pesticide | 14 | 3.6 |
| Washed the chemical off immediately | 43 | 10.9 |
| I continued spraying, and after I had finished, I washed the chemical off | 133 | 33.8 |
| Went to private/ family doctor | 16 | 4.1 |
| Went to Health Centre (RGD poli) | 2 | 0.5 |
| Went to hospital | 2 | 0.5 |
| Self-treatment (specify) | 143 | 36.4 |
| **Total** | **393** | **100.0** |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 382 instead of 267 and 143.1% instead of 100.0%) since a respondent can select multiple responses. Survey Q10a.

After exposure to the pesticide, most respondents (93.3%) did not have health problems which enabled them to go to work. The majority of the respondents (90.3%) was exposed to diluted mixture and were mostly exposed to the pesticide for less than an hour (45.3%) or for 1 or 2 hours (39.3%). The respondents (65.2%) indicated that they observed the harmful effects almost immediately. Only twenty respondents (5.1%) visited the doctor, Health centre or went ot the hospital of which 65.0% had a onetime visit for medical assistance.

As indicated by the respondents, some of the doctor's diagnosis were that the respondent:

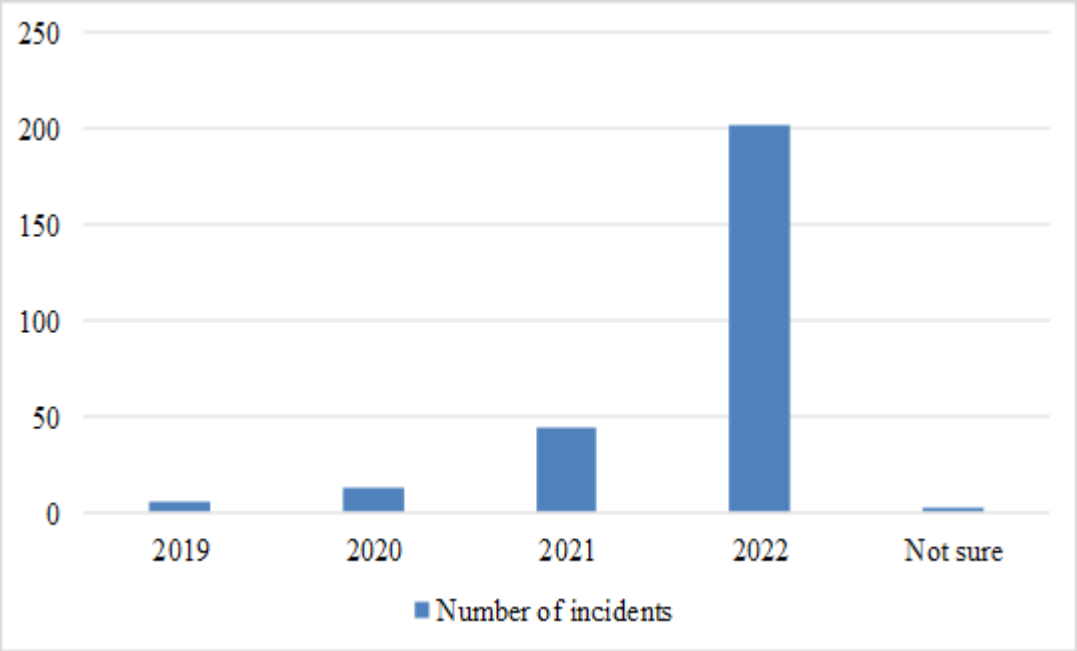
- was allergic to the chemical;
- damaged the eye lens because of grammaxone residues;
- had a high blood pressure
- throat damage due to inhalation of the pesticide;
- had lung inflammation.

The health effects were not that severe that most of the respondent had to stay overnight in a hospital, while one stayed for one week (due to lung inflammation) and one for one month (due to severe skin burn). The respondents who went to a doctor received medical treatment, such as ointment, treated with cold water, eye drops, antibiotics, vitamin C, Gastro-resistant tablets, Beclomethasone nose spray, inhaler, Losartan, Amlodipine, Spironolactobe, Bisoprolol Fumarate, Hydroxyl, Ascorbic acid, paracetamol, etc.

During the last four years, most of the pesticide incidents which caused health issues as indicated by the respondents took place in August 2022 (22.5%). Figure 3 show an increase per year during the last four years of pesticide incidents reported by the respondents.

**Figure 3**

*Overview of pesticide poisoning incidents from 2019 to 2022*




Most of the respondents were exposed to the pesticide during application in the field (58.9%), while 22.2% of the respondents were standing/working in or near a field during or after pesticide application (bystander).

### 3.3 Cause of pesticide poisoning incident

Almost half of the respondents (46.8%) got poisoned due to the fact that the wind blew spray mist on the spray man during the field application of the pesticide, from which 53.6% indicated that although the wind was blowing, they did not expect it to be a problem. Approximately 26.6% of the respondents were bystanders who were not involved in the pesticide usage, but were affected during mixing, or during/after application of the pesticide. Remarkable is that 7.9% of the respondents who sprayed in windy condition stated that they consider the wind as a tool for better spreading of the chemical. However, more than half of the respondents stated that the label of the pesticide was available (73.8%) and that they read and understood the label (86.3%).

Table 11 provides an overview of how the pesticide poisoning incident occurred with the bystanders and actively involved respondents. Most of the bystanders (19.9%) got involved with the pesticide poisoning incident due to neighbors or family members who were spraying in the near surroundings of the bystander.

*R168: 'Person was sitting in her house. Her neighbor started spraying, when she smelled it, she went inside and closed her house.'*

*R221: 'The husband of the bystander was busy spraying Gramoxone and the odor of Gramaxone was strong for the wife while she inhaled it and the symptoms felt.'*

*R236: 'A neighbor was busy spraying and the bystander inhaled it, in her house. She got headache and closed all the doors and windows of her house.'*

In a few cases (3.7%) the wind caused the spreading of the pesticide, resulting in the involvement of the bystander regarding the pesticide poisoning.

*R197: 'The son of this person was spraying the chemical, he was helping him there. The wind blew the chemical on his face. When he arrived home (in 20 minutes), he felt a burning sensation on his face.'*

*R264: 'The neighbors sprayed Malathion in their yard. Due to the wind, the strong smell spread very strongly over the entire area and that caused the health problems.'*

Another reason mentioned by the bystanders how they got involved, is due to the spraying of the pesticide with an aeroplane in the nearby agricultural area near the bystander (5.6%). This reason was only mentioned by bystanders in district Nickerie.

*R68: 'Rice fields were being sprayed, with Fujione, with an aeroplane. The smell troubles him and he went inside the house. He turned on the fan, but he still started coughing and got a bad headache.'*

*R72: 'Farmers were spraying their rice fields, with Fujione, with the aerial method (plane). The smell of the pesticide troubled her and she went inside the house. She turned the fan on but got nauseous and had a headache after that.'*

*R118: 'She was at home and when the rice areas were sprayed with the aeroplane the wind blew towards his house which led to health issues.'*

Regarding the respondents who were actively involved with the pesticide during the incident, the wind was the main reason for spreading the pesticide on the (body)part of the respondent (35.6%) or inhalation of the pesticide (3.7%).

*R58: 'He was spraying Karate on the field and the wind blew the mist on him. After 2 hours he felt a burn and went to take a bath.'*

*R183: 'During spraying it was windy. He inhaled it. But felt the effects (dizziness) after he had finished his work. After about 1.5 hours he felt the dizziness.'*

*R184: 'A person was spraying the pesticide mix. It was a mix of BioPel and Karate. The wind blew suddenly. The mix came on his face. He was not wearing any safety goggles that's how it came into his eyes. His eyes and around his eyes started burning. He went and washed his eyes immediately.'*

Other reasons which were mentioned by them, were that the pesticide fell on, leaked, spilled on their body or due to the fact that the spray tank was overfilled (14.2%).

*R49: 'The mixture leaked out of the backpack sprayer and came onto the back of the farmer, causing a burning sensation.'*

*R111: 'The respondent was using a back sprayer and the cap of the backpack was not closed properly, that's why there was a leakage of the chemical which was also blown by wind.'*

*R107: 'He was pouring the diluted mixture, then some of it got on his hand and he started to experience a burning sensation.'*

*R157: 'Gramoxone came on the farmer's back after he want to wear the spray tank with liquid on his back. When lifting and placing the spray tank, the fluid is shaken on all sides. The farmer did not wear the necessary (full) PPE, which increases the chance of skin irritation when wearing the spray tank.'*

**Table 11**

*How pesticide incident occurred and resulted in the contamination*

| | Bystander, indirectly exposed to the pesticide | | Actively involved with the pesticide | | Total | |
|---|---|---|---|---|---|---|
| **How incident occurred** | **N** | **%** | **N** | **%** | **N** | **%** |
| Aeroplane spraying | 15 | 5.6 | - | - | 15 | 5.6 |
| Neighbors/ family member spraying | 53 | 19.9 | - | - | 53 | 19.9 |
| Spread by wind | 10 | 3.7 | - | - | 10 | 3.7 |
| Fell on body/ leakage/ overfilled tank/ spilled | - | - | 38 | 14.2 | 38 | 14.2 |
| Pesticide on body(part) due to wind | - | - | 95 | 35.6 | 95 | 35.6 |
| Residue on body(part) | - | - | 20 | 7.5 | 20 | 7.5 |
| Inhalation | - | - | 20 | 7.5 | 20 | 7.5 |
| Inhalation due to wind | - | - | 10 | 3.7 | 10 | 3.7 |
| No protective clothing | - | - | 6 | 2.2 | 6 | 2.2 |
| **Total** | **78** | **29.2** | **189** | **70.8** | **267** | **100.0** |

*Note.* Survey Q18.

*3.3.1 Protective clothing during time of exposure*

The respondents revealed whether they wore protective clothing during the time of exposure to the pesticide (see Table 12). Most of the respondents (75.8%) did not wear protective clothing. The reasons mentioned by the respondents for not wearing protective clothing, were that they felt that it was uncomfortable (34.3%), they were bystanders or they could not recall (24.8%), they did not think that it was necessary (16.0%) and it was too hot weather to wear protective clothing (13.2%). It is noticeable that protective clothing being expensive is not a reason for farmers for not wearing PPE's during pesticide application since only 8% mentioned that they did not wear protective clothing because of being too expensive. Only 24.1% wore protective clothing, of which 75.9% wore long sleeve shirts, 75.0% wore long pants and 50.0% wore water boots. Some farmers (28.6%) revealed that they wore other equipment during the time of exposure, such as hats (34.7%), t-shirts (18.7%) and short pants (18.7%). Remarkable is that plastic bags were used

to cover hands (1.3%), surgical mask were used to protect the nose and mouth area (6.7%) and slippers (2.7%) or no shoes at all (2.7%) were worn when applying pesticides.

**Table 12**

*Protective clothing used during the time of incident*

| | Yes | | No | | Not sure/ cannot recall | |
|---|---|---|---|---|---|---|
| **Protective clothes** | **N** | **%** | **N** | **%** | **N** | **%** |
| Rubber gloves | 38 | 19.8 | 153 | 79.7 | 1 | 0.5 |
| Coverall/ overall | 12 | 6.3 | 179 | 93.2 | 1 | 0.5 |
| Spray maks/ face shield | 6 | 3.1 | 185 | 96.4 | 1 | 0.5 |
| Goggles | 24 | 12.5 | 167 | 87.0 | 1 | 0.5 |
| Eyeglasses | 16 | 8.3 | 176 | 91.7 | - | - |
| Respirator with cartridges | 10 | 5.2 | 182 | 94.8 | - | - |
| Dust mask with pesticide absorbing particles (single use) | 14 | 7.3 | 178 | 92.7 | - | - |
| Regular dust mask | 51 | 26.6 | 141 | 73.4 | - | - |
| Scarf or cloth over nose and mounth | 29 | 15.1 | 163 | 84.9 | - | - |
| Water boots | 96 | 50.0 | 96 | 50.0 | - | - |
| Shoes/ regular boots | 48 | 25.0 | 144 | 75.0 | - | - |
| Long sleeve shirt | 145 | 75.5 | 47 | 24.5 | - | - |
| Long pants | 144 | 75.0 | 48 | 25.0 | - | - |
| Waterproof apron | 5 | 2.6 | 187 | 97.4 | - | - |
| Other | 55 | 28.6 | 137 | 71.4 | - | - |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 192 instead of 267 and 71.9% instead of 100.0%) since a respondent can select multiple responses. Survey Q22b.

### 3.4 Application of the pesticide

For the application of the pesticides, different methods were used by the respondents, such as backpack/knapsack prayers (49.8%) and mist blower/motor blower (24.3%). The places where

the pesticide poisoning incident took place, were on the field (58.8%), inside or outside the house (26.2%) or in the home garden (12.7%). At the time of the pesticide exposure, the respondents were treating their crops (52.1%), insects and reptiles (27.0%) or weeds (14.2%). Several respondents (26.6%) indicated that during the application of the pesticide, other individuals were also affected.

### 3.5 Training

Most of the respondents (76.4%) did not receive any training in the use of agricultural pesticide, including the use of personal protective equipment (PPE). Only 22.8% of the respondents mentioned that they received training from the Ministry of Agriculture (44.3%), another farmer (9.8%) or from Anne van Dijk Rice Research Institute (ADRON) (8.2%) (see Table 13).

**Table 13**

*Who provided the training*

| **Training provided by** | **N** | **%** |
|---|---|---|
| Ministry of Agriculture | 27 | 44.3 |
| Pesticide salesman | 1 | 1.6 |
| Another farmer | 6 | 9.8 |
| Pesticide store | 3 | 4.9 |
| Other individual, other than farmer/salesman | 3 | 4.9 |
| A school in the Netherlands | 1 | 1.6 |
| ADRON | 5 | 8.2 |
| (Self)education during study | 4 | 6.6 |
| Food and Agriculture Industries (FAI) | 4 | 6.6 |
| Healthcare workers | 1 | 1.6 |
| Transferred traditional knowledge by family member(s) | 3 | 4.9 |
| Newmont | 1 | 1.6 |
| Staatsolie Maatschappij Suriname NV | 2 | 3.3 |
| **Total** | **61** | **100.0** |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 61 instead of 267 and 22.8% instead of 100.0%). Survey Q29.

### 3.6 Doctor's experiences

This paragraph provides the results on experiences of interviewed doctor's regarding patients with pesticide poisoning incidents.

#### *3.6.1 General*

The respondents mentioned that people who visit the clinic know that they should be careful with the use of pesticide. However, they are not (fully) aware how to handle pesticide and to be cautious and wear protective clothes.

R2: *Most people know that pesticides are such resources that you have to be careful. But that's not necessarily what they understand to protect. E.g. wash hands or close the cap properly. But it means is too generalthat people don't stop to think that people need to protect themselves from breathing it in or getting it on their skin. Or, where they have already sprayed they walk there. They do not wear protective clothing or they wear the same clothes all day. Also, when buying them they don't pay attention totransport it separately. They act just lik this. The question is do they know how to apply it properly.*

R3: *I am currently sporadically at the outpatient clinic. I have occasionally some cases due to carelessness.*

According to the respondents, not many people visit the clinic for pesticide incidents. However, when they do come, it is mostly a case of irresponsible use of pesticide or due to spilling. Also, one of the respondents mentioned she was part of a focus group research, which revealed that people from an inhabited area in Henar complained that they had health issues such as nausea and stomach pain due to leaking nozzles from pesticide spraying aeroplane. She also emphasizes that 2,4-D metabolites were found in the urine of pregnant women.

