

**Acute Occupational
Pesticide Poisoning in
Texas
2006-2015**

April 2019

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Executive Summary

Acute occupational pesticide poisoning (AOPP) is reportable to the Texas Department of State Health Services under the Texas Administrative Code, Title 25, Rule 99.1. This report summarizes AOPP in Texas from 2006-2015.

A total 1,971 AOPP cases were reported in Texas from 2006-2015. The 10-year rate of AOPP was 1.75 cases per 100,000 full-time equivalent workers in Texas. Men accounted for 60% (1,189) AOPP cases. Non-Hispanic, white workers had the highest number of cases (674, 34%) followed by Hispanic workers (488, 25%). Workers aged 25-34 years had the highest number of AOPP (568, 29%). However, the rate of AOPP was highest in younger workers in 16-17 age group with 10.1 cases per 100,000 full-time equivalent workers.

The agriculture industry sector in Texas had the highest rate of AOPP from 2006-2015 with 3.97 cases per 100,000 full-time equivalent workers, followed by transportation, warehousing and utilities industries with a rate of 1.58 cases per 100,000 full-time equivalent workers. Regardless of industry sector, workers in service occupations had the highest rate of AOPP with 2.61 cases per 100,000 full-time equivalent workers.

Over half (1,008, 51%) of AOPP cases involved exposures to disinfectants, i.e. antimicrobial pesticides used to kill or control the growth of harmful bacteria, viruses, fungi or other microorganism on non-living objects and surfaces. About 52% (1,023) AOPP cases resulting from inhaling fumes, vapors or dust of pesticide chemical.

Seventeen cases resulted in high severity of injury and illness, which required professional medical treatment and involved more than 5 days away from work or normal activities. Only one case resulted in death from 2006-2015, which was reported in 2011. The majority of cases (1,327, 67%) sought advice from the poison control center to treat an AOPP.

AOPP is a public health concern in Texas. The findings from this report can be used to prioritize and plan interventions to prevent AOPP among high-risk worker populations in Texas.

1. Introduction

Pesticides are substances or mixture of substances used to kill, repel, control or prevent pests, such as insects, rodents, fungi, weeds and microorganisms. Pesticides include insecticides, insect repellants, herbicides, fungicides, weed-killers, wood treatment products, fumigants and disinfectants. Pesticides are widely used, but no pesticide use is perfectly safe. Individuals may get exposed to pesticides while handling or using it, which can result in short and long-term health effects. DSHS needs to watch for patterns in pesticide exposure and its health effects to control and prevent it.

Acute occupational pesticide poisoning (AOPP) is a reportable condition in Texas. The Texas Administrative Code, Title 25, Rule 99.1 implements the Texas Occupational Condition Reporting Act, Health and Safety Code, Chapter 84, and requires reporting of AOPP cases to the Texas Department of State Health Services (DSHS). The DSHS Occupational Health Surveillance (OHS) program receives funds from a cooperative agreement with the Center for Disease Prevention and Control (CDC) National Institute for Occupational Safety and Health (NIOSH) for AOPP surveillance and prevention activities.

The OHS program receives AOPP reports from multiple sources, and performs follow-up investigations on all reported cases. Most cases are reported through the Texas Poison Control Network (TPCN), followed by the Texas Department of Agriculture (TDA), physicians, and laboratories.

The OHS program conducts follow-up investigations on all reported cases in order to confirm that the case is both occupation related and involves acute pesticide poisoning. A case is classified as occupational if the exposure occurs at work and the evaluation criteria to ascertain work-relatedness are met. A case is considered related to acute pesticide poisoning depending on the type of pesticide product and symptoms involving the skin, eyes, or other body systems (respiratory, gastrointestinal, allergic, and neurologic).

DSHS also conducts outreach and educational activities targeting both employers and workers in efforts to prevent pesticide exposures. The analysis of reported AOPP data is essential in planning outreach and educational efforts. This report summarizes characteristics of AOPP cases in Texas that occurred from 2006 to 2015.

2. Methods

Data Sources

The OHS program extracted data for AOPP cases in Texas during 2006-2015 from OHS surveillance database.

The OHS program obtained population estimates on full time equivalent workers (FTE) and denominators for rate calculations from the U.S. Bureau of Labor Statistics' Current Population Survey (CPS) using the National Institute for Occupational Safety and Health (NIOSH) Employed Labor Force (ELF) Query System¹.

Analyses

The OHS program conducted analyses using statistical software SAS 9.4 (SAS Institute, Cary NC).

3. Findings

AOPP in Texas Over Time

From 2006 to 2015, there were 1,971 acute occupational pesticide poisoning cases in Texas, with an average of 197 cases per year (Figure 1). The 10-year rate of AOPP was 1.7 cases per 100,000 full time equivalent (FTE) workers in Texas from 2006 to 2015 (Figure 2).

Figure 1: Annual number of AOPP: Texas, 2006-2015 (n=1,971)

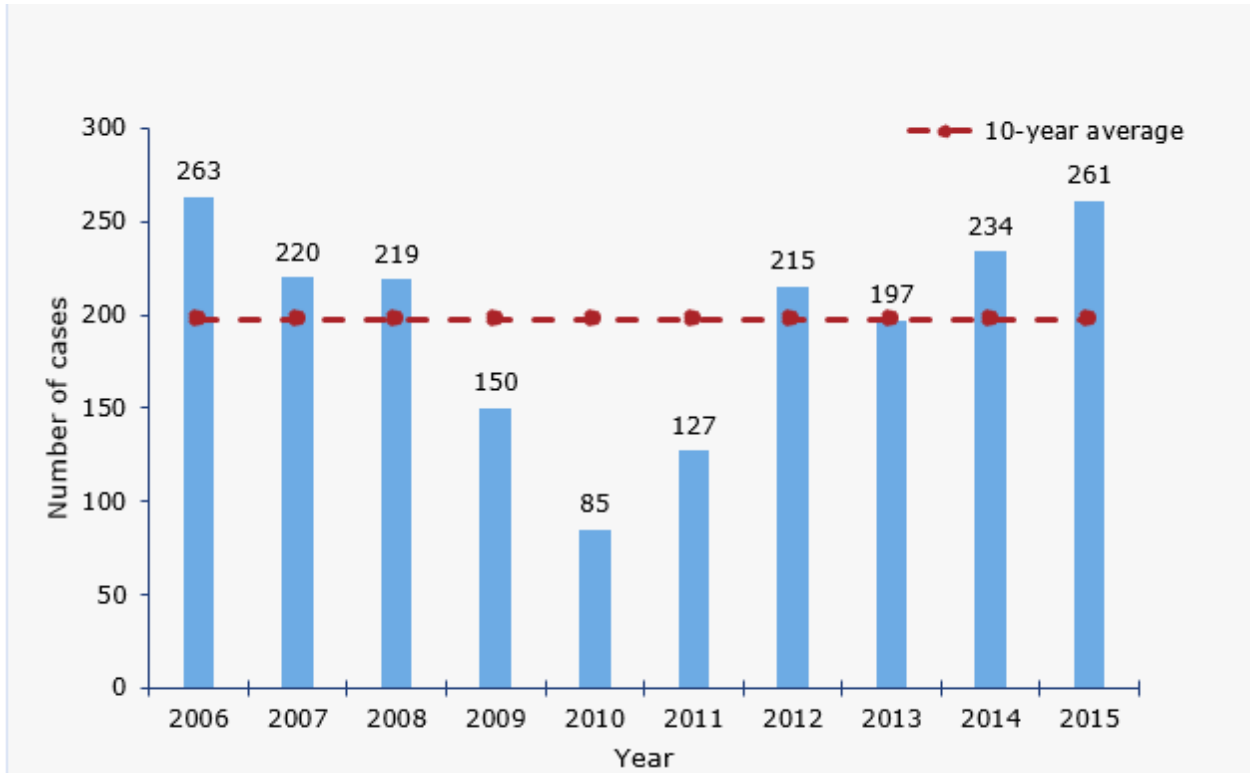
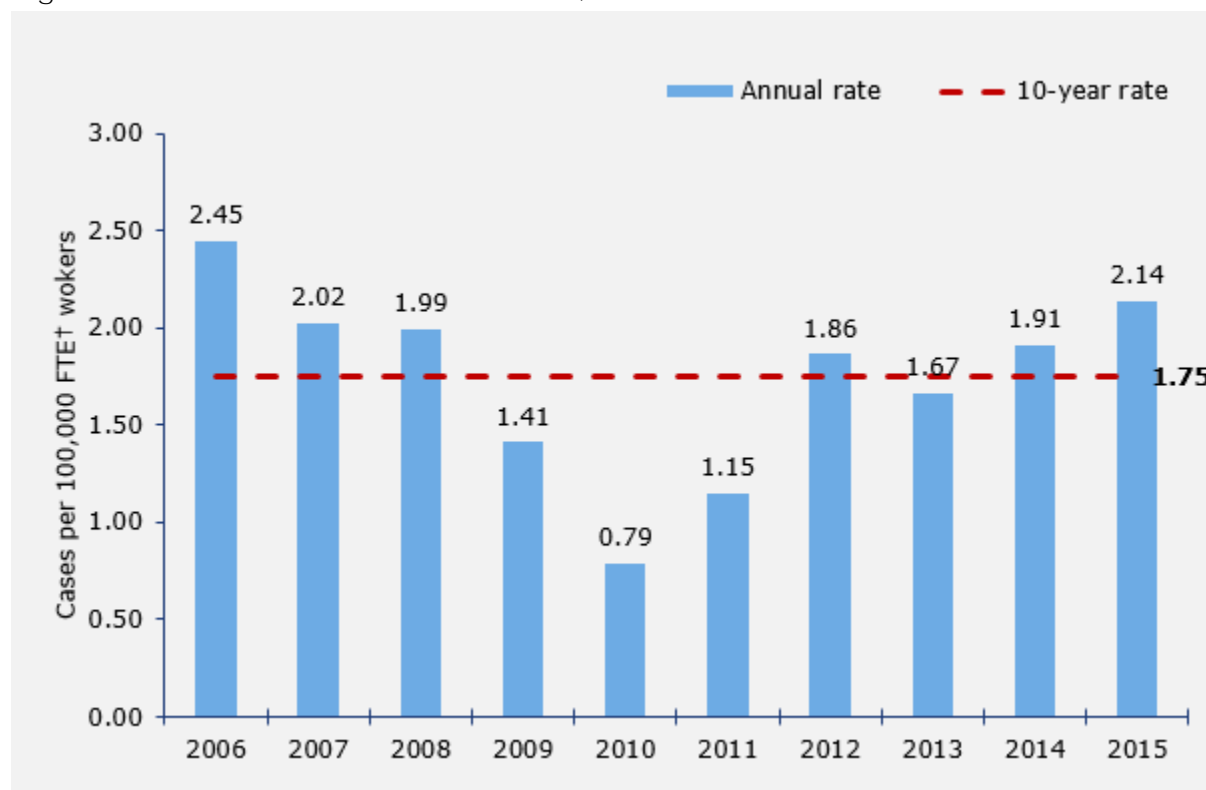


