Reducing Pesticide Exposure to Migrant Farmworker Children

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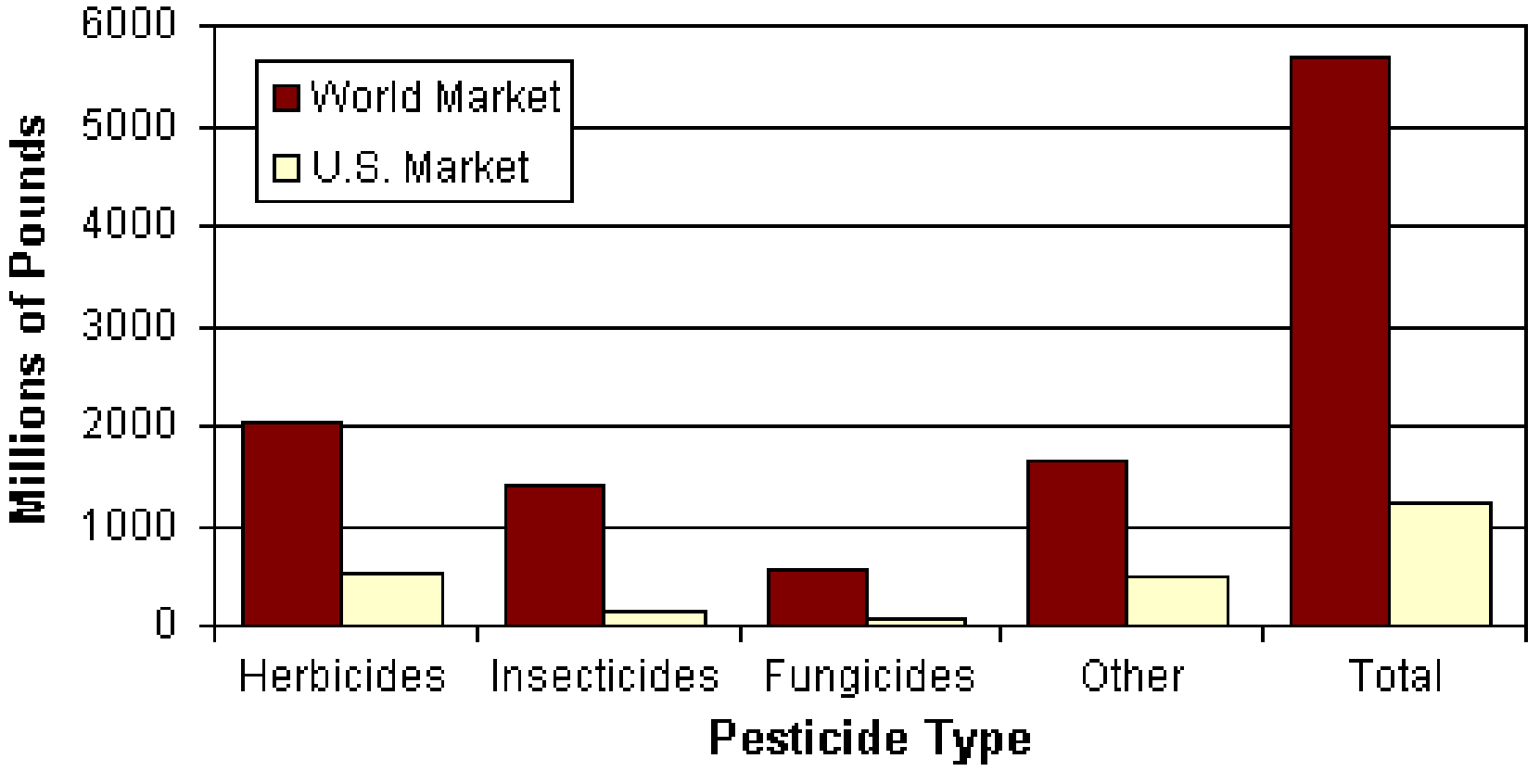
Outline of Presentation

- Review pesticides as a health concern for all children
- Focus on farmworker children's exposure: double jeopardy
  - Agricultural and household
  - Predictors
- Strategies for reducing pesticide exposures

US Applies Large Proportion of the Pesticides Used in the World



Comparison of World and U.S. Pesticide Pounds of Active Ingredient at User Level, 1999 Estimates, USDA

Why is Pesticide Exposure a Child Health Concern?

- Effects include:
  - Acute exposure
    - Poisoning: coma, death
    - Lower dose: skin, eye, GI effects
  - Chronic exposure
    - Subclinical: neurobehavioral deficits
    - Reproductive, cancers
- Effects related to dose
  - Body size
  - Developmental stage

Pesticides and Children

- Young children don't metabolize pesticides as fast as older children
  - Pesticides stay in the body longer
- Hand-to-mouth activity brings young children in contact with more pesticides than older children

Precautionary Principle

- Levels at which exposure is dangerous: unknown
- Therefore, assume exposure should be minimized

How Do Pesticides Enter the Body?