R2: *They come because they sprayed and had a weird taste in their mouth or spilled it when mixing. But not that people come because of pesticide incidents.*

R3: *I occasionally come across patients. In 2013-2014 I was actively involved in Nickerie with focus groups. For example, the focus group was held in Henar were the aircraft is spraying pesticides. This research revealed that the pilot took his own route/shortcut above inhabited*

*areas and the aircraft had leaking nozzles. During school hours, students complained of nausea and stomach pain. The 2,4-D metabolites were also found in the urine of pregnant women.*

*3.6.2 Pesticide incidents*

The respondents mentioned that they had some cases where farmers came to the clinic for medical assistance after a pesticide incident took place. According to the respondents they had a few cases in the past five (5) years regarding pesticide incidents during application or as a bystander. Some of the cases they mentioned, caused by leakage, spilling, inhalation, the wind, irresponsible storage and labeling of pesticide.

R2: *Less than 5 cases*

R3: *Case 1: backpack sprayer had a leak, where pesticide leaked on the back. The patient was referred to the internist for further examination (skin absorption pesticide).*
*Case 2: patient had bought pesticide (Gramaxone/Karate) and stored it in a Coca Cola bottle with no label on the bottle. When he sat on his plot and wanted to drink something, he took the bottle thinking it was Coca Cola. He took a sip and immediately spit it out. He then visited the outpatient clinic and was referred.*

The respondent indicated that they rarely received such cases. Body parts which are often affected in such incidents, are the skin, eyes, mouth, and respiratory system.

R3: *Senses: skin, mouth, inhalation. The skin of private part is the most sensitive part, especially for men.*

The respondents stated that these incidents can be vary from mild, serious to deadly for the person who is applying the pesticide. Both acute and chronic poisoning has been identified by the respondents. No cases had been reported by these respondents regarding patients that have died after a pesticide incident due to application or as a bystander.

R2: *They see it as serious because they come to the doctor's clinic*

R3: *It can be deadly for the person involved in the incident. Important is to diagnose which pesticide was used, if he was protected (PPE), the direction of the wind, type of poison and how the poison got into his body.*

*3.6.3 Solutions provided to the patients*

Based on the diagnosis (seriousness) of the doctor, the patient can be referred to the specialist or can be treated at the clinic. Also, the doctor proved advice regarding the correct use of pesticide.

R1: *Depends on seriousness: rinse with plenty of water, local treatment v symptoms or refer to A&E*

R2: *General advice is the correct use of pesticides. And don't just tell, but go through and ask what kind of remedy it was and see what the best treatment is for that. And discuss the safest way to use it. Person where the product has entered the eyes has been referred to the ophthalmologist.*

The respondents indicated that drinking milk and washing the affected spot with Coca Cola are not medically proven solutions. However, consulting the doctor immediately is advised after the pesticide incident.

*3.6.4 Awareness*

According to the respondents, people are still insufficiently aware of the dangers of careless use of pesticides and that awareness/training is necessary for people using pesticide.

R2: *Yes, continuous training is required. And not just from the people who use it. Everyone uses it. The farmers and the people who do domestic horticulture and people who work for others. Spraying between the stones and spraying houses and people from the ministry of Regional Development doing maintenance. And the people in the interior districts, the commissariat also requests pesticide use. Large companies also receive the information, but there is no control over its correct use. Control in where the gap is, in awareness and in the correct use of pesticides is often lacking.*

As soon as possible/immediately after a pesticide incident a medical doctor should be consulted in order to minimize health damage. To emphasize the danger and the safe use of pesticide in accordance with the requirements to their users, the respondents mentioned that there is enough information provided to people and extension/training which is still ongoing. However, compliance of rules and regulation regarding pesticide usage are not followed optimal and there is a lack of monitoring by the responsible institutions.

R1: *Info by LVV, seller, media, on-site inspection by LVV*

R2: *More targeted information or education should be done. Actually, who are the persons who are using pesticides. If this is in the picture, then you can know through consultation with those groups that these people use it, how often, how they use it, how they store it, etc. In that consultation, the way can be opened to pass on the correct information play and see if giving the education works. Provide more hands-on education. Not only adults, but also at school, the curriculum about the safe use of Pesticides must be adjusted.*

R3: *The problem in Suriname is that the monitoring and living according to the rules is not in place. There is ongoing extension and they receive enough information. You should use PPE all the time when using pesticides.*

## 4. Discussion and conclusions

This study showed that the majority of pesticides poisoning incidents in all 5 districts in Suriname in the period of 2019 – 2022 was among men (71.2%). This can probably be explained by the fact that the males were much more active in spraying compared to females and therefore exposed to higher risks. In this study the geographic region was an important factor for pesticide poisoning incidents. Since agriculture is practiced in each of the 5 districts, the majority of the respondents (69.3%) were actively practicing farmers who were applying pesticide(s) on the farm at the time of the incident. In comparison to the other 4 districts, Nickerie has reported a noticeably higher risk of pesticide poisoning. Additionally, district Nickerie has also reported a higher number of bystander cases (16.9% of the 29.2% reported bystander cases). The reason for the majority of the bystander from district Nickerie is probably due to the fact that Nickerie is a district with preferentially rice farming where aeroplanes spray rice fields with pesticide(s). People living around these areas mentioned that they suffered from the spray mist of the pesticide. Although the bystanders got accidently involved in the pesticide poisoning incident, there is still no policy regarding safe use of pesticide taking the neighbor and nearby area (or community) into account. Also, policy should be formed and controlled around housing in agricultural areas, especially for district Nickerie where using aeroplanes is a common method to apply pesticide(s).

The three pesticides (*Karate*, *Gramazon* and *Malathion*) that are most frequently reported as causes of accidental poisoning (Table 7a) were also mentioned as the most commonly used and farmers agreed that their use poses risk to human health. It is also important to highlight that in this study, WHO class I products were not reported as major causes of poisoning which might be due to the fact that these are registered for "restricted use". From the list of pesticides (Table 7a), 213 (73.3%) were insecticides, 56 (19.4%) were herbicides, 20 (6.9%) were fungicides. The three pesticides are also mentioned in the unintentional pesticide cases reported in ED-AZP and ED-MMC from 2010-2012 (Table 1). A number of pesticides which have been banned or severely restricted, are still marketed and used in Suriname. The continued use of restricted pesticides is due to lack or insufficient national controlling of the government.

Karate (39.1%) was the pesticide most mentioned in the poisoning incidents. Karate is locally used and has lambda cyhalothrin (λ-Cyhalothrin) as an active ingredient. It is a synthetic

pyrethroid insecticide with moderate acute toxicity which can cause skin damage and may be fatal if swallowed or inhaled.

The herbicide gramaxone was included in the most pesticide poisoning incidents. It has an active ingredient of paraquat dichloride and is highly toxic. When inhaled, paraquat can cause damage of the lungs. Paraquat poisoning is also possible after skin exposure. If Paraquat is exposed to the skin over an extended period of time, in concentrated form, or via damaged skin (skin that has sores, cuts, or a severe rash), poisoning is more likely to develop. Absorption of the chemical in the blood through skin exposure has been reported in a few cases (Zhou et al., 2013). Besides *Karate* and *Gramaxone*, Malathion is the third most commonly involved pesticides in this study. Malathion is an insecticide with an organophosphate compound used in the agriculture as a potent pesticide. Malathion is absorbed through the skin, lungs, and gastrointestinal tract.

Out of the 267 cases, respondents (92.1%) reported a single pesticide involved during the pesticide incident. However, 17 reported a mixture of two pesticides involved (6.4%) and 4 reported a mixture of 3 pesticides involved (1.5%). It was clear that the majority of the respondents used one specific pesticide when the incident happened.

Regarding the symptoms of poisoning, it was found in this study that the largest number of individuals had two, three or more symptoms of poisoning. Immediate symptoms that the farmers have reported include respiratory problems; skin rashes; eye irritation; and headaches. Remarkable is that although most respondents indicated that they have inhaled the pesticide, the first health problems they noticed were not on their respiratory system, but on the skin (skin irritation/itching/burning sensation). This could be due to the fact that penetration through skin is faster than through the respiratory system.

To this end, whenever pesticides are used, operative and well-maintained spraying equipment and the necessary precautions at all stages of pesticide handling are essential for reducing farmers' exposure to pesticides.

The knowledge of pesticide poisoning by the medical doctor is also most important in order to make a correct diagnosis of the symptoms of the patient. Important here is to diagnose where the exposure is, what the characteristics of the pesticide are and the toxicity of the pesticide to diagnose the seriousness of the case.

It can be absolutely stated that there is a lack of awareness on how to use and what the dangers are of irresponsible use of pesticides among the population in general and particularly among the laborers in the agricultural field of work.

## Recommendations

1. Farmers should take necessary precautions at all stages of pesticide handling to minimize exposure. The use of proper protection/Gear (PPE) is necessary. This can be monitored by the responsible institutions that supervision of compliance is ensured.
2. Consulting the doctors in case of a pesticide incident is of eminent importance for the health of the farmer. The doctor's clinic can create awareness through promo material, brochures and flyers on the dangers of irresponsible use of pesticide and on the urgency to consult a doctor after a pesticide incident.
3. Aircraft spraying of pesticides should be checked/supervised in district Nickerie to minimize the exposure of the pesticide to the community. Monitoring compliance with the rules as mentioned in the legislation of Suriname is of eminent importance.
4. Farmers, extension officers and agrochemical traders should be given regular training for the safe pesticide handling and adoption of PPE, and sanitation practices during, and after pesticide application of pesticides. In each district the Extension Officer Unit of the Ministry of Agriculture per region can set up a training program/workshop in collaboration with the other stakeholders for farmers to attend the training/workshop at favorable times.
5. Strengthen research and extension in IPM-method to encourage the use of biochemicals and biopesticides. The Extension Officer Unit of the Ministry of Agriculture can collaborate with de AdeKUS, CELOS, ADRON and other research institutes on how the use of IPM and other sustainable methods can be encouraged under farmers.
6. An efficient process of re-evaluating pesticide registrations should be developed to update and have good regulatory practices in line with the FAO/WHO Code of Conduct in Suriname.
7. Persistent organic pollutants and illegal pesticides should be banned. Stop the import of restricted pesticides. The implementation of the adopted FAO negative list is necessary.
8. Strengthening of the institution in charge of monitoring persistent organic pollutants and illegal pesticides.
9. A coordinated effort of all stakeholders - farmers, private pesticide retailers and consultants is necessary for pesticide awareness in Suriname. This can be developed through workshops and meetings on regular basis per district.

## References


De West. Dagblad uit en voor Suirname (2022). Gebruik verkeerde kaart van suriname verzwakt internationaal standpunt. Retrieved 31.01.2023 from https://dagbladdewest.com/2022/05/16/gebruik-verkeerde-kaart-van-suriname-verzwakt-internationaal-standpunt/

FAO/WHO (2009). International Code of Conduct on the Distribution and Use of Pesticides. Guideliness on Developing a Resporting System for Health and Environmental Incidents Resulting from Exposure to Pesticide. E-ISBN 978-92-5-106831-1. Retrieved 31.01.2023 from https://www.fao.org/fileadmin/templates/agphome/documents/Pests_Pesticides/Code/Incidentreporting09.pdf

FAO (2021). Q&A on Pests and Pesticide Management. Retrieved 31.01.2023 from https://www.fao.org/news/story/pt/item/1398779/icode/#:~:text=Pesticides%20are%20any%20substance%20or,or%20for%20regulating%20plant%20growth.

FAO (2023). FAO Term Portal. Retrieved 31.01.2023 from https://www.fao.org/faoterm/viewentry/en/?entryId=396

Mahabali S, Spanoghe P. Risk assessment of pesticide usage by farmers in Commewijne, Suriname, South America: a pilot study for the Alkmaar and Tamanredjo regions. Environ Monit Assess. 2015 Mar;187(3):153. doi: 10.1007/s10661-015-4363-3. Epub 2015 Mar 1. PMID: 25726027.

Pan American Health Organization (1986) , EPI Newsletter 8(5): 1

Ryberg, M., Rosenbaum, R., Mosqueron, L., & Fantke, P. (2018). Addressing bystander exposure to agricultural pesticides in life cycle impact assessment. *Chemophere.* 197: 541-549. Doi: 10.1016/j.chemosphere.2018.01.088

Wahid, F. A., Wickliffe, J., Wilson, M., Van Sauers, A., Bond, N., Hawkins, W., Mans, D., & Lichtveld, M. (2017). Presence of pesticide residues on produce cultivated in Suriname. Environmental Monitoring and Assessment, 189(6). https://doi.org/10.1007/s10661-017-6009-0

World Medical Association (2023). Wma declaration of helsinki – ethical principles for medical research involving human subjects. https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/

Zhou, Q., Kan, B., Jian X., Zhang, W., Liu, H., & Zhang., Z. (2013) Paraquat poisoning by skin absorption: Two case reports and a literature review. *Experimental and therapeutic medicine*. 6 (6): 1504-1506

# ANNEX I Questionnaire

## Pesticide Poisoning Survey Questionnaire Suriname (Final July 24, 2022)

| | |
|---|---|
| **District where the interview takes place** (Place a circle):<br>**Commewijne, Nickerie, Paramaribo, Saramacca, Wanica** | **Person nr: ……**<br>**on the Yes-No incident** |

This survey is being conducted in **five (5)** districts of Suriname where most agricultural activities take place. The survey is to find out if persons had a health problem due to a pesticide. If you (= the respondent) have inhaled a pesticide or it went in your eyes or on your skin, and it caused you a health problem, will you be willing to answer some questions about the incident?
**Instructions to the INTERVIEWER: Please read each question to the respondent and fill out the responses on the form.**

1. **Gender:**
   a) Male
   b) Female

2. **Age:**
   a) younger than 21
   b) 21-40
   c) 41-60
   d) over 60

3. **Place or location of Interview:**
   a) Farm
   b) Home
   c) Market
   d) Meeting / training
   e) Pesticide Shop
   f) Other (specify): _____

4. **District in Suriname where the pesticide poisoning incident occurred**
   a) Commewijne
   b) Nickerie
   c) Paramaribo
   d) Saramacca
   e) Wanica
   f) Other: ……

**5. When you were exposed to the pesticide and experienced the pesticide poisoning incident,**

**you were:**

a) Actively involved, working with the pesticide on the farm or applying pesticide on the farm.

b) Actively involved, working with the pesticide NOT on the farm (e.g. in pesticide shop, at home)

c) A bystander, indirectly exposed to the pesticide when other people were applying the pesticide.

d) Other: ……..

**6. Ask the respondent the question: "Please tell me the names of ALL pesticides <u>USED ON your/ the FARM</u> or which you are working with?"** ***For <u>EACH</u> pesticide named, ask if the person thinks the pesticide can cause a health problem.*** Question 6 is split up in 6a and 6b.

