Adolescent Pesticide Exposures

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Defining "Adolescent"

- Youth, teen, adolescent
- Upper end of the childhood age scale
- No standardized age grouping
- Comparisons difficult
- For this study: 10-19 years = adolescent

  US Department of Health & Human Services, CDC, NCHS Adolescent Health Chartbook (CDC 2000)

Why this age group?

- Literature recognizes Windows of Vulnerability
- Physiologic differences
- Early development – organ systems
- Vulnerability of adolescents is hard to ascertain
- Most studies address <5 yrs. or adults

Development

- Biological systems are not commonly considered matured until age 18
- Absorption, metabolism, detoxification, and excretion of xenobiotic compounds differ by age

Pesticides

- Toxic chemicals intentionally released into the environment to cause harm to a living thing
- Prevent, destroy, repel, or mitigate any form of life declared to be pests
- Pests can be plants, animals, insects, fungi, microorganisms

Routes of Exposure

- Dermal
- Inhalation
- Ingestion
- Ocular

Pesticide Use Associated with:

- Cancers
- Skin and respiratory disorders
- Neurological & reproductive adverse effects
- Immune function impairments

Pesticide Exposure Surveillance

- Surveillance = “data for action”
- There is no systematic collection of pesticide exposure data in many states
- Concerns about health consequences from exposures may prompt calls to Poison Control Centers
  - Toxic Exposure Surveillance System
  - Systematic, Standardized

Poison Control Centers

- 61 nationwide
- Provide free telephone consultation for suspected exposure to toxic substances
- Staffed by registered nurses (RNs) and/or pharmacists with physician and clinical toxicologist back-up
- In 2006, received more than 2.5 million human exposure calls

Poison Control Center Specialist

PCC Medical Record

- Searchable variables from standardized fields
- Narrative free-text section for additional comments by the Specialist in Poison Information about the case
- “Tox Notes” supply valuable information
- Notes section is underutilized

Objective of the Study

Identify the distribution, determinants, and effects of pesticide exposures among adolescents in the lower Mississippi River Delta Region of the US and develop prevention strategies appropriate for this age group

Parent Study

- "Improving Surveillance of Pesticide and Other Agricultural-related Poisonings"
  - Supported by CDC/NIOSH cooperative agreement U5O OH07547-03, under human subject protocol 01-0757-P3B
  - Conducted by the Southeast Center for Agricultural Health & Injury Prevention , University of Kentucky, Lexington, KY.
- Retrospective, descriptive, population-based epidemiological study (n= 4435)
- Harmonized archival data from 9 poison control centers in 8 states to examine pesticide exposures in lower Mississippi River Delta

