

Pesticide Incidents

Although pesticides play a role in protecting human health, food, and crops, they pose a risk of poisoning when not used and/or stored properly. The American Association of Poison Control Centers (AAPCC) collects statistics on poisonings and represents the single largest source of information on the acute health effects of pesticides which resulted in symptoms that required medical attention (Calvert et al., 2010). The data include incidents related to both individual pesticides and to mixtures of products (about 8 percent of reports). The data also include intentional exposures such as suicide attempts and malicious use. The AAPCC uses the National Poison Data System (NPDS), formerly the Toxic Exposure Surveillance System, to collect information on all reported incidents.

This indicator is based on data from NPDS-published reports for the years 1998 through 2016. During this period, the percent of the U.S. population covered by Poison Control Centers (PCCs) reporting to the national database rose from 80 percent to 100 percent. Annual reports of incidents were divided by the percent of U.S. population served to estimate the total incidents nationwide, then divided by the total U.S. population to develop the incidence rate.

What the Data Show

Between 1998 and 2016, there was an overall 56 percent decline in the rate of reported pesticide incidents in the U.S. (Exhibit 1). Cases involving disinfectants and rodenticides decreased by more than 70 percent. The single largest decline occurred for the category of organophosphate (OP) insecticides, which saw an 87 percent drop in the rate of reported incidents between 1998 and 2016. Part of the decline in reported OP-related incidents may be due to the substitution of other, less toxic insecticides for some of the OPs over time. Reported incidents involving other categories of pesticides also decreased during this period, including fungicides (61 percent), herbicides (52 percent), and other pesticides, including fumigants and repellents (49 percent).

Limitations

- Incidents may be misclassified when they are reported over the phone and are not verified by laboratory tests. For example, a child found holding a pesticide container may not have been exposed, but if a PCC poison specialist receives a call and determines that the reported symptoms are consistent with the toxicology, dose, and timing of the incident, the call is registered as an incident. About 23 percent of calls to PCCs arise from health care facilities, but most of the calls originate from the victim's residence. Although some misclassification can be expected, it is assumed to be non-differential among the different types of pesticides.
- Only calls with known outcomes are reported in this indicator. This may introduce some bias, as the percent of all reported pesticide incidents with known outcomes declined from 48 percent in 1998 to 39 percent in 2016.
- The data collection process is standardized for PCCs, but it is a passive system. Under-reporting of incidents is a serious shortcoming. Studies show that medical facilities generally report between 24 and 33 percent of incidents from all substances to PCCs (Chafee-Bahamon et al., 1983; Harchelroad et al., 1990; Veltri et al., 1987).
- In 2006, the methodology for identifying exposures and outcomes changed, potentially making

comparison of these data with the data in previous AAPCC Annual Reports problematic. The extent to which the changes affect the numbers of exposures and reported outcomes is unclear from the published report, and generally the percentage of reported outcomes has only decreased slightly from 2004 to 2016.

- Data are collected by multiple PCCs, with follow-up likely performed in different ways.

Data Sources

This indicator is based on summary data from annual reports published by NPDS, 1998–2016 (AAPCC, 2018) (available from <http://www.aapcc.org/annual-reports/>). Annual data from these reports are presented and incidence rates were calculated from the population served by participating PCCs; population figures can also be found in the annual reports. Only summary data are publicly available; raw data from individual cases are considered confidential.