**If BYSTANDER incident, or PERSON NOT actively working with pesticides SKIP this question and CONTINUE with the NEXT QUESTION 7.**

*<u>NOTE:</u> If no chemicals are used on the farm or the farmer/ person working with the pesticides does not know the names of what is used, end the interview, and thank the person. This will not count as an interview and must be cancelled.*

| **6a. Do you think the pesticide being used on your farm can cause health problems?** | | | |
|---|---|---|---|
| | **YES** | **NO** | **Not sure** |
| 2, 4-D Amine (H1) | | | |
| **A** | | | |
| Admajor/Atmajoor (I37) | | | |
| All Rounder (H8) | | | |
| Alpha cypermethrin (I3) | | | |
| Angloxone (H11) | | | |
| Aval (I55) | | | |
| **B** | | | |
| Basagran (I9) | | | |
| Best Attack/ Bestact (I3) | | | |
| Birigand (R2) | | | |
| Brestan (F38) | | | |
| **C** | | | |
| Caprid/ Capridox | | | |
| Carimectin (I25) | | | |
| Cartap (I11) | | | |
| Cetamax (I15) | | | |
| Chlorfenapyr (I12) | | | |
| Coback (F11) | | | |
| Copper Hydrox (F11) | | | |
| Copper Plus (F13) | | | |
| Copperite (F13) | | | |

| | | | |
|---|---|---|---|
| Cuproneb (F12) | | | |
| Cyperbull/ Cyperkill/ Cypermethrin (I15) | | | |
| **D** | | | |
| Deltamehthrin (I18) | | | |
| Deltamethrin + Fipronil (I19) | | | |
| Demon WSP (I16) | | | |
| Diazinon/ Diazinox (I22) | | | |
| Dip lotion (I56) | | | |
| Diquat (H5) | | | |
| **E** | | | |
| Elimina (H1) | | | |
| Emamectin Benzoate (I25) | | | |
| **F** | | | |
| F1 Natio (F37) | | | |
| F4 (F38) | | | |
| F5 Copper Hydrox (F11) | | | |
| F50 (F39) | | | |
| FB12 No Smelter (F21) | | | |

| 6a. Continued | YES | NO | Not Sure |
|---|---|---|---|
| FR1 (F38) | | | |
| Fastac (I3) | | | |
| Fendo/ Findo-thrin (I29) | | | |
| Fenitrothion (I30) | | | |
| Fentin Acetat (F38) | | | |
| Fipramex/ Fipronil/ Fipro bait / Fipro Lokaas (I35) | | | |
| Flip (I35) | | | |
| Fipronil + Thiamethoxam (I36) | | | |
| **G** | | | |
| Gramazon/ Grammoxone (H12) | | | |
| **H** | | | |
| Herbizone (H12) | | | |
| Hit Rats (R2) | | | |
| **I** | | | |
| Imajor (I37) | | | |
| Imidox/ Imidacloprid (I37) | | | |
| Indox / Indoxacarb / NDOX Worong (I38) | | | |
| Infinito (I50) | | | |
| **K** | | | |
| Karate/Karatos/Karatox/Karteka/Karatine (I41) | | | |
| Klerat block (R2) | | | |
| Krovar DF herbicide (H4) | | | |
| **L** | | | |
| Lime sulfur 29% (F19) | | | |
| **M** | | | |
| Matabicheiras forte (I24) | | | |

| | | | |
|---|---|---|---|
| Maxi blast killer (F30) | | | |
| Maxi Deltaflip (I19) | | | |
| Maxi Hopro (F11) | | | |
| Maxi Moraya (I20) | | | |
| Maxi-HPC (I34) | | | |
| Methyldehyde (M1) | | | |
| Miron/ MIPO (I10) | | | |
| Molecricket bait (I14) | | | |
| Molecricket Kill (I55) | | | |
| **O** | | | |
| Oxamyl (N1) | | | |
| Qx1 SuperGram (H12) | | | |
| **P** | | | |
| Padan (I11) | | | |
| Paraquat Aleman / Paraquat Plus/ Paraquat Super (H11) | | | |
| Payrate / Piraat OX / Pirate (I12) | | | |
| Profenophos (I47) | | | |
| Propicon (F25) | | | |
| Protector (I37) | | | |
| Pyriran (I14) | | | |
| **R** | | | |
| Raticate (R2) | | | |
| Regency (F41) | | | |
| Reglone (H5) | | | |

| **6a. Continued** | **YES** | **NO** | **Not Sure** |
|---|---|---|---|
| **S** | | | |
| Samurai (I26) | | | |
| Sluggy/ Slug Bait (M1) | | | |
| Steadfast (I3) | | | |
| Super Copperite (F42) | | | |
| Superthrin (I15) | | | |
| Supona/ Sypona (I13) | | | |
| **T** | | | |
| Tebuconazole (F31) | | | |
| Termiban (I14) | | | |
| Thermitox (I51) | | | |
| Thiolarv (I49) | | | |
| Torque (I28) | | | |
| Tropigro (M1) | | | |
| Turbo (H1) | | | |
| TWT (I35) | | | |
| **Z** | | | |
| ZetaDox (I52) | | | |
| **Other** | | | |
| 1 | | | |

| | | | |
|---|---|---|---|
| 2 | | | |
| 3 | | | |
| **6b. If "Other 1, 2, 3" in question 6a., write the name of the pesticide.** | | | |

7. **Exact name of pesticide (or pesticides in a mixture) involved in the incident** (Refer to question 6 for spelling the pesticide name):
   ……

8. **Where on your body did the pesticide get on you, or into you? (What was the exposure to the pesticide)** (*Record multiple responses if applicable*)
   a) Eyes
   b) Inhaled (through respiratory system)
   c) Skin - face
   d) Skin - other than face
   e) Mouth
   f) Other: ……

**9a. What were the health problems you experienced and how severe (how bad) was each health problem? (Indicate in what degree the respondent experienced a health problem with the pesticide or mixture).** (*Record ALL symptoms experienced*)

| Part of body | **Very serious problem** | **Moderate problem** | **Not much of a problem** | **Cannot recall severity** |
|---|---|---|---|---|
| **SKIN** | | | | |
| a. Skin Bleeding (subcutaneous bleeding) | | | | |
| b. Skin Burns | | | | |
| c. Skin Irritation /itching | | | | |
| d. Skin Rash (redness or swelling, without itching) | | | | |
| | | | | |

| Part of body | **Very serious problem** | **Moderate problem** | **Not much of a problem** | **Cannot recall severity** |
|---|---|---|---|---|
| **EYES** | | | | |
| e. Blurred Vision | | | | |
| f. Eye Irritation / burning | | | | |
| g. Eye Twitching | | | | |
| h. Pinpoint pupils | | | | |
| i. Excessive tear production/ watery eye | | | | |

| Part of body | **Very serious problem** | **Moderate problem** | **Not much of a problem** | **Cannot recall severity** |
|---|---|---|---|---|
| **GASTRO-INTESTINAL** | | | | |
| j. Diarrhoea | | | | |

| | | | | |
|---|---|---|---|---|
| k. Nausea (without vomiting) | | | | |
| l. Stomach pain | | | | |
| m. Vomiting | | | | |

| Part of body | **Very serious problem** | **Moderate problem** | **Not much of a problem** | **Cannot recall severity** |
|---|---|---|---|---|
| **RESPIRATORY** | | | | |
| n. Coughing (regular) | | | | |
| o. Coughing blood | | | | |
| p. Runny nose | | | | |
| q. Sneezing | | | | |
| r. Tightness of Chest / shortnes of breath/ Asthma | | | | |

| Part of body | **Very serious problem** | **Moderate problem** | **Not much of a problem** | **Cannot recall severity** |
|---|---|---|---|---|
| **OTHER SYMPTOMS** | | | | |
| s. Accelerated heart rate (heart palpitions) | | | | |
| t. Confusion | | | | |
| u. Dizziness | | | | |
| v. Excessive salivation | | | | |
| w. Excessive sweating | | | | |
| x. Fainting | | | | |
| y. Headache | | | | |
| z. Staggering | | | | |
| aa) Tremor/trembling/convulsion | | | | |
| bb) Unconsciousness | | | | |
| cc) Other: | | | | |
| Other 1 | | | | |
| Other 2 | | | | |
| Other 3 | | | | |
| **9b. Please write down the Other symptoms (Other 1, 2, 3) that were not in the list of question 9a., but were experienced by the respondent** | | | | |

**10a. What did you do when you felt the effects of the pesticide?**

*(Record multiple responses if applicable)*

a) Nothing / no action
b) Rested/ stopped using the pesticide
c) Washed the chemical off immediately
d) I continued spraying, and after I had finished, I washed the chemical off

e) Went to private/ family doctor
f) Went to Health Centre (RGD poli)
g) Went to Hospital
*h)* Self-treatment *(if self-treatment, please proceed with question 10b.)*

**10b. If Self-treatment, describe the type of self-treatment that was performed.**
***(INTERVIEWER:***
***Probe for detail of Self-treatment type. Record multiple responses if applicable)*.**
a) Asthma inhaler used
b) Applied vaseline to skin
c) Applied alcohol to skin
d) Applied lotion/ oil/ ointment to skin
e) Drank milk
d) Drank alcohol
f) Drank some type of tea
g) Eye wash/ eye drops
h) Pain medication used
i) Other: ……

***11.*** **How many days were you unable to work, due to the health problems caused by the pesticide incident?** *Mark only one answer*
☐ 0 days ☐ 1 day ☐ 2 days ☐ 3 days ☐ 4 days ☐ 5 days ☐ Other: …….

**12. Were you exposed to:**
a) Concentrated commercial product
b) Diluted mixture
c) Both
d) Not sure/ cannot recall

**13. How long were you exposed to the pesticide?**
a) Less than one hour
b) 1 – 2 hours
c) 3 - 6 hours
d) Other (specify) ……..

**14. How soon after exposure to the pesticide or mixture were the harmful effects observed?**
a) Almost immediately
b) 1- 2 hours
c) 3 - 6hours
d) Other (specify) ……..

**15. If treated by doctor or at Health Center (RGD Poli) or Emergency Center (EHBO), answer the following questions 15a – 15f. If NOT, go directly to question 16.**

a) Name of private/ family doctor or health facility _____

b) Number of visits to the doctor or health facility. Mark only one answer. If "Other", specify)

1 tim☐ 2 ti☐s 3 ti☐s 4 ti☐s 5 ti☐s Oth☐……..

c) Doctor's diagnosis, as indicated by the respondent: _____

_____

_____

d) Medication and treatment that was received, as indicated by the respondent:

_____

_____

e) How many days did you overnight in the hospital? Mark only one answer. If "Other", specify.

0 da☐ 1 da☐ 2 da☐ 3 da☐ 4 da☐ 5 da☐ Oth☐……..

f) Other relevant details of treatment: _____

_____

_____

**16. What year and month was the incident? (Based on question 7, ONE MOST important incident (Mark only One answer)**

| Month / Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Okt | Nov | Dec | Not Sure |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2019 | | | | | | | | | | | | | |
| 2020 | | | | | | | | | | | | | |
| 2021 | | | | | | | | | | | | | |
| 2022 | | | | | | | | | | | | | |
| Not sure/ Cannot recall | | | | | | | | | | | | | |

**17. Activities at the time of exposure (Record those that apply):**

a) Application in field
b) Mixing pesticide
c) Loading pesticide into sprayer
d) Application to livestock (control of animal ticks etc.)

e) Application in house (household pests)
f) Application around or near house, including backyard garden
g) Vector control application (mosquito fogging etc.)
h) Standing/working in or near a field during or after pesticide application (Bystander)
i) Handling pesticides in a pesticide shop
j) Other (specify) _____

***18.*** **Describe exactly <u>HOW</u> the pesticide incident occurred / <u>what happened</u> that resulted in the contamination** *(Record every detail; prompt the person if needed)*

---

---

.....

.....

***19a. <u>FOR INTERVIEWER</u>****: based on details of the response given to Question 18, which ones of the following best summarise* ***<u>what caused</u>*** *the pesticide poisoning incident (More than one can be recorded if applicable):*

a) Wind blew spray mist on sprayman during field application (*If this is selected, also answer question 19b in addition*).
b) Spray mist contacted sprayman during field application (wind not involved).
c) Splashed/spilled pesticide on self while mixing/handling.
d) During application, pesticide leaked from spray equipment onto sprayman.
e) Hand or glove contaminated with pesticide contacted other body parts.
f) <u>Bystander</u> not involved in pesticide use, was affected during mixing, or during / after application.
g) While mixing pesticide, person was affected by pesticide vapours (fumes)
h) Skin was contaminated with pesticide when applying with a bucket
i) Wind blew pesticide granules or powder on the person *(If this is selected, also answer question 19b in addition*)
j) Other (specify)_____

**19b. <u>IF INTERVIEWER SELECTS option a) or i) in question 19a</u>**, ask the person being interviewed:
"**Why were you applying pesticides in windy conditions?**" *(Multiple responses if applicable)*

a. Not windy when I started

b. The pest problem was urgent
c. Wind was blowing but I did not expect it would be a problem
d. I was instructed to spray at that time (someone else's decision)
e. No particular reason
f. Other _____

**20. Was the pesticide label available before or at the time of the incident?**

a) Yes
b) No
c) Not applicable
d) Not sure/cannot recall

**21. If YES (in question 20), did you understand what was written on the pesticide label?**

a) Yes, I read and understood the label
b) I did not read the label
c) No, I read the label but did not understand it
d) Not applicable

**22a. Which of the following protective clothing were you wearing at the time of the incident?** *Question 22 is split up in 22a and 22b.* Pictures of PPE for illustration.

| |
|---|
| a) Not applicable - Bystander incident |
| b) Not sure/Can't recall anything of what was being worn *(if either option a) or option b) in question 22a. is selected as a response, go to next question 23). If NOT go to question 22b.* |

| **22b. Which of the following protective clothing were you wearing at the time of the pesticide incident?** *Read EACH item in the list to the person being interviewed and record all that was being worn*. Mark only one answer per row. (Record all that apply). | **YES** | **NO** | **Not sure/ Cannot recall** |
|---|---|---|---|
| c) Rubber gloves | | | |
| d) Coverall / Overall | | | |
| e) Spray mask/ Face shield | | | |
| f) Safety goggles (*If safety goggles - YES, go to h*) | | | |
| g) Eyeglasses | | | |
| h) Respirator with cartridges (*if respirator - YES, skip i) to k)*) | | | |
| i.) Dust mask with pesticide absorbing particles (single use) (*if YES, skip j) to k)*) | | | |
| j) Regular dust mask (*if dust mask - YES, skip k) scarf or cloth*) | | | |
| k) Scarf or cloth over nose and mouth | | | |
| l) Water boots (*if water boots - YES, skip m) shoes/regular boots*) | | | |
| m) Shoes / regular boots | | | |
| n) Long sleeve shirt | | | |
| o) Long pants | | | |
| p) Waterproof apron | | | |
| q) Other<br>**22b. Continued. If Other, please specify** | | | |

**23. If you were not wearing rubber gloves, safety goggles, or respirator** (question 22b) **explain**

**why not.** *(Record multiple responses if applicable)*

a) Not applicable (Could not recall anything what was being worn/ Bystander incident)
b) Too hot
c) Too expensive to buy
d) Did not think it was necessary
e) Uncomfortable
f) Other reason (specify) _____

**24. What was the application method** (How the pesticide was being applied). (Only one answer)

a) Aerial spraying (plane)
b) Backpack / Knapsack sprayer
c) Bucket
d) by Hand
e) Hand sprayer
f) Mist blower / Motor blower
g) Tractor mounted sprayer
h) Not applicable
i) Other (specify): _____

**25. Where did the exposure to the pesticide occur?**

a) Field
b) Storeroom
c) Home Garden
d) Inside or outside of house
e) Other (Specify) _____

***26.*** **What was being treated?** *(Mark only one answer)*

a) Animals (livestock / pet)
b) Crops
c) Stored products
d) Weeds
e) Not applicable
f) Other (specify):_____

**27. Were other individuals affected in the same incident?**

a) Yes
b) No

c) Not sure / Cannot recall

**28. Did you get any training in the use of agricultural pesticides, including the use of Personal Protective Equipment such as gloves, respirator, and safety goggles?**

a) Yes
b) No
c) Not sure/ cannot recall

**29. If YES (in question 28), who provided this training?**

a) Ministry of Agriculture
b) Pesticide salesman
c) Another farmer
d) Pesticide store
e) Other (specify)

_____

---

**PERSONAL Information** (for AdeKUS quality check)

Name of Participant/ respondent: _____
Home Address: _____
Resort/ Location: _____
Cell phone number(s): _____

Name of interviewer (data collector): ……
Date: _____

## ANNEX II Overview of the survey results

**Table 14**

*Distribution of respondents by selected demographic characteristics*

| Demographic characteristics | N | % |
|---|---|---|
| **Sex** | | |
| Male | 190 | 71.2 |
| Female | 77 | 28.8 |
| **Age group** | | |
| Younger than 21 years | 4 | 1.5 |
| 21 – 40 years | 77 | 28.8 |
| 41 -60 years | 147 | 55.1 |
| Over 60 years | 39 | 14.6 |
| **Districts Where pesticide Poisoning Incident Occured** | | |
| Paramaribo | 39 | 14.6 |
| Saramacca | 44 | 16.5 |
| Wanica | 37 | 13.9 |
| Commewijne | 35 | 13.1 |
| Nickerie | 112 | 41.9 |
| **Place of interview** | | |
| Farm | 19 | 7.1 |
| Home | 210 | 78.7 |
| Market | 13 | 4.9 |
| Pesticide shop | 3 | 1.1 |
| Workplace | 8 | 3.0 |
| At the side of the road | 5 | 1.9 |
| Some other place | 9 | 3.4 |

*Note.* A total of 267 respondents participated in the survey, representing an effective response rate of 100.0%. Survey Q1- Q4.

