

Review

Trends of Pesticide Exposure and Related Cases in the Philippines

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Abstract

The study aims to provide a comprehensive trend of pesticide poisoning cases in the Philippines as well as pesticide exposures, and risk factors related to the adverse effects of pesticide. Records were gathered from the National Poison Control and Management Center (NPCMC), the Philippine General Hospital, De La Salle Medical Center, and other hospitals, and reviewed research studies conducted in the Philippines. Based on hospital surveys, the number of pesticide cases as well as mortality trends have been increasing. Studies from 2006 to 2010 showed that human health especially those of the farmers is at risk due to pesticide exposure. Illnesses and symptoms such as headache, skin abnormalities, fatigue, fever, and weaknesses were the common health complaints experienced by the farmers as reported in the research studies. Moreover, the studies showed risk factors to pesticide exposure, work practices, and pesticide residues in environmental media that could be contributory to pesticide poisoning cases. Government agencies should intensify their surveillance and regulation on both household and agricultural pesticides. The state of pesticide-related illnesses mirrors the poor safety practices among farmers as well as lack of necessary supervision from the government agencies.

Key words: pesticide exposures and risk factors, pesticide poisoning cases, pesticide residues, agriculture, occupational health and safety

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Introduction

Pesticides are widely used by developing countries such as the Philippines for agricultural purposes. However, pesticide poisoning is still one of the global health problems.

It is estimated that about 5 million people die every year as a result of intentional, accidental, and occupational exposures worldwide¹.

Pesticides are primarily used in agriculture. Agriculture is one of the contributors to the Gross Domestic Product (GDP) in the Philippines. In 2005, the Gross Domestic Product (GDP) of the country was estimated to be US\$451.3 billion, or US\$5,100 per capita². The largest contributors to the growth of GDP came from the services (52.8%) and industrial sectors (31.8%) whereas agriculture accounted for 15.3%³. In 2008, the Bureau of Agricultural Statistics reported that the country's Gross National Product grew by 6.17 percent, and the Gross Domestic Product expanded by 3.84 percent compared to the previous year. Agriculture and fishery sectors, which contributed 18 percent to the Gross Domestic Product, gave a 3.23 percent growth. The employment rate was 92.6 % or a total of 34.09 million employed persons in 2008. About 12.03 million persons were employed in the agriculture sector, and they represented 35 percent of the country's labour force. The major agricultural products in 2008 were rice, corn, coconuts, and bananas (see Table 1) as well as livestock and poultry. In 2005, crops accounted 46.4% of the value of all agricultural production, while livestock and poultry accounted only 28.8%, and fishing at 24.9%².

Table 2 shows the list of the most commonly used pesticides in the Philippines. Based on surveys, these pesticides are used by farmers in amounts ranging from 2–5 ml per 16 liters of water for liquid pesticides and 3–5 g per 16 liters for pesticides in solid form⁴. For every application, their loads can range up to 15–20 per 500 square meters to 1,000 square meters.

Pesticides are also used in and around the home to get rid of the household pests such as cockroaches, mosquitoes, termites, ants, rats, and germs. Table 3 shows the list of known household pesticides in the country. In the United

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Table 1 Agricultural outputs in the Philippines per major crop (2009)

Agricultural crop	Area	Production (metric tons)
Vegetables	Benguet	Broccoli: 2,685 Cabbage: 124,712 Carrots: 68,328 Cauliflower: 10,559 Lettuce: 3,577
Rice/Palay Production	Central Luzon	16,266,417
Banana	Davao Region	9,013,186
Mango	Ilocos Region	771,441
Sugarcane	Western Visayas	22,932,819
Corn	Cagayan Valley	7,034,033
Coconut	Davao Region	15,667,565
Pineapple	Northern Mindanao and SOCCSKSARGEN (South Cotabato, Sultan Kudarat, Sarangani and General Santos City)	2,198,497

Source: Bureau of Agricultural Statistics, 2009⁴).

Table 2 List of commonly used pesticides in the Philippines

Most commonly used pesticide in the Philippines	Amount used/ Pesos (Annual) Liquid-liter/pesos; solid-kilogram/pesos
Dithane (Fungicide)	464.17
Mancozeb (Fungicide)	426.21
Funguran (Fungicide)	704.72
Cypermethrin (Insecticide)	320
Decis (Insecticide)	1,108.33
Malathion (Insecticide)	311.67
Clear out (Weedicide)	460.83
Round-up (Weedicide)	500

Source: Bureau of Agricultural Statistics, 2010⁴).

Table 3 List of household pesticides

Brand name	Generic name	Classification	Company
Baygon total insect killer	Transfluthrin and cyfluthrin	Pyrethroid	Bayer Phils, Inc.
Racumin ready made bait	Coumatetralyl	Rodenticide	Bayer Phils, Inc.
Raid germkill insect killer liquid	Propoxur + neopynamin	Carbamate	S.C. Johnson & Son, Inc
KISS naphthalene balls	Napthalene		D' World 2000 Enterprise
OFF! Classic insect repellent lotion	DEET		SC Johnsons & Sons, Inc.

Source: Fertilizer and Pesticide Authority, 2002⁶).

States, about 85% to 90% of the households used pesticides, and children were vulnerable to exposure to household pesticides. Young children may be exposed in various ways such as inhalation, absorption through skin contact,

ingestion during food consumption or accidental ingestion of the pesticide itself. Moreover, children are at higher risk of exposure than adults since per pound of body weight, children breathe more, eat more, and have more rapid

metabolism than adults⁵).