- Ingestion
- Inhalation
- Absorption through the skin
  - Responsible for most casual pesticide absorption
  - In adults, some areas of body absorb more than others
    - More absorption: genital area, underarms
    - Less absorption: hand, feet

How Are Farmworker Children Exposed to Pesticides?

- Pathways
  - Take-home pathway
  - Drift from nearby fields
  - Food
    - Contamination on produce
    - Incorporated into processed foods
  - Water
  - Residential application
    - Home
    - Yard and garden
- Pesticides do NOT break down indoors

Who Are Farmworkers?

- Employed in 42/50 states
- 4.2 million farmworkers and dependents
  - How many children??????
- 78% foreign-born
  - 75% -- Mexico
  - 2% -- Central America
  - 1% -- Other
- Minority, economically disadvantaged, medically underserved
- Mean educational attainment: 7th grade
- Poor quality housing

Research on Farmworker Children and Pesticides

- Agricultural only, concentration on organophosphorus pesticides
  - University of Washington
  - University of California
  - Oregon Health and Science University
  - Rutgers University
- Both agricultural and residential, multiple classes of pesticides
  - Wake Forest University

The *¡La Familia!* Project

- Reduce farmworker families' exposure to pesticides
- Develop and test a culturally appropriate pesticide education program for farmworker families
- Community-based participatory research
  - NIEHS grant 08739

Research Site

- Six western North Carolina counties and three western Virginia counties
- Major crops:
  - Christmas trees
  - Vegetables
  - Tobacco
  - Ornamental

Formative Research

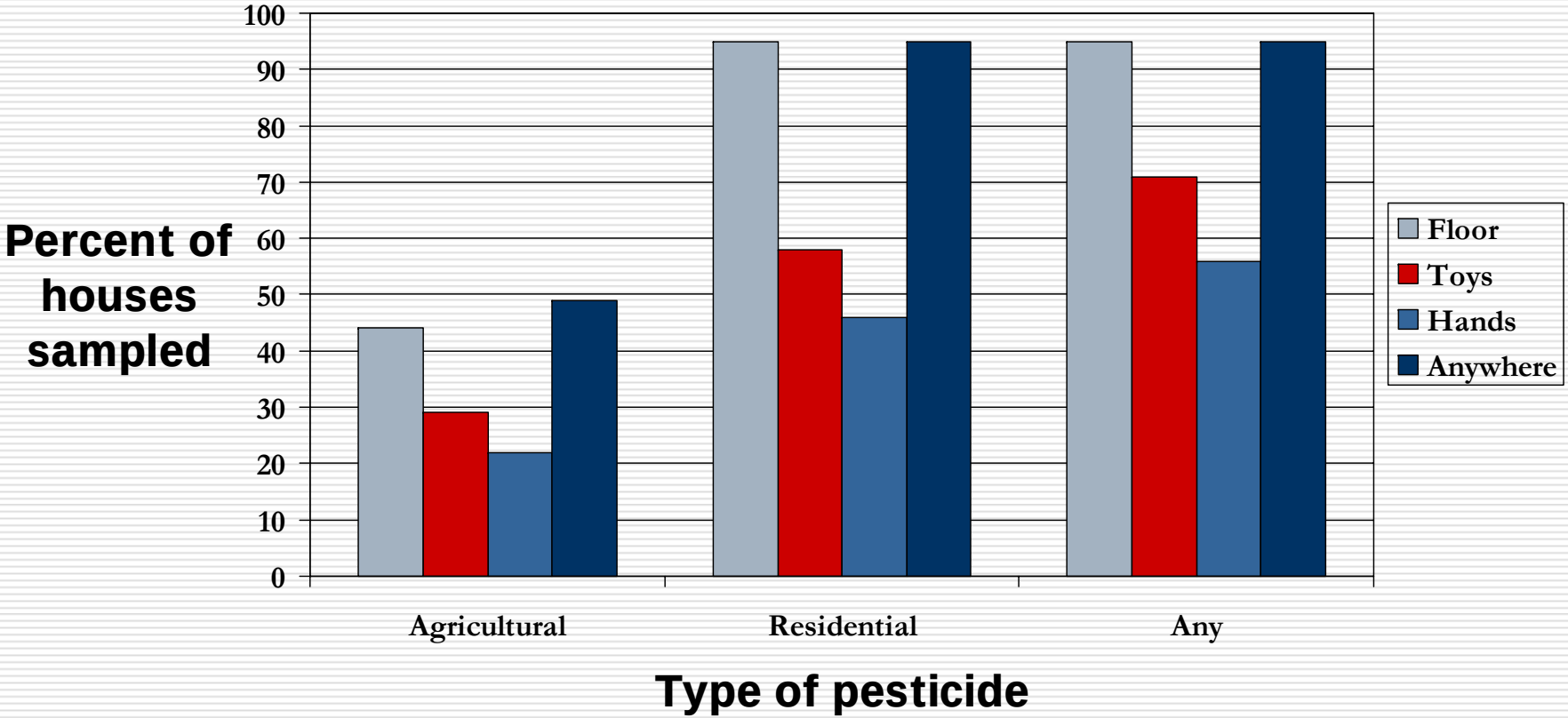
- In-depth research with farmworkers families (n=41)
  - Dust wipes: floor, toys, hands
  - Urine samples: 9 households
  - Qualitative interview: beliefs and behaviors
- Site-based sampling
- Inclusion criteria
  - Someone in the household engaged in farmwork
  - Broad definition of farmwork: Christmas trees, wreaths, roping, nurseries, tobacco, landscaping, vegetable crops
  - Child under the age of 7