**Table 15**

*Involvement in the pesticide usage and exposure during pesticide poisoning incident*

| **Involvement** | **N** | **%** |
|---|---|---|
| A bystander, indirectly exposed to the pesticide when other people were applying the pesticide | 78 | 29.2 |
| Actively involved working with the pesticide NOT on the farm (e.g. in pesticide shop, at home, etc.) | 4 | 1.5 |
| Actively involved, working with the pesticide on the farm or applying pesticide on the farm. | 185 | 69.3 |
| **Total** | **267** | **100** |

*Note.* Survey Q5.

**Table 16**

*Distribution of respondents by pesticide and do you think this pesticide being used is a health problem*

| Pesticides | Do you think this pesticide being used is health problem? | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Not Sure | | Does not use | |
| | N | % | N | % | N | % | N | % |
| 2, 4-D Amine | 30 | 11.2 | 7 | 2.6 | 2 | 0.7 | 228 | 85.4 |
| Admajor/Atmajoor | 30 | 11.2 | 5 | 1.9 | 1 | 0.4 | 231 | 86.6 |
| All Rounder | 6 | 2.2 | 1 | 0.4 | - | - | 260 | 97.4 |
| Angloxone | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| Basagran | - | - | 1 | 0.4 | - | - | 266 | 99.6 |
| Best Attack/Bestact | 45 | 16.8 | 1 | 0.4 | 2 | 0.7 | 219 | 82.1 |
| Brestan | 16 | 6 | 1 | 0.4 | - | - | 250 | 93.7 |
| Caprid/Capridox | 5 | 1.9 | 1 | 0.4 | 2 | 0.7 | 259 | 97.0 |
| Cetamax | 6 | 2.2 | - | - | - | - | 261 | 97.8 |
| Coback | 3 | 1.1 | 1 | 0.4 | - | - | 263 | 98.5 |
| Copper Hydroxide | 2 | 0.7 | - | - | - | - | 265 | 99.3 |
| Copper plus | 2 | 0.7 | 1 | 0.4 | - | - | 264 | 98.9 |
| Copperite | 4 | 1.5 | - | - | - | - | 263 | 98.5 |
| Cuproneb | 1 | 0.4 | 1 | 0.4 | - | - | 265 | 99.3 |
| Cyperbull/Cyperkill/Cypermethrin | 14 | 5.2 | 1 | 0.4 | - | - | 252 | 94.4 |
| Diazinon/Diazinox | 29 | 10.8 | 4 | 1.5 | - | - | 234 | 87.7 |
| Elimina | 1 | 0.4 | 1 | 0.4 | - | - | 265 | 99.3 |
| F1 Natio | 2 | 0.7 | 2 | 0.7 | - | - | 263 | 98.5 |
| F4 | 3 | 1.1 | - | - | - | - | 264 | 98.9 |
| F5 Copper Hydrox | 3 | 1.1 | 1 | 0.4 | - | - | 263 | 98.5 |
| F50 | 3 | 1.1 | - | - | - | - | 264 | 98.9 |
| FB12 No Smelter | 3 | 1.1 | 1 | 0.4 | - | - | 263 | 98.5 |
| FR1 | 2 | 0.7 | - | - | - | - | 265 | 99.3 |
| Fastac | 4 | 1.5 | - | - | - | - | 263 | 98.5 |
| Fendo/Fendo-thrin | 2 | 0.7 | - | - | - | - | 265 | 99.3 |
| Fenitrothion | 1 | 0.4 | 1 | 0.4 | - | - | 265 | 99.3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Fipramex/Fipronil/Fipro bait/Fipro Lokaas | 2 | 0.7 | 1 | 0.4 | - | - | 264 | 98.9 |
| Fipronil + Thiamethoxam | 1 | 0.4 | 1 | 0.4 | - | - | 265 | 99.3 |
| Gramazon/Grammoxone | 111 | 41.4 | 17 | 6 | 2 | 0.7 | 137 | 51.3 |
| Imajor | 2 | 0.7 | 1 | 0.4 | - | - | 264 | 98.9 |
| Imidox/Imidacloprid | 2 | 0.7 | 1 | 0.4 | - | - | 264 | 98.9 |
| Indox/Indoxacarb/NDOX Worong | 2 | 0.7 | 1 | 0.4 | - | - | 264 | 98.9 |
| Infinito | 2 | 0.7 | 1 | 0.4 | - | - | 264 | 98.9 |
| Karate/Karatos/Karatox/Karteka/Karatine | 147 | 54.9 | 7 | 2.6 | 5 | 1.9 | 108 | 40.7 |
| Lime sulfur 29% | - | - | 1 | 0.4 | - | - | 266 | 99.6 |
| Miron/MIPO | - | - | 1 | 0.4 | - | - | 266 | 99.6 |
| Molecricket bait | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| Molecricket kill | 1 | 0.4 | 1 | 0.4 | - | - | 265 | 99.3 |
| Qx1 Supergram | 2 | 0.7 | - | - | - | - | 265 | 99.3 |
| Padan | - | - | 1 | 0.4 | - | - | 266 | 99.6 |
| Paraquat Aleman/Paraquat Plus/Paraquat Super | 23 | 8.6 | 5 | 1.9 | - | - | 239 | 89.6 |
| Payrate/Piraat Ox/Pirate | 10 | 3.7 | 4 | 1.5 | 1 | 0.4 | 252 | 94.4 |
| Propiconazole | - | - | 1 | 0.4 | - | - | 266 | 99.6 |
| Protector | 3 | 1.1 | - | - | - | - | 264 | 98.9 |
| Pyriran | 2 | 0.7 | - | - | - | - | 265 | 99.3 |
| Regency | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| Sluggy/Slug Bait | 1 | 0.4 | 1 | 0.4 | - | - | 265 | 99.3 |
| Supona/Sypona | - | - | 1 | 0.4 | - | - | 266 | 99.6 |
| Torque | 4 | 1.5 | 2 | 0.4 | - | - | 261 | 97.8 |
| Turbo | 4 | 1.5 | 1 | 0.4 | 1 | - | 262 | 98.1 |
| TWT | 8 | 3 | 1 | 0.4 | - | - | 258 | 96.6 |
| ZetaDox | 16 | 6 | 4 | 1.5 | - | - | 247 | 92.5 |
| **Others** | | | | | | | | |
| Abalotin (Pesticide) | 2 | 0.7 | 1 | 0.4 | - | - | 264 | 98.9 |
| Abamectin (Pesticide) | - | - | - | - | 1 | 0.4 | 266 | 99.6 |
| Advance (Pesticide) | 4 | 1.5 | - | - | - | - | 263 | 98.5 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| All-rounder (Pesticide) | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| Bactral (Pesticide) | 3 | 1.1 | - | - | - | - | 264 | 98.9 |
| Bio-ABA (pesticide) | - | - | 1 | 0.4 | - | - | 266 | 99.6 |
| Bio-Pel (Pesticide) | 2 | 0.7 | - | - | - | - | 265 | 99.3 |
| Bravo (Pesticide) | 16 | 6 | - | - | - | - | 251 | 94.0 |
| Break-Thru (Plant hormone) | 1 | 0.4 | 1 | 0.4 | - | - | 265 | 99.3 |
| Buctril (pesticide) | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| Captan (pesticide) | - | - | 2 | 0.7 | - | - | 265 | 99.3 |
| Confidor (Pesticide) | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| Cure (Pesticide) | 1 | 0.4 | 1 | 0.4 | - | - | 265 | 99.3 |
| Cytokine (Pesticide) | 2 | 0.7 | - | - | - | - | 265 | 99.3 |
| Detrin (Pesticide) | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| Dipel (Pesticide) | - | - | 1 | 0.4 | - | - | 266 | 99.6 |
| Enzyl (Pesticide) | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| F10 (titan) (Pesticide) | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| F12 Cuproneb (Pesticide) | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| F2 (maxi-mativo) (Pesticide) | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| Fujione (Pesticide) | 5 | 1.9 | - | - | - | - | 262 | 98.1 |
| Furadan (Pesticide) | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| Fusirore (Pesticide) | 3 | 1.1 | - | - | - | - | 264 | 98.9 |
| Gluphosinate (Pesticide) | 38 | 14.2 | 4 | 1.5 | 1 | 0.4 | 224 | 91.4 |
| Glyphomax (Pesticide) | - | - | - | - | 1 | 0.4 | 265 | 99.6 |
| Grasokoning (Pesticide) | 2 | 0.7 | - | - | - | - | 265 | 99.3 |
| Hurricane (Pesticide) | 2 | 0.7 | - | - | - | - | 265 | 99.3 |
| Lasso (Pesticide) | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| Malathion (Pesticide) | 52 | 19.4 | 10 | 3.7 | 1 | 0.4 | 204 | 76.5 |
| Manzeb (Pesticide) | 6 | 2.2 | - | - | 1 | 0.4 | 260 | 97.4 |
| Maxi bactara (Pesticide) | 2 | 0.7 | - | - | - | - | 265 | 99.3 |
| Nomina (Pesticide) | - | - | 2 | 0.7 | - | - | 265 | 99.3 |
| Turbo Nomore (Pesticide) | - | - | 1 | 0.4 | - | - | 266 | 99.6 |
| Ox1 Super gram (Pesticide) | 1 | 0.4 | 1 | 0.4 | - | - | 265 | 99.3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Panally (Pesticide) | 11 | 4.1 | - | - | - | - | 256 | 95.9 |
| Pegasus (Pesticide) | 5 | 1.9 | - | - | - | - | 262 | 98.1 |
| Polygram (Pesticide) | 3 | 1.1 | - | - | - | - | 264 | 98.9 |
| Prontinex (Pesticide) | - | - | 1 | 0.4 | - | - | 266 | 99.6 |
| Rizolex (Pesticide) | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| Roundup (Pesticide) | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| Savernate (Pesticide) | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| Superkill (Pesticide) | 3 | 1.1 | - | - | - | - | 264 | 98.9 |
| Terminator (Pesticide) | 1 | 0.4 | - | - | - | - | 266 | 99.6 |
| Trimmer (Pesticide) | 3 | 1.1 | - | - | - | - | 264 | 98.9 |

*Note. Survey Q6*

**Table 17**

*Exposure to the body*

| **Involvement** | **N** | **%** |
|---|---|---|
| Eyes | 38 | 10.4 |
| Inhaled (through respiratory systems) | 116 | 31.6 |
| Skin-face | 103 | 28.1 |
| Skin-other than face | 107 | 29.2 |
| Mouth | 3 | 0.8 |
| **Total** | **367** | **100** |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 367 instead of 267 and 137.5% instead of 100.0%) since a respondent can select multiple responses. Survey Q8.

**Table 18**

*Health problems and how severe it was*

| | Very serious problem | | Moderate Problem | | Not much of a problem | | Total | |
|---|---|---|---|---|---|---|---|---|
| **Part of body** | **N** | **%** | **N** | **%** | **N** | **%** | **N** | **%** |
| **Skin** | | | | | | | | |
| skin bleeding | 2 | 0.4 | 1 | 0.2 | - | - | 3 | 0.6 |
| skin burns | 11 | 2.4 | 16 | 3.4 | 1 | 0.2 | 28 | 6.0 |
| skin irritation/itching | 31 | 6.6 | 64 | 13.7 | 7 | 1.5 | 102 | 21.9 |
| skin rash | - | - | 9 | 1.9 | 2 | 0.4 | 11 | 2.4 |
| **Eyes** | | | | | | | | |
| blurred vision | 5 | 1.1 | 6 | 1.3 | - | - | 11 | 2.2 |
| eye irritation/burning | 14 | 3.0 | 30 | 6.4 | 1 | 0.2 | 45 | 9.7 |
| eye twitching | - | - | 2 | 0.4 | - | - | 2 | 0.4 |
| pinpoint pupils | - | - | - | - | - | - | - | - |
| tear production/watery eye | 4 | 0.9 | 8 | 1.7 | 1 | 0.2 | 13 | 2.8 |
| **Gastro-Intestinal** | | | | | | | | |
| diarrhea | | | | | | | | |
| nausea | 6 | 1.3 | 24 | 5.1 | - | - | 30 | 6.5 |
| stomach pain | 3 | 0.6 | - | - | - | - | 3 | 0.6 |
| vomiting | 1 | 0.2 | - | - | - | - | 1 | 0.2 |
| **Respiratory** | | | | | | | | |
| coughing (regular) | 8 | 1.7 | 19 | 4.1 | - | - | 27 | 5.8 |
| coughing blood | - | - | 1 | 0.2 | - | - | 1 | 0.2 |
| runny nose | 2 | 0.4 | 8 | 1.7 | - | - | 10 | 2.2 |
| sneezing | 3 | 0.6 | 10 | 2.1 | - | - | 13 | 2.8 |
| tightness of chest/asthma | 3 | 0.6 | 6 | 1.3 | - | - | 9 | 1.9 |
| **Other symptoms** | | | | | | | | |
| accelerated heart rate | 1 | 0.2 | 3 | 0.6 | - | - | 4 | 0.9 |
| confusion | - | - | 1 | 0.2 | - | - | 1 | 0.2 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| dizziness | 3 | 0.6 | 23 | 4.9 | 2 | 0.4 | 28 | 6 |
| excessive salivation | - | - | - | - | - | - | - | - |
| excessive sweating | - | - | 4 | 0.9 | - | - | 4 | 0.9 |
| fainting | - | - | - | - | - | - | - | - |
| headache | 12 | 2.6 | 45 | 9.6 | 2 | 0.4 | 59 | 12.7 |
| staggering | - | - | - | - | - | - | - | - |
| tremor/trembling/convulsion | - | - | - | - | - | - | - | - |
| unconsciousness | - | - | - | - | - | - | - | - |
| other 1 | 21 | 4.5 | 35 | 7.5 | 1 | 0.2 | 57 | 12.3 |
| other 2 | - | - | 4 | 0.9 | - | - | 4 | 0.9 |
| other 3 | - | - | 1 | 0.2 | - | - | 1 | 0.2 |
| | **130** | **27.8** | **320** | **68.5** | **17** | **3.6** | **467** | **100** |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 467 instead of 267 and 174.9% instead of 100.0%) since a respondent can select multiple responses. Survey Q9a.