Figure 2: Annual rate of AOPP*: Texas, 2006-2015



$$* \text{Annual rate of AOPP} = \left(\frac{\text{Number of AOPP in Texas during 2006-2015}}{\text{Number of full time equivalent workers in Texas during 2006-2015}} \right) \times 100,000$$

†FTE= Full time equivalent

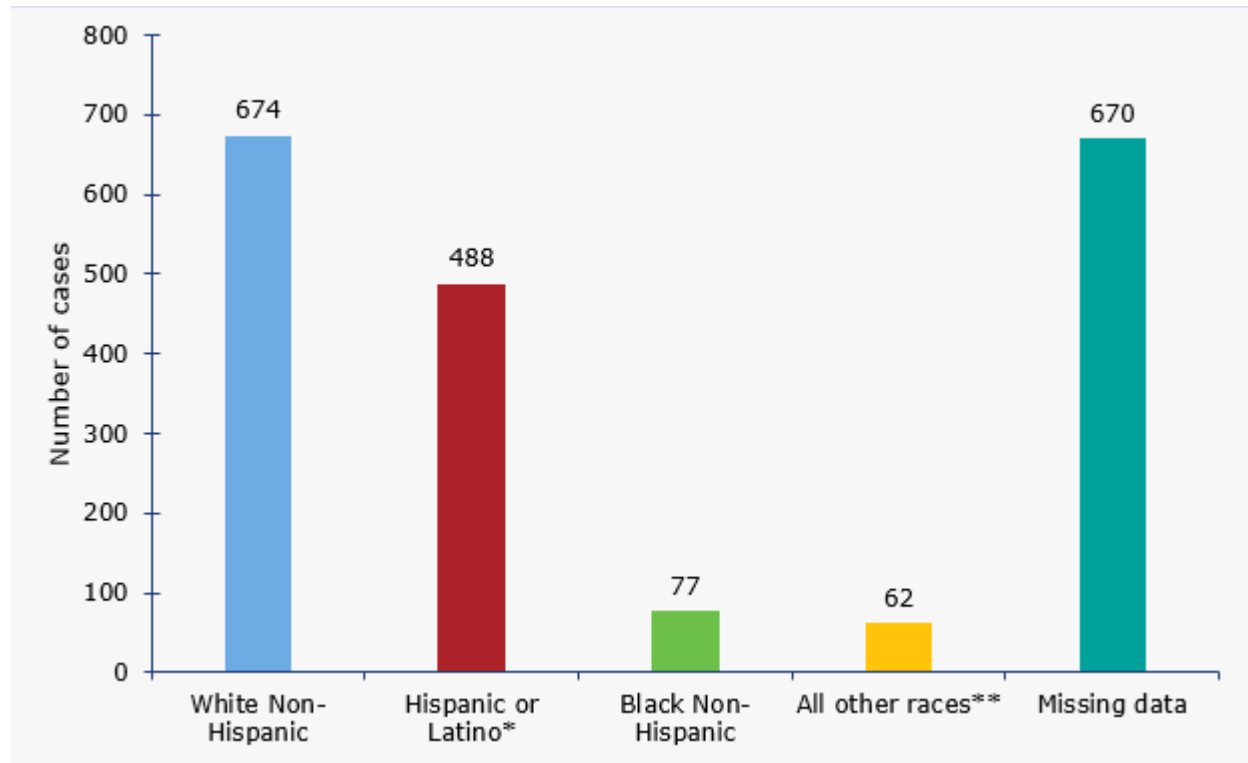
AOPP in Texas by Worker Characteristics

Of the 1,971 cases of AOPP reported from 2006 to 2015, about 60% (n=1,189) were men, 40% (n=768) were women and 7% (n=14) had missing data on gender.

Non-Hispanic white workers accounted for the highest number of all AOPP cases (n=674, 34%), followed by Hispanic or Latino workers of any race (n=488, 25%) (Figure 3). The OHS program excluded 670 (34%) cases from rate calculations due to missing race and ethnicity information. See Figure 4 for rate of AOPP by race/ethnicity.

Workers 25 to 34 years old made up the highest number of cases (n=568, 29%), while workers 65 and older made up the lowest number of cases (n=47, 2%) (Figure 5). Since the population of workers was highest in 25-34 years old, the rate of AOPP was actually lower in this age group despite the highest number of cases. Workers 16-17 years old had the highest rate of AOPP, which shows a need to focus pesticide exposure prevention in younger workers (Figure 6).

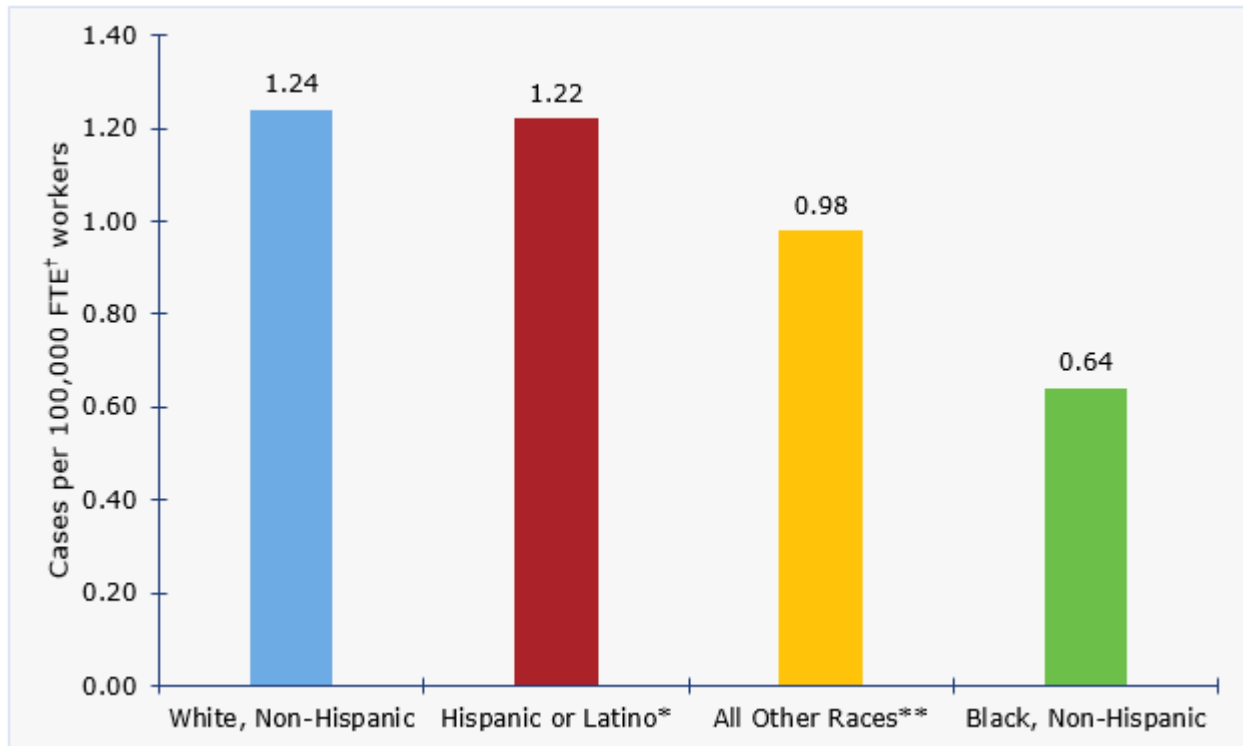
Figure 3: Number of AOPP by race/ethnicity: Texas, 2006-2015 (n=1,971)