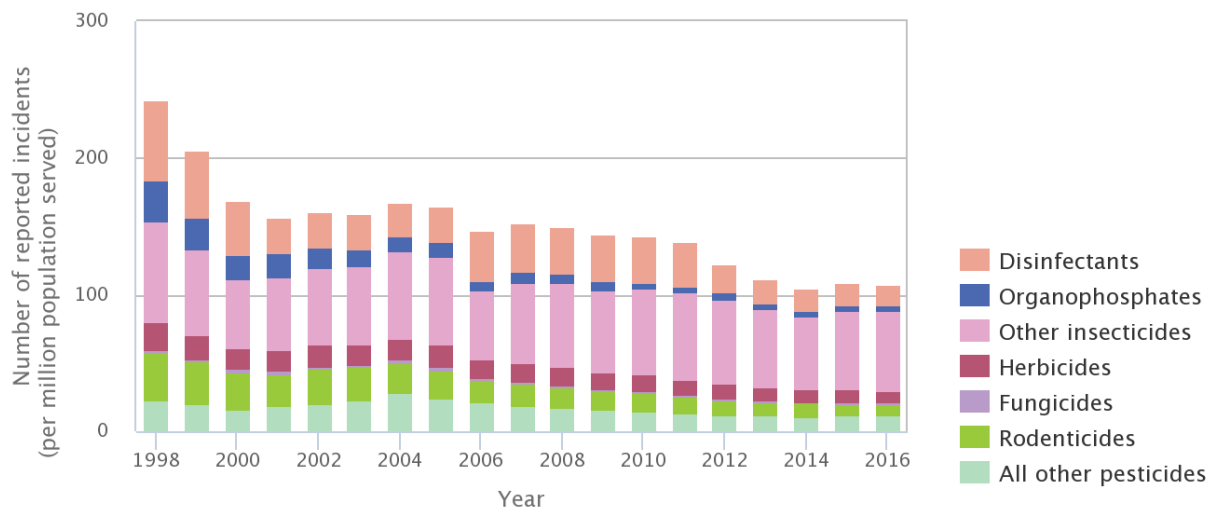
References

- AAPCC (American Association of Poison Control Centers). 2018. Annual reports. Accessed June 2018. <http://www.aapcc.org/annual-reports/>.
- Bronstein, A.C., D.A. Spyker, L.R. Cantilena, J.L. Green, B.H. Rumack, and R.C. Dart. 2012. 2011 annual report of the American Association of Poison Control Centers' National Poison Data System: 29th annual report. *Clin. Toxicol.* 50(10):911-1164. <http://www.aapcc.org/annual-reports/>.
- Bronstein, A.C., D.A. Spyker, L.R. Cantilena, J.L. Green, B.H. Rumack, and R.C. Dart. 2011. 2010 annual report of the American Association of Poison Control Centers' National Poison Data System: 28th annual report. *Clin. Toxicol.* 49(10):910-941. <http://www.aapcc.org/annual-reports/>.
- Bronstein, A.C., D.A. Spyker, L.R. Cantilena, J.L. Green, B.H. Rumack, and S.L. Giffin. 2010. 2009 annual report of the American Association of Poison Control Centers' National Poison Data System: 27th annual report. *Clin. Toxicol.* 48(10):979-1178. <http://www.aapcc.org/annual-reports/>.
- Bronstein, A.C., D.A. Spyker, L.R. Cantilena Jr., J. Green, B.H. Rumack, and S.L. Giffin. 2009. 2008 annual report on the American Association of Poison Control Centers' National Poison Data System: 26th annual report. *Clin. Toxicol.* 47(10):911-1084. <http://www.aapcc.org/annual-reports/>.
- Bronstein, A.C., D.A. Spyker, L.R. Cantilena Jr., J. Green, B.H. Rumack, and S.E. Heard. 2008. 2007 annual report of the American Association of Poison Control Centers' National Poison Data System: 25th annual report. *Clin. Toxicol.* 46(10):927-1057. <http://www.aapcc.org/annual-reports/>.
- Bronstein, A.C., D.A. Spyker, L.R. Cantilena Jr., J. Green, B.H. Rumack, and S.E. Heard. 2007. 2006 annual report of the American Association of Poison Control Centers' National Poison Data System. *Clin. Toxicol.* 45(8):815–917. <http://www.aapcc.org/annual-reports/>.
- Calvert, G. M., L.N. Mehler, J. Alsop, A.L. De Vries, and N. Besbelli. 2010. Chapter 61: Surveillance of Pesticide-Related Illness and Injury in Humans. *Hayes' Handbook Of Pesticide Toxicology*, 1313-1369.
- Chafee-Bahamon, C., D.L. Caplan, and F.H. Lovejoy. 1983. Patterns in hospitals' use of a regional poison information center. *Am. J. Public Health* 73:396–400.
- Gummin, D.D., J.B. Mowry, D.A. Spyker, D.E. Brooks, M.O. Fraser, and W. Banner 2017. 2016 annual report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 34th annual report. *Clin. Toxicol.* 55(10):1072-1254. <http://www.aapcc.org/annual-reports/>.