Sates Participating in the Study

Mississippi River Delta Counties

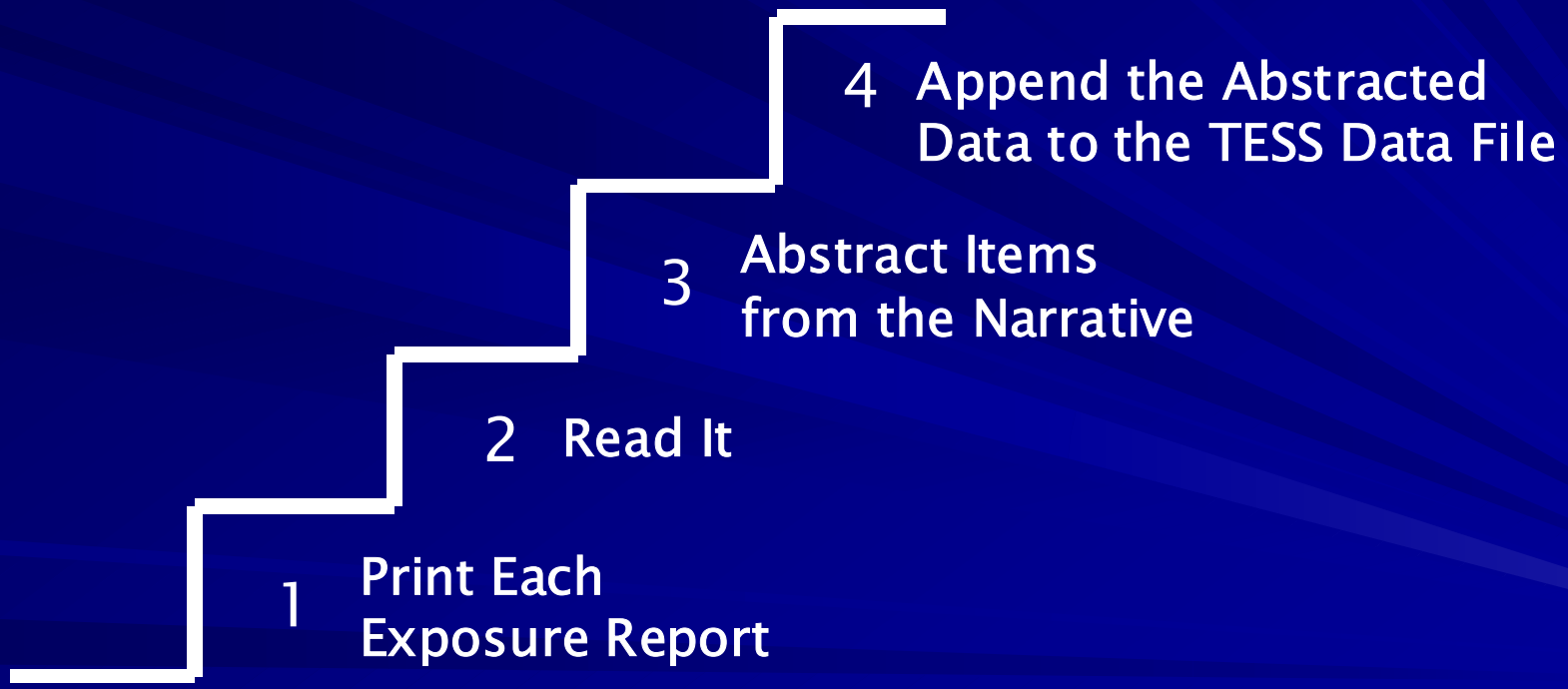
Why this Area?

- Mississippi River Delta is an agriculturally intensive region
- Little is known about pesticide exposures occurring in the region
- Even less is known about pesticide exposures incurred by local adolescents
- Opportunity to look for occupational and non-occupational exposures

Study Population

- 4,435 reports received by study centers during 2001 & 2002
- Ages ranging from 4 months – 95 years
- 159 reports involved exposures to person 10-19 years old