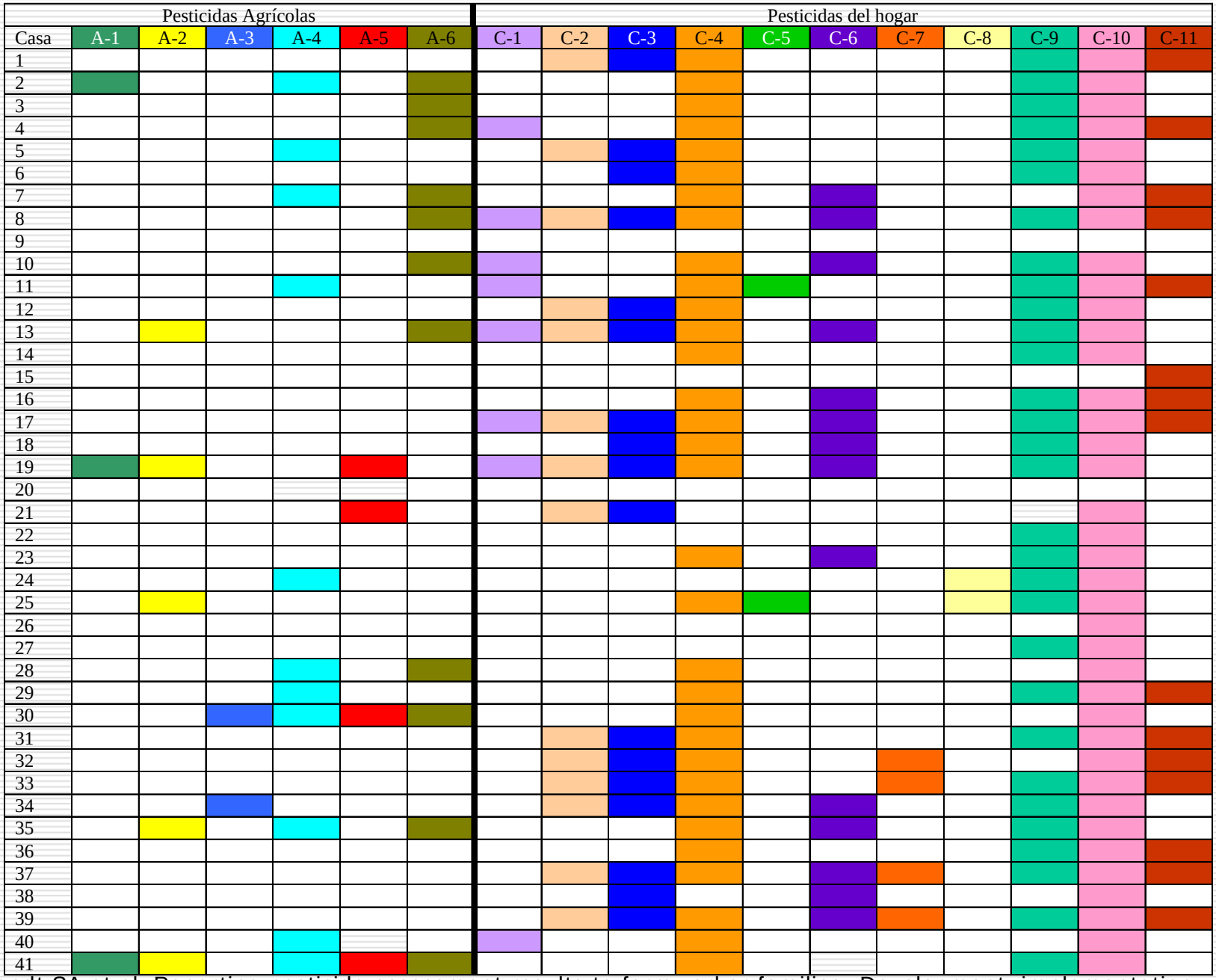
Dust Wipe Results

- Pesticides present in 39/41 homes
  - Tested for 8 agricultural and 13 residential
  - Found multiple classes of pesticides
    - Organophosphorus pesticides
    - Pyrethroids
    - Carbamates
    - Herbicides
    - Organochlorines: including DDT!
- Pathway: floors-toys-hands

Quandt et al. Agricultural and residential pesticides in wipe samples from farmworker family residences in North Carolina. Environmental Health Perspectives 2004; 112:382-387.

Pesticides in Dust Wipes





Quandt SA et al. Reporting pesticide assessment results to farmworker families: Development, implementation and Evaluation of a risk communication strategy. Environmental Health Perspectives. 2004; 112:636-642.

Predictors of Pesticides in Homes

- Agricultural pesticides
  