In the Philippines, the government agency that regulates the use of pesticides is the Fertilizer and Pesticide Authority (FPA). This agency is primarily responsible for the registration of pesticide active ingredients and formulated products, and licensing of all pesticide handlers and pest control operators, and agro-medical training programs. Unfortunately, the policies of FPA are not well disseminated and followed by the public such that restricted and banned pesticides are still found present in the foods. Farmers still do not have enough knowledge regarding safe handling of pesticides; and there is still inadequate number of trained rural health workers. It is therefore suggested that FPA should be given sufficient manpower and resources to enable it to do its mandate⁷.

Methods and Materials

The data for this study were gathered from reviews of literature and journals on pesticides, pesticide use, pesticide poisoning and related concerns. Data were taken from at the Department of Health, the Philippine General Hospital, and other hospitals. Moreover, records in agricultural and related agencies like the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development, and Philippine Council for Industry and Energy Research Development – Department of Science and Technology, Department of Health, Department of Agriculture, Bureau of Agricultural Statistics, Bureau of Soils and Water Management, and the University of the Philippines, Los Banos were also gathered and included in this review. Exhaustive data reviews, and collection of records were undertaken in order to make comprehensive data trends of pesticide poisoning cases in the country. Other studies conducted by researchers and health practitioners in the past filled in missing information on pesticide poisoning.

Data and reports were also taken from National Poison Control and Information or now known as National Poison Management and Control Center (NPCMC). This is the first poison control center in the Philippines Manila in partnership with the Department of Health. It is housed at the Philippine General Hospital, University of the Philippines. This center was established as a response to the increasing incidence of poisoning due to improper and rampant use of pesticides in the country. The center focuses on the management of acute poisoning cases.

Analysis for the data was done for the annual data records on pesticide poisoning cases of hospital surveys, as well as comparison of the results of the research studies in the different years and geographical locations were done.

There is a large dearth of data on pesticide poisoning in

the Philippines. The latest record is done by the National Poison Control and Management Center. However, the data are limited, and pesticide is mostly categorized as mixed pesticide. There are no further categorizations or classifications per socio-demographics, regional profiling, and trending. The Department of Health also does not keep a record of pesticide poisoning cases in the Philippines. This posed as a challenge and limitation in this review of pesticide exposure and poisoning in the Philippines.

Results and Discussion

Pesticide poisoning has become an increasing health problem in the Philippines. Based on the records of the National Poison Control Management Center (NPCMC)⁸, mixed pesticide had been in the top 10 poisons recorded from 2004–2009 (see Figures 1–7). In the year 2004, of the 260 poison cases, 17 poisoning cases were recorded due to mixed pesticides (Figure 1). In the year 2005, 20 of the 295 cases were due to mixed pesticide (Figure 2). In 2006, of the 1216 cases of poisons, there were 118 pesticide poisoning cases (Figure 3). Mixed pesticides accounted for 104 of the 3,620 poison cases in 2007 (Figure 4), and 209 of the 3931 cases in 2008⁸. In 2009, pesticide ranked third with 164 cases (Figure 6).

Shown in Figure 7 is the trend of mixed pesticide poisoning cases recorded from 2004 to 2009. For a total of poisoning cases for six years from 2004 to 2009, pesticide poisoning ranks sixth. This means that mixed pesticides have become part of the main causes of poisoning cases in the Philippines. Other studies have reported poisoning cases and their relationship with increased mortality rates^{9–11}. In the study of Loevensohn¹¹, he noted that there is widespread use of pesticides by farmers in Central Luzon in the Philippines. Briones also reported that, from 1980 to 1988, 15% of an average of 503 cases had died of pesticide poisoning every year¹².

Hospital Surveys on Pesticide Poisoning Cases

Over the period 1980–1987, hospitals in the Philippines under the jurisdiction of the Department of Health recorded 4,031 cases of acute pesticide poisoning and 603 cases resulted in death¹³. At JP Rizal Memorial Medical Center and DLSU-Medical Center, from January, 1985 to December, 1987, 49 cases of poisoning from all causes were reviewed. Twelve cases were related to pesticide intoxication¹⁴. At the Philippine General Hospital, there were 78 admissions out of a total of 1,112 poisoning cases seen from April 2000–March 2001. In 2002, pesticide poisoning ranked second among the 2,848 poisoning cases referred to the poison information service¹⁵. Thirty two per-

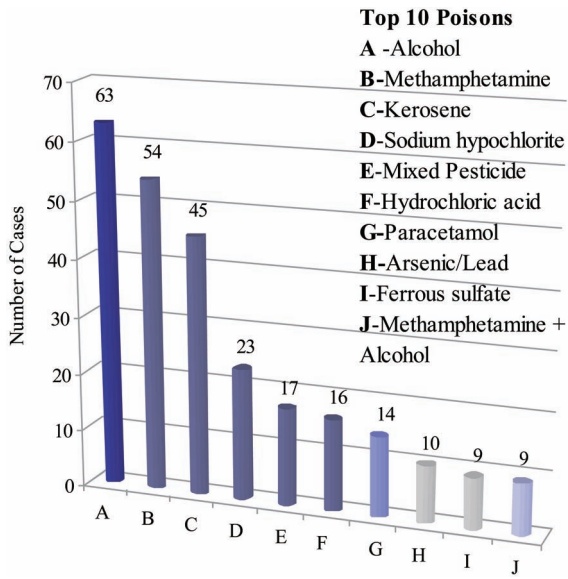


Figure 1 Frequency of top ten poisons including pesticide poisoning cases, 2004 (N=260). Source: NPCMC, 2004⁸⁾.

