SUMMARY OF PESTICIDE SURVEILLANCE DATA: LOUISIANA, 2006-2014

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DEPARTMENT OF HEALTH
AND HOSPITALS

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INTRODUCTION

The Louisiana Department of Health and Hospitals/Office of Public Health's Section of Environmental Epidemiology and Toxicology's (SEET) Pesticide Surveillance Program investigates and tracks pesticide exposures occurring throughout the state. The Program, which is partially supported by a grant from the Environmental Protection Agency, serves all Louisiana residents. Routine program activities include:

- Review health and exposure information for cases of pesticide exposure;
- Compile state statistics for pesticide exposure;
- Make recommendations to prevent and/or reduce pesticide exposure; and
- Provide follow up assessment and surveillance for environmental emergency events involving pesticides.

Case reports of pesticide exposure are primarily received from the Louisiana Department of Agriculture and Forestry (LDAF) and the Louisiana Poison Center.

BACKGROUND

Louisiana has been investigating health-related pesticide complaints since 1991 when LDAF and SEET entered into an interagency agreement. The interagency agreement recognizes the participation and cooperation of both agencies needed in order to handle health complaints involving possible pesticide exposure. An investigation is initiated when LDAF receives a complaint of adverse health effects possibly associated with pesticide exposure. These joint investigations involve the collection and review of environmental and health data relevant to the reported pesticide exposure incident. LDAF determines if a pesticide misapplication has occurred, and SEET evaluates the health effects associated with a pesticide exposure.

In November 2002, SEET began receiving case reports from the Louisiana Poison Center (LPC) for calls involving exposure to pesticides. These calls are reviewed by SEET and, in some cases, are forwarded to LDAF for investigation. Calls selected for investigation by LDAF are based on criteria that consider the location of exposure, pesticide toxicity, and circumstances of exposure. SEET also forwards calls from SEET's Indoor Air Quality and National Toxic Substance Incidents Program (NTSIP) to LDAF if they involve a pesticide exposure. NTSIP events are obtained from reports issued by the National Response Center and Louisiana State Police.

In 2006, SEET authored changes to disease reporting requirements mandating all health care providers report to SEET all confirmed or suspected cases of pesticide poisoning, in addition to cholinesterase test results. SEET has since established electronic reporting of cholinesterase tests with clinical laboratories conducting tests on Louisiana residents.

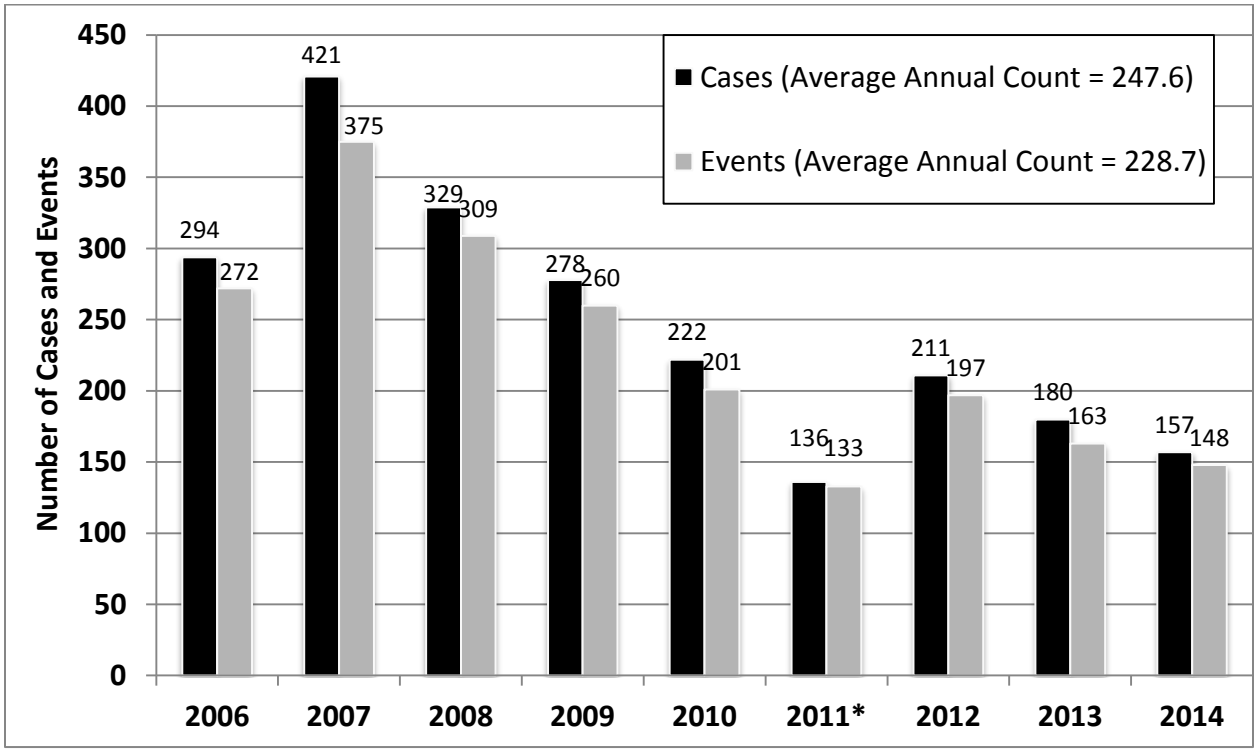
METHODS

Information collected during a pesticide exposure investigation includes demographic data, circumstance and route of exposure, pesticide product information, type of application, location of pesticide application, medical signs and symptoms, biological and environmental monitoring information (e.g., results of cholinesterase and swab samples), severity of health effects and healthcare utilization. This information is obtained from a variety of sources: LDAF inspector reports, LPC case reports, environmental samples, medical records, pesticide product labels and Material Safety Data Sheets, and complainant interviews. The collected data are entered into a database maintained by SEET. The database, data coding guides, and case classification and severity criteria were developed by the National Institute for Occupational Safety and Health and are used by most states that have a pesticide surveillance program. This document presents summary information on reported pesticide exposure cases/events from 2006 through 2014.

RESULTS AND DISCUSSION

Cases & Events: An event is defined as a reported health-related pesticide incident affecting at least one person. Each individual affected by a single health-related pesticide incident is considered a case. Therefore, more than one case may be included in each event.

Figure 1.Pesticide Exposure Cases and Events, 2006-2014.



*In 2011, the Program discontinued tracking non-occupational disinfectant exposures.

Case Classification: The case classification matrix is used to rank evidence linking the illness and injury to the pesticide exposure. Cases are classified using the National Institute for Occupational Safety and Health's (NIOSH) case definition for acute pesticide-related illness and injury. Classification categories consider the level of certainty of exposure, documentation of health effects, and the plausibility of reported health effects based on the known toxicology of the pesticides. The strongest evidence of pesticide exposure is confirmation of exposure by environmental or biological samples and of health effects by medical records.