* Persons identified as Hispanic or Latino may be of any race.

** All other races include American Indian, Hawaiian/Pacific Islander, Asian, multiple races, and other race categories.

Figure 4: Rate of AOPP by race/ethnicity: Texas, 2006-2015



* Persons identified as Hispanic or Latino may be of any race.

** All other races include American Indian, Hawaiian/Pacific Islander, Asian, Multiple races, and other race categories.

[†]FTE= Full time equivalent.

Note: There were 1,971 AOPP cases reported in Texas from 2006-2015. OHS program excluded 670 (34%) cases from rate calculations due to missing race and ethnicity information.

Figure 5: Number of AOPP by age group: Texas, 2006-2015 (n=1,971)

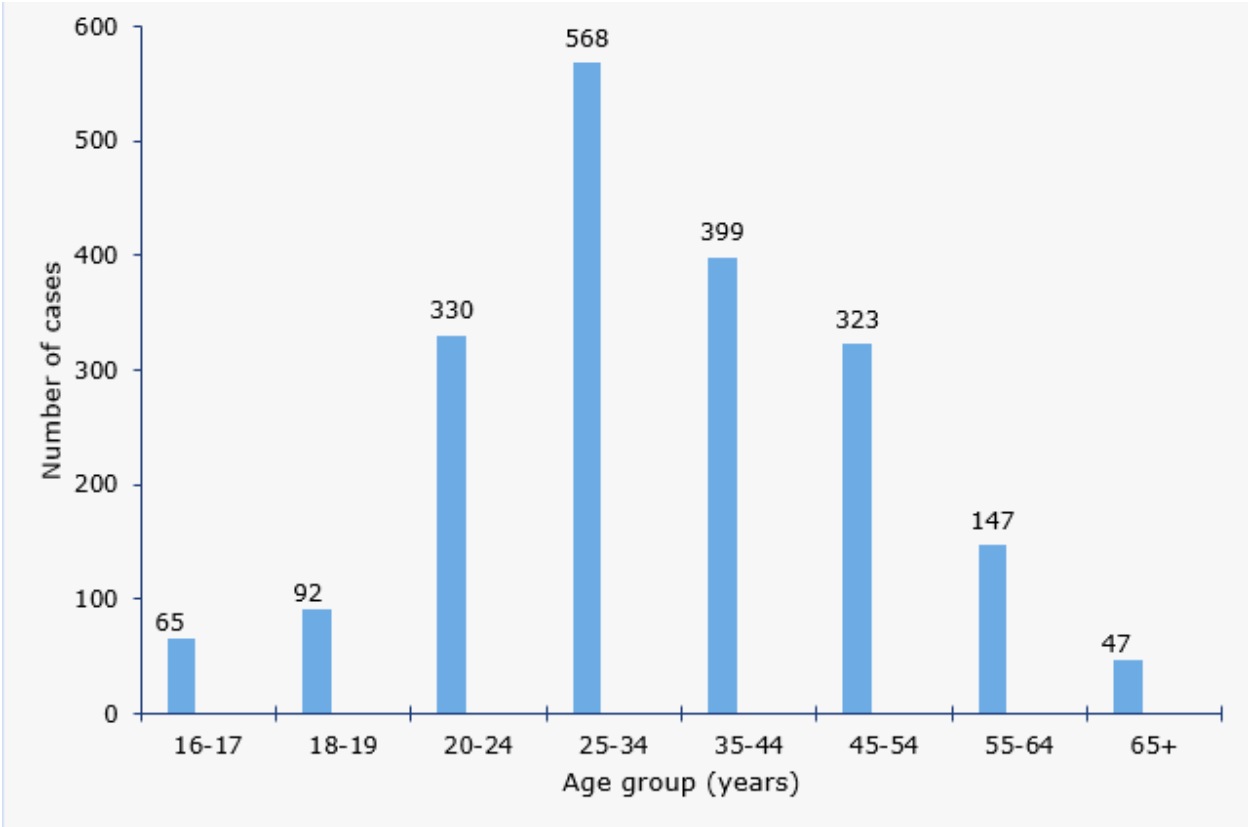
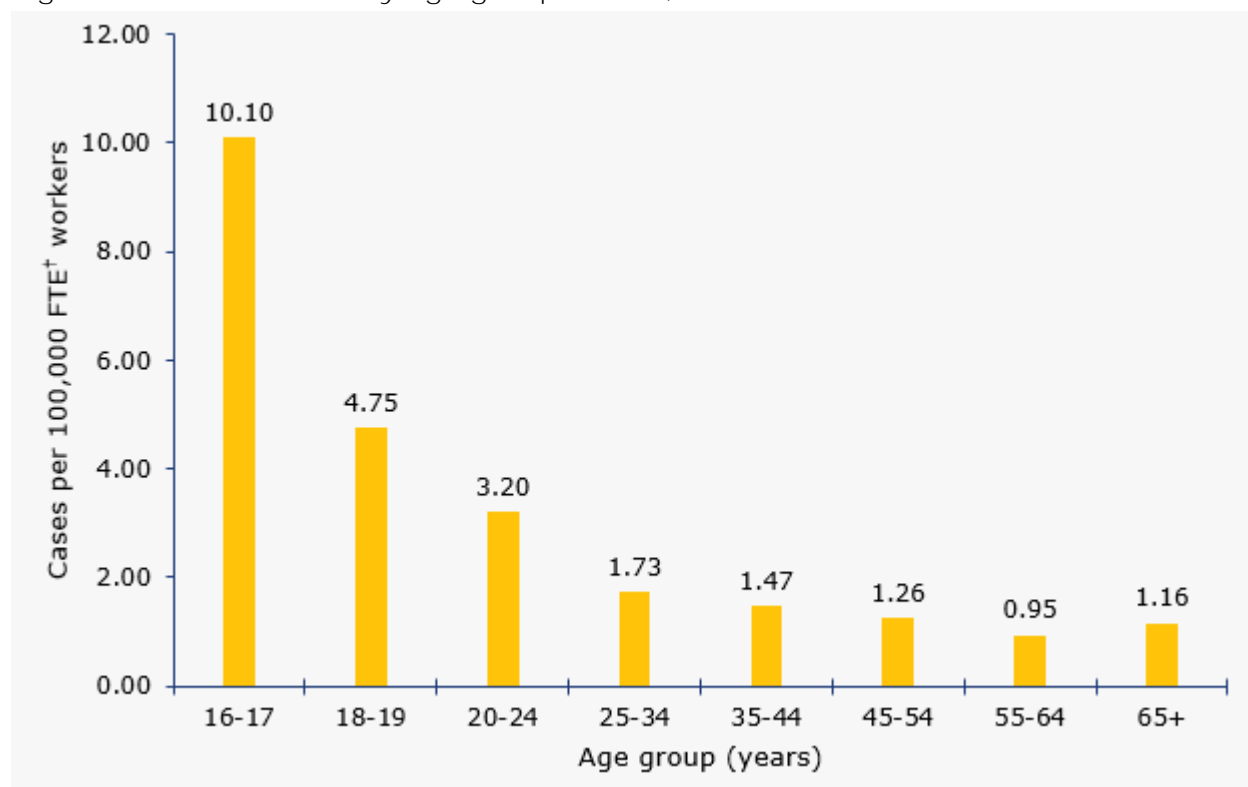


Figure 6: Rate of AOPP by age group: Texas, 2006-2015



†FTE= Full time equivalent.