- Harchelroad, F., R.F. Clark, B. Dean, and E.P. Krenzelo. 1990. Treated vs. reported toxic exposures: Discrepancies between a poison control center and a member hospital. *Vet. Hum. Toxicol.* 32:156–159.
- Lai, M.W., W. Klein-Schwartz, G.C. Rodgers, J.Y. Abrams, D.A. Haber, A.C. Bronstein, and K.M. Wruk. 2006. 2005 annual report of the American Association of Poison Control Centers' National Poisoning and Exposure Database. *Clin. Toxicol.* 44:803–932. <http://www.aapcc.org/annual-reports/>.
- Litovitz, T.L., W. Klein-Schwartz, G.C. Rodgers, Jr., D.J. Cobaugh, J. Youniss, J.C. Omslaer, M.E. May, A.D. Woolf, and B.E. Benson. 2002. 2001 annual report of the American Association of Poison Control Centers' Toxic Exposure Surveillance System. *Am. J. Emerg. Med.* 20(5):391–452. <http://www.aapcc.org/annual-reports/>.
- Litovitz, T.L., W. Klein-Schwartz, S. White, D.J. Cobaugh, J. Youniss, J.C. Omslaer, A. Drab, and B.E. Benson. 2001. 2000 annual report of the American Association of Poison Control Centers' Toxic Exposure Surveillance System. *Am. J. Emerg. Med.* 19(5):337–395. <http://www.aapcc.org/annual-reports/>.
- Litovitz, T.L., W. Klein-Schwartz, S. White, D.J. Cobaugh, J. Youniss, A. Drab, and B.E. Benson. 2000. 1999 annual report of the American Association of Poison Control Centers' Toxic Exposure Surveillance System. *Am. J. Emerg. Med.* 18(5):517–571. <http://www.aapcc.org/annual-reports/>.
- Litovitz, T.L., W. Klein-Schwartz, E.M. Caravati, J. Youniss, B. Crouch, and S. Lee. 1999. 1998 annual report of the American Association of Poison Control Centers' Toxic Exposure Surveillance System. *Am. J. Emerg. Med.* 17(5):435–487.
- Mowry, J.B., D.A. Spiker, D.E. Brooks, A. Zimmerman, and J.L. Schauben. 2016. 2015 annual report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 33rd annual report. *Clin. Toxicol.* 54(10):924-1109. <http://www.aapcc.org/annual-reports/>.
- Mowry, J.B., D.A. Spyker, D.E. Brooks, M. Naya, and J.L. Schauben. 2015. 2014 annual report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 32nd annual report. *Clin. Toxicol.* 53(10):962-1147. <http://www.aapcc.org/annual-reports/>.
- Mowry, J.B., D.A. Spyker, L.R. Cantilena, M. Naya, Jr., and M. Ford. 2014. 2013 annual report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 31st annual report. *Clin. Toxicol.* 52(10):1032-1283. <http://www.aapcc.org/annual-reports/>.
- Mowry, J.B., D.A. Spyker, L.R. Cantilena, J.E. Bailey, and M. Ford. 2013. 2012 annual report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 30th annual report. *Clin. Toxicol.* 51(10):949-1229. <http://www.aapcc.org/annual-reports/>.
- Veltri, J.C., N.E. McElwee, and M.C. Schumacher. 1987. Interpretation and uses of data collected in poison control centers in the United States. *Med. Toxicol.* 2:389–397.
- Watson, W.A., T.L. Litovitz, G.C. Rodgers, W. Klein-Schwartz, N. Reid, J. Youniss, A. Flanagan, and K.M. Wruk. 2005. 2004 annual report of the American Association of Poison Control Centers' Toxic Exposure Surveillance System. *Am. J. Emerg. Med.* 23(5):589–666. <http://www.aapcc.org/annual-reports/>.
- Watson, W.A., T.L. Litovitz, W. Klein-Schwartz, G.C. Rodgers, Jr., J. Youniss, N. Reid, W.G. Rouse, R.S. Rembert, and D. Borys. 2004. 2003 annual report of the American Association of Poison Control Centers' Toxic Exposure Surveillance System. *Am. J. Emerg. Med.* 22(5):335–404. <http://www.aapcc.org/annual-reports/>.
- Watson, W.A., T.L. Litovitz, G.C. Rodgers, Jr., W. Klein-Schwartz, J. Youniss, S.R. Rose, D.

Borys, and M.E. May. 2003. 2002 annual report of the American Association of Poison Control Centers' Toxic Exposure Surveillance System. Am. J. Emerg. Med. 21(5):353–421.
<http://www.aapcc.org/annual-reports/>.

Exhibit 1. Reported pesticide incidents per million U.S. population by type of pesticide, 1998–2016



This indicator tracks pesticide incidents reported to poison control centers (PCCs) that report to the AAPCC national database. The rate of reported incidents is calculated based on the population served by these PCCs.

Information on the statistical significance of the trends in this exhibit is not currently available. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

Data source: AAPCC, 2018