Definitions of case classification categories:

Definite: Objective evidence confirms the exposure and illness, and the temporally related illness is consistent with the known toxicology of the pesticide.

Probable: Objective evidence of either the pesticide exposure or the health effects is available, and the temporally related illness is consistent with the known toxicology of the pesticide.

Possible: Only subjective evidence of exposure and illness is available, and the temporally related symptoms are consistent with the known toxicology of the pesticide.

Suspicious: Insufficient toxicological information is available to determine whether a causal relationship exists between the pesticide exposure and the health effects.

Unlikely: The relationship between the reported exposure and illness is not consistent with the known toxicology of the pesticide.

Insufficient Information: Insufficient documentation was obtained about the exposure or health effects to determine whether the health effects were related to a pesticide exposure.

Asymptomatic: A case reported exposure to a pesticide, but was asymptomatic.

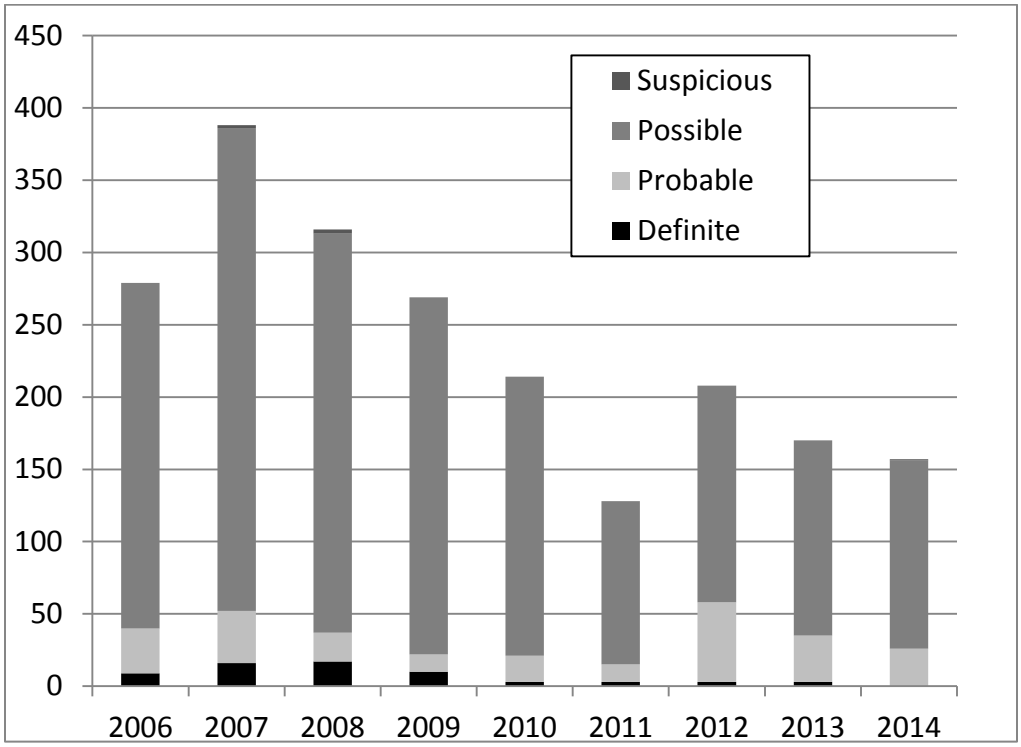
Unrelated: It was determined that health effects were due to a condition other than a pesticide exposure.

Table 1. Pesticide Exposure Cases by Classification Category, 2006-2014.

Case	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
1 Definite	9	16	17	10	3	3	3	3	0	64
2 Probable	31	36	20	12	18	12	55	32	26	242
3 Possible	239	334	276	247	193	113	150	135	130	1817
4 Suspicious	0	2	3	0	0	0	0	0	1	6
Subtotal	**279**	**388**	**316**	**269**	**214**	**128**	**208**	**170**	**157**	**2129**
5 Unlikely	0	2	0	0	3	1	0	0	5	11
6 Insufficient Information	15	29	11	7	4	7	3	8	12	96
7 Asymptomatic	0	0	1	1	0	0	0	2	2	6
8 Unrelated	0	2	1	1	1	0	0	0	0	5
Subtotal	**15**	**33**	**13**	**9**	**8**	**8**	**3**	**10**	**19**	**118**

THE FOLLOWING TABLES AND FIGURES PRESENT INFORMATION ON THE 2129 CASES FROM 2006-2014 CLASSIFIED AS EITHER "DEFINITE", "PROBABLE", "POSSIBLE" OR "SUSPICIOUS".

Figure 2. Pesticide Exposure Cases by Classification Category, 2006-2014.



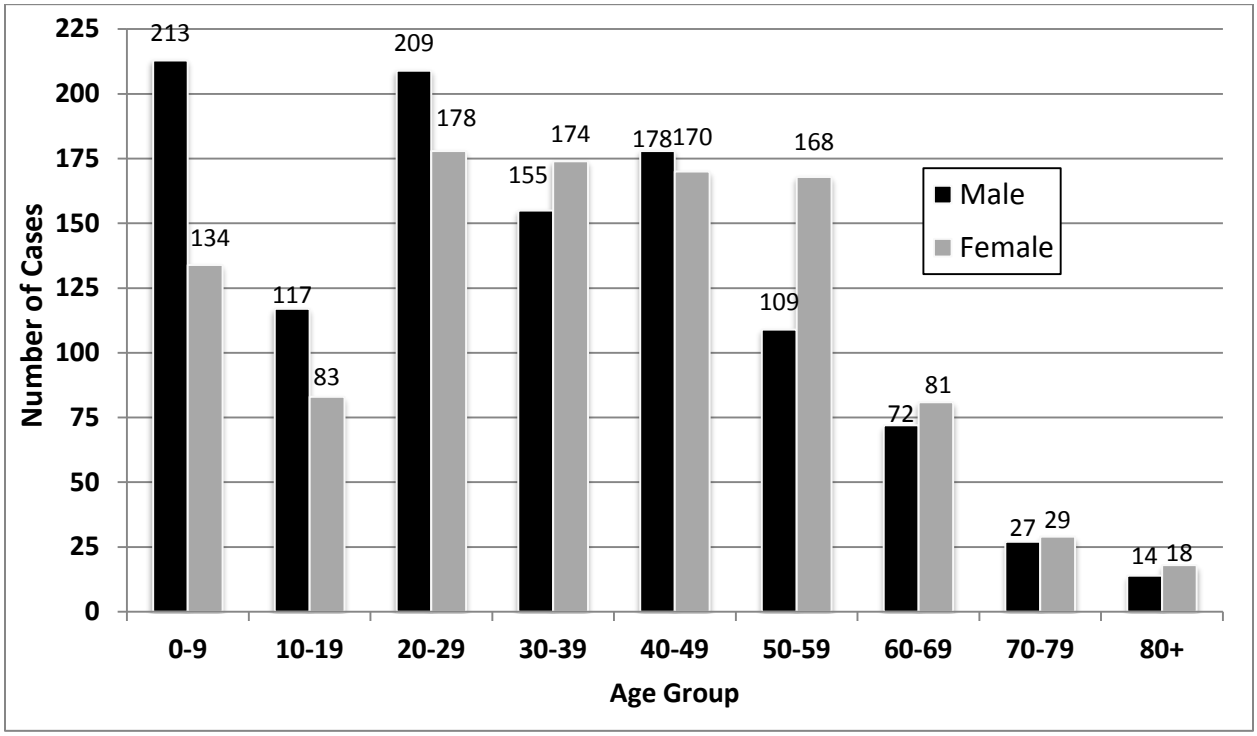
Source of Case Report: Table 2 identifies the source from which LDHH received the pesticide exposure case report.