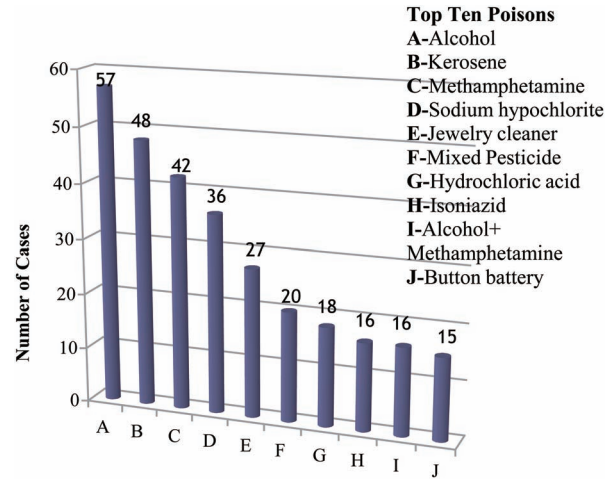


Figure 2 Frequency of top ten poisons including pesticide poisoning cases, 2005 (N=295). Source: NPCMC, 2005⁸⁾.

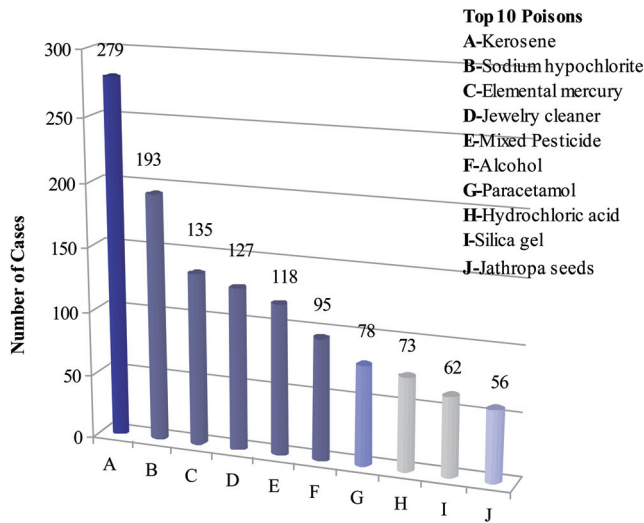


Figure 3 Frequency of top ten poisons including pesticide poisoning cases, 2006 (N=1216). Source: NPCMC, 2006⁸⁾.

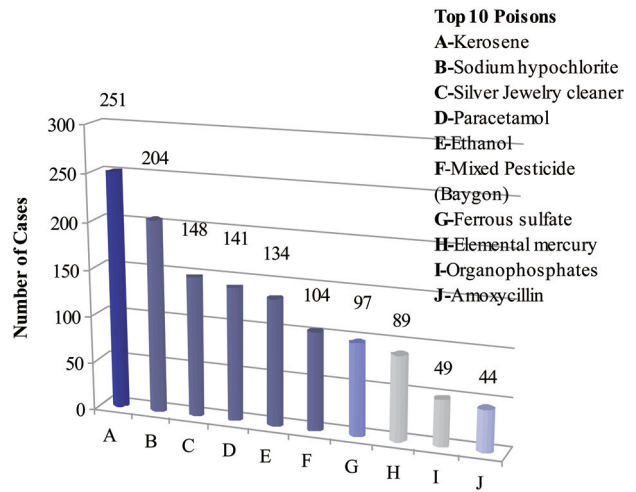


Figure 4 Frequency of top ten poisons including pesticide poisoning cases, 2007 (N=3,620). Source: NPCMC, 2007⁸⁾.

cent of such cases were secondary to mixed household pesticides. In Benguet General Hospital in northern Philippines, there had been increasing reports of pesticide poisoning among agricultural workers from 1987 to 1989. Approximately 30% of these were due to accidental poisoning¹⁶⁾. Moreover, farm-work related diseases such as dermal and allergic disorders were noted¹⁷⁾.

In the study conducted by the National Poison Control and Information Service (NPCIS), there were 2,346 poisoning cases reported from 1986 to 1990 involving 38 hospitals in the National Capital Region. The incidence was 27.6/100 population with a case fatality rate of 1.4. From 1992 to 1994, 2,587 poisoning cases were recorded involving 7 hospitals in the National Capital Region with an incidence of

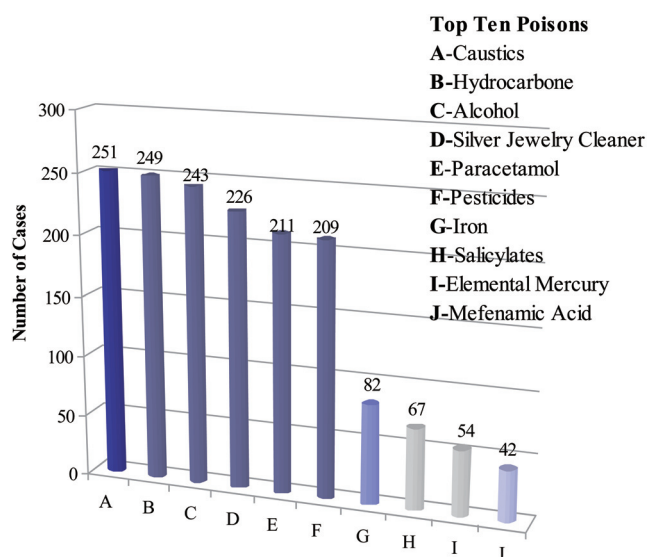


Figure 5 Frequency of top ten poisons including pesticide poisoning cases, 2008 (N=3,931). Source: NPCMC, 2008⁸⁾.