AOPP by Industry Sector

Industry sectors were determined by following guidelines in NIOSH's Standardized Variables document², then categorized according to the U.S. Census 2002 Industry Codes³.

In Texas from 2006 to 2015, 23% (445) of all AOPP cases occurred in the services industry. Examples of service industries include accommodation and food services, arts, entertainment, and recreation, and educational services. The industry with the fewest cases was mining (n=13, 0.6%) (Figure 7).

The OHS program excluded 931 (47%) AOPP cases from rate calculations due to **lack of information on a person's industry**. The industry with the highest average annual rate of reported AOPP was agriculture, with 3.97 reported cases per 100,000 FTE workers (Figure 8). Examples of agriculture industries include crop production, forestry and logging, and animal production and aquaculture.

Figure 7: Number of AOPP by industry sector: Texas, 2006-2015 (n=1,971)

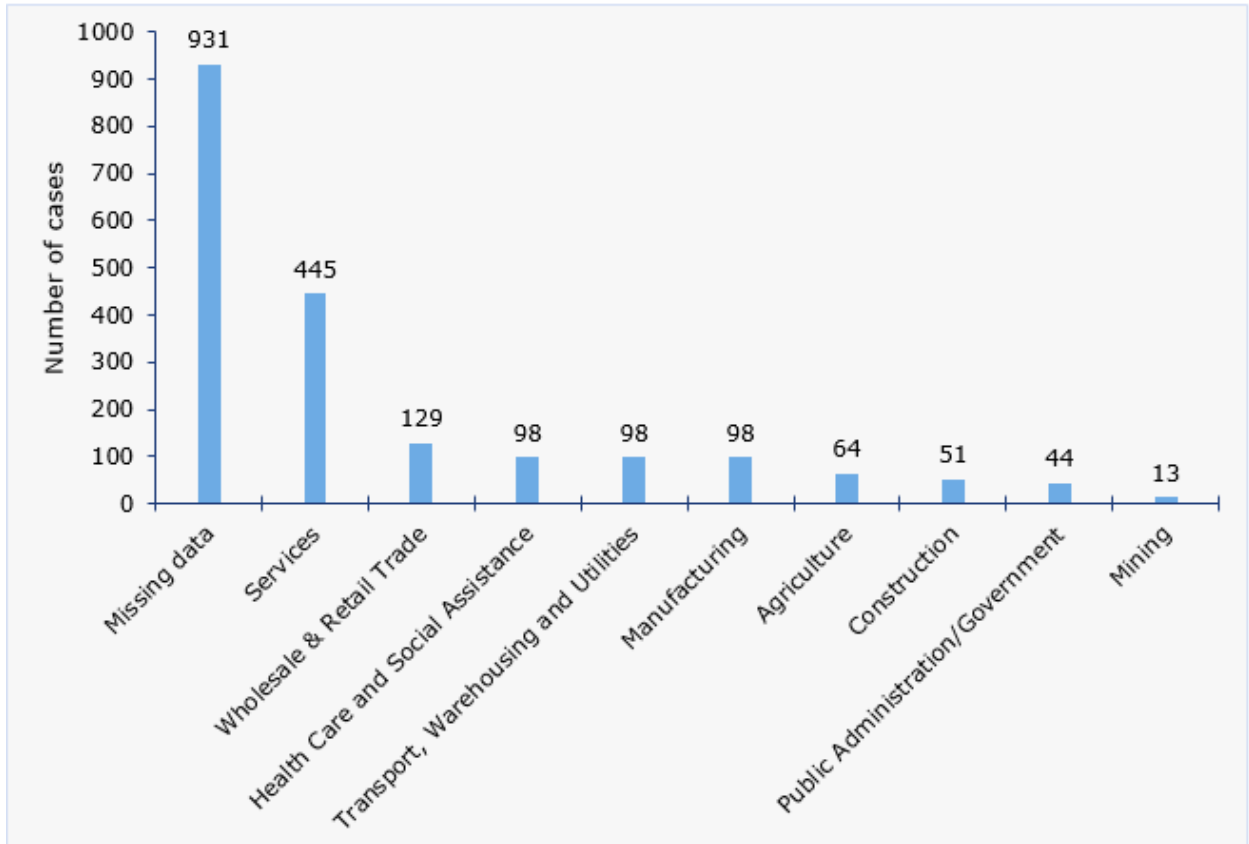
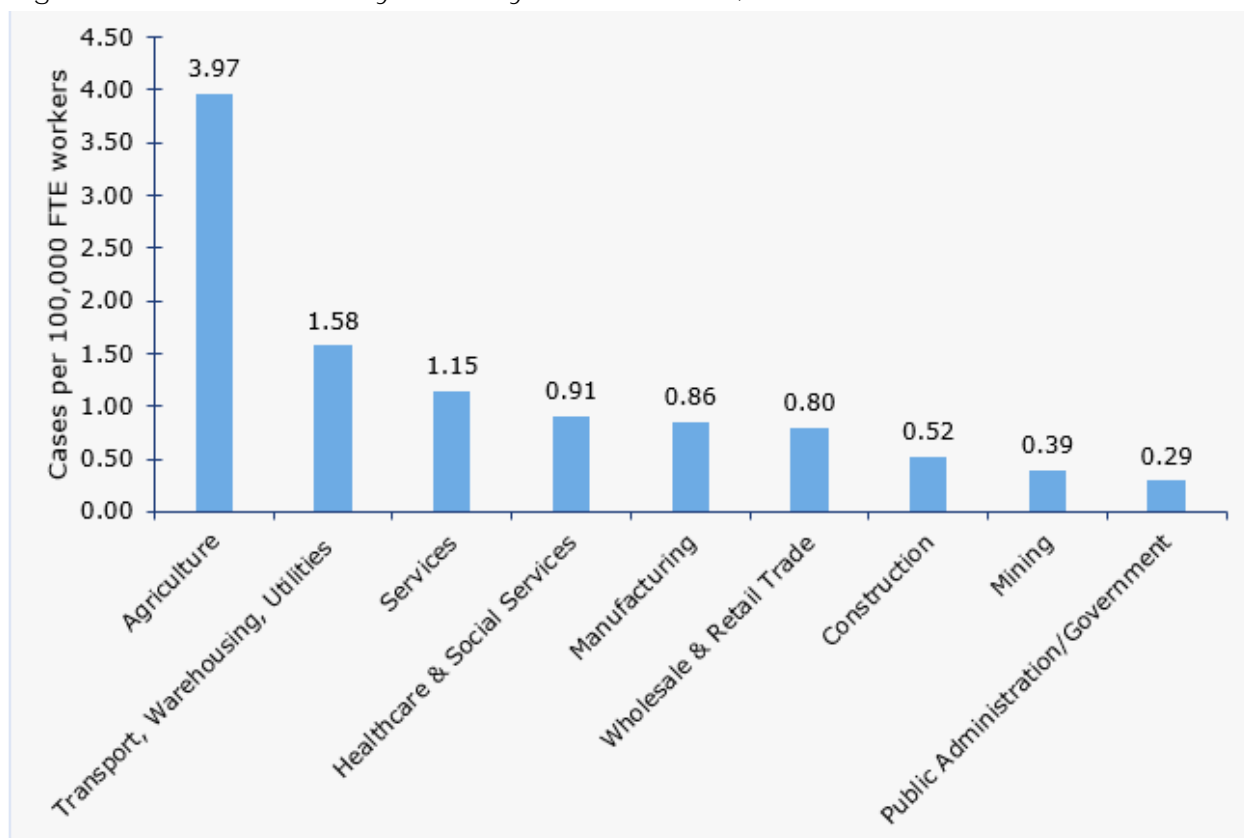


Figure 8: Rate of AOPP by industry sector: Texas, 2006-2015



†FTE= Full time equivalent.

Note: There were 1,971 AOPP cases reported in Texas from 2006-2015. OHS program excluded 931 (47%) cases from rate calculations due to missing industry information.

AOPP by Occupation Type

Occupational groups were determined by following guidelines in NIOSH's Standardized Variables document², then categorized according to the U.S. Census 2002 Occupation Codes³.

In Texas from 2006 to 2015, 23% (n=456) of AOPP cases occurred in service occupations (Figure 9). Examples of service occupations include healthcare support occupations (e.g. nurses, medical assistants, phlebotomists) or food preparation occupations (e.g. cooks, waiters, dishwashers).

The OHS program excluded 894 (45%) cases from rate calculations due to missing **data on a person's occupation**. See Figure 10 for AOPP rates by occupation group.