Table 2. Cases by Reporting Source, 2006-2014.

Source	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total	%
LA Poison Center	270	353	310	258	193	118	194	152	137	1985	93.24%
LDAF	9	35	6	11	16	10	14	17	19	137	6.43%
Other	0	0	0	0	5	0	0	1	1	7	0.33%
Total	**279**	**388**	**316**	**269**	**214**	**128**	**208**	**170**	**157**	**2129**	

Demographics: The figure below shows cases by age and gender.

Figure 3. Pesticide Exposure Cases by Age and Gender, 2006-2014.



Location: Annual parish pesticide exposure case rates for 2006 through 2014 were calculated using annual parish population data from the US Census. An average annual pesticide exposure case rate was calculated for each parish by averaging the annual case rates for the study period. Average annual case rates (per 100,000 residents) for each parish and the State are shown in Table 3.

Table 3. Average Annual Pesticide Exposure Case Rate by Parish, 2006-2014.

LDHH Region	Parish	N	Avg. annual case rate (per 100,000)	LDHH Region	Parish	N	Avg. annual case rate (per 100,000)
8	Madison	17	15.55	7	Sabine	11	5.05
8	Richland	24	12.85	7	Red River	4	4.91
8	East Carroll	9	12.85	1	Orleans	142	4.78
8	Franklin	22	11.82	5	Cameron	3	4.74
2	Pointe Coupee	21	10.26	9	St. Tammany	98	4.65
6	La Salle	12	9.03	2	Iberville	14	4.65
8	Tensas	4	8.52	5	Jefferson Davis	13	4.59
8	Lincoln	33	7.89	8	Jackson	6	4.14
9	Washington	33	7.87	3	St. Mary	20	4.11
6	Avoyelles	29	7.71	4	St. Martin	18	3.83
4	Iberia	51	7.70	7	De Soto	9	3.74
8	West Carroll	8	7.66	2	West Feliciana	5	3.57
5	Beauregard	24	7.50	1	Jefferson	136	3.49
6	Catahoula	7	7.50	3	St. John the Baptist	14	3.41
8	Union	15	7.36	9	Livingston	39	3.40
3	Assumption	14	6.67	7	Bossier	35	3.30
9	Tangipahoa	72	6.61	7	Claiborne	5	3.28
4	Lafayette	131	6.56	6	Concordia	6	3.25
8	Morehouse	16	6.38	3	Lafourche	28	3.23
5	Calcasieu	106	6.15	6	Vernon	14	3.02
7	Caddo	139	6.07	1	St. Bernard	9	2.92
3	Terrebonne	61	6.07	1	Plaquemines	6	2.88
6	Rapides	71	6.00	2	East Feliciana	5	2.75
7	Webster	22	5.96	2	Ascension	23	2.38
2	East Baton Rouge	233	5.89	7	Bienville	3	2.33
8	Ouachita	81	5.85	6	Winn	3	2.19
4	St. Landry	44	5.82	6	Grant	4	2.03
4	Vermilion	30	5.74	9	St. Helena	2	2.02
5	Allen	13	5.61	3	St. James	3	1.52
4	Acadia	31	5.60	3	St. Charles	7	1.48
4	Evangeline	16	5.22	8	Caldwell	1	1.10
2	West Baton Rouge	11	5.13	-	Unknown	25	-
7	Natchitoches	18	5.09	-	**Louisiana**	**2129**	**5.18**

Figure 4. Average Annual Pesticide Exposure Case Rate by LDHH Region, 2006-2014.