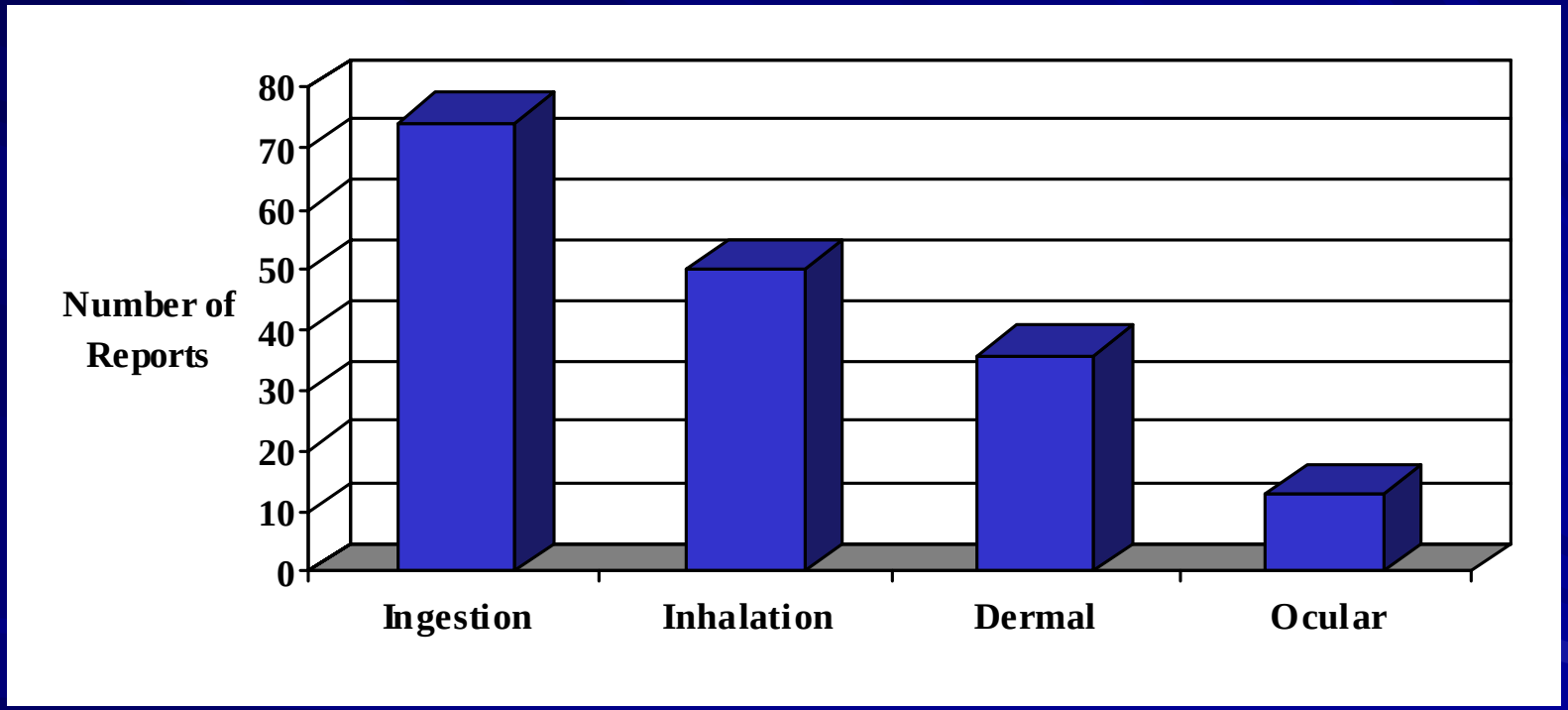
Four Steps to Better Data: Retrospective Exposures from CY 2001



Results

- Substances implicated
- Route of exposure
- When occurred
- Site of the exposure
- Reason for the exposure
- Severity
- Prevention strategies