**Table 19**

*Other symptoms*

| **Other symptoms** | **N** | **%** |
|---|---|---|
| Burn feeling (on the skin)/sensation | 30 | 48.4 |
| Itchy nose | 4 | 6.5 |
| Nasal stimuli (stingy nose) | 3 | 4.8 |
| Sore throat | 1 | 1.6 |
| Uncomfortable feeling | 1 | 1.6 |
| Burning nose | 2 | 3.2 |
| Cold | 1 | 1.6 |
| Dry throat | 9 | 14.5 |
| Dyspnea (shortness of breath) | 2 | 3.2 |
| Burned feet | 1 | 1.6 |
| Itching and skin rash | 1 | 1.6 |

| | | |
|---|---|---|
| Laryngitis (throat inflammation) | 1 | 1.6 |
| lethargic (sleepy) | 1 | 1.6 |
| pain in the lungs | 1 | 1.6 |
| skin irritation without itching | 1 | 1.6 |
| Smell | 2 | 3.2 |
| Nose pain | 1 | 1.6 |
| **Total** | **62** | **100.0** |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 62 instead of 267 and 23.2% instead of 100.0%). Survey Q9b.

**Table 20**

*Type of self-treatment applied after respondent felt the effects of the pesticide*

| **Self-treatment** | **N** | **%** |
|---|---|---|
| Asthma inhaler used | 4 | 2.1 |
| Applied Vaseline to skin | 5 | 2.6 |
| Applied alcohol to skin | 1 | 0.5 |
| Applied lotion/ oil/ ointment to skin | 51 | 26.2 |
| Drank milk | 38 | 19.5 |
| Drank alcohol | 2 | 1.0 |
| Drank some type of tea | 3 | 1.5 |
| Eye wash/ eye drops | 2 | 1.0 |
| Pain medication used | 22 | 11.3 |
| Other | 67 | 34.4 |
| **Total** | **195** | **100.0** |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 195 instead of 267 and 73.0% instead of 100.0%) since a respondent can select more than one action taken, when respondent felt applied the type of self-treatment at question 10a as shown in Table 8. Survey Q10b.

**Table 21**

*Number of days unable to work*

| Number of days | N | % |
|---|---|---|
| 0 days | 249 | 93.3 |
| 2 hours | 1 | 0.4 |
| Half a day | 1 | 0.4 |
| 1 day | 5 | 1.9 |
| 2 days | 3 | 1.1 |
| 3 days | 2 | 0.7 |
| 1 week | 4 | 1.5 |
| 3 weeks | 1 | 0.4 |
| 1 month | 1 | 0.4 |
| **Total** | **267** | **100.0** |

*Note.* Survey Q11.

**Table 22**

*Pesticide mixture or product that respondents were exposed to during pesticide poisoning incident*

| Pesticide mixture | N | % |
|---|---|---|
| Concentrated commercial product | 10 | 3.7 |
| Diluted mixture | 241 | 90.3 |
| Both | 2 | 0.7 |
| Not sure/ cannot recall | 14 | 5.2 |
| **Total** | **267** | **100** |

*Note.* Survey Q12.

**Table 23**

*Duration of pesticide exposure period*

| **Duration** | **N** | **%** |
|---|---|---|
| Less than one hour | 121 | 45.3 |
| 1-2 hours | 104 | 39.3 |
| 3-6 hours | 27 | 10.1 |
| 8 hours | 2 | 0.7 |
| 8-12 hours | 3 | 1.1 |
| 24 hours | 2 | 0.7 |
| 1-2 days | 1 | 0.4 |
| Other: | | |
| Closed her house after the other person started spraying | 1 | 0.4 |
| Depends on how big the farm is | 1 | 0.4 |
| Depends on the work/task | 2 | 0.7 |
| Immediately after the chemical was mixed | 1 | 0.4 |
| Not sure | 1 | 0.4 |
| **Total** | **267** | **100.0** |

*Note.* Survey Q13.

**Table 24**

*Length of time harmful effects were observed after exposure*

| **Duration** | **N** | **%** |
|---|---|---|
| Almost immediately | 174 | 65.2 |
| 15 minutes | 3 | 1.1 |
| 30 minutes | 8 | 3.0 |
| 1-2 hours | 59 | 22.1 |
| 3-6 hours | 10 | 3.7 |
| 10-12 hours | 1 | 0.4 |
| After 1 day | 4 | 1.5 |
| After 2 days | 1 | 0.4 |

| | | |
|---|---|---|
| After he was done spraying | 5 | 1.9 |
| After work hours | 2 | 0.7 |
| **Total** | **267** | **100.0** |

*Note.* Survey Q14.

**Table 25**

*Name of doctor/family doctor or health facility*

| **Name** | **N** | **%** |
|---|---|---|
| drs. Biens | 1 | 5 |
| drs. Bleusaon | 1 | 5 |
| drs. Karaja | 4 | 20 |
| drs. Kromopawiro | 4 | 20 |
| drs. Mahangi | 1 | 5 |
| drs. Manan | 1 | 5 |
| drs. Manna | 2 | 10 |
| drs. Punwasi | 2 | 10 |
| drs. Hemradj | 2 | 10 |
| drs. Simbodath Panday | 1 | 5 |
| drs. Sodikromo | 1 | 5 |
| **Total** | **20** | **100** |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 20 instead of 267 and 7.5% instead of 100.0%) since a respondent who is treated by a doctor or a Health Center (RGD Poli) or Emergency Center (EHBO) can answer this question. Survey Q15a.

**Table 26**

*Number of times visiting the doctor*

| **Number of times** | **N** | **%** |
|---|---|---|
| 1 time | 13 | 65.0 |
| 2 times | 3 | 15.0 |
| 3 times | 1 | 5.0 |

| | | |
|---|---|---|
| Depending on the regularity of spraying | 1 | 5.0 |
| Regular | 1 | 5.0 |
| Still under treatment | 1 | 5.0 |
| **Total** | **20** | **100.0** |

*Note.* Survey Q15b.

**Table 27**

*Year and month of incident*

| | 2019 | | 2020 | | 2021 | | 2022 | | Not sure | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Month** | **N** | **%** | **N** | **%** | **N** | **%** | **N** | **%** | **N** | **%** | **N** | **%** |
| January | - | - | - | - | 2 | 0.7 | 1 | 0.4 | - | - | 3 | 1.1 |
| February | 1 | 0.4 | - | - | 5 | 1.9 | 6 | 2.2 | - | - | 12 | 4.5 |
| March | - | - | 1 | 0.4 | 2 | 0.7 | 5 | 1.9 | - | - | 8 | 3.0 |
| April | - | - | - | - | | 0.0 | 4 | 1.5 | - | - | 4 | 1.5 |
| May | - | - | 1 | 0.4 | 1 | 0.4 | 12 | 4.5 | - | - | 14 | 5.2 |
| June | - | - | - | - | 1 | 0.4 | 33 | 12.4 | - | - | 34 | 12.7 |
| July | - | - | - | - | 2 | 0.7 | 39 | 14.6 | - | - | 41 | 15.4 |
| August | - | - | - | - | 3 | 1.1 | 60 | 22.5 | - | - | 63 | 23.6 |
| September | - | - | 2 | 0.7 | 1 | 0.4 | 15 | 5.6 | - | - | 18 | 6.7 |
| October | - | - | - | - | 1 | 0.4 | 9 | 3.4 | - | - | 10 | 3.7 |
| November | - | - | 1 | 0.4 | 1 | 0.4 | - | - | - | - | 2 | 0.7 |
| December | - | - | - | - | 2 | 0.7 | - | - | - | - | 2 | 0.7 |
| Not sure | 5 | 1.9 | 8 | 3.0 | 23 | 8.6 | 18 | 6.7 | 2 | 0.7 | 56 | 21.0 |
| **Total** | **6** | **2.2** | **13** | **4.9** | **44** | **16.5** | **202** | **75.7** | **2** | **0.7** | **267** | **100.0** |

*Note.* Survey Q16.

**Table 28**

*Activities at the time of exposure*

| **Activity** | **N** | **%** |
|---|---|---|
| Application in field | 162 | 58.9 |
| Mixing pesticide | 10 | 3.6 |
| Loading pesticide into sprayer | 3 | 1.1 |
| Application to livestock (control of animal ticks, etc.) | - | - |
| Application in house (household pests) | 5 | 1.8 |
| Application around or near house, including backyard garden | 31 | 11.3 |
| Vector control application (mosquito fogging, etc.) | 2 | 0.7 |
| Standing/working in or near a field during or after pesticide application (bystander) | 61 | 22.2 |
| Handling pesticides in a pesticide shop | - | - |
| Other: putting tank or sprayer on the back | 1 | 0.4 |
| **Total** | **275** | **100.0** |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 275 instead of 267 and 103.0% instead of 100.0%) since a respondent can select multiple responses. Survey Q17.

**Table 29**

*Cause of pesticide poisoning incident*

| **Cause of pesticide poisoning incident** | **N** | **%** |
|---|---|---|
| Wind blew spray mist on spray man during field application | 132 | 46.8 |
| Spray mist contacted spray man during field application (wind not involved) | 13 | 4.6 |
| Splashed/ spilled pesticide on self while mixing/ handling | 37 | 13.1 |
| During application, pesticide leaked from spray equipment onto spray man | 14 | 5.0 |
| Hand or glove contaminated with pesticide contacted other body | - | - |

| | | |
|---|---|---|
| parts | | |
| Bystander not involved in pesticide use, was affected during mixing, or during/ after application of the pesticide | 75 | 26.6 |
| While mixing pesticide, person was affected by pesticide vapours (fumes) | 5 | 1.8 |
| Skin was contaminated with pesticide when applying with a bucket | - | - |
| Wind blew pesticide granules or powder on the person | - | - |
| Other: Not/not appropriate PPE/PPE in bad condition | 3 | 1.1 |
| Other: it was not windy, but felt a burning sensation on the face | 1 | 0.4 |
| Other: Due to early morning mist | 1 | 0.4 |
| Other: the pesticide leaked from the upper tree branches on him | 1 | 0.4 |
| **Total** | **282** | **100.0** |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 282 instead of 267 and 105.6% instead of 100.0%) since a respondent can select multiple responses. Survey Q19a.

**Table 30**

*Reason for application of pesticide in windy condition*

| **Reason for applying pesticides in windy condition** | **N** | **%** |
|---|---|---|
| Not windy when I started | 33 | 23.6 |
| The pest problem was urgent | 7 | 5.0 |
| Wind was blowing but I did not expect it would be a problem | 75 | 53.6 |
| I was instructed to spray at that time (someone else's decision) | 1 | 0.7 |
| No particular reason | 6 | 4.3 |
| Other: For a better spread of the chemical | 11 | 7.9 |
| Other: Because it was a dry day to spray the pesticide | 2 | 1.4 |
| Other: To finish quickly | 1 | 0.7 |
| Other: the work needed to be done | 4 | 2.8 |
| **Total** | **140** | **100.0** |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 140 instead of 267 and 52.4% instead of 100.0%) since a respondent can select multiple responses. Survey Q19b.

**Table 31**

*Availability of label*

| **Availability of label** | **N** | **%** |
|---|---|---|
| No | 3 | 1.1 |
| Not applicable | 66 | 24.7 |
| Not sure/ Cannot recall | 1 | 0.4 |
| Yes | 197 | 73.8 |
| **Total** | **267** | **100.0** |

*Note.* Survey Q20.

**Table 32**

*Capability of reading and understanding of the label*

| **Capability reading and understanding of label** | **N** | **%** |
|---|---|---|
| Yes | 170 | 86.3 |
| No | 21 | 10.7 |
| Not applicable | 6 | 3.0 |
| **Total** | **197** | **100.0** |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 197 instead of 267 and 73.8% instead of 100.0%) since a respondent can select multiple responses. Survey Q21.

**Table 33**

*Protective clothing*

| **Protective clothing** | **N** | **%** |
|---|---|---|
| Not sure/ can't recall anything of what was being worn | - | - |
| Not applicable – Bystander incident | 75 | 100.0 |
| **Total** | **75** | **100.0** |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 75 instead of 267 and 28.1% instead of 100.0%). Survey Q22a.

**Table 34**

*Specification of other used protective clothing than mentioned in Q22b*

| **Other** | **N** | **%** |
|---|---|---|
| Hat | 26 | 34.7 |
| Socks | 3 | 4.0 |
| T-shirt | 14 | 18.7 |
| Short | 14 | 18.7 |
| Surgical mask | 5 | 6.7 |
| Slippers | 2 | 2.7 |
| A plastic cover up | 2 | 2.7 |
| Sneakers | 1 | 1.3 |
| Respirator with build in glasses | 1 | 1.3 |
| Gloves | 3 | 4.0 |
| Hands covered with plastic bag | 1 | 1.3 |
| Headgear | 1 | 1.3 |
| No shoes/bare feet because difficult walking in field | 2 | 2.7 |
| **Total** | **75** | **100.0** |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 75 instead of 267 and 28.1% instead of 100.0%). Survey Q22b-other.

**Table 35**

*Reason for not wearing protective clothing*

| Reason for not wearing protective clothing | N | % |
|---|---|---|
| Not applicable (Could not recall anything what was being worn/ Bystander incident) | 79 | 24.8 |
| Too hot | 42 | 13.2 |
| Too expensive to buy | 26 | 8.2 |
| Did not think it was necessary | 51 | 16.0 |
| Uncomfortable | 109 | 34.3 |
| Other: Because of a rush didn't pay attention | 6 | 1.9 |
| Other: Not available at the moment of spraying | 3 | 0.9 |
| Other: Was not planning to work with the sprayer/pesticide | 1 | 0.3 |
| Other: Don't have the PPE | 1 | 0.3 |
| **Total** | **318** | **100.0** |

*Note.* Sum of each frequency and percent value does not equal to respective totals shown (i.e. 318 instead of 267 and 119.1% instead of 100.0%) since a respondent can select multiple responses. Survey Q23.

**Table 36**

*Application method*

| Application method | N | % |
|---|---|---|
| Aerial spraying (plane) | 10 | 3.7 |
| Backpack / Knapsack sprayer | 133 | 49.8 |
| Bucket | 2 | 0.7 |
| By Hand | 1 | 0.4 |
| Hand sprayer | 12 | 4.5 |
| Mist blower / Motor blower | 65 | 24.3 |
| Tractor mounted sprayer | - | - |
| Not applicable | 34 | 12.7 |
| Other: Stick with sponge | 1 | 0.4 |

| | | |
|---|---|---|
| Other: Accident while pouring or mixing chemical | 2 | 0.7 |
| Other: Bottle with holes in the lid | 7 | 2.6 |
| **Total** | **267** | **100.0** |

*Note.* Survey Q24.

**Table 37**

*Place of exposure*

| **Place of exposure** | **N** | **%** |
|---|---|---|
| Field | 157 | 58.8 |
| Storeroom | 1 | 0.4 |
| Home Garden | 34 | 12.7 |
| Inside or outside of house | 70 | 26.2 |
| At work other than field | 5 | 1.9 |
| **Total** | **267** | **100.00** |

*Note.* Survey Q25.