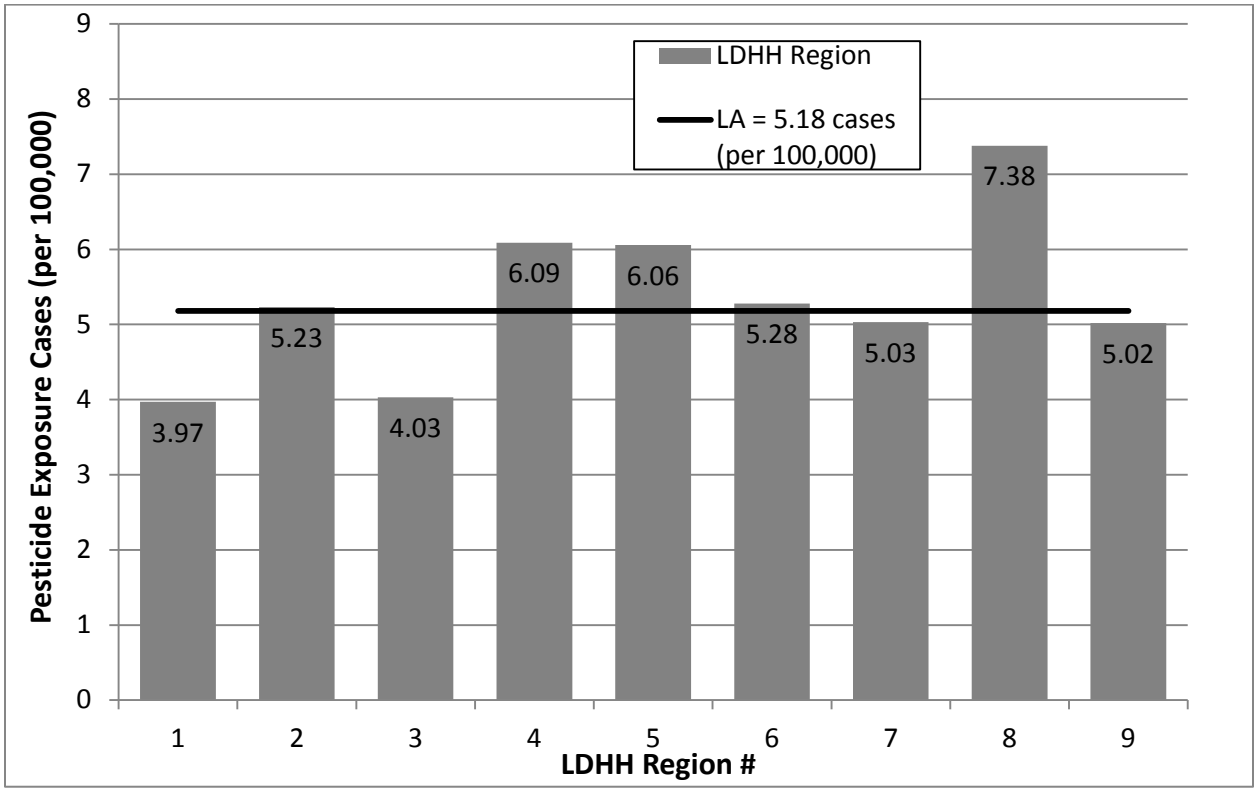
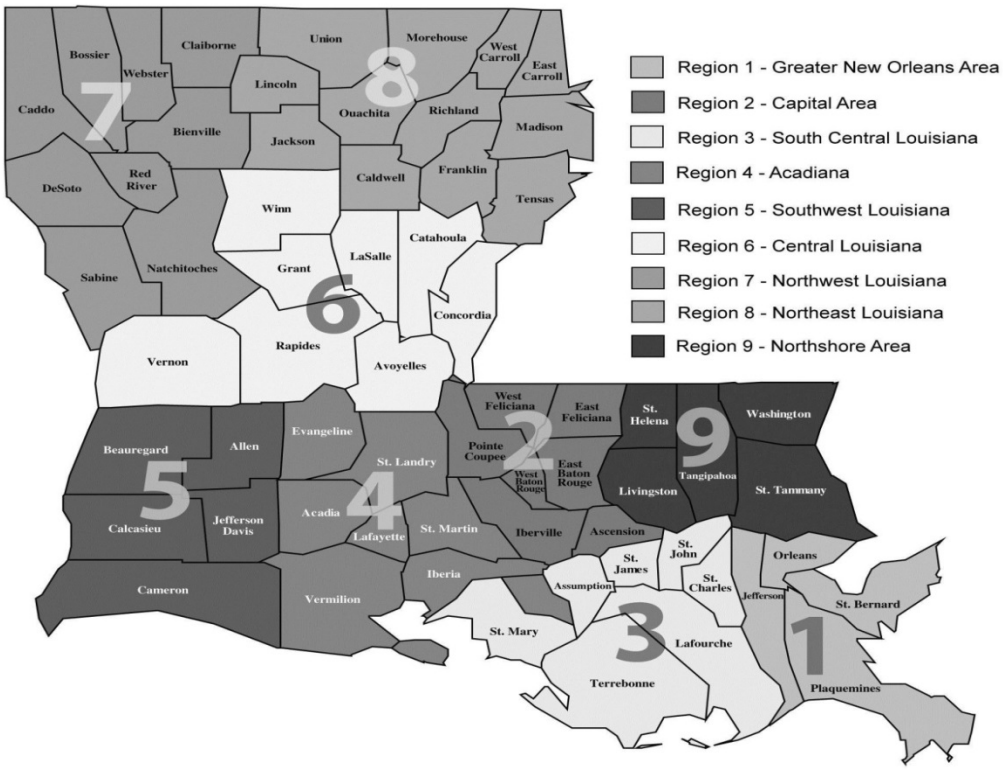
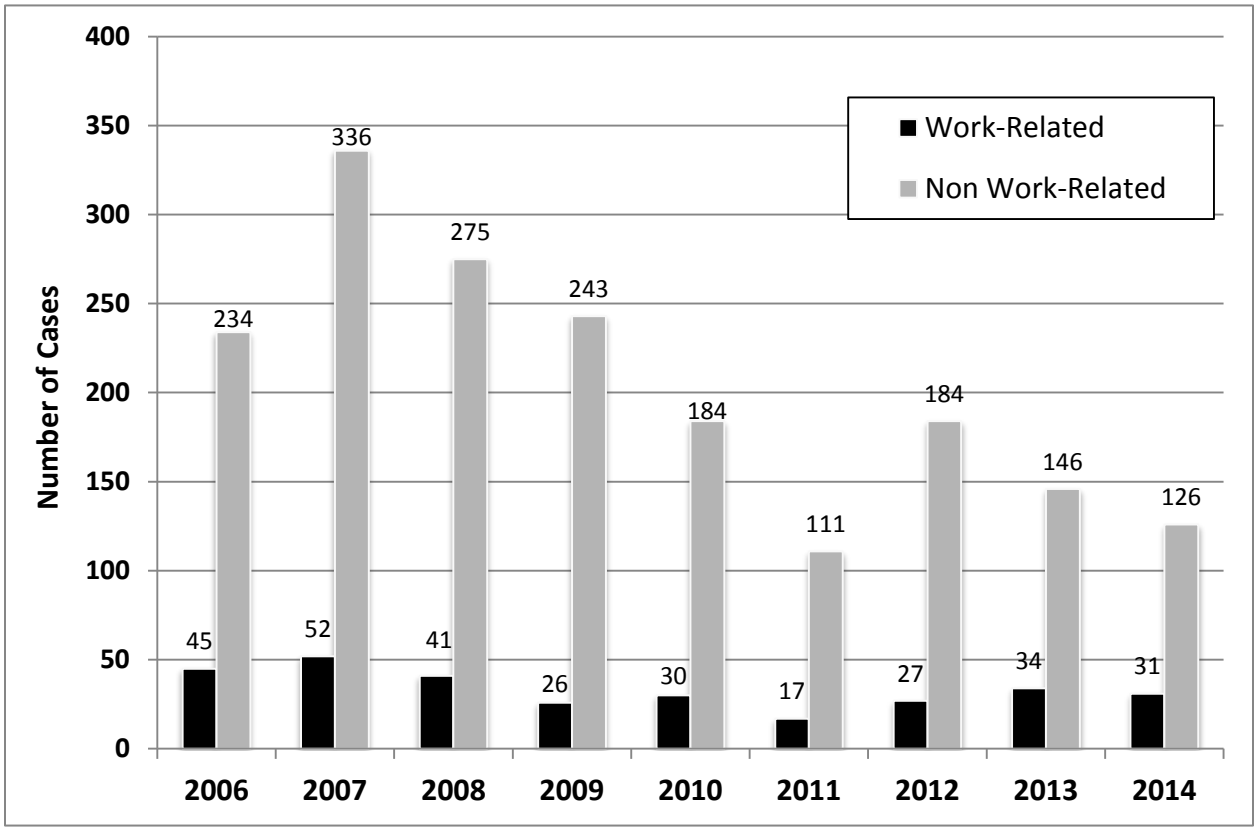


Figure 5. LA Department of Health and Hospitals (LDHH) Administrative Regions



Work Status: A case is considered work-related if the reported incident occurred while the individual was working regardless if he/she was the applicator of the pesticide.

Figure 6. Pesticide Exposure Cases by Work Status, 2006-2014.



Severity: The severity of each case depends on signs and symptoms, healthcare utilization, length of hospital stay, and lost time from work or disruption in normal activities due to pesticide exposure.