Figure 9: Number of AOPP by occupation group: Texas, 2006-2015 (n=1,971)

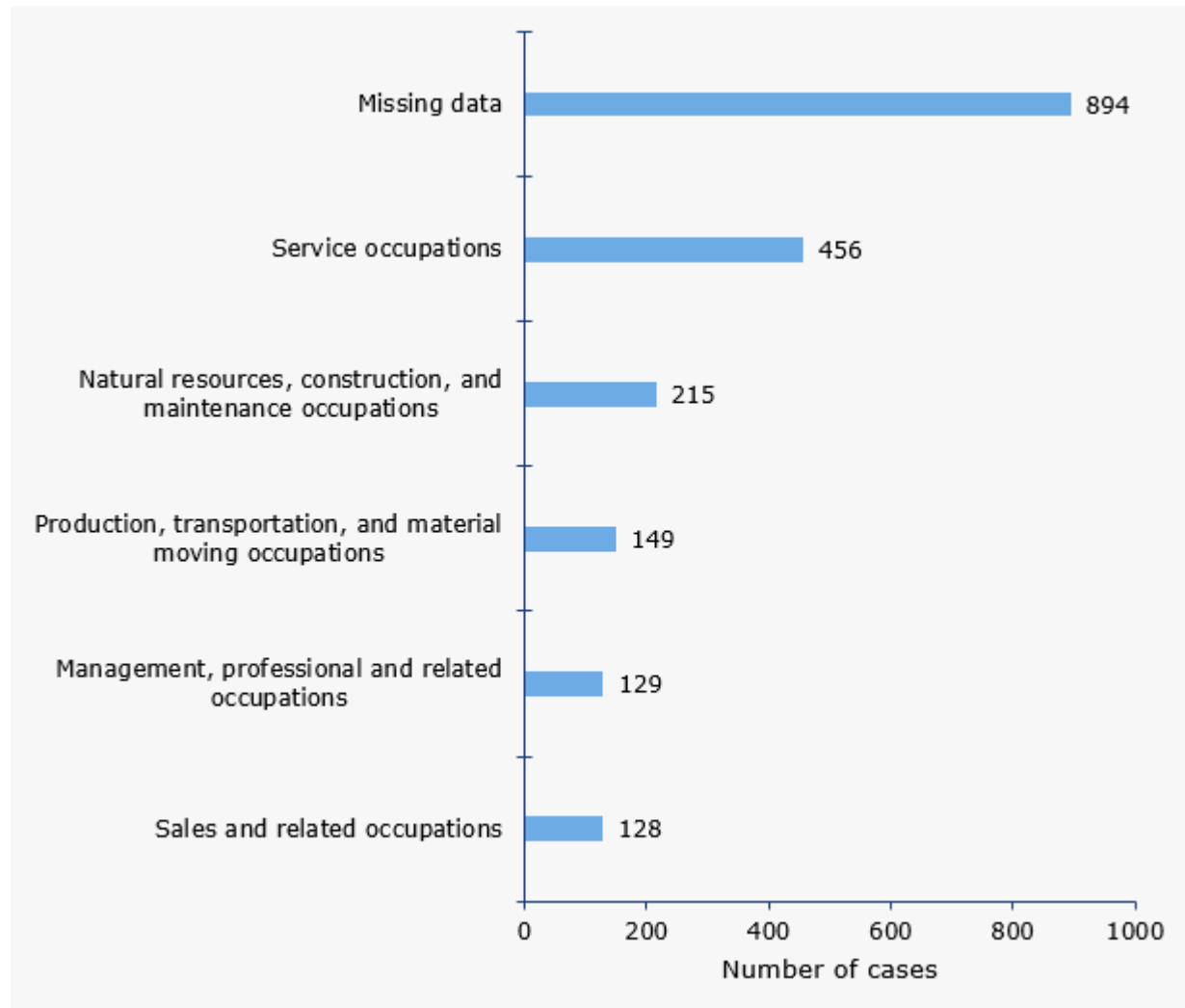
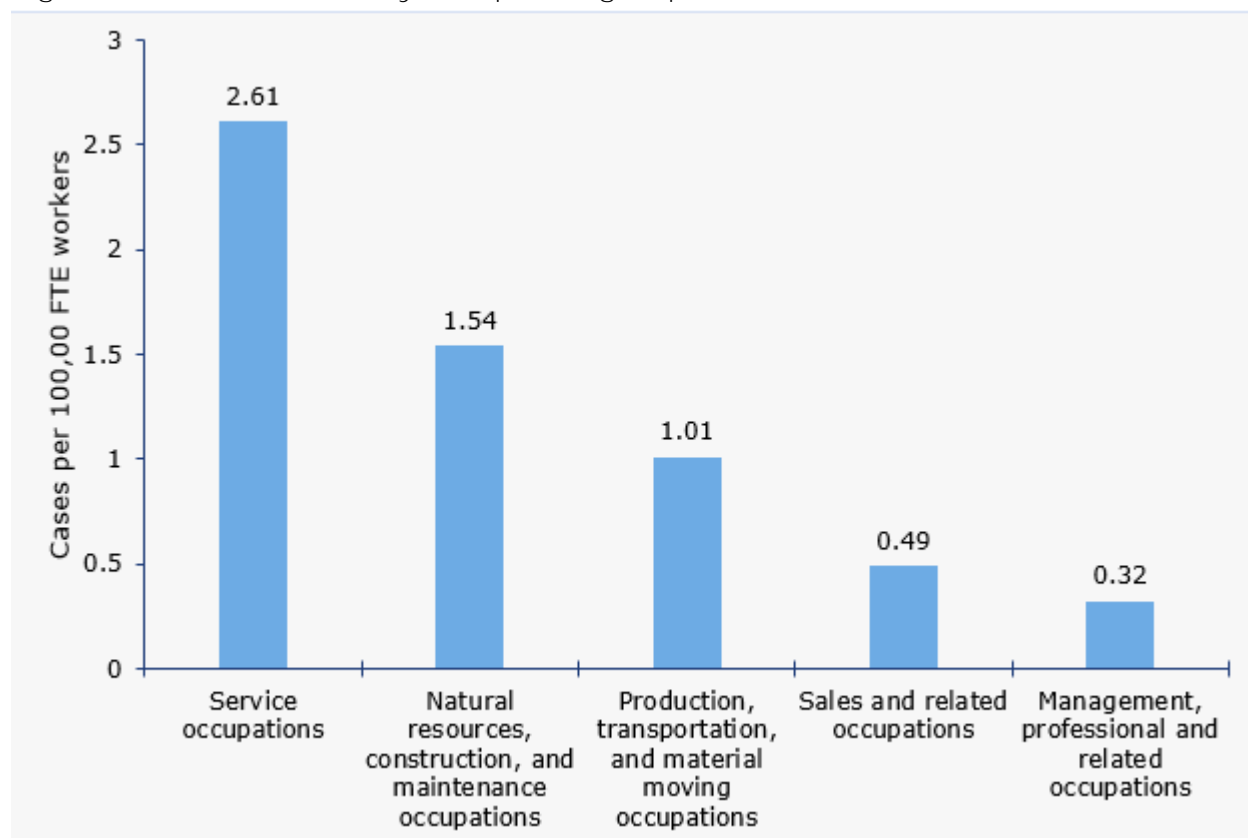


Figure 10: Rate of AOPP by occupation group: Texas, 2006-2015



†FTE= Full time equivalent.

Note: There were 1,971 AOPP cases reported in Texas from 2006-2015. OHS program excluded 894 (45%) cases from rate calculations due to missing occupation data.

AOPP by Product Type, Exposure Route, Exposure Site, and Contributing Factors

Product type, exposure route, exposure site, and contributing factor are variables defined by NIOSH's **Standardized Variables for State Surveillance of Pesticide-Related Illness and Injury**³. Product type is the type of pesticide product a person was exposed to; exposure route tells how a person was exposed to the chemical substance; exposure site is the location where the exposure took place, and contributing factors are factors that may have played a role in exposing a person to the chemical substance.