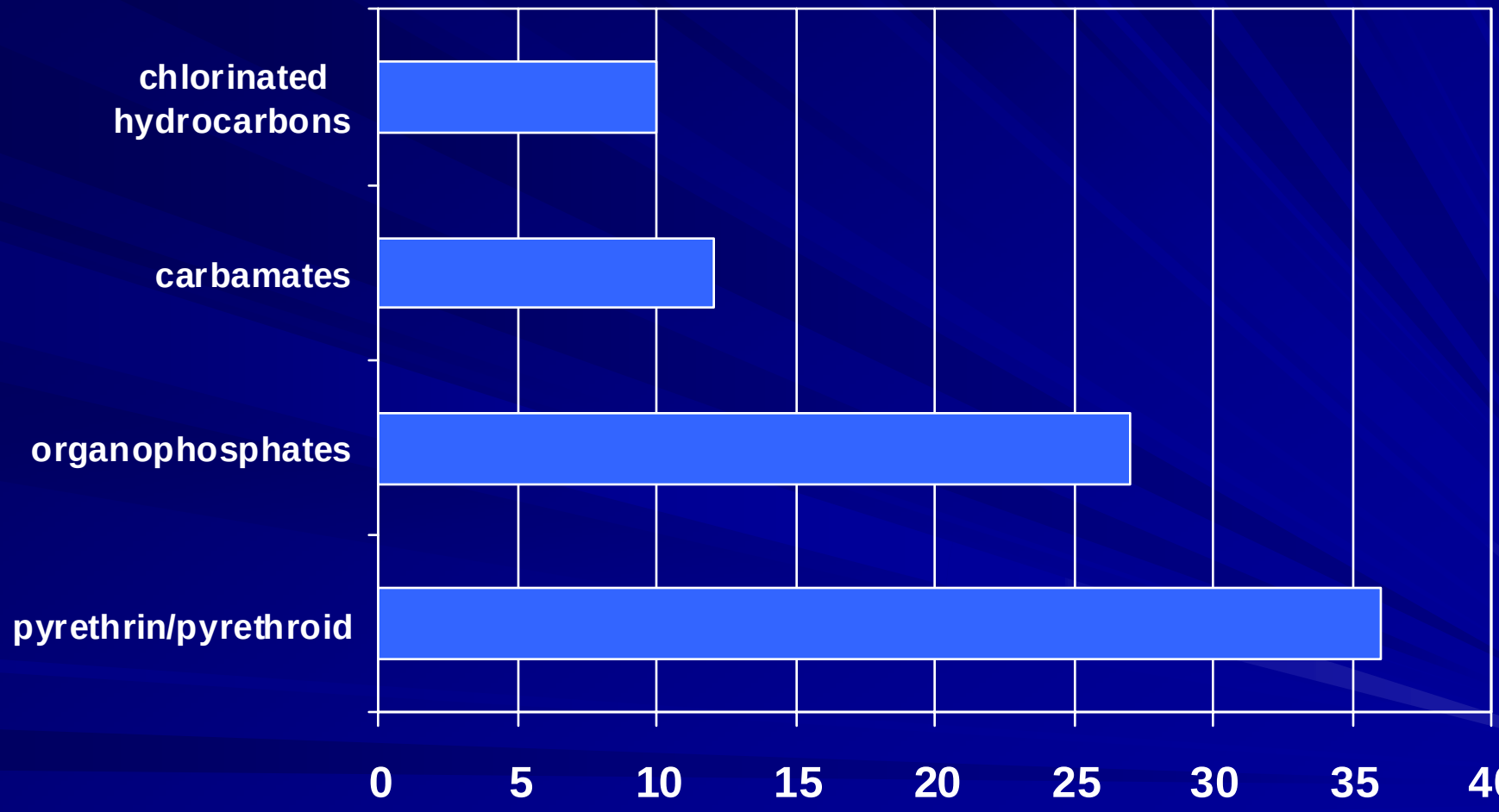
Route of Exposure



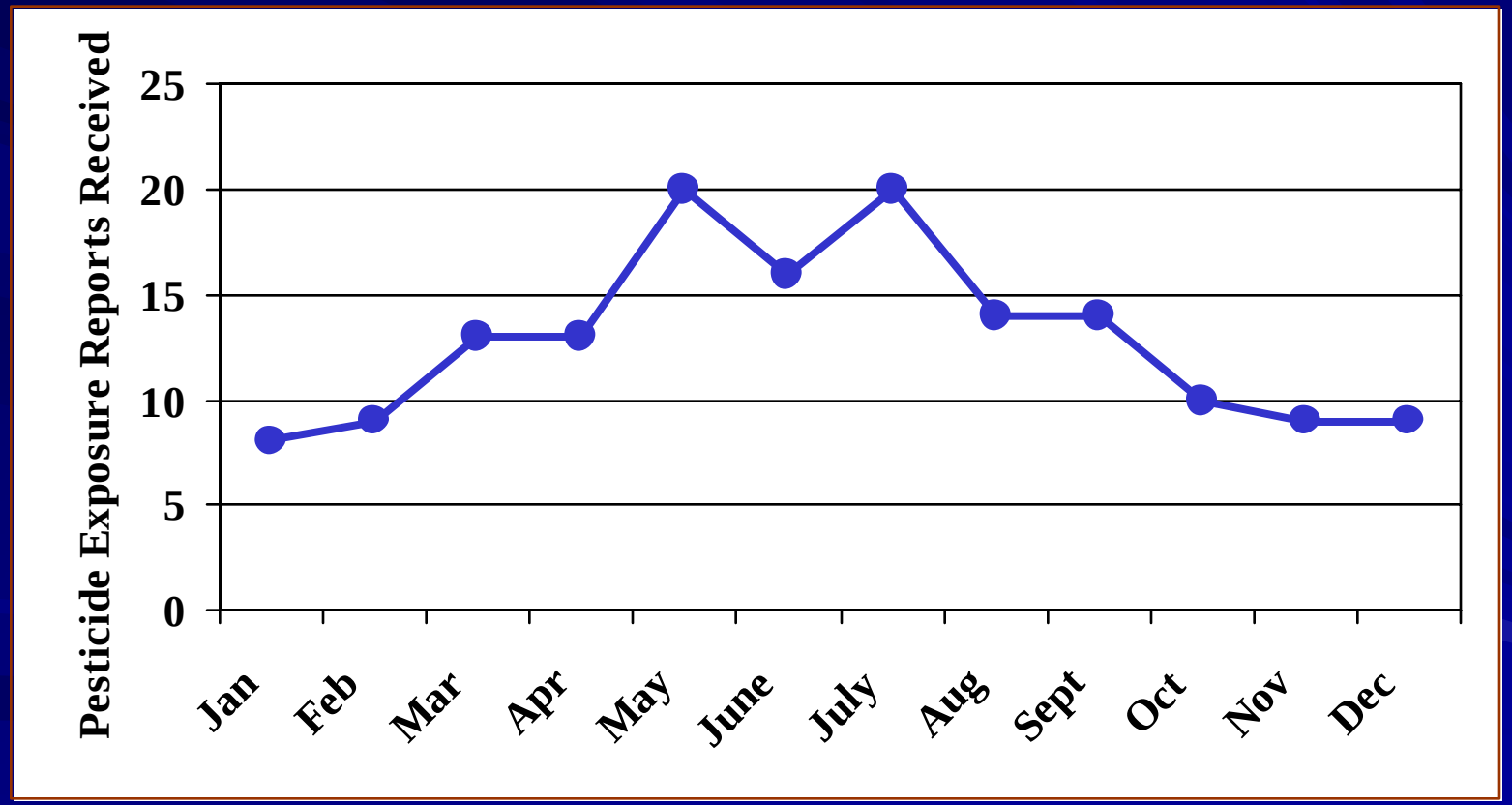
Substances Implicated

Substance	N	%
Insecticides	113	71.1
Rodenticides	17	10.7
Fertilizers	15	9.5
Fungicides	12	7.5