**Table 38**

*What was being treated*

| **Being treated** | **N** | **%** |
|---|---|---|
| Animals (livestock/pet) | - | - |
| Crops | 139 | 52.1 |
| Stored products | - | - |
| Weeds | 38 | 14.2 |
| Not applicable | 11 | 4.1 |
| Insects and reptiles | 72 | 27.0 |
| Sanitizing | 1 | 0.4 |
| Flowers and plants | 6 | 2.2 |
| **Total** | **267** | **100.0** |

*Note.* Survey Q26.

**Table 39**

*Other individuals affected in same incident*

| **Others affected** | **N** | **%** |
|---|---|---|
| No | 190 | 71.2 |
| Yes | 71 | 26.6 |
| Not sure/ Cannot recall | 6 | 2.2 |
| **Total** | **267** | **100.0** |

*Note.* Survey Q27.

**Table 40**

*Training received*

| **Training received** | **N** | **%** |
|---|---|---|
| No | 204 | 76.4 |
| Yes | 61 | 22.8 |
| Not sure/ Cannot recall | 2 | 0.7 |
| **Total** | **267** | **100.0** |

*Note.* Survey Q28.

## ANNEX III Responses on Q18 (qualitative data) of survey

In Annex 2 the responses of the respondents on Q18 (‘*Describe exactly HOW the pesticide incident occurred/ what happened that resulted in the contamination?’*), which was an open-ended question, are presented.

*R1:* ‘*During the application of the herbicide, the farmer experienced a sudden wind stream which caused the herbicide to blow into his direction.’*

*R2: ‘The back sprayer that was used to apply herbicides in the field, wasn't cleaned of properly and the residue came onto the farmer who carried the back sprayer on his back.’*

*R3: When spraying onto her flowers, miss Vonne gets pesticide into her eyes when the wind directions changes.’*

*R4: ‘Through sudden change of wind direction, he suddenly got the fumes of the pesticide in his eyes.’*

*R5: ‘After spraying, he experienced a burning sensation on his hands, he washed it off and drank milk and also ate banana.’*

*R6: ‘He didn`t experienced any symptoms while spraying. After an hour spraying, he got nauseous and then he drank milk, after a while he felt better.’*

*R7: ‘After spraying he experienced a burning sensation, then he directly took a shower, drank milk and eat banana.’*

*R8: ‘While spraying the wind blew the pesticide on his body. He experienced a burning sensation and stopped immediately.’*

*R9: ‘After spraying he experienced headache, he then drank paracetamol, after a while he felt better.’*

*R10: 'Another person was busy spraying near him, and after a while his eyes started to burn*

*R11: 'When her husband is applying pesticides around the house, the wife experiences dizziness from the strong smell.'*

*R12: 'When her dad or husband apply pesticides around the house, she experiences nausea and headache from the strong smell.'*

*R13: 'Her son was spraying the diluted malathion on plants and for mosquitos. The smell of it caused nauseous and dry throat. To treat herself, she drank milk.'*

*R14: 'Spraying in wind. Spray mist blew in face and eyes.'*

*R15: 'The sprayer that was used during application was overfilled, causing the fluid to spill over the back of the farmer.'*

*R16: 'He sprayed against the wind that made him inhale it.'*

*R17: 'Someone was busy squirting on her turn causing her to inhale it and got a headache last time.'*

*R18: 'Someone was squirting on her turn causing her to inhale it and got a headache last time.'*

*R19: 'Someone was squirting on her turn causing her to inhale it and got a headache last time.'*

*R20: 'The person was spraying malathion in the early morning (mist) and while and after spraying he felt a burning sensation and washed immediately the chemical off.'*

*R21: 'People from next door were spraying Malathion and the smell started to bother the person.'*

*R22: 'When the neighbors or her son use malathion, the smell bothers her.'*

*R23: 'The connection of the hose to the backpack sprayer was not good, so it leaked on my back. My back got very wet.'*

*R24: 'Busy with Karatox. There was a lot of wind, but he had a mask. He felt that smell. After half an hour when he finished, he felt it on the eyebrows.'*

*R25: 'Tank was too full. He closed it too tight, causing it to splash in his eyes.'*

*R26: 'After bathing, he feels a burning sensation in his face, an hour after finishing work.*

*R27: 'While spraying, the handle started to leak and it leaked onto his hand. He worked until the tank was empty. Then he washed his hand. He got a slight burning sensation in his hand after the tank was empty.'*

*R28: 'The pesticide incident occurred because the person did not use PPE while spraying.'*

*R29: 'Usually when the gentleman is not wearing a face mask, he gets into trouble.'*

*R30: 'Was spraying when the wind changed direction and the paraquat got into his eyes.'*

*R31: 'Someone sprayed paraquat and it came with the wind in his eyes.'*

*R32: 'Man was spraying and wind was blowing in his direction.'*

*R33: 'During the rainy season they were bothered by snakes. So, her husband sprayed all over the yard with malathion to keep the snakes away. The strong smell of the malathion caused the health problems.'*

*R34: 'During application in the field, the gentleman stooped with the backpack sprayer on his back, so that a lot of the pesticide leaked onto his body.'*

*R 35: 'In the field during the application of the pesticide, the coupling of the hose broke, causing it to leak onto the gentleman's back.'*

*R36: 'The man had a short-sleeved t-shirt on, causing the chemicals to get on his arms with the wind.'*

*R37: 'The man was spraying in strong winds which makes that he had inhaled it.'*

*R38: 'Due to unexpected strong winds, the man ended up inhaling the pesticide that he used.'*

*R39: 'He was spraying his crops, but suddenly strong winds occurred causing the pesticide to end up on his arms.'*

*R40: 'The rice field lies on the opposite side of his house. The wind is then bringing the residues of the pesticide towards his house, causing him and his family to end up on their skin. They then get burned feelings on their skin.'*

*R41: 'During application of the pesticide in the field a sudden change in the wind direction occurred causing the pesticide to end up on his face.'*

*R42: 'During the application, the wind occurred which ended the pesticide to end up on his eyes and skin.'*

*R43: 'The man sprayed on behalf of his employee. His employee had not indicated to him that the backpack sprayer was half broken. When the man put the backpack sprayer on his back, the pesticide mixture leaked onto his back and legs. He got a burned wound on his back and legs.'*

*R44: 'The farmer mixed the pesticide without wearing cloves or any other protection, so the mixture entered the skin.'*

*R45: 'The vapor of the pesticide cocktail fell on the skin of the farmer and it started burning.'*

*R46: 'Vapor of the pesticide came on the skin of the farmer when the wind blew in a different direction.'*

*R47: 'During application in the field, the mixture leaked onto his skin when working in a different wind direction. The vapor came onto his skin.'*

*R48: 'The farmer didn't use gloves when making the mixture, causing him to get the mixture on his hands.*

*R49: 'The mixture leaked out of the backpack sprayer and came onto the back of the farmer, causing a burning sensation.'*

*R50: 'When spraying in the field with Atmajor in the afternoon in different wind directions, vapor came onto the farmer's face due to sudden wind change.'*

*R51: 'Karate fell on his hands and started burning. It was windy and sunny.'*

*R52: 'While spraying, the wind shifted and came against his face; he breathed.*
*arriving home and taking a shower after lightly branding the flesh.*
*after two days, when cleaning my teeth in the morning, I coughed up blood and went to the doctor.'*

*R53: 'They were at home when they got a headache from the spraying. They walked inside, shut everything, and then took a paracetamol.'*

*R54: 'She was busy at home when someone began spraying 2,4-D amine on the ground, inhaling it before closing the house's rooms and doors. She subsequently experienced a headache and took paracetamol.'*

*R55: 'Busy with households, while a farmer instructed his worker to spray 2,4-D Amine in a windy situation. The mist and smell made cough.'*

*R56: 'Was at home, busy, spraying started, they smelled, felt pain, went into room, shut windows, and took paracetamol.'*

*R57: 'He quickly feels the effects of opening the bottle while in touch with Bestact.'*

*R58: 'He was spraying Karate on the field and the wind blew the mist on him. After 2 hours he felt a burn and went to took a bath.'*

*R59: 'She gets a headache when sprayed nearby. Sprays and smells shiny oil.'*

*R60: 'People are irritated and suffer headaches as a result of an aircraft spraying the area. close the doors and windows after that.'*

*R61: 'When an aeroplane sprays the field, individuals feel discomfort, and when they get inside the home, they feel headache and nausea.'*

*R62: 'People spray with motor spray, and then it blows where buildings are, giving the area where he enters the home a tingling sensation.'*

*R63: 'Nearby spraying causes a person's headaches and nose irritations, so they go inside and take some paracetamol.'*

*R64: 'The spray mist blew on skin while being sprayed and afterwards began to burn. spraying at home, washing, applying ointment, drinking alcohol, and afterwards it improved.'*

*R65: 'After an aircraft sprays, someone smells it, sneezes and coughs, but does nothing; when it passes, the symptoms disappear.'*

*R66: 'While spraying wind blew and mist on person.'*

*R67: 'He was busy working at home, while a worker, who was instructed by a farmer, was spraying 2,4-D Amine in the field. The wind carried the smell and mist with it and he started coughing and his skin started burning.'*

*R68: 'Rice fields were being sprayed, with Fujione, with an aeroplane. The smell troubles him and he went inside the house. He turned on the fan, but he still started coughing and got a bad headache.'*

*R69: 'The mother in law of this person sprayed the chemical for wood-louse. This person is allergic to the chemical but had to clean the remains. The smell hindered her straight away. She got nauseous and got the other symptoms afterwards.'*

*R70: 'Person was spraying the chemical for wood-louse that was on a height. Because of that the mist came onto him. He got a burning sensation on his hands and in his eyes, and because of the inhalation he also got lethargic.'*

*R71: 'While mixing the pesticide and sealing the pesticide container, his hands got contaminated with the pesticide. After he was done with his work, he felt his face and skin burning.'*

*R72: 'Farmers were spraying their rice fields, with Fujione, with the aerial method (plane). The smell of the pesticide troubles here and she went inside the house. She turned the fan on but got nauseous and had a headache after that.'*

*R73: 'Spraying on the field with karate. Because of the wind the mist came onto him and his skin started burning and he also got dizzy.'*

*R74: 'Farmers were applying the chemical with a motor sprayer on a rice field and because of the windy situation, it blew the mist on her. After which she got a burning sensation.'*

*R75: 'She let someone spray the chemical around the house for weeds. The smell of it hindered her and she got a headache. When the smell hindered her, she went away from that area, because she also got another sickness (aerodrome)'*

*R76: 'The pesticide spraying plane was spraying Fujione on the rice fields. The smell caused headache and dizziness.'*

*R77: 'Person was busy spraying the chemical on his rice field when the wind blew it onto his face, which started burning almost immediately.'*

*R78: 'Person was spraying the karate on his rice field. In the evening he got a burning sensation on his skin after which he applied ghee.'*

*R79: 'Her house mates were spraying the chemical because its recommended to spray it for a patient at home (to remove mosquitos etc.). Because of the smell she got a headache and went out of the house after taking her allergic pills.'*

*R80: 'He was spraying the pesticide in a windy situation. The wind direction changed a little bit an blew the mist on him.'*

*R81: 'Person was applying the chemical on his field when the wind blew it on his hand.'*

*R82: 'While spraying, the wind blew pesticide mist on him. When he went home, he felt his skin burning.'*

*R83: 'Person was spraying his fruit trees. After 2 minutes he felt the burning sensation. He washed the chemical immediately off but still had the burning sensation even after washing.'*

*R84: 'Person was spraying a cocktail of the chemicals around his house when the wind blew mist onto his skin, which started burning immediately.'*

*R85: 'The neighbors were spraying Gramoxone in the field and they were burning paddy waste. She got a lung inflammation and was getting dyspnea. She went to the doctor, and they took her in.'*

*R86: 'They neighbor frequently sprays Gramoxone around his house. She always has health problems with the smell, but the last time she got dizzy and had a headache because of the smell. Every time this happens, she just gets herself away from the area. '*

*R87: 'A bystander who has had asthma for years and who is sensitive to the scent of malathion, which makes them cough, enters the house while the partner sprays malathion in the home garden to repel ants.'*

*R88: 'A passerby who witnessed the injection of malathion in a home garden developed a cough, a little headache, and fled onto the street.'*

*R89: 'Person was using chemicals in the field; the wind direction changed. Hands were exposed and resulted in skin irritation. After person returned home, he took a bath, drank milk, and applied oil.'*

*R90: 'Person was in house while neighbor was using pesticide. once inhaled the person started to have a headache and then the person went inside her house.'*

*R91: 'Farmer was working in the field spraying Karate on his rice field and suddenly due to wind direction changed, the chemical blew in his face and he stopped immediately. Once he noticed this, he went to wash his face immediately with water and the symptoms stopped immediately.'*

*R92: 'There was a leak in the pump of the backpack sprayer he was using to spray against weeds on another person's plot. This led to a leak on his right leg. After spraying, he had a bath at home, and the symptoms eventually disappeared.'*

*R93: 'While spraying in the wind the pesticide landed on the skin.'*

*R94: 'In his opinion the sudden change in wind direction has caused the vapor of the pesticides to land on the farmer.'*

*R95: 'The farmer stated that application of pesticides should be in the same direction as the wind. However, on that day the wind direction changed which caused the vapor to land on his face and arms.'*

*R96: 'The strong smell due to the application of pesticide on her yard by her father or husband, causes her to get headache.'*

*R97: 'There was a house infestation of woodlice and the strong smell caused nausea and the mist ended on her skin.'*

*R98: 'When applying pesticides on crops, he often inhales the vapor and it also ends on his face and arms causing headache and skin irritation.'*

*R99: 'The vapor comes to her house with the wind and when she inhales it, she gets nauseous.'*

*R100: 'While spraying karate in the wind, the spray mist landed on the skin.'*

*R101: 'Everywhere the pesticide lands on the skin, the farmer develops a burning sensation. The farmer was spraying in the wind.'*

*R102: 'Spraying in the wind. Spray mist landed on the skin.'*

*R103: 'Spraying against the wind, the mist blew in the face.'*

*R104: 'While spraying the pesticide leaked on the farmer's back.'*

*R105: 'In the morning the plane was turning on the field and it needed to be loaded with the pesticide. But before loading it, while mixing, the chemical was blown by high wind speed.'*

*R106: 'The person started spraying in the afternoon and the wind started blowing from everywhere and due to the wind, the chemical got on his face.'*

*R107: 'He was pouring the diluted mixture, then some of it got on his hand and he started to experience a burning sensation.'*

*R108: 'Was spraying with the wind, then wind direction changed and blew chemical on person.'*

*R109; 'When the person was busy in the field, he sprayed with the wind. But when the wind direction changed the chemical came on the body.'*

*R110: 'Person had put the diluted mixture to a stick and it splashed. Later, he started sweating, he wiped his sweat and it got into his eyes. He went to the doctor after a week.'*

*R111: 'The respondent was using a back sprayer and the cap of the backpack was not closed properly, that's why there was a leakage of the chemical which was also blown by wind.'*

*R112: 'When the aeroplane spraying takes place then the respondent was bothered by the smell of the chemical due inhaling it and felt the symptoms immediately.'*

*R113: 'In the afternoon at 5 o'clock due to wind change, the chemical ended up on the bystander while the workers were spraying the chemical.'*

*R114: 'When pesticide is being sprayed nearby and person inhales it, he experiences headache and takes paracetamol.'*

*R115: 'During spraying, the wind blew the pesticide on the person.'*

*R116: 'When pesticide is sprayed nearby and person smells it, he gets headache and drinks paracetamol.'*

*R117: 'He was at home and when the rice areas were sprayed with the aeroplane the wind blows towards his house which led to health issues.'*

*R118: 'She was at home and when the rice areas are sprayed with the aeroplane the wind blows towards his house which led to health issues.'*