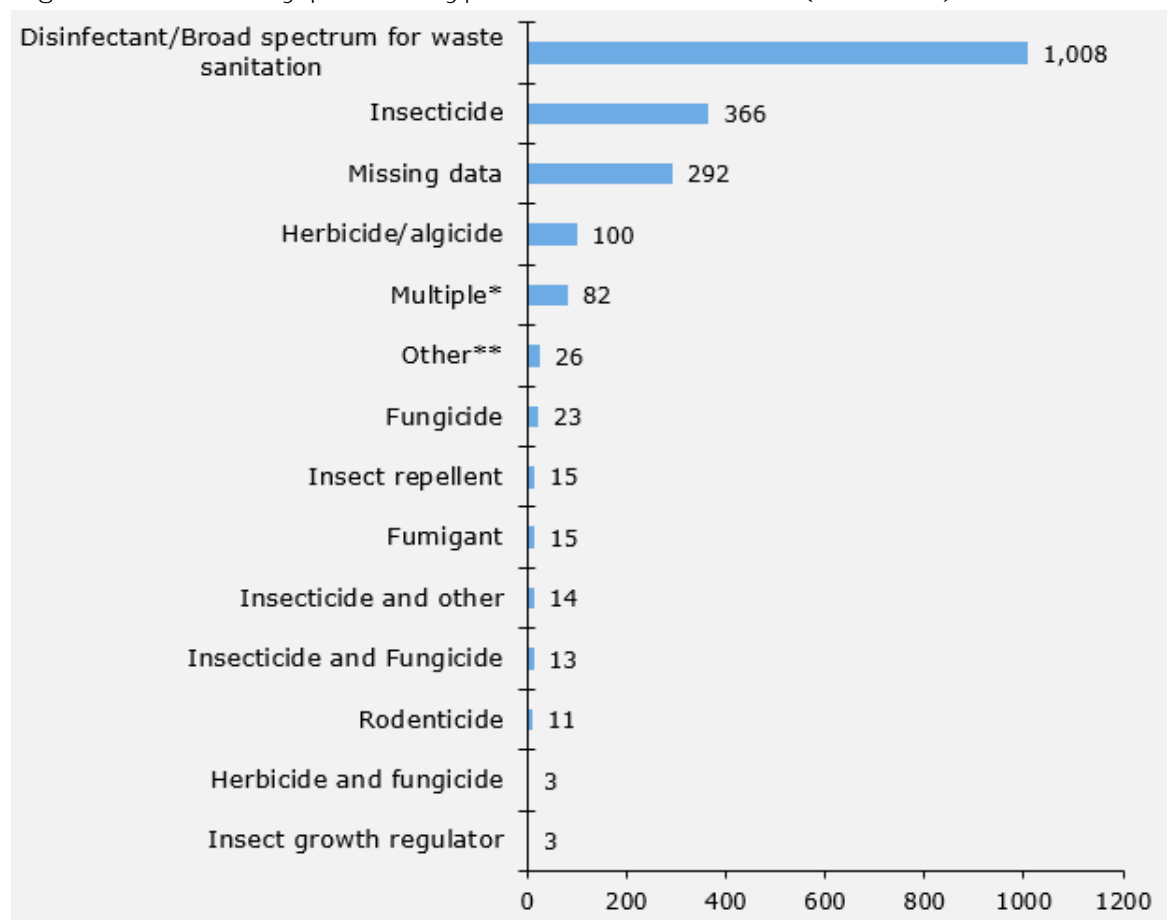
In Texas from 2006 to 2015, over half (n=1,008, 51%) of cases involved disinfectants. This was followed by insecticides (n=334, 17%) and then herbicides/algicides (n=100, 5%) (Figure 11).

Over half of exposures (n=1,023, 52%) resulted from breathing in fumes or dust of pesticide, or inhalation (Figure 12).

Non-manufacturing commercial facilities accounted for almost one-quarter (n=481, 24%) of the exposure sites (location where the exposure took place) for AOPP cases from 2006 to 2015 (Figure 13). Examples of non-manufacturing commercial facilities include retail establishments, offices/businesses (non-retail, non-industrial), and services establishments, such as hotels and health clubs.

The most frequently identified contributing factor among cases from 2006 to 2015 was spill or splash of liquid or dust (n=205, 10%). The OHS program could not determine the contributing factor for more than half of AOPP cases due to insufficient exposure or incident information (Figure 14).

Figure 11: AOPP by product type: Texas, 2006-2015 (n=1,971)



*Multiple includes products that fit in more than one product type category.

**Other includes biological controls or biopesticides (pesticides obtained from natural materials such as animals, plants, bacteria and certain minerals), plant growth regulators, antibiotics, etc.

Figure 12: AOPP by exposure route: Texas, 2006-2015 (n=1,971)