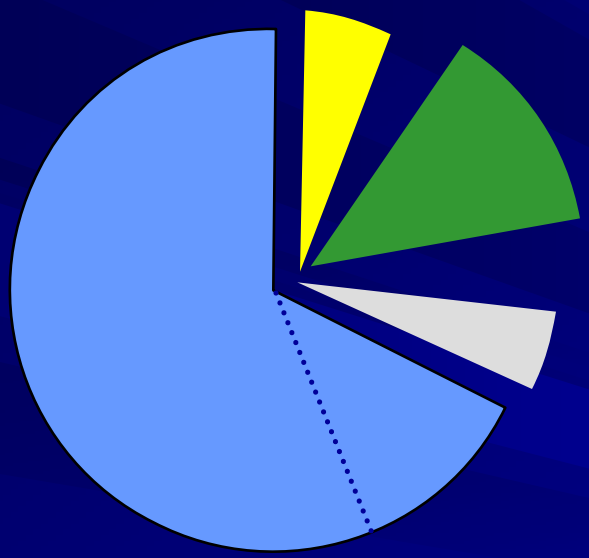
Insecticides Implicated



Seasonality

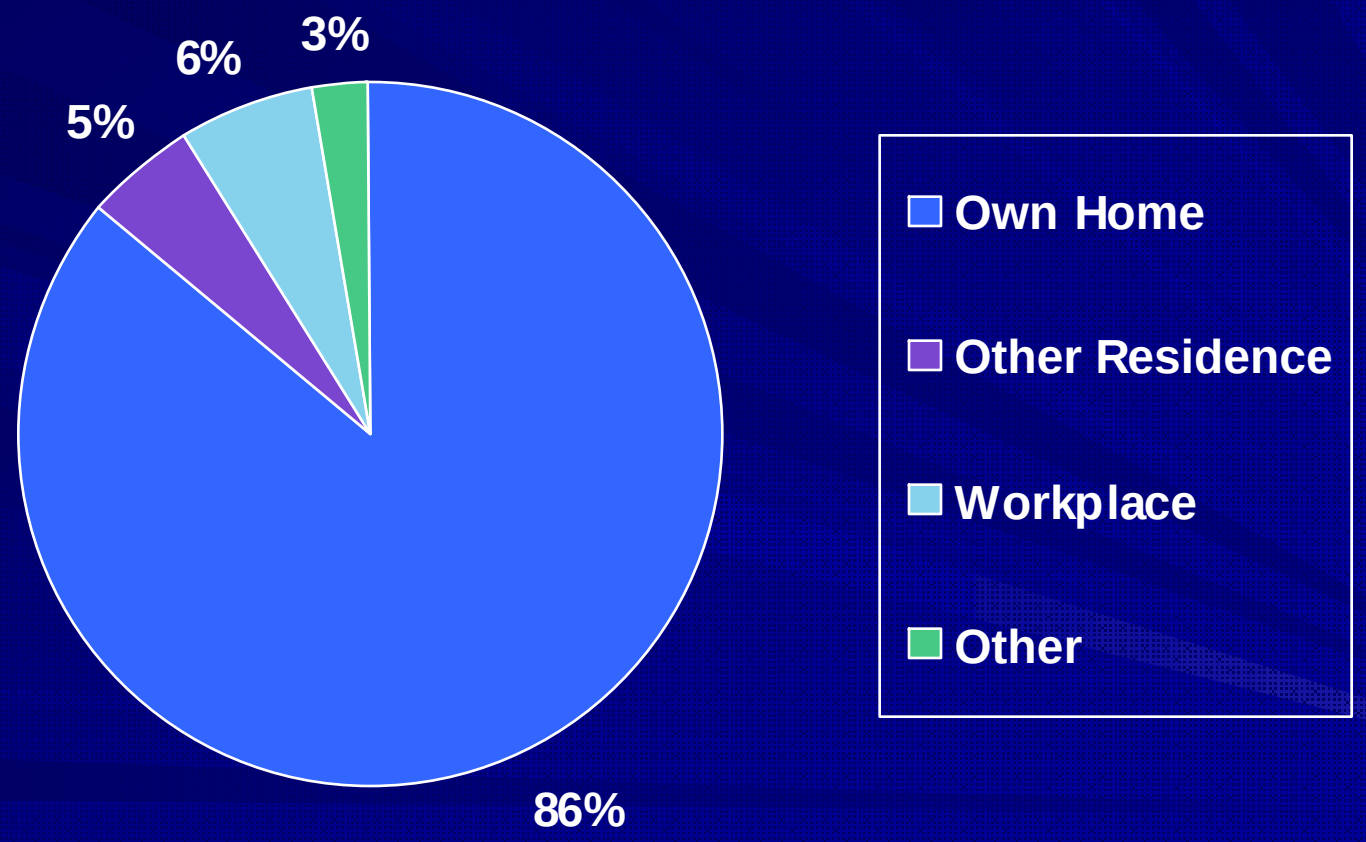


Who placed the call



- Self (6.9%)
- Health professional (20.8%)
- Relative (65.3%)
  - Parents (55.3%)
- Unknown (7%)

Site of Exposure



Exposure Reason #1 Ingestion of contaminated food (n=17)

Exposure Reasons

- Premature re-entry into treated area (n=12)
- Foggers (n=11)
- Contact with animal products (n=10)
- Applying pesticides in a confined space (n=10)

Exposure Reasons

- Ingestion of product in non-standard container (n=7)
- Mistook pesticide for oral medications (7)
- Inappropriate handling of pesticide (n=6)
- Exposure through Drift (n=6)
- Malfunctioning equipment (n=4)
- Public Health mosquito spraying (n=2)

Severity Measurement

- Where the case was managed
- The medical effect from the exposure

Severity

- 64.8% (n=103) managed on site, no health care facility involvement
- 33.3% (n=53) referred to a health care facility
- About 29 were treated as outpatients
- 8 were admitted – non-critical care unit
- 2 admitted to a critical care unit

Severity

- 61% (97 cases) were followed to a known medical outcome
- Minor medical effects = 31.4%
- Moderate medical effects = 7.5%
- Major medical effects = 1 case