*R119: 'He was spraying and suddenly the wind direction changed, causing him problems.'*

*R120: 'Person was spraying and the wind direction suddenly changed causing him problems.'*

*R121: 'People were spraying. Scent enters her house making her feel dizzy.'*

*R122: 'Someone was spraying with the aeroplane. He was supervising and the mist got on him.'*

*R123: 'He was spraying his acreage. It blew and got on his body and inhaled, because the wind changed direction.'*

*R124: 'He was spraying his acreage. It blew and got on his body and inhaled, because the wind changed direction.'*

*R125: 'She was home when she smelled the smell of Panally.'*

*R126: 'Person was spraying on the rice field, wind changed direction has come on the body and started to burn, continued to spray. Arrived at home bathed and put coconut oil and Vaseline on and it subsided after a while in burning sensation.'*

*R127: 'The chemical is sprayed with the aeroplane, which bothers her when she smells it.'*

*R128: 'The aeroplane sprays the chemical causing her to have an allergic reaction.'*

*R129: 'He was spraying a paddy field and as soon as the chemical gets on his face, he starts to sneeze and his face begins to burn.'*

*R130: 'Aeroplane made an emergency landing. There was a blockage in the filter. When the filter was opened, the agent blew on his face.'*

*R131: 'She was busy spraying the chemical and when she was done she couldn't breathe properly.'*

*R132: 'He was spraying weeds. When then the wind started blowing, the chemical hit him. The smell also bothered him. He has trouble with his eyes.'*

*R133: 'The incident happened when the woman wanted to mix the pesticide with water. Even though she wore the gloves the pesticide (concentrated liquid) somehow leaked on her hand when she wanted to mix it. She began to feel a burning sensation after an hour or two.'*

*R134: 'The man was applying the pesticide on his vegetables in his garden with a bottle. The diluted mixture leaked on his hand. Presumably the vapor from the diluted mixture also got on his face, causing him to feel a burning sensation on his hand and face.'*

*R135: 'While mixing the pesticide with water, a bit of the diluted mixture splashed on his arms.'*

*R136: 'He sprayed against the wind, causing the vapor to go on his face.'*

*R137: 'The owner (bystander) had instructed his employees to spray his agricultural area with an aeroplane. Despite standing at a far distance, the spray mist got on his face.'*

*R138: 'Because the cap of the tank/pump was not tightened properly, there was a leakage of the pesticide. In this way it came in contact with the person's skin.'*

*R139: 'The top of the tank was not closed properly and then the agent leaked onto his back during application.'*

*R140: 'The syringe began to leak while spraying. The pesticide then fell on his foot.'*

*R141: 'Workers were spraying and the smell got into his nose. His nose immediately felt a burning sensation.'*

*R142: 'There was wind and during spraying the agent got on her hands and feet.'*

*R143: 'Lid was not screwed properly by the son. As a result, the tank leaked. There was also wind.'*

*R144: 'The tube of the sprayer is cut during working. As a result, the substance leaked onto the person.'*

*R145: 'He tried to spray with the direction of the wind around a fruit tree, but while turning around the tree he sprayed against the wind.*

*R146: 'He was busy spraying and the wind direction changed, and blew the pesticide on his face.*

*R147: 'Person was spraying the pesticide in the same direction of the wind. The wind turned and blew the pesticide on his face.'*

*R148: 'Person was spraying with malathion for high buildings. While spraying the sprayer stick was pointed upward and the mist fell on him.'*

*R149: 'When he is working with Karate, his face burns. He works (sprays) with his back against the wind, but despite the fact that he is working with his back against the wind, he still inhales the fumes. This causes burning of his face.'*

*R150: 'When he works with Gramoxone, he gets dizzy. He works with his back against the wind. Even though he works with his back against the wind, he still inhales the fumes. This makes him dizzy.'*

*R151: 'One (1) bottle cap of Gluphosinate was mixed in a bucket filled with 3 quarters of water. In a pump Paraquat was added. He began spraying. There was a leakage in the pump. During spraying his back got wet.'*

*R152: 'During spraying of his cabbage plantation on the agricultural plot of his brother.'*

*R153: 'When applying the pesticide, it gets into his eyes due to the wind.'*

*R154: 'During soil tillage, he sprayed to control mole crickets. The wind blew and mist got on his face and his body. Also through inhalation (breathing).'*

*R155: 'When he or someone else was working, he got a burning sensation in his eyes.'*

*R156: 'When spraying karate using a spray tank against the wind direction, the farmer experiences skin irritations. Because he sprayed against the wind and the liquid (mist) spilled on the farmer's skin.'*

*R157: 'Gramoxone came on the farmer's back after he want to wear the spray tank with liquid on his back. When lifting and placing the spray tank, the fluid is shaken on all sides. The farmer*

*did not wear the necessary (full) PPE, which increases the chance of skin irritation when wearing the spray tank.'*

*R158: 'He diluted the pesticide with water. While spraying, it leaked from the leaves on the body, from above the tree, from the upper branches. After that he stopped immediately, because of the skin rash.'*

*R159: 'If she or the neighbors spray malathion for pests or crops, she feels dizzy. She smells it in the house with neighbors.'*

*R160: 'While spraying, the wind changed direction and that is how he inhaled it.'*

*R161: 'He was ready to put on his backpack sprayer and got a burning sensation because his sprayer started leaking.'*

*R162: 'While he was spraying, the cap of the spray tank was not well closed, and it leaked from the tank to his back.'*

*R163: 'In the process of spraying, wind started blowing and the product came on his face.'*

*R164: 'Dosage higher than indicated on the bottle. Problem: While spraying. Uncertainty about the wind direction.'*

*R165: 'While spraying, the wind started blowing and it went into his eye. He just kept going. It wasn't until the next day that he started having pain in his eye. He had a swelling with red eyes.'*

*R166: 'The karate (5%) was stored in the bucket, along with brush cutter parts. Karate bottle wasn't sealed well, what caused leakage. He was taking out the brush cutter parts that were contaminated and his hands got contaminated. He unknowingly touched his face, what started burning after some time.'*

*R167: 'While mixing the pesticide with water in the sprayer tank. The tank exploded and the diluted mixture splashed on his face and skin, and started burning after some time.'*

*R168: 'Person was sitting in her house. Her neighbor started spraying, when she smelled it, she went inside and closed her house.'*

*R169: 'Was mixing the pesticide with water and then filled the backpack sprayer. During spraying the pesticide leaked on my back and burned the skin.'*

*R170: 'During spraying with karate for insects in the field. Before spraying the wind, direction was taken into consideration. When the wind direction changed, the spray mist blew in my face and was inhaled.'*

*R171: 'Spraying fruit trees against fungi and ants. Was spraying against the wind so the mist came in my face.'*

*R172: 'The incident occurred when the person was spraying the chemical and it came on his face.'*

*R173: 'When the person began spraying the chemical it was not windy, but after sometime the wind started to blow and at that time the chemical blew on his face.'*

*R174: 'The woman was spraying the chemical and wind blew.'*

*R175: 'When the pesticide is been sprayed by neighbors, she inhales it, and then she experiences headache and dizziness, so she closes all the doors and windows, and turns on the ventilator.'*

*R176: 'During the preparation of the pesticide for the field the farmer didn't have protection on for his nose and mouth therefore inhaling the fumes of the pesticide.'*

*R177: 'He was busy spraying and felt a burning sensation on his face and eyes after spraying.'*

*R178: 'He was spraying grass. After feeling the dry throat, he stopped and drank milk.'*

*R179: 'He was spraying cucumber and the wind was blowing the chemical in his face.'*

*R180: 'He was busy spraying and the wind blew, causing the chemical to come on his face.'*

*R181: 'The person was spraying the pesticide on the field, when the wind blew the chemical on his face. He says that because he was spraying from a height. But he finished his work, continued spraying and then washed the chemical off with soap.'*

*R182: 'The person was using pesticide against pests. Wind blew and it came on his skin. He had a burning sensation, but finished his work and then went to take a bath and rested.'*

*R183: 'During spraying it was windy. He inhaled it. But felt the effects (dizziness) after he had finished his work. After about 1.5 hours he felt the dizziness.'*

*R184: 'Person was spraying the pesticide mix. Was a mix of BioPel and Karate. Wind blew suddenly. The mix came on his face. He was not wearing any safety goggles that's how it came into his eyes. His eyes and around his eyes started burning. He went and washed his eyes immediately.'*

*R185: 'Contamination through wind.'*

*R186: 'Because of the wind, the pesticide mist come on her hand.'*

*R187: 'When: during mixing and application. How: immediately when lid opens.'*

*R188: 'He didn't wear any safety glasses. The wind blew, and that's how the pesticide came on his eyes.'*

*R189: 'He was spraying the wood lice and worms that were on a house. Suddenly the wind blew and it landed on his face and hands. He got a burning feeling later.'*

*R190: 'After harvesting the crop, he sprayed the weeds. Then he felt nauseous.'*

*R191: 'He didn't use PPE. He said that when he wears the backpack sprayer the pesticide mixture spills on his back.'*

*R192: 'Was spraying the pesticide with a backpack sprayer. Wind suddenly blew the mist on her face. Almost immediately she felt the burning sensation on her face.'*

*R193: 'Was busy spraying the chemical in his field, when the wind blew it on his skin. He felt a burning sensation but continued spraying, because according to him the wind is necessary for a better spread of the chemical.'*

*R194: 'Was spraying the pesticide on his field, but forgot his safety goggles at home in a hurry. Wind blew the chemical in his eyes and had a burning sensation. But finished his work and then washed the chemical off.'*

*R195: 'Was applying the chemical on his field for (rice). Wind blew the chemical on his face, but continued working. After working he went to take a bath and then rested.'*

*R196: 'Was spraying the chemical. It was windy, but was necessary for a better spread. The wind blew the chemical on his skin. He had a burning sensation, but according to him the work had to be done.'*

*R197: 'The son of this person was spraying the chemical, he was helping him there. The wind blew the chemical on his face. When he arrived home (in 20 minutes), he felt a burning sensation on his face.'*

*R198: 'Person was spraying the chemical. It was windy and because of that it was blown on his face and hands. after that he felt a burning sensation. He finished his work and then treated himself. According to him the wind is necessary for a better spread of the chemical.'*

*R199: 'During spraying of the chemical on the crops, she inhaled it. After she was done with her work she felt nauseous. This happens every time she sprays chemicals.'*

*R200: 'Person was spraying the chemical in his field, when the wind blew it on his face. he felt a burning sensation, but finished his work and then washed the chemical off.'*

*R201: Wind blew the chemical during spraying on the persons skin. after the person was done working, the symptoms were felt.'*

*R202: 'Person got the chemical on his skin because the diluted chemical was spilled on the strap of the backpack sprayer (which he did not realize until after the burning sensation). He felt the burning sensation after returning from the field.'*

*R203: 'Person was spraying the chemical in a windy situation. it came on his face. But it was necessary to spray like that, because the wind will spread the chemical in all directions.'*

*R204: 'His workers were spraying the chemical. Wind blew it on his face. after about an hour he felt a burning sensation.'*

*R205: 'During spraying the wind blew the chemical on his face. He felt the burning sensation after he had finished his work.'*

*R206: 'During application, wind blew the chemical on the person, also because of the trees. but the wind was necessary for better spread of the chemical.'*

*R207: 'He diluted the pesticide and started spraying on the crops. The wind blew the mist on him and he inhaled it. The day after he felt pain in his throat.'*

*R208: 'He was spraying the diluted pesticide near the house and wind blew the mist on him. He continued spraying and took a shower after and applied oil to the affected areas on his body. '*

*R209: 'Spraying on field and the wind blew the mist on him. He continued spraying. When finished he felt the pepper like burning on the skin.'*

*R210: 'He was spraying diluted malathion around the house so kill insects. His respirator filters were full, so he inhaled the smell of the malathion. When finished he felt the symptoms.'*

*R211: 'While spraying with diluted karate, the mist blew the mist on his face. Almost Immediately he felt his face skin burning.'*

*R212: 'Was busy helping in the field, when another person was spraying the chemical. The wind blew the chemical on her face. After done working she felt a lightly burning sensation on her face.'*

*R213: 'Was busy mixing the pesticide in the field, when it splashed on her hand. But she did not realized it at that time and also touched her face. After the person was done working in the field, she took a bath. After that she felt the burning sensations on her skin and applied oil.'*

*R214: 'Accident occurred while mixing the pesticide. When pouring the concentrated chemical to be diluted it splashed on his hands. He did not realize it until he was further busy spraying the chemical on his field. During the spraying he felt the burning sensations and went home immediately to wash it off.'*

*R215: 'Was spraying the chemical on his field, when the wind blew it on his hands. He continued working. After he was done, he washed the chemical away.'*

*R216: 'Was spraying the chemical on a height. On citrus trees. The wind blew it on his face and hands. After he was done working on the field, he felt the burning sensations.'*

*R217: 'Busy with kids and suddenly smelled malathion. When she came out, she saw her neighbor spraying the malathion. She closed her house and left.'*

*R218: 'He was spraying (kaisoi) for Kotkoti and ants. Wind blew and blew the chemical in his face.'*

*R219: 'Spraying for ants in the yard. She was spraying against the wind which blew it on her face.'*

*R220: 'Substance inhaled while pouring into spraying backpack. After mixing with water, he got the problems. He went to wash his face and after 45 minutes he was good again. But when he started spraying afterwards, he didn't feel well.'*

*R221: 'The husband of the bystander was busy spraying gramoxone and the odor if gramaxone was strong for the wife while she inhaled it and the symptoms felt.'*

*R222: 'The respondent was busy spraying and it was not windy but after spraying he felt a burning sensation on his face.'*

*R223: 'The neighbors were busy spraying and by the strong odor of malathion she knew that it was malathion. The malathion odor was getting heavy for the woman when she inhaled it and felt a burning sensation inside her body.'*

*R224: 'The bystander was in her home garden and smelled the odor of malathion and also inhaled it after which she felt the symptoms.'*

*R225: 'Somebody was spraying malathion in her home garden and the odor of the chemical was still in the air while she inhaled it and felt the symptoms.'*

*R226: 'As the respondent claimed he was busy spraying malathion in his house and after some minutes he felt the symptoms but still continued till he did the whole place. After he was done, he drank milk with cardamom and went to take a bath and after 30 minutes he got ill after getting the symptoms like stomach ache, feeling nauseous etc.'*

*R227: 'Was spraying seedlings of lettuce to treat lice. After 15 min he started to feel symptoms.'*

*R228: 'The farmer used 20 liters and through pressure the hose burst open. The pesticide then fell into his boots. He also had socks on.'*

*R229: 'The woman came home between 12pm and 13pm from work. When she came home, she smelt the malathion. She immediately closed everything in her house and went to the doctor in the afternoon.'*

*R230: 'While spraying crops, the wind blew the chemical into his face, giving him a burning sensation.'*

*R231: 'During the spraying, the karate was blown on him by the wind and that's how he got the burning sensation on his face and skin.'*

*R232: 'He was busy spraying the chemical and then the wind blew it on his face.'*

*R233: 'During application in the field, the wind blew the spray mist on the interviewee, causing it to get on his hands, causing burns to the skin.'*

*R234: 'After field application, the interviewee developed health problems. His skin burned him. He had the problem until late in the evening.'*

*R235: 'Was busy spraying, suddenly the air direction changed and came in contact on face of the farmer, he continued spraying and after finishing, he washed the chemical off.'*

*R236: 'A neighbor was busy spraying and the bystander inhaled it, in her house. She got headache and closed all the doors and windows of her house.'*