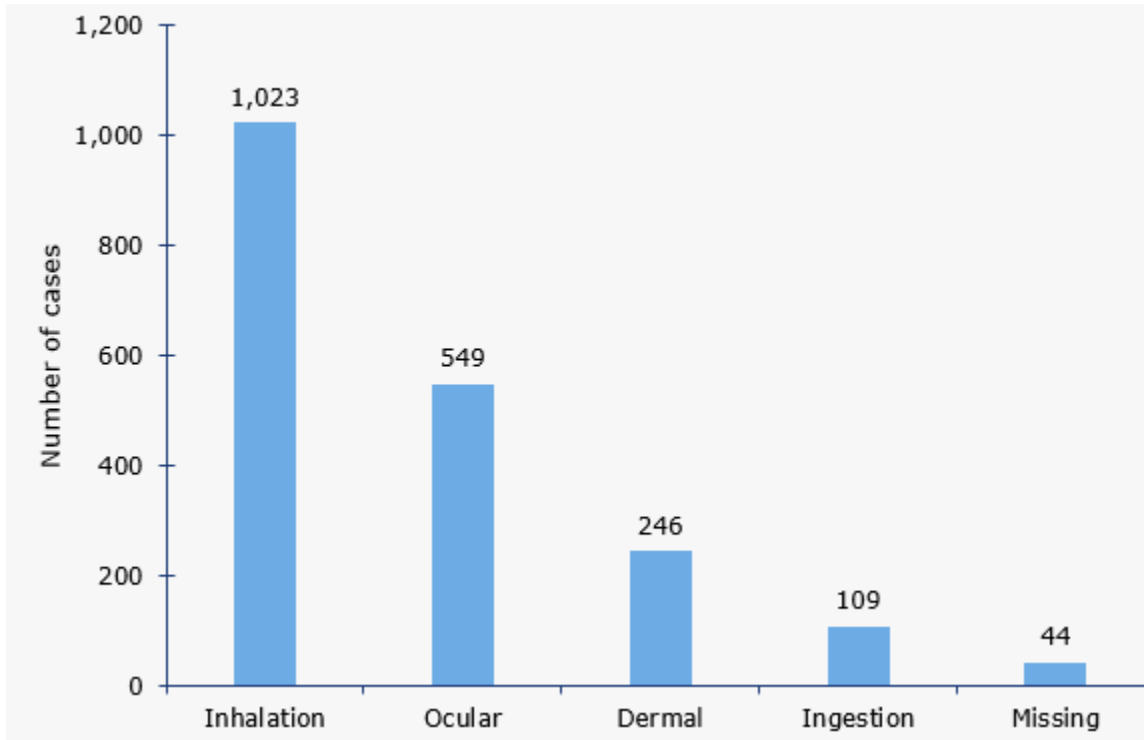
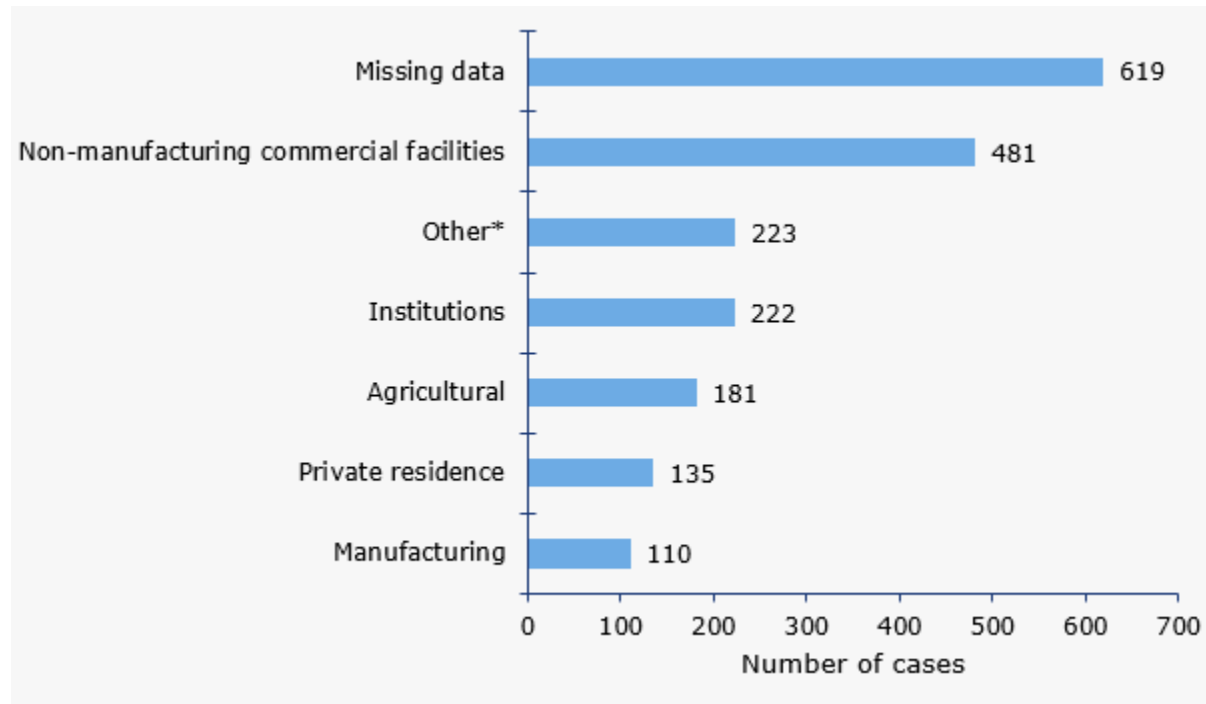
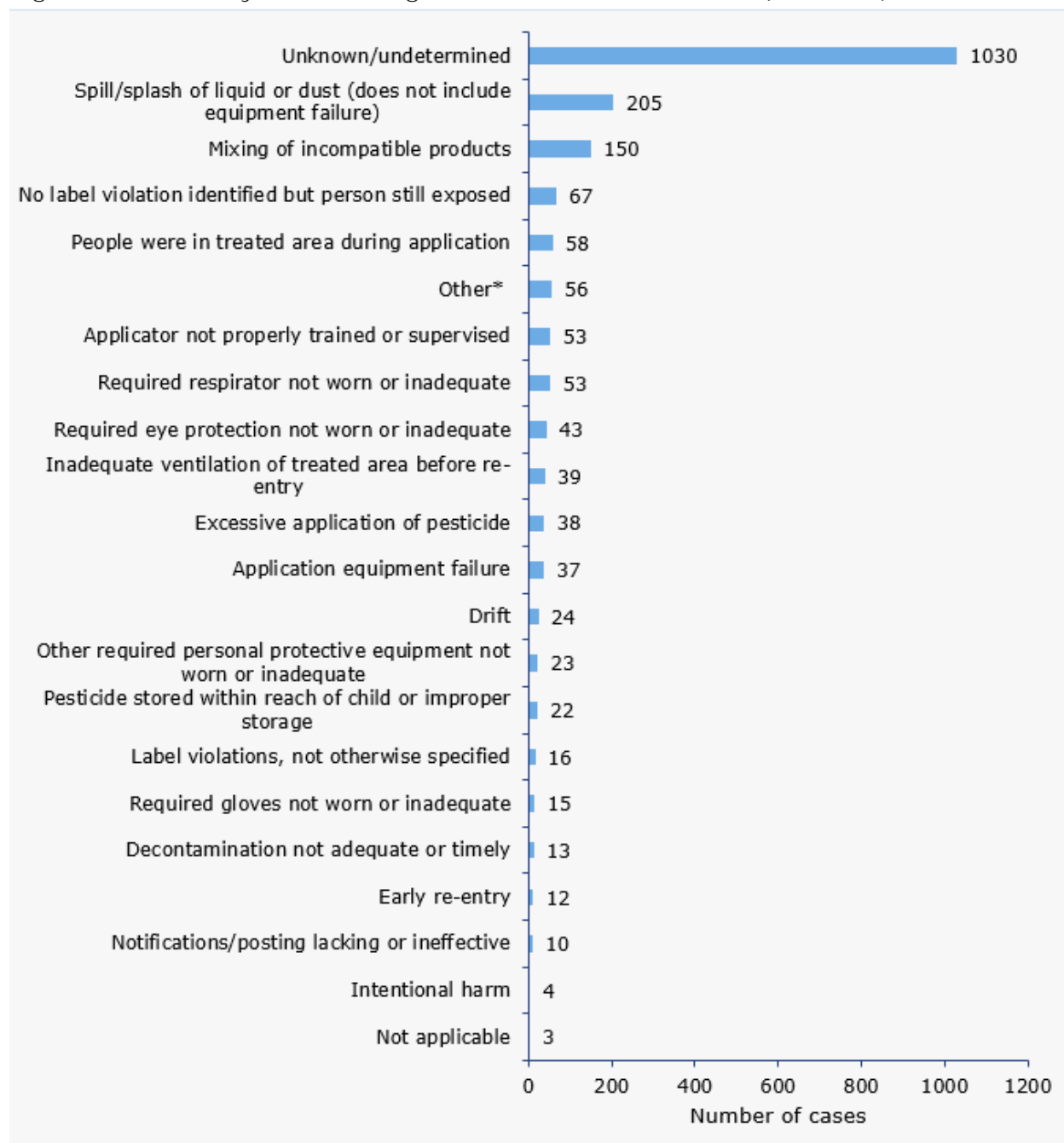


Figure 13: AOPP by exposure site: Texas, 2006-2015 (n=1,971)



* "Other" includes: road/rail, right-of-way for road, rail or utility, park, golf course, private vehicle, public transportation vehicle, cemetery, or emergency response vehicle.

Figure 14: AOPP by contributing factor: Texas, 2006-2015 (n=1,971)



*Other category includes situations that do not fit any other contributing factor categories listed above. Example situations in other category can include a chemical plant fire or explosion, contamination during a natural or man-made disaster, etc.

Note: There can be more than one contributing factor for an exposure, so counts for contributing factor categories may not add up to the total.

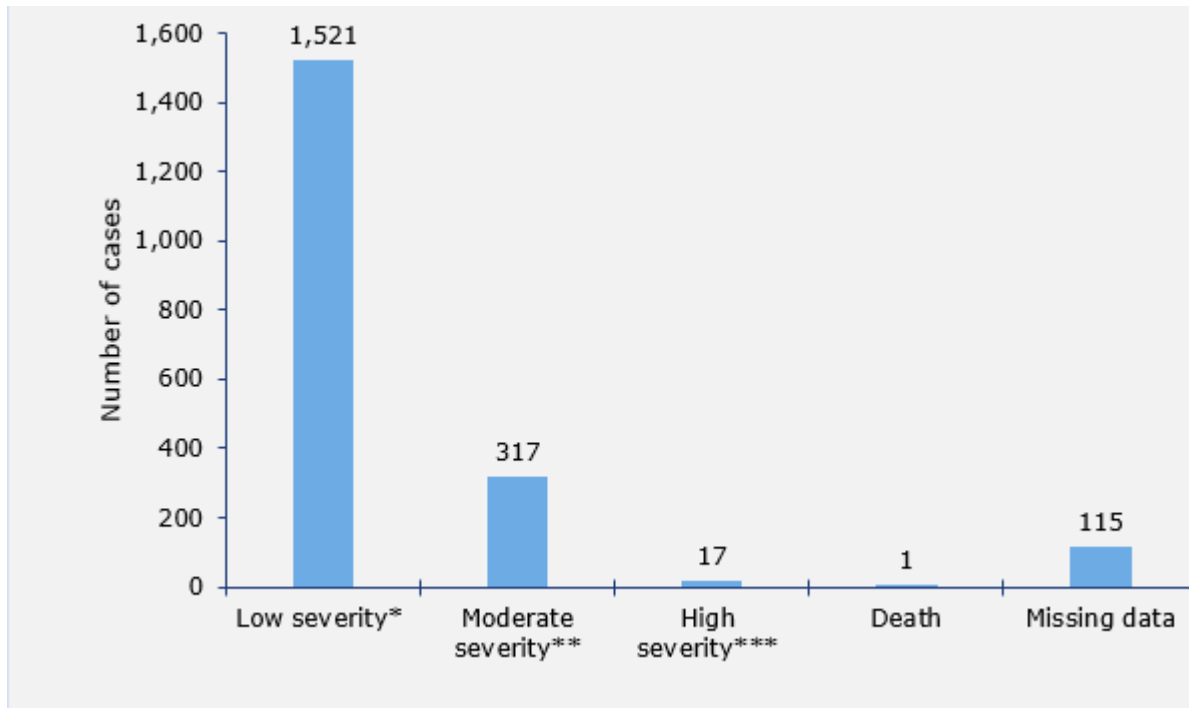
AOPP by Injury or Illness Severity, and Treatment Site

Severity of injury or illness and treatment site are variables **defined by NIOSH's** Standardized Variables for State Surveillance of Pesticide-Related Illness and Injury³. Severity of injury or illness measures the outcome of an exposure- whether it resulted in death, required hospitalization or medical treatment by a licensed health care provider, and the amount of work time lost. Treatment site is where an exposed individual received medical care for pesticide poisoning.