Haddon Matrix

Who is affected

Setting

	Host	Agent	Environment	
			Physical	Social
Pre-event				
Event				
Post-event				

Proximate cause

Social and legal norms and practices

Haddon Matrix

	Host	Agent	Environment	
			Physical	Social
Pre-event	**Primary Prevention**			
Event	**Secondary Prevention**			
Post-event	**Tertiary Prevention**			

Primary Prevention

- Identify & follow-up exposures as sentinel events
- Increase awareness of toxicity of pesticides & safe handling practices
- Educate professional exterminators to educate their clients
- Increase support for pesticide prevention efforts
- Encourage increased funding to PCCs
- Increase literacy of residents
- Assess attitudes on pesticide use, handling & storage

Adolescent Risk Perception & Behavior

- Legitimate users of pesticides
- Self-determination – Find themselves in new environments
- May misjudge the risk to themselves

Adolescent Risk Perception & Behavior

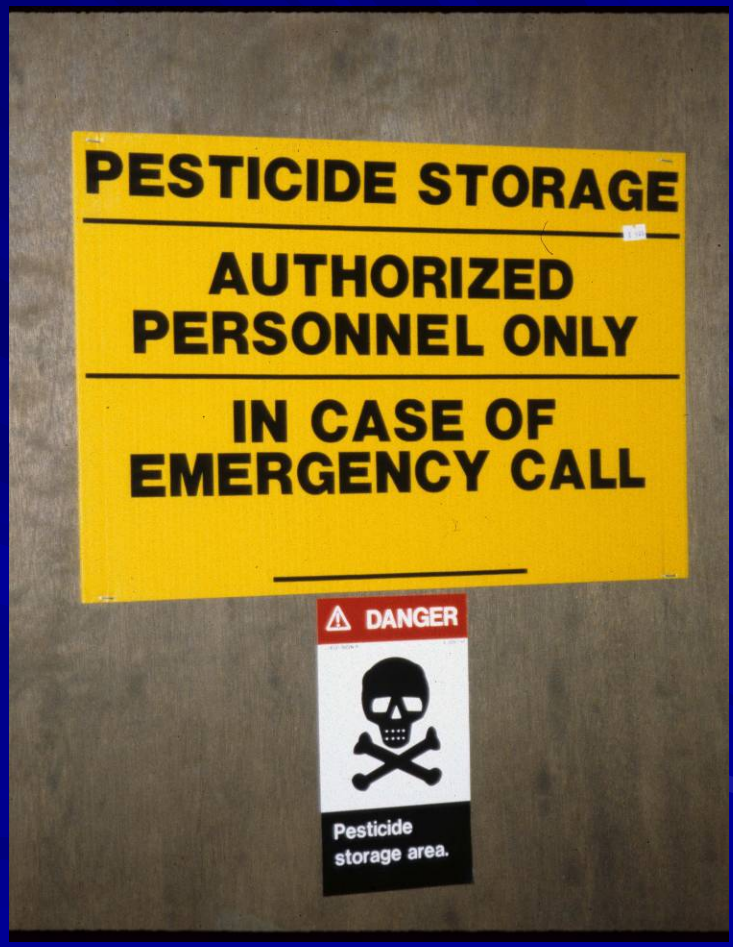
- Emotional maturity & judgment
- Perception of illness vulnerability
- Habits & attitudes affect how risk communication information is interpreted

Secondary Prevention

- Educate adolescents to recognize the symptoms of pesticide poisoning
- Encourage use of personal protective equipment
- Use pesticides with the least human toxicity to do the job well
- Develop foggers or sprayers with slow initial release to allow departure from spray area & shut off valve

Tertiary Prevention

- Call Poison Control Center
- Provide first aid skills
- Identify and follow-up sentinel events
- Support PCCs
- Increase access to full PCC record
- Ensure training of Emergency personnel



PCC Surveillance Effectiveness

- This study provides greater understanding of pesticide poisoning concerns of this age group
- Poison Centers may greatly underestimate the true number of pesticide exposures to this age group (Crude incidence rate of 4.4 reports per 100,000 Mississippi Delta adolescents/year)
- Each case should be looked at as a possible sentinel event

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