Acute Pesticide Releases in 17 States and the Resulting Public Health Consequences, 1993-2001

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Abstract and Introduction

Each year in the US, more than 2 billion pounds of pesticides are applied to food crops, homes, schools, and parks (*1*). Pesticides are critical to society because of their ability to kill potential disease-causing organisms and their ability to control insects, weeds, and other pests. However, because they are designed to kill or adversely affect certain living organisms, incorrectly applied pesticides may harm humans, animals, or the environment, especially if they are involved in uncontrolled releases. Data from 17 state health departments participating in the Agency for Toxic Substances and Disease Registry's (ATSDR) Hazardous Substances Emergency Events Surveillance (HSEES) system were analyzed from 1993 through 2001 to determine the public health consequences (i.e., morbidity, mortality) that occurred from actual releases in pesticide events.

Methods

From 1993–2001, 17 state health departments participated in the active HSEES system collecting information (i.e., substance[s] released; number of victims, injuries, and evacuees) about hazardous substances events. An event was defined as any release(s) or threatened release(s) of at least one hazardous substance. A substance was considered hazardous if it might reasonably had been expected to cause an adverse human health effect. Various data sources used by states to collect event information included, but were not limited to, state environmental protection agencies, police and fire departments, hospitals, and local media. For this analysis, the HSEES database was queried for all single-substance events that were grouped in the hazardous substance category pesticides. Pesticides include, but are not limited to, insecticides, herbicides, fungicides, rodenticides, antimicrobials, plant growth regulators, defoliants, and dessicants. Once the pesticide events were identified (hereafter referred to as pesticide events), the remaining events were considered non-pesticide events for data comparison.

Results

- See Tables 1-4

Discussion

- Annual expenditures for pesticides in the US account for $11 billion-or about one-third of the world total (1).
- While the reporting of pesticide and non-pesticide events increased, pesticide events appeared to have had less of an increase when compared with non-pesticide events.
- Pesticide events typically follow seasonal trends with the numbers of events being highest from April through July, with a peak occurring in May. This peak in events is most likely due to the planting season when the demand for pesticides is high.
- Pesticide events have a higher percentage of victims compared with non pesticide events most likely because the highest percentage of events with victims occurred in private households among members of the general public.

Conclusions

While the uses of pesticides are numerous, when mishandled, hazardous substances such as pesticides can have adverse consequences. Effective safeguards need to be implemented to help reduce the potential for injuries associated with pesticide exposure. Some of these may include

- Using alternatives to pesticides, where feasible;
- Ensuring proper home sanitation measures such as:
  - sealing entry ways, replacing rotten wood, eliminating moisture, and landscape control,
  - keeping garbage cans clean and free of sticky liquids, blocking nest entrances with dirt,
  - mowing lawns frequently and pulling dandelion roots before they have matured, and
  - eliminating harborage around house (i.e., tall grass, woodpiles);
- Providing ongoing training in proper PPE usage to at-risk employee groups (i.e., agricultural services) who use pesticides, as required;
- Conducting routine preventive maintenance on equipment (i.e., crop-dusters, tanker trucks) used to transport/disperse pesticides and other hazardous substances; and
- Educating consumers about the proper use of pesticides and other hazardous chemicals in the home (e.g., read labels carefully).

Limitations

- The reporting of events to participating HSEES states is not mandatory; therefore, participating states may not be informed about every event.
- Not all states participated during the entire analysis period.

Case Vignette

Minnesota. In June 2001, a chemical storage shed containing various pesticides at a potato farm caught on fire. The cause of the fire was unknown. At least 29 different pesticides were stored in the shed including 2,4-D, ammonium sulfamate, diquat, permethrin, and paraquat. Approximately 1,200 citizens in the southeast part of town were evacuated for five hours. A police officer was treated at a hospital for respiratory irritation and released.

Table 1: Distribution of all events, by substance category*

Hazardous substance category	Events No.	Events % of total
Other inorganic substances	10,270	20.8
Other	9,818	19.9
VOC's	9,150	18.5
Mixture across chemical categories	5,072	10.3
Acids	4,340	8.8
Ammonia	3,357	6.8
Pesticides	2,284	4.6
Bases	1,914	3.9
Paints & dyes	1,213	2.5
PCB's	1,028	2.1
Chlorine	997	2.0
Total	**49,443**	**100.0**

* Includes events in which one substance was actually released.