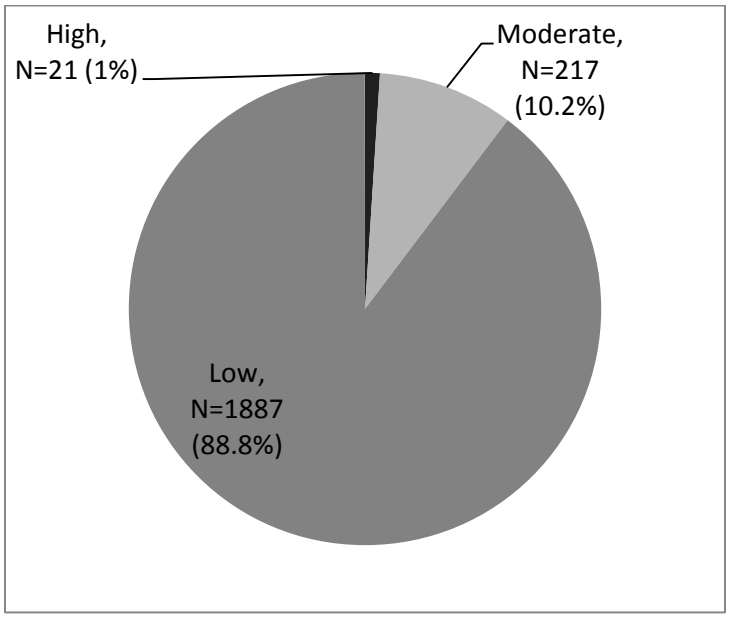
Definitions of the severity categories:

High: Symptoms due to pesticide exposure were life-threatening and medical treatment commonly involving hospitalization was required. Leave from work or inability to carry out normal activity was for an extended period of time (more than five days).

Moderate: Symptoms were less severe than life-threatening, but treatment is usually required. Less time is lost from work or normal activities (3-5 days) compared to "high" severity cases. No residual impairment is present although effects may be persistent.

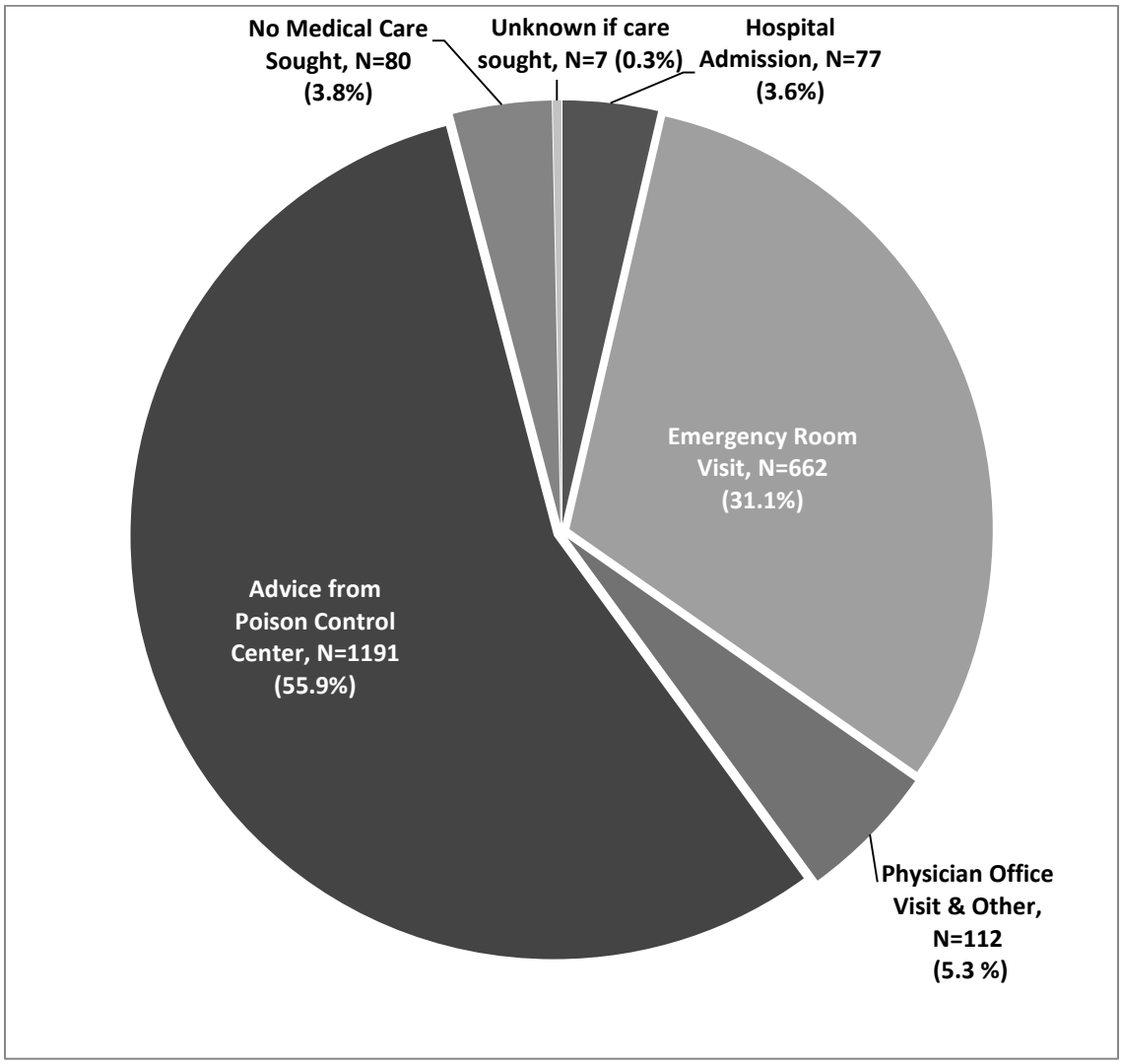
Low: Exposure caused benign reactions to the skin, eye, or respiratory tract. Typically the illness orinjury resolves without medical treatment, and fewer than three days of work or normal activity was lost.

Figure 7. Pesticide Exposure Cases by Severity, 2006-2014.



Healthcare Utilization: The table below shows the type of medical care each case received.