*R237: 'The person was diluting the pesticide, accidently she spilled on her hand, she went to wash it with soap, but after washing she still had burning sensation and she also touched her face, had also burning feeling on face. it burned till the night.'*

*R238: 'While spraying, the air direction changed and came on the person's face and skin, he also inhaled it, he continued spraying. after spraying he washed the chemical off. He experienced the symptoms after spraying.'*

*R239: 'While spraying, the wind blew the chemical on the person. After having sprayed the person experienced burning sensation and went to take a shower. after this, he still experienced burning sensation, so he applied Vaseline.'*

*R240: 'Someone else was spraying, it bothered this person and she experienced headache and an uneasy feeling. She went into the house and closed all the windows.'*

*R241: 'While opening the bottle, some off pesticide that was on the cap, contacted his fingers. it began to burn and he went directly to wash it off with soap and water.'*

*R242: 'While spraying the air direction changed and the person inhaled the mist of the diluted pesticide. He experienced the symptoms after finishing spraying.'*

*R243: 'She mixed a cab of a chemical in one-liter water and then sprayed it, it than came on her hand and she got a burning sensation. After spraying she washed her hand with water and soap and applied coconut oil.'*

*R244: 'A neighbor was busy spraying the pesticide, she inhaled it, got a headache, than she closed the doors and the windows and she went to sleep.'*

*R245: 'The wind was blowing when the farmer was using karate. He indicated that if he sprayed in the opposite direction, fog came (blowing) in his face.'*

*R246: 'When applying pesticide on the field he uses a cloth or covid-mask to cover up his nose and mouth, which results in him inhaling the fumes.'*

*R247: 'When applying pesticides, he faces his too much downward which causes the fumes to hit his face and cause the burning sensation.'*

*R248: 'On the field during application. He didn't have the right PPE. During spraying it started to blow a lot, but he continued normally.'*

*R249: 'Neighbors were spraying malathion around their house. The scent made the person dizzy and have a runny nose.'*

*R250: 'Neighbors were spraying malathion. The scent of the chemical caused issues for the person.'*

*R252: 'She started spraying and inhaled the karate and then she got the prickly feeling. She then took a choke to sneeze.'*

*R253: 'She started fighting weeds and realized that the wind was blowing from the Gramoxone. Then she got a dry throat and burning on her lips. She then ate a chocolate candy.'*

*R254: 'Neighborhood people started spraying and she got nausea. She closed the windows and doors until the smell went away. And after a while she felt good again.'*

*R255: 'He started spraying and has experienced a headache. He continued to inject, then bathed and drank milk.'*

*R256: 'During the spraying it splashed on her leg and then it started to burn.'*

*R257: 'Spraying, wind has changed direction and the Karate has come on her. Finished to spray, wet eyes and take a shower.'*

*R258: 'He sprayed above those trees and then it hit him. Wind also turned and it hit his body. by inhaling the vapor during application, he experiences a dry throat, and the vapor also ends on his skin causing a burning sensation.'*

*R259: 'She blames her sensitive skin for the burning sensation on her skin when in contact with the vapor.'*

*R260: 'Farmer states that even though he applies pesticides in the evening, and takes in account the wind direction, the vapor still manages to come unto his skin and cause the burning sensation.'*

*R261: 'Her husband sprayed Malathion against insects, fungi, fleas and ants. The strong smell of the malathion caused health problems for the interviewee.'*

*R262: 'The interviewee sprayed her plants with Malathion to combat ants. The strong smell of the pesticide caused her health problems.'*

*R263: 'The interviewee's son sprayed Malathion in the yard to combat ants. The strong smell caused the health problems.'*

*R264: 'The neighbors sprayed Malathion in their yard. Due to the wind, the strong smell spread very strongly over the entire area and that caused the health problems.'*

*R265: 'The interviewee's husband sprayed Malathion in the yard to control ants. Its strong smell caused the health problems.'*

*R266: 'Man was spraying with Cyperkill. The smell gave health problems to the woman. Burning sensation in the face and irritations in the nose.'*

*R267: 'During field application the spray mist came into the face of the interviewee due to the wind. He didn't have a face shield on, which caused health problems.'*

## ANNEX IV Topic list interview with doctors

**Topics**

**A. General**

1. What is your experience with people/patients who use pesticides for spraying in your district?
2. Do you often come across patients at the doctor's clinic with pesticide incidents because they applied it themselves or as a bystander?

**B. Pesticide incidents**

1. Have you had any cases where farmers have come by for medical assistance after an incident involving the use of pesticides during a spraying or as a bystander?
2. Can you indicate how many and what kind of cases you have had in the past five (5) years regarding pesticide incidents during application or as a bystander?
3. How often do you receive such cases (daily/weekly)?
4. Which part of the body is often affected in such an incident? (skin, eyes, senses, or otherwise)?
5. How serious can these incidents be for the person applying the pesticide?
6. Are there clear incidents that can be characterized as acute poisoning or chronic poisoning?
7. Have you had cases where the patient has died after a pesticide incident due to the application or as a bystander?

**C. Solution**

1. What is medically advised to a patient who experienced a pesticide incident by application or as a bystander?
2. Some residents have indicated that they drink milk, wash the affected spot on their body with Coca Cola and/or do not immediately consult a doctor after a pesticide incident. What is your (medical) perception about this?

**D. Awareness**

1. Do you think that people are still insufficiently aware of the dangers of careless use of pesticides?
2. How soon should someone consult a doctor after such an incident in order to minimize health damage?
3. What do you think could be done more to emphasize the danger and the safe use of pesticides in accordance with the requirements to their users, so that the environment (humans, animals and plants) is not affected/endangered?

# ANNEX V Data of doctors in surveyed area regarding pesticide poisoning incident

**Response doctor 1**

***Interview: Doctor from Regionale Gezondheids Dienst Commewijne***

***Date: January 13th, 2023***

***Time: 21.00h – 21.55h***

**Topics**

A. General

1. **What is your experience with people/patients who use pesticides for spraying in your district?**
   *Very few*
2. **Do you often come across patients at the doctor's clinic with pesticide incidents because they applied it themselves or as a bystander?**
   *No*

B. Pesticide Incidents

1. **Have you had any cases where farmers have come by for medical assistance after an incident involving the use of pesticides during a spraying or as a bystander?**
   *Rarely to never*
2. **Can you indicate how many and what kind of cases you have had in the past five (5) years regarding pesticide incidents during spraying, application or bystander?**
   *No*
3. **How often do you receive such cases (daily/weekly)?**
   *Rarely to never*
4. **Which part of the body is often affected in such an incident (skin, eyes, senses, or otherwise)?**
   *Skin*
5. **How serious can these incidents be for the person applying the pesticide?**
   *Local skin reaction (allergy or irritation)*

6. **Are there clear incidents that can be characterized as acute poisoning or chronic poisoning?**

   *No*

7. **Have you had cases where the patient has died after a pesticide incident due to application or as a bystander?**

   *No*

C. Solution

1. **What is medically advised to a patient who experienced a pesticide incident by application or as a bystander?**

   *Dep. v seriousness: rinse with plenty of water, local treatment v symptoms or refer to A&E*

2. **Some residents have indicated that they drink milk, wash the affected spot on their body with Coca Cola and/or do not immediately consult a doctor after a pesticide incident. What is your (medical) perception about this?**

   *Incorrect*

D. Awareness

1. **Do you think that people are still insufficiently aware of the dangers of careless use of pesticides?**

   *Yes*

2. **How soon should someone consult a doctor after such an incident in order to minimize health damage?**

   *Immediately*

3. **What do you think could be done more to emphasize the danger and the safe use of pesticides in accordance with the requirements to their users, so that the environment (humans, animals and plants) is not affected/endangered?**

   *Info by LVV, seller, media, on-site inspection by LVV*

**Response doctor 2**

***Interview: Doctor from Medische Zending Suriname***

***Date: January 13th, 2023***

***Time: 21.00h – 21.55h***

**Topics**

A. General

1. **What is your experience with people/patients who use pesticides for spraying in your district?**

   *Most people know that pesticides are such resources that you have to be careful. But that's not necessarily what they understand to protect. E.g. wash hands or close the cap properly. But it means too generally that people don't stop to think that people need to protect themselves from breathing it in or getting it on their skin. Or where they have already sprayed they walk there. Do not wear protective clothing. Or wear the same clothes all day. Also, when buying them they don't pay attention that they transport it separately. They act just like. The question is do they know how to do it.*

2. **Do you often come across patients at the doctor's clinic with pesticide incidents because they applied it themselves or as a bystander?**

   *They come because they sprayed and had a weird taste in their mouth or spilled it when mixing. But not that people come because of pesticide incidents.*

B. Pesticide Incidents

1. **Have you had any cases where farmers have come by for medical assistance after an incident involving the use of pesticides during a spraying or as a bystander?**

   *Yes. But not much*

2. **Can you indicate how many and what kind of cases you have had in the past five (5) years regarding pesticide incidents during application or as a bystander?**

   *Less than 5 cases*

3. **How often do you receive such cases (daily/weekly)?**

   *Not that frequent*

4. **Which part of the body is often affected in such an incident (skin, eyes, senses, or otherwise)?**

   *Skin, in the eyes was splashed. More skin because of a spill. And were two that have to do with the taste.*

5. **How serious can these incidents be for the person applying the pesticide?**

   *They see it as serious because they come to the doctor's clinic*

6. **Are there clear incidents that can be characterized as acute poisoning or chronic poisoning?**

   *It's acute. They come for cases that happened then, but they were all individuals who regularly use pesticides.*

7. **Have you had cases where the patient has died after a pesticide incident due to application or as a bystander?**

   *No*

C. Solution

1. **What is medically advised to a patient who experienced a pesticide incident by application or as a bystander?**

   *General advice is the correct use of pesticides. And don't just tell, but go through and ask what kind of remedy it was and see what the best treatment is for that. And discuss the safest way to use it. Person where the product has entered the eyes has been referred to the ophthalmologist*

2. **Some residents have indicated that they drink milk, wash the affected spot on their body with Coca Cola and/or do not immediately consult a doctor after a pesticide incident. What is your (medical) perception about this?**

   *No, fats in the milk stimulate absorption more quickly, wash with water and consult a doctor immediately, it is also stated on the packaging.*

D. Awareness

1. **Do you think that people are still insufficiently aware of the dangers of careless use of pesticides?**

*Yes, continuous training is required. And not just from the people who use it. Everyone uses it. The farmers and the people who do home and horticulture and people who work for others. Spraying between the stones and spraying houses and people from the ministry of Regional Development doing maintenance. And the people in the interior districts, the commissariat also requests pesticide use. Large companies also receive the information, but there is no control over its correct use. Control in where the gap is, in awareness and in the correct use of pesticides is often lacking.*

2. **How soon should someone consult a doctor after such an incident in order to minimize health damage?**
   *Immediately*
3. **What do you think could be done more to emphasize the danger and the safe use of pesticides in accordance with the requirements to their users, so that the environment (humans, animals and plants) is not affected/endangered?**
   *More targeted information or education should be done. Actually, who are the persons who are using pesticides. If this is in the picture, then you can know through consultation with those groups that these people use it, how often, how they use it, how they store it, etc. In that consultation, the way can be opened to pass on the correct information play and see if giving the education works. Provide more hands-on education. Not only adults, but also at school, the curriculum about the safe use of Pesticides must be adjusted.*

**Response doctor 3**

***Interview: Doctor from Nickerie***

***Date: January 13th, 2023***

***Time: 21.00h – 21.55h***

**Topics**

A. General

1. **What is your experience with people/patients who use pesticides for spraying in your district?**
   *I am currently sporadically at the outpatient clinic. I have occasionally some cases due to carelessness.*

2. **Do you often come across patients at the doctor's clinic with pesticide incidents because they applied it themselves or as a bystander?**

   *I occasionally come across patients. In 2013-2014 I was actively involved in Nickerie with focus groups. For example, the focus group was held in Henar were the aircraft is spraying pesticides. This research revealed that the pilot took his own route/shortcut above inhabited areas and the aircraft had leaking nozzles. During school hours, students complained of nausea and stomach pain. The 2,4-D metabolites were also found in the urine of pregnant women.*

B. Pesticide incidents

1. **Have you had any cases where farmers have come by for medical assistance after an incident involving the use of pesticides during a spraying or as a bystander?**

   *I've had cases.*

2. **Can you indicate how many and what kind of cases you have had in the past five (5) years regarding pesticide incidents during application or as a bystander?**
   - *Case 1: backpack sprayer had a leak, where pesticide leaked on the back. The patient was referred to the internist for further examination (skin absorption pesticide).*
   - *Case 2: patient had bought pesticide (Gramaxone/Karate) and stored it in a Coca Cola bottle with no label on the bottle. When he sat on his plot and wanted to drink something, he took the bottle thinking it was Coca Cola. He took a sip and immediately spat it out. He then visited the outpatient clinic and was referred.*
   - *Case 3: patient has a rash on the hands. The doctor knows the symptoms and asked if the patient is a farmer. The patient admitted that he/she is a farmer.*
   - *Case 4: the person was spraying a mix/cocktail, where at a given moment the pesticide came on the person due to the wind, resulting in his death.*
   - *Case 5: a Chinese woman came to the clinic with her baby who had swallowed mosquito gel.*

3. **How often do you receive such cases (daily/weekly)?**
   *Incidentally.*

4. **Which part of the body is often affected in such an incident? (skin, eyes, senses, or otherwise)?**
   *Senses: skin, mouth, inhalation. The skin of private part is the most sensitive part, especially for men.*

5. **How serious can these incidents be for the person applying the pesticide?**
   *It can be deadly for the person involved in the incident. Important is to diagnose which pesticide was used, if he was protected (PPE), the direction of the wind, type of poison and how the poison got into his body.*

6. **Are there clear incidents that can be characterized as acute poisoning or chronic poisoning?**
   *I have had both incidents. Acute poisoning: after intake or inhalation the patient should immediately go to the emergency hospital (EHBO).*
   *Chronic poisoning: I asked the patient if he is involved in agricultural practices. Sometimes when you eat vegetables with residues you can also get the pesticide into your body. The problem here is that no analysis of exposure can be conducted in Suriname. Hair samples can be analyzed at the AdeKUS.*

7. **Have you had cases where the patient has died after a pesticide incident due to the application or as a bystander?**
   *Acco*

C. Solution

1. **What is medically advised to a patient who experienced a pesticide incident by application or as a bystander?**
   *When symptoms are identified or when there is a suspicion that it is a pesticide case, the patient is referred to the internist.*

2. **Some residents have indicated that they drink milk, wash the affected spot on their body with Coca Cola and/or do not immediately consult a doctor after a pesticide incident. What is your (medical) perception about this?**
   *Medically, this is not a solution.*

D. Awareness

1. **Do you think that people are still insufficiently aware of the dangers of careless use of pesticides?**
   *People know it but they are not aware of it. Even if you explain it to them they don't follow the instructions. Mrs. Sauers trained 25 people but there was no follow-up.*

2. **How soon should someone consult a doctor after such an incident in order to minimize health damage?**
   *As soon as possible. If it is only a little bit on the skin (a graze), you can wash it or apply ointment. Important here is to diagnose where the exposure is, what the characteristics of the pesticide are and the toxicity of the pesticide.*

3. **What do you think could be done more to emphasize the danger and the safe use of pesticides in accordance with the requirements to their users, so that the environment (humans, animals and plants) is not affected/endangered?**
   *The problem in Suriname is that the monitoring of living according to the rules is not in place. There is ongoing extension and they receive enough information. You should use PPE all the time when using pesticides.*