Table 2: Distribution of pesticide events compared with non-pesticide events, by year

Year	No. of Participating states	Pesticide events* Events	Pesticide events* % of total	Pesticide events* Events with victims	Pesticide events* % of yearly events with victims§	Non-pesticide events† Events	Non-pesticide events† % of total	Non-pesticide events† Events with victims	Non-pesticide events† % of yearly events with victims§
1993	11	180	7.9	32	17.8	3,306	7.0	374	1.3
1994	12	227	9.9	21	9.2	3,557	7.5	337	9.5
1995	14	294	12.9	28	9.5	4,653	9.9	318	6.8
1996	14	273	11.9	30	11.0	4,955	10.5	305	6.2
1997	13	275	12.0	27	9.8	4,978	10.6	291	5.8
1998	13	217	9.5	15	6.9	5,503	11.7	315	5.7
1999	13	256	11.2	22	8.6	5,735	12.2	410	7.1
2000	15	266	11.6	50	18.8	6,774	14.4	566	8.3
2001	16	296	13.0	39	13.2	7,698	16.3	545	7.1
Total	**---**	**2,284**	**100.0**	**264**	**11.6**	**47,159**	**100.0**	**3,461**	**7.3**

* Includes events where only pesticides were involved.
† Includes remaining non-pesticide events.
§ Number of events with victims ÷ number of events.

Table 3: A ranking of the leading pesticides released and the leading pesticides with victims*

Rank	All pesticide events: Pesticide name	Events	%	Pesticide events with victims: Pesticide name	Events	%
1	Pesticide NOS† (pesticide)	255	11.2	Pesticide NOS (pesticide)	39	14.8
2	Ethylene oxide (antimicrobial)	191	8.4	Malathion (insecticide)	31	11.7
3	Pendimethalin (herbicide)	130	5.7	Chlorpyrifos (insecticide/miticide)	13	4.9
4	Malathion (insecticide)	104	4.6	Isopropylamine glyphosate (herbicide)	10	3.8
5	Trifluralin (herbicide)	99	4.3	2, 4-D/Diazinon§ (herbicide/insecticide)	8	3.0

* Includes events in which one substance was actually released.
† NOS - not otherwise specified.
§ Tie.

Table 4: A ranking of pesticide and non-pesticide events, by frequency and state

Pesticide events: Rank	HSEES states	Total events	Percent of total	Non-pesticide events: Rank	HSEES states	Total events	Percent of total
1	Iowa	390	17.1	1	Texas	19,282	40.9
2	Texas	328	14.4	2	New York	4,603	9.8
3	Wisconsin	296	13.0	3	Wisconsin	3,360	7.1
4	Minnesota	285	12.5	4	Washington	3,286	7.0
5	New York	170	7.4	5	Colorado	2,691	5.7
6	Washington	156	6.8	6	Iowa	2,136	4.5
7	Missouri	124	5.4	7	Minnesota	1,896	4.0
8	North Carolina	122	5.3	8	North Carolina	1,875	4.0
9	Oregon	107	4.7	9	Missouri	1,701	3.6
10	Colorado	821	3.6	10	Alabama	1,423	3.0
11	Alabama	80	3.5	11	Oregon	1,362	2.9
12	Mississippi	59	2.6	12	Mississippi	968	2.1
13	New Jersey	27	1.2	13	New Jersey	919	1.9
14	Louisiana	23	1.0	14	Utah	578	1.2
15	Rhode Island	13	0.6	15	Louisiana	576	1.2
16	Utah	12	0.5	16	Rhode Island	371	0.8
17	New Hanpshire	10	0.4	17	New Hampshire	132	0.3
		2,284	**100.0**	**17**		**47,159**	**100.0**

References

1. Environmental Protection Agency (EPA). 2002. Promoting Safety for America's Future, Office of Pesticide Programs, FY2002 Annual Report [cited 2004 May 27]. Available at URL: http://www.epa.gov/oppfead1/annual/2002/2002annualreport.pdf.

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