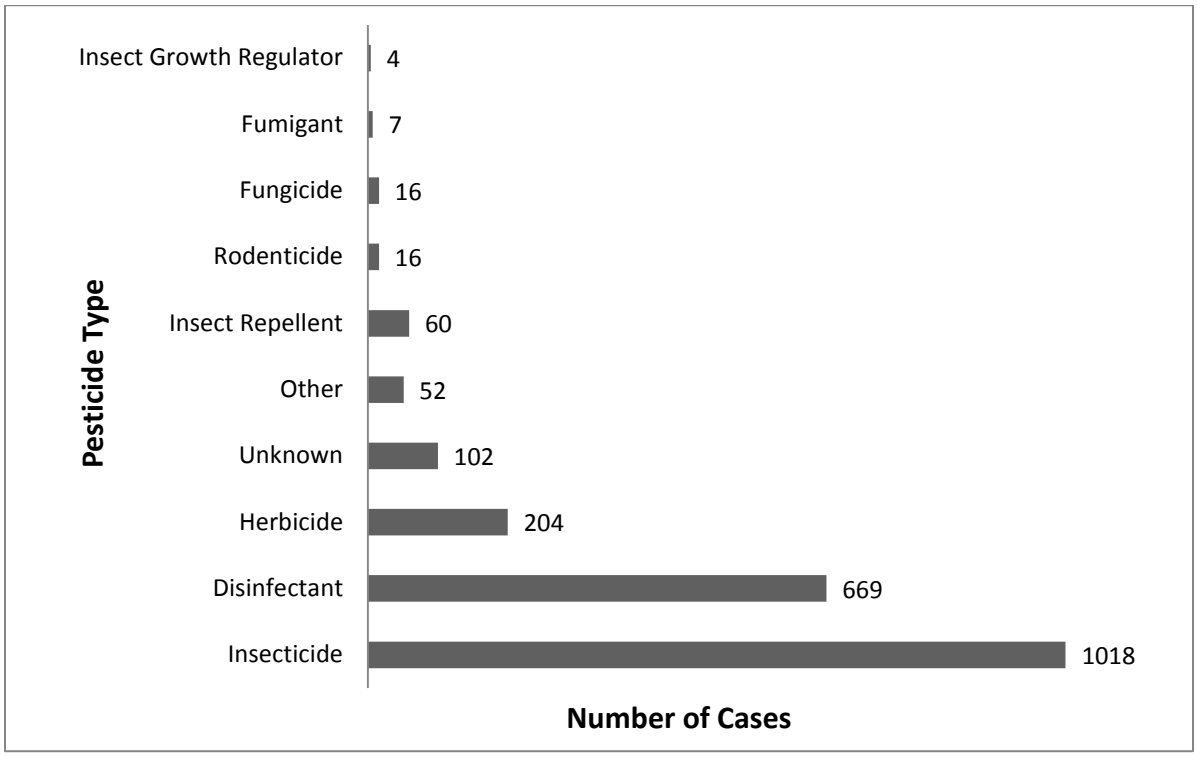
Figure 8. Pesticide Exposure Cases by Healthcare Utilization Type, 2006-2014.



Pesticide Product Information: Figure 9 presents the distribution of pesticide active ingredients by type of pesticide: insecticide, herbicide, fungicide, etc. Commonly used insecticides include organophosphates and pyrethroids.

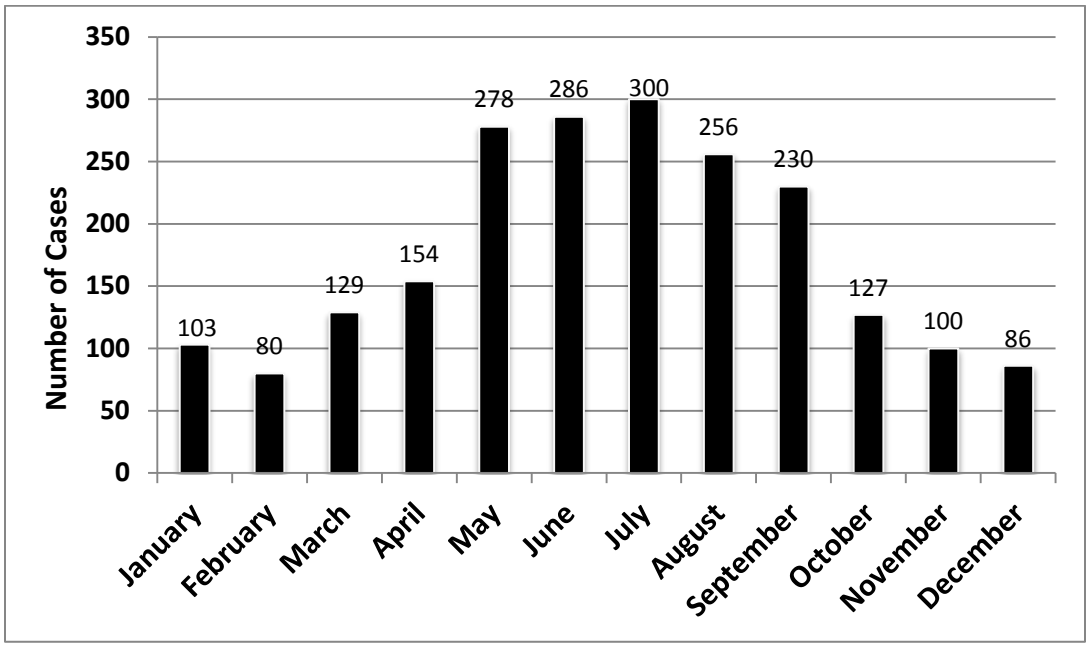
Each exposure may involve multiple products and each product may contain multiple active ingredients. For example, the herbicide Misty Repco Kill contains both bromacil and 2,4-D. Because each case exposure may involve multiple ingredients, the total of all pesticide type categories below are greater than the total number of cases.

Figure 9.Pesticide Exposure Cases by Pesticide Type, 2006-2014.



Season:

Figure 10.Pesticide Exposure Cases by Month, 2006-2014.



Site of Pesticide Event: The site of the pesticide event is the location where the pesticide application or event (e.g., airplane application, spill) occurred. Note that the location of the event may differ from the location where the person was exposed such as when someone is exposed via aerial drift. In some instances, the event site could not be determined.

Table 4. Pesticide Exposure Cases by Exposure Site, 2006-2014.

Site	N	Percent
Single Family Home	1755	82.43%
Unknown	70	3.29%
Other	52	2.44%
Farm	39	1.83%
Road/Rail	29	1.36%
Hospital	25	1.17%
Service Establishment	23	1.08%
Retail Establishment	19	0.89%
Multi-Unit Housing	14	0.66%
Office/Business (non-retail, non-industrial)	12	0.56%
Private Vehicle	11	0.52%
Mobile Home/Trailer	10	0.47%
Prison	10	0.47%
School	9	0.42%
Other Institution	8	0.38%
Industrial Facility	7	0.33%
Forest	6	0.28%
Other Manufacturing Facility	6	0.28%
Park	4	0.19%
Day Care Facility	3	0.14%
Right-of-way for Road, Rail, or Utility	3	0.14%
Residential Institution	2	0.09%
Livestock Production	2	0.09%
More Than One Site	2	0.09%
Nursery	2	0.09%
Public Transportation Vehicle	2	0.09%
Private Residence, Unknown	1	0.05%
Greenhouse	1	0.05%
Pesticide Manufacturing/Formulation Facility	1	0.05%
Golf Course	1	0.05%
Total	**2129**	**100%**

Target: The application target is the target surface that the applicator intended to treat, and may not necessarily be a target approved by the pesticide product label. "Application not involved" describes reported exposures in which an application was not being made at the time of exposure (e.g. a child is exposed to a product that is being stored in the home). Human refers to products used to control pests such as mosquitos and lice.

Table 5. Pesticide Exposure Cases by Target, 2006-2014.

Target	Total	Percent
Building (Interior or Exterior)	875	41.1%
Application not involved	302	14.2%
Unknown	283	13.3%
Swimming pool	148	7.0%
Landscape (lawn/flower beds)	156	7.3%
Human	117	5.5%
Other	75	3.5%
Crops	71	3.3%
Animal	63	3.0%
Community application (ex. mosquito control)	39	1.8%
Total	**2129**	**100%**

Contributing Factors:

Table 6. Pesticide Exposure Cases by Contributing Factor, 2009-2014*.

Factor	Total	Percent
Spill/Splash of Liquid or Dust	169	14.6%
Peoples In Treated Area During Application	166	14.3%
Pesticide Stored in Reach of Child or Other Improper Storage	156	13.4%
No Label Violation Identified but Person Still Exposed/ill	147	12.7%
Label Violations NOS	99	8.5%
Early Re-Entry	68	5.9%
Excessive Application of Pesticide	63	5.4%
Drift	60	5.2%
Unknown	54	4.7%
Mixing of Incompatible Products	42	3.6%
Decontamination Not Adequate or Timely	37	3.2%
Intentional Harm	25	2.2%
Application Equipment Failure	20	1.7%
Required Gloves Not Worn or Inadequate	15	1.3%
Applicator Not Properly Trained or Supervised	13	1.1%
Inadequate Ventilation Before Re-Entry	11	0.9%
Required Eye Protection Not Worn or Inadequate	5	0.4%
Other Required PPE Not Worn or Inadequate	4	0.3%
Required Respirator Not Worn or Inadequate	3	0.3%
Illegal Pesticide Used/Illegal Dumping of Pesticide	2	0.2%
Notification/Posting Lacking or Ineffective	1	0.1%
	1160	**100.0%**

*Note: Coding for Contributing Factors began in 2009 so table only includes records 2009-2014.

Circumstance of Exposure: Cases are classified based on the circumstance or manner in which the reported pesticide exposure occurred. Some involved more than one mode of exposure, thus for these events each circumstance is counted independently. For example, someone could be exposed via drift of a pesticide and contact with a treated surface.

Definitions of circumstance of exposure categories:

Targeted: Individual exposed to an application of a pesticide material released at the target site, and not carried from the target site by air.

Other: Type of exposure does not fit any of the defined categories.

Indoor Air: Individual exposed via indoor air contamination (residential, commercial, greenhouse).

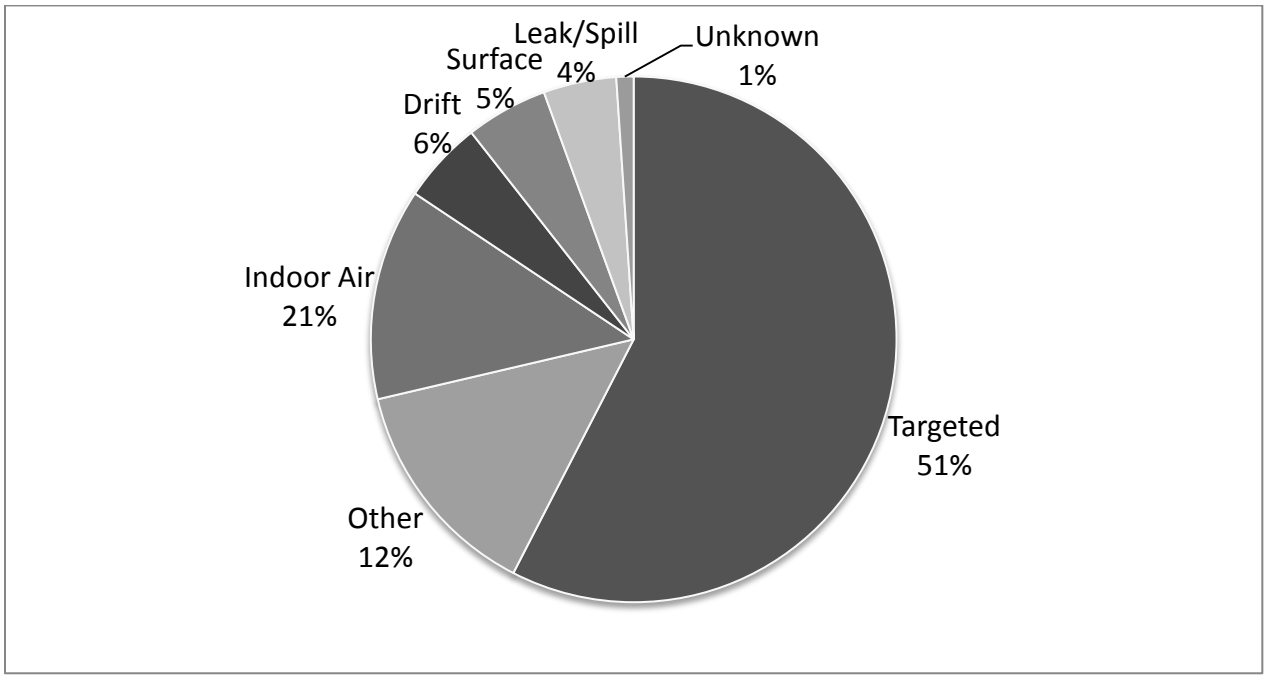
Drift: Individual exposed to pesticide spray, mist or fumes carried from the target site by air.

Surface: Individual exposed by contact with pesticide residues on a treated surface (plant material, carpets, treated animal) or entry into an outdoor treated area.

Leak/Spill: Individual exposed to a leak or spill of a pesticide material from any cause.

Unknown: Circumstance of exposure is unknown.

Figure 11.Pesticide Exposure Cases by Circumstance of Exposure, 2006-2014.*



*More than one circumstance of exposure may be associated with a case.

Equipment Used for Application: This variable refers to the type of equipment or application method used in the event. Equipment used is recorded regardless of whether it was used by the exposed individual or another individual who performed the pesticide application.

Definitions of equipment categories:

Manual placement: e.g. gopher bomb, bait station, pellets, hand toss of briquette, placement of fumigant pellet packs; this also reflects circumstances where a pesticide is poured directly onto a target surface from a container.

Pressurized can: Pesticides that are combined with an inert compressed gas propellant in a disposable or refillable self-dispensing container. This container may release the pesticide as a spray, mist, or fog. Spray line, hand held: Hose end sprayers, hand held lines attached to powered spray tanks.

Total release fogger or aerosol bomb: Aerosol foggers or bombs are single use disposable units designed to completely empty their contents in a single use.

Handheld granular or dust applicator: Squeeze bulb, bellows, tube, shaker, sliding tube, or fan powered by a hand crank.

Aerial application equipment: Application by a fixed-wing plane or helicopter.

Trigger pump, push-pull, or compressed air hand sprayer: Handheld units used for spot spraying.

Aerosol generator or fogger (thermal or cold): Equipment designed to disperse pesticide as small airborne droplets into confined spaces such as greenhouses and warehouses or for outdoor control of mosquitoes and other public health or nuisance insects.

Low-pressure ground sprayer not otherwise specified: Sprayers attached to or pulled by tractor or ATV.

Manual placement: Circumstances where pesticide is poured directly onto a target surface from a container (e.g. gopher bomb, bait station pellets, hand toss of briquette, placement of fumigant pellet packs).

Sprayers (backpack): This includes both powered and manual backpack spray units.

Chemigation: Application through irrigation system.

Dip tank or tray: Dipping of animals, produce, bulbs, plant material, etc.

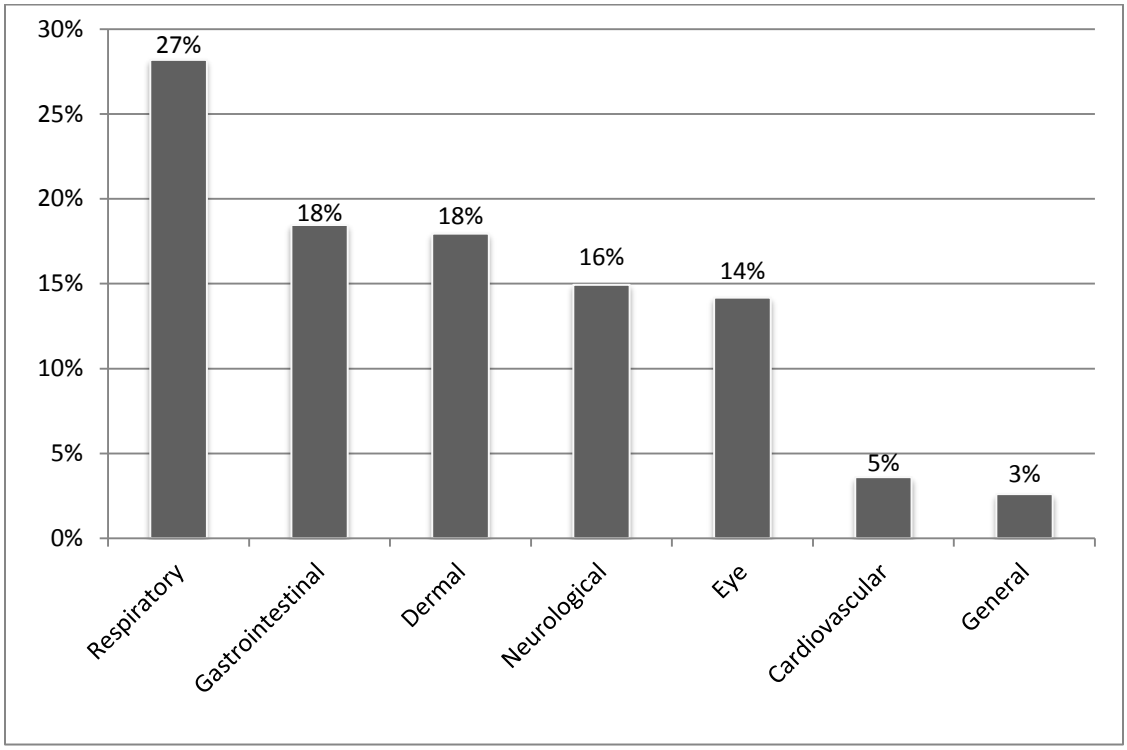
Table 7. Pesticide Exposure Cases by Equipment Used in Application, 2006-2014.

Equipment	N	Percent
Manual Placement	767	36.03%
Pressurized Can	495	23.25%
Spray Line, Hand Held	227	10.66%
Total Release Fogger or Aerosol Bomb*	147	6.90%
Trigger Pump, Push-Pull, or Compressed Air Hand Sprayer	108	5.07%
Unknown	87	4.09%
Not Applicable	81	3.80%
Handheld Granular or Dust Applicator	72	3.38%
Aerial Application Equipment	71	3.33%
Low-Pressure Ground Sprayer Not Otherwise Specified	24	1.13%
Aerosol Generator or Fogger	24	1.13%
Other	10	0.47%
Sprayer (Backpack)	8	0.38%
Dip Tank or Tray	3	0.15%
Chemigation	2	0.09%
More Than One Type of Application Equipment Used	2	0.09%
Air blast sprayer	1	0.05%
Total	**2129**	**100%**

*Coding for Total Release Foggers/Aerosol Bombs began in 2009. Prior to that time, these products were coded as Pressurized Cans. Based on data from 2009-2011, approximately 40% of Pressurized Cans are Total Release Foggers.

Signs and Symptoms: Reported health effects were categorized according to organ system. Cases reported, by definition, a minimum of 2 symptoms.

Figure 12.Percent of Reported Symptoms by Organ System, 2006-2014.*



*During the study period, only 5 (<1%) "Renal/Genitourinary" symptoms were reported, thus it is not visible in the figure.

SUMMARY

Over the course of 9 years (2006-2014), 2247 reported pesticide exposure cases were investigated by SEET. Of these cases, 2129 had health effects associated with pesticide exposure. The report provides summary information of the 2129 cases. The median number of cases per year was 248, ranging from 136 (2011) to 421 (2007). The Program discontinued tracking non-occupational disinfectant exposures in 2011 which resulted in fewer cases for years 2011-2014. Madison, Richland and East Carroll Parishes, in the northeastern part of the state (LDHH Region 8) had the highest average annual rates of pesticide exposure cases; all parishes statewide had at least 1 reported exposure.

Overall there were more male cases (51%) than female cases (49%). Approximately thirty-four percent (34%) of cases (N=716) were between 20 and 39 years old. Three hundred and forty-seven cases (16%) were less than ten years old. Three hundred and three cases (14.1%) were working when the reported pesticide exposure occurred. Eighty-nine percent of cases had mild health effects (low severity). There were no deaths. The most common type of symptom reported was respiratory (27%), followed by gastrointestinal (18%).

Approximately sixty-six percent of the reported exposures (N=1403) occurred during spring or summer months. The circumstance of exposure for the majority of cases was targeted exposure (51%, N=1085). The target surface for approximately 41% (875 cases) of all applications was the interior or exterior of a building. The most common site of an exposure event was a single family home (82%, or 1755 cases). Applications via manual placement accounted for 36%, or 767, of the-cases. The most common pesticide types involved in reported incidents were insecticide (47%, 1018 cases) followed by disinfectants (31%, 669 cases).

For more information on LDHH's Pesticide Surveillance Program, visit the website at http://dhh.louisiana.gov/index.cfm/page/836, call 1-888-293-7020 (toll free), or send an email to oph.seetweb@la.gov.