Seventy-seven percent (1,521) of exposures resulted in low severity illness or injury, compared to 16% (317) resulting in moderate severity illness/injury, and 0.86% (17) high severity illness or injury. The OHS program could not determine severity of injury or illness for 115 cases due to missing health information (Figure 15). All 17 high severity injury or illness cases required medical treatment, of which 7 cases needed hospitalization for life threatening situation and lost 5 or more days at work.

Only one case resulted in death from 2006 to 2015; this case was reported in 2011. Sixty-seven percent (1,327) of cases sought advice from the poison control center, while 21% (416) and 3% (53) received care at emergency departments and medical care clinics, respectively (Figure 16).

Figure 15: AOPP by severity of injury or illness: Texas, 2006-2015 (n=1,971)

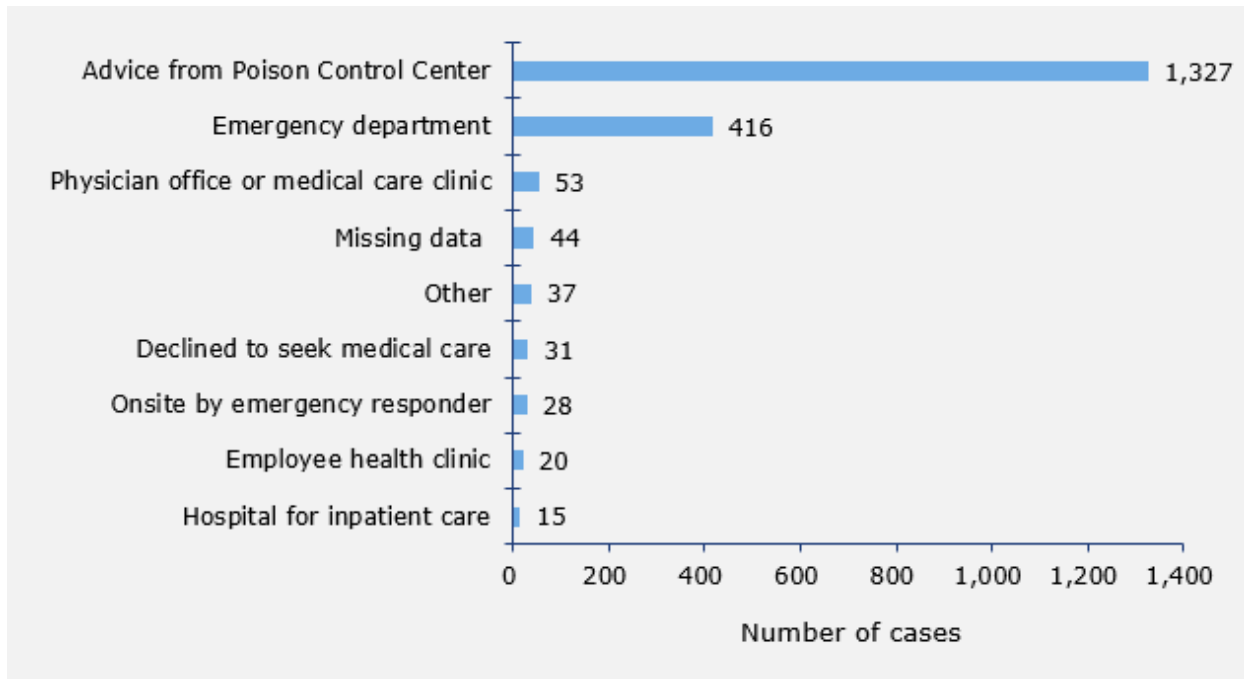


*Low severity injury or illness typically resolves without treatment and there is minimal lost time (<3 days) work or normal activities.

**Moderate severity injury or illness generally treatment provided and there is less lost time (≥ 3 -5 days) from work or normal activity. The individual is able to return to normal functioning without any residual disability.

***High severity injury or illness is severe enough to be considered life threatening and requires treatment, commonly involves hospitalization and a substantial loss of time (>5 days) from work or normal activities. The individual may sustain permanent disability.

Figure 16: AOPP by treatment site: Texas, 2006-2015 (n=1,971)



Note: Treatment site categories are not mutually exclusive, so counts may not add up to the total. An individual may have obtained medical care for AOPP at more than one treatment site.

4. Summary and Discussion

Acute occupational pesticide poisoning is a public health concern. In Texas, 1,971 AOPP cases occurred from 2006 to 2015. Non-Hispanic white male workers, workers aged 25-34, and workers in the services industry sector and services occupation group accounted for the highest number of cases. Most pesticide exposures occurred at non-commercial manufacturing facilities. Spills or splashes of liquid or dust frequently played a role in AOPP exposures. Disinfectant (such as bleach) was the most frequently reported product type and inhalation was the most common route of exposure. Despite a small number, AOPP cases with high severity of injury or illness had a great impact on health and well-being of exposed workers.

DSHS uses AOPP surveillance data to:

- Identify worker populations who are at a high risk for pesticide exposure.
- Watch for trends in workplace health and safety.
- Plan outreach and education efforts for preventing pesticide exposures in Texas workers.

5. Limitations

Health care providers, workers, and employers underreport AOPP, which is a major limitation in data collection and analysis. There is missing or incomplete data for industry, occupation, pesticide exposure and health effects. It is possible that because of missing or incomplete data one might wrongly assign a person to an industry or occupation group, or say it is not a case of pesticide poisoning when it is actually true. Common reasons for missing data are:

1. Program staff could not interview the exposed person because of missing or incorrect contact details.
2. The exposed person refused an interview.
3. The exposed person did not give all details during interview.

6. Recommendations

Acute occupational pesticide poisoning is preventable. Recommendations given below for workers and employer can help prevent exposures to pesticides and hazardous chemicals when using or handling them.

Recommendations for Workers

Workers of all ages should receive adequate training about the use, clean-up, storage, and disposal of pesticides at work. This includes training on proper use and maintenance of personal protective equipment (PPE), and understanding basic safety information on product labels.

Workers ages 16 to 17 may need specialized training about the use of cleaning and sanitizing products in the work setting.

Recommendations for Employers

Employers should make the following available to all workers:

- Basic pesticide safety information- how to prevent an exposure and what to do immediately in case of an exposure.
- Pesticide product information and safety data sheets from the product manufacturer.
- Correct PPE, and a place where workers can change and store clothes and PPE before and after work.
- Procedures and protocol for managing a pesticide exposure, including supplies for decontamination (remove pesticide or dangerous substances) such as clean water, shower area, eye flushing stations, clean clothing and single-use towels.

Keep records for all pesticide applications, safety trainings, and exposure incidents.

Employers or supervisors should check if workers correctly use PPE and procedures for appropriate tasks, especially at worksites in the services industries and occupations.

Agricultural employers must make sure that pesticide applications and worker trainings comply with the Worker Protection Standard⁴.

Recommendations for Health Care Providers

Health care providers should carefully review the reporting requirement for acute occupational pesticide poisoning.

Health care providers should report cases or suspected cases of acute pesticide poisoning to DSHS or the local health department.

Recommendations for Public Health Professionals

DSHS should focus on outreach and educational efforts for worker populations at high risk for pesticide exposures, as identified in this report.

DSHS recommends local health departments:

- Distribute pesticide safety education materials to local worker communities.
- Report cases or suspected cases of AOPP in their jurisdiction to DSHS.
- Work with health care providers in their jurisdiction to increase awareness on reporting requirement for AOPP.

Researchers at academic and health institutions should conduct further analysis of OHS program and other pesticide surveillance data to identify relationships and trends of AOPP among Texas workers.

For Workers, Employers, Health Care Providers and the General Public

If you have questions or concerns about pesticide poisoning or exposures, call the Texas Poison Center Network at 1-800-222-1222. To report an occupational pesticide exposure, call the DSHS OHS program at 1-800-588-1248.

List of Acronyms

Acronym	Full Name
AOPP	Acute occupational pesticide poisoning
BLS	Bureau of Labor Statistics
CPS	Current Population Survey
FTE	Full time equivalent
NIOSH	The National Institute for Occupational Safety and Health
OHS	Occupational Health Surveillance
PPE	Personal protective equipment
TPCN	Texas Poison Center Network
TDA	Texas Department of Agriculture

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For more information, please contact:

Texas Department of State Health Services
Environmental Surveillance and Toxicology Branch
Phone: 1-800-588-1248
<http://www.dshs.texas.gov/epitox>