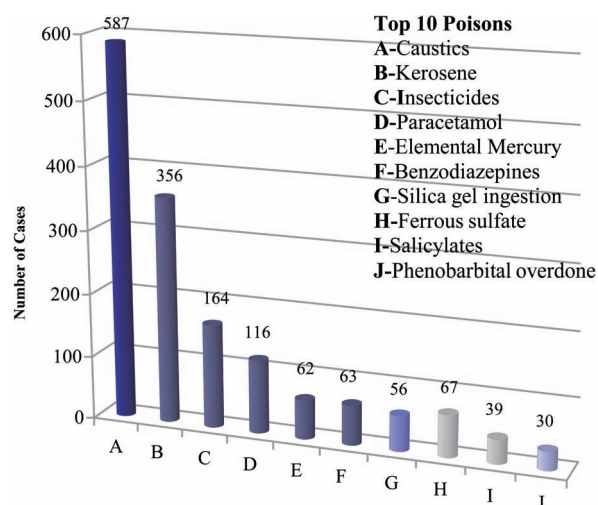


Figure 6 Frequency of top ten poisons including pesticide poisoning cases, 2009 (N=1,526). Source: NPCMC, 2009⁸⁾.

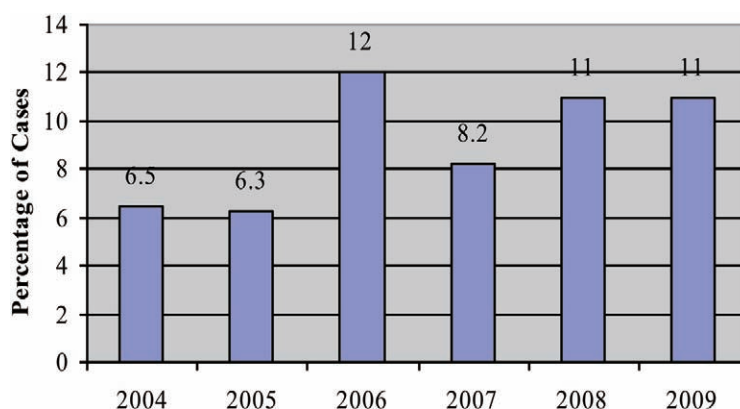


Figure 7 Percentage distribution of mixed pesticide poisoning cases from 2004 to 2009. Source: NPCMC⁸⁾.

30.4/100 and a case fatality rate of 2.7. In 2000, the NPCIS's in-patient statistics recorded a total of 956 patients of pesticide poisoning cases. In April 2000 and May 2001, there were 273 pesticide poisoning cases recorded by the NPCIS, most commonly due to ingestion, and approximately 16 cases of death. From 2000 to 2001 data gathered through the epidemiologic study of NPCIS revealed a total of 328 pesticide poisoning cases admitted from a total of 789 poisoning cases in 34 hospitals⁸⁾. Moreover, Dioquino reported a total of 273 cases of poisoning and 16 deaths over the year¹⁷⁾. Majority were due to severe cases of organophosphate or organochlorine poisoning.

Regional Records on Pesticide Poisoning Cases in the Philippines

In Davao Del Norte which is in the southern part of Luzon Island in the Philippines, a case report showed pesticide poisoning among residents due to the chemical leak of ethotrop. This chemical is contained in a nematocide Mocap used to spray in banana plantation in the town of Braulio Dujali, Davao del Norte. Ethotrop is a chemical ingredient that severely affects the functioning of the nervous system. This toxin causes tremors, nausea and weakness at low exposure, and paralysis and death on exposure to high doses,

according to the Pesticide Action Network. There were at least 79 people affected by the said chemical leak. Most of them were school children and at least 30 students passed out while they were gathering for the flag ceremony. The victims inhaled the toxic chemical fumes after pesticide application in the plantation¹⁸).

In Bohol Province located in the southern part of Luzon in the Philippines, a mass pesticide poisoning case among children was reported on March 2005 due to the chemical carbamate commonly used as household and agricultural pesticides. The victims ate cassava contaminated by carbamate¹⁹). This is a case of unsafe pesticide storage. The pesticide was mistaken for flour that caused the food poisoning of more than 100 children resulting in 27 deaths²⁰).

In a study conducted among the farmers in Nueva Ecija in northern Philippines, most of the respondents interviewed reported that they had felt some symptoms during or after pesticide application. These symptoms were headache, dizziness, and vomiting²¹).

In Benguet province which is the vegetable capital of the Philippines and located in the northeastern part of the Philippines, 2,000 vegetable farmers were shown in hospital records to have common complaints of allergic reactions both in the skin and the eyes, abdominal pain, dizziness, chest pain, headache and nose bleeding²²). Based on a study²³), the full-time farmers experienced more abnormal health findings compared to the part-time farmers.

In a consolidated study conducted by the Pesticide Action Network Asia and the Pacific in Asian countries targeting Digos City in Davao Del Sur which is located in Mindanao island of southern Philippines, adverse health symptoms were shown to be associated with pesticide exposure. Among the farmers interviewed, the most prevalent symptoms were headache (81%), dizziness (79%), excessive sweating (3%), excessive salivation (1%), blurred vision, and narrowed pupils²⁴).

In some studies, pesticides identified in human tissues were DDT (dichlorodiphenyltrichloroethane), and its metabolites DDE (dichlorodiphenyltrichloroethylene) aldrin, dieldrin and lindane²⁵). Cases of such were reported in Laguna province located in the southern part of Luzon Island. Human milk was also found to contain DDT among women residents in a farming community in Laguna, Philippines¹²).

Pesticide Poisoning Cases according to Types

Mixed pesticides are usually categorized as organophosphates, carbamates, pyrethroid, and organochlorines. Organophosphate pesticides are the most popular pesticides used in agriculture²⁶). Most

organophosphates are well absorbed by the skin, oral mucous membranes, conjunctiva and gastrointestinal and respiratory routes²⁷). One type of organophosphate is chlorpyrifos. Chlorpyrifos is an organophosphorus anticholinesterase insecticide. Organophosphate intoxication can induce symptoms such as miosis, urination, diarrhea, diaphoresis, lacrimation, excitation of central nervous system, salivation, and consciousness disturbance²⁸). Carbamates such as Carbaryl (SEVIN) and carbofuran (FURADAN) can cause cancer. Some carbamates, such as carbofuran (FURADAN), have been shown to cause birth defects or reproduction²⁹). Organophosphorus and carbamate pesticides are acetylcholinesterase-inhibiting pesticides³⁰). Pyrethroids are a group of man-made pesticides that are also used in agriculture. Persons who apply pyrethroids and are accidentally exposed to very large amounts may experience dizziness, headache, nausea and diarrhea³¹). Organochlorine is another pesticide widely used in the agriculture. One type of which is endosulfan which is rapidly absorbed following ingestion, inhalation, or skin exposure. Symptoms occur rapidly following exposure with central nervous system toxicity³²).

In the Philippines, the widely used insecticides are carbofuran, endrin, parathion, and monocrotophos, which are all classified by the World Health Organization as extremely or highly hazardous³³).

A local study in 2002 showed that insecticides accounted for 71.3% of the poisoning incidents followed by herbicides at 10.2%. Of the pesticides, pyrethroids accounted for 29.3%, and organophosphates for 22%. Some of the most common pesticides included cypermethrin, malathion, carbofuran, combination cyfluthrin, dichlorvos and propoxur and deltamethrin³⁴).

In the reported poisoning cases in JP Rizal Memorial Medical Center (1985–1987)³⁵), the most common types of pesticides belonged to the organophosphate group of insecticides (9 cases), followed by the carbamate group and organochlorine insecticides with 1 case each.

In the Philippine General Hospital which is the largest tertiary and government hospital in the Philippines (2000–2001)¹⁵), the most commonly encountered pesticides were mixed pesticides (39%) containing organophosphates, carbamates and pyrethroids followed by rodenticides (15%). Majority (62.8%) presented with minor signs and symptoms of poisoning. Mortality rate was 2.6%. Shown in Figures 1–7 above, pyrethroids registered the highest number of reported cases of poisoning from 2008–2009.

Based on an epidemiologic study in 2000–2001¹), the commonly encountered pesticides were pyrethroids (27.2%), organophosphates (18.0%), carbamates (9.5%), mixed pesticides (7.9%) and chlorophenoxy compounds (4.0%).

Mortality rate was 5.8% with organochlorine poisoning having the highest case fatality rate (22.2%)³⁶.

In a study in farming areas of Benguet in 2010³⁷, positive results of pesticide residues were obtained in water and soil samples. Of the 78 soil samples, 34 were found to be positive with pesticide residues and of the 49 water samples, 1 sample was found to be positive with pesticide chlorpyrifos. Chlorpyrifos gave a concentration of 0.07 mg/L. In soil samples, the specific residue types were endosulfan sulfate, profenofos, chlorothalonil, T endosulfan, chlorpyrifos, cypermethrin, and cyhalothrin. The most prevalent types of pesticide in all municipalities were endosulfan sulfate and chlorpyrifos (17.7%), followed by profenofos (8.9%), cyhalothrin (5.1%), cypermethrin (3.8%), technical (t) endosulfan (0.25%), and then chlorothalonil (0.13%). As for pesticide concentration, the most significant pesticide with the highest concentration was t-endosulfan, with a mean concentration of 0.025 mg/kg, followed by endosulfan sulfate (0.015 mg/kg), chlorpyrifos (0.01 mg/kg), profenofos (0.003 mg/kg), chlorothalonil, cypermethrin, and cyhalothrin (all at 0.002 mg/kg). The samples were positive for cyhalothrin (5.1% of soil samples, at a concentration of 0.002 mg/kg), and cypermethrin (3.8%, at 0.002 mg/kg). Chlorpyrifos was found only in soil, and not in water samples. Soil samples were positive for chlorothalonil (0.13% of soil samples, at a concentration of 0.002 mg/kg). Chlorothalonil is a chloronitrile which is a broad-spectrum OC fungicide and it is degraded more rapidly at higher temperatures and when soil moisture is increased. It has a low water solubility, 0.6 mg/L, at 25 degrees Celsius. There was no water sample with chlorothalonil because of its low water solubility. Chlorpyrifos, which is an organophosphate, was found in 27.4% of soil samples at 0.01 mg/kg concentration. It was also found in one water sample at 0.07 mg/L, which is above the threshold limit value for both acute and chronic effects on aquatic and marine life³⁷.

Meanwhile, Rother reported in his study that highly-toxic pesticides, such as aldicarb, methamidophos, and chlorpyrifos, are easily available in informal markets. Plasma cypermethrin, endosulfan, imidacloprid, thiodicarb, carbofuran, and methamidophos levels were found in his study to be higher than allowable daily intake³⁸.

In one study of Lu²³, pyrethroids (71.1%, 73%) were used by majority of the full-time and part-time farmers. For the full-time farmers, this was followed by organophosphates (67.8%) and carbamates (57%). For the part-time farmers, carbamate (48%) was the second most commonly used. Organophosphate was the least used pesticide (31%). Other pesticides used by both groups included organochlorides and nitrites (Table 2). Both groups were similar in terms of pyrethroid, carbamate and other pesticide use.

However, their use of organophosphate was significantly different ($p=0.001$), such that about 2/3 of the full-time farmers used organophosphate, while only 1/3 of the part-time farmers used it. Shown in Figure 8 are the brand names of pesticides used by the farmers in the study of Lu²³. Tamaron (methamidophos) was most commonly used by both groups of farmers as shown in the figure above.

In another study of Lu³⁷, it was found that cutflower farmers used pesticides such as Dithane (mancozeb), Tamaron (methamidophos), and Lannate (methiocarb). Dithane (mancozeb) is the most toxic and hazardous among the pesticides used.

Based on NPCMC data, pyrethroid had been the most frequent cause of pesticide poisoning from 2008 to 2009⁸. Figure 9 shows the frequency of types of pesticides used from the year 2008 to 2009. In the year 2008, there were 112 recorded pesticide poisoning cases due to pyrethroids. Then in 2009, 72 cases were recorded. In other countries such as India and Tunisia, organophosphorus and carbamate pesticides were widely used^{1, 39}.

Pesticide Poisoning Cases according to Age Category

As for age category, a study showed that more than 60% of the victims of pesticide poisoning were between 10 and 35 years old³⁴. Based on the records of JP Rizal Memorial Medical Center (1985–1987), 50% of the pesticide poisoned victims were young adults (22–32 years old)³⁵. Records from the Philippine General Hospital showed that early adult (20–35 years old) persons were highly exposed to pesticide poisoning situations (Figure 10)¹.

Pesticide Poisoning Cases in Children and Infants

Pesticide poisoning is also common among children and infants. In the study of Cucuenco in Benguet province located in the north eastern part of Luzon Island in the Philippines, school children were reported to start working in the vegetable gardens as early as 6–9 years old⁴⁰. Their work consisted of filling the soil, land preparation, planting, watering, harvesting, and application of both fertilizer and pesticides. The children were familiar with both garden pests and pesticides. Some of them were involved in chemical preparation, mixing, and spraying pesticides. Leftover pesticides were often stored or burned. The symptoms experienced by the children were skin and nasal irritation, headaches, and abdominal pain after use of chemicals. Many of them showed signs of poor nutrition as well as skin rashes. In Nicaragua, records from the Ministry of Health's Pesticide Program showed continuing occupational acute

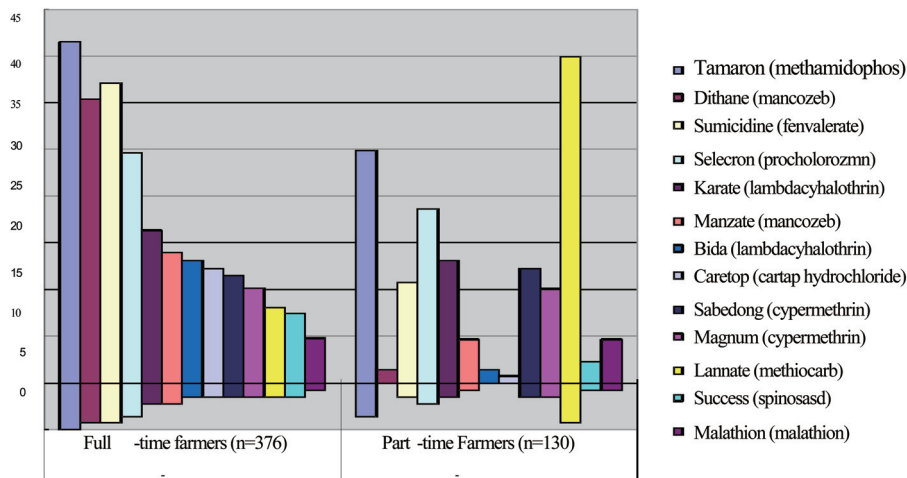


Figure 8 Percentage distribution of pesticides used. Source: Lu, 2010²³).

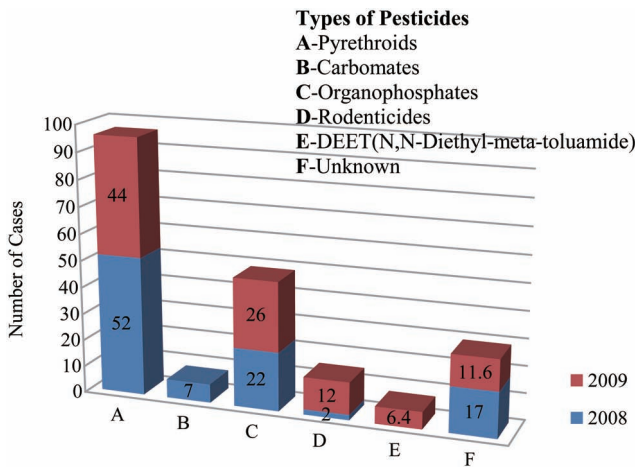


Figure 9 Percentage of types of pesticide poisoning from 2008–2009, (N=323). Source: NPCM, 2009⁸).

pesticide poisonings among children five to 14-year-old. The children were exposed to pesticides at work in tobacco and basic grain crops⁴¹. A case study in the United States reported that 2.5-year-old ingested an unknown amount of endosulfan from a 20-ounce soft drink bottle. Lee *et al.* also reported a case of pesticide intoxication specifically chlorpyrifos of a healthy 5-year 6-month-old boy²⁸. Moreover, in the study of Lu, pesticide DDT residue such as endosulfan was found in soil. Shown below (Figures 11 and 12) are the pesticide poisoning cases in children and infants admitted to the Philippine General Hospital⁸.

Pesticide Poisoning Exposure and Practices

Pesticide self-poisoning is the most common form of suicide in rural Asia, accounting for 60% of all deaths⁴². In one study in rural areas of China, highly lethal pesticides are a common method used for suicide⁴³. At the Philippine General Hospital in Metro Manila, Philippines⁸) (2000–2001), recorded pesticide poisoning cases showed that 80.8% were intentional in nature.

In Benguet General Hospital in the Philippines, data showed increasing reports of pesticide poisoning among agricultural workers (1987–1989)⁴⁴. Approximately 30% were due to accidental poisoning.

In another study, around 88% of poisoning cases were due to intentional exposure (oral contact in 251 cases), while accidental and occupational exposures accounted for 8 and 4% respectively³⁴. The most common place of exposure was in the rural home followed by the urban home. Only less than 10% occurred in the farm.

The National Poison Control and Information Service (2000–2001) data also showed that 87% of pesticide poisoning cases were intentional in nature with 17.5% of patients having moderate-severe manifestations⁸.

One study that was conducted in Barangay Ruparan, Digos City, Davao del Sur, explicitly investigated pesticide exposures/practices among the farmers. This involved pesticide application, storage, and disposal. Most of the respondents worked in the farm sector, and 97% of the respondents were pesticide applicators. Their activities related to pesticides were as follows: 100% application in the field; 100% washing clothes that have been used when spraying; 100% mixing pesticides; 99% re-entry to treated fields; 89% washing equipments; 87% washing spouses

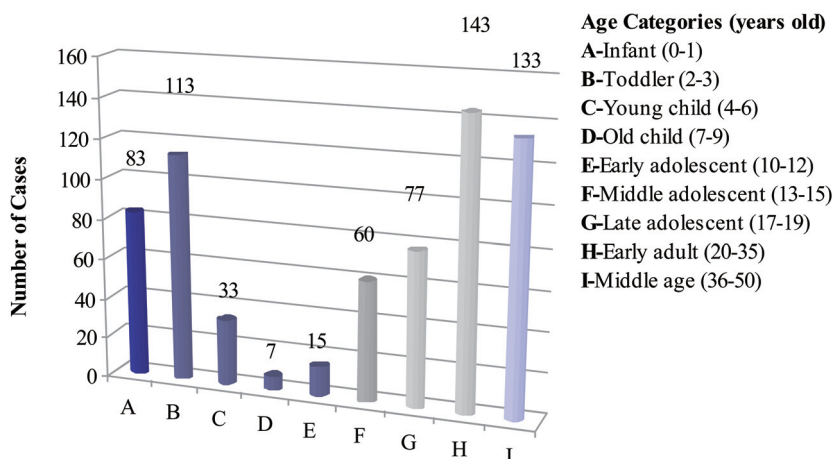


Figure 10 Frequency of poisoning cases at different age category, (N=664). Source: NPCMC, 2009⁸⁾.

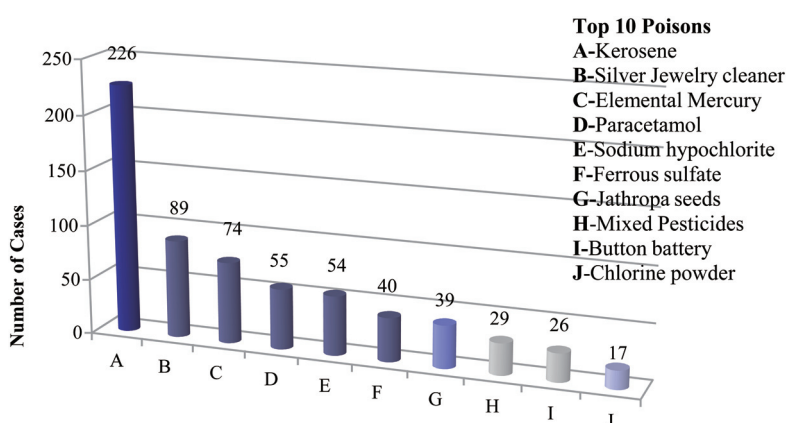


Figure 11 Frequency of top ten poisons including pesticide poisoning cases among children (N=1,832). Source: Philippine General Hospital, 2009⁸⁾.

clothes; 70% working in fields where pesticides have been used or are being used; 60% purchasing pesticides. The participants also reported how they were exposed to pesticides, as follows: 98% exposure to pesticides applied by ground methods; 96% eating food that is sprayed with pesticides and 4% water contamination. 94% of the applicators used protective clothing when applying pesticides and 93% applicators had washing facilities. Majority of the respondents had experienced spillages which occurred while spraying(71%), loading(5%), and mixing (2%). Majority of the respondents sprayed both with and against the wind. The farmers disposed containers by burying, putting in a trash, burning, or selling. Farm equipment was washed in irrigation canal (87%), drum or water container (5%), in the field (4%), or faucet (2%). The farmers stored pesticides at home

(32%), shed (23%), or field (4%)⁴⁵⁾.

Other studies have shown that agricultural workers are not using personal protective equipments. The main reason for not using protective measures was discomfort¹⁾.

Pesticide Poisoning Related Illnesses

Pesticide exposure has been linked to an increased prevalence of respiratory symptoms in several farming populations. Respiratory hazards significantly contributed to the burden of occupational disease among farmers⁴⁶⁾.

The effects of pesticide exposure can be acute or chronic. Acute toxicity is the effect of a single massive dose which can readily be remedied by medical measures. Non-fatal symptoms include headaches and giddiness as well as skin

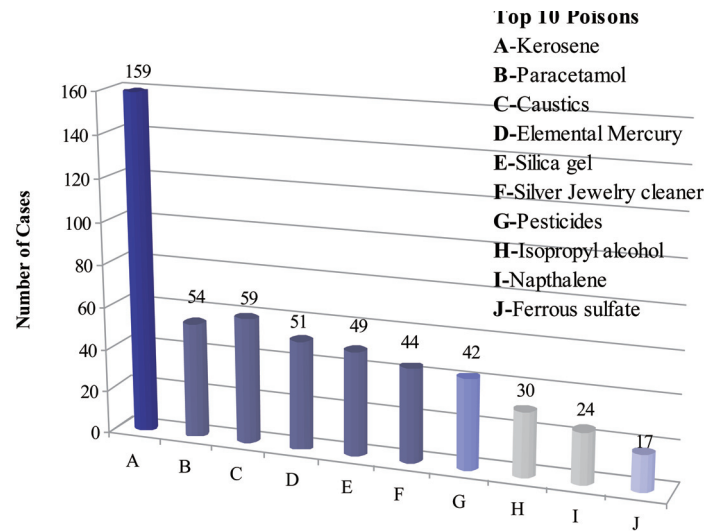


Figure 12 Frequency of top ten poisons including pesticide poisoning cases among infants, (N=529). Source: NPCMC, 2009⁸⁾.

rashes and skin disorders. Chronic toxicity results from repeated biochemical lesions due to low-level poisoning. This is severely dangerous although physical symptoms may not be present. In chronic cases, it is difficult to determine if the pesticides indeed caused such poisoning⁴⁷⁾. The Department of Health (2001) found that there were more cases of acute poisoning than chronic⁴⁸⁾. Both acute and chronic types posed risks to pregnant women⁴⁹⁾.

Recovery of Poisoning Cases including Pesticide Poisoning

The data from the National Poison Control and Information Service (2000–2001) showed that the average duration of hospital stay in majority of cases was 1-2 days. Shown in Table 4 is the data from Philippine General Hospital (2006) in regard the final outcome of the overall poisoning cases admitted⁸⁾. It is quiet alarming that 44 cases were recorded resulting in death.

Conclusion

Pesticide poisoning cases in the Philippines have been part of the health problem of the country. In the agricultural sector, pesticides play major role in food production. Unfortunately, overusing pesticides especially without proper equipment and precautionary measures can pose adverse health effects to the farmers and the environment.

It is suggested that the government should implement a limit on the amount of pesticide used by the farmers and

Table 4 Number of cases by final health outcome, 2006

Final outcome	Cases
Full recovery	939
Full but delayed recovery	214
Sequelae	161
Death	44
Unknown	562
Total	1920

Philippine General Hospital, 2006⁸⁾.

provide a training program for the farmers regarding proper handling of pesticides. With regards child labor and pesticide exposure, child right’s violation should be abolished in both formal employment and in the informal economy. For household use of pesticides, correct information dissemination on proper storage, proper labeling, and correct application should be conducted for urban and rural dwellers. Medical and health personnel in the community health units, and in public and private hospitals should be trained on proper documentation and database keeping of pesticide poisoning cases they handle, as well as on the proper management of pesticide poisoning. Recording should also be done by hospitals on acute and chronic pesticide poisoning including socio-demographics and types of poisoning in order to have more comprehensive data. Government agencies should intensify surveillance and regulation on both household and agricultural pesticides. It

is further recommended that a more comprehensive database and record keeping be put in place in the various government agencies tasked to monitor and treat pesticide poisoning cases. The state of pesticide-related illnesses mirrors the poor safety practices among farmers as well as lack of necessary supervision from concerned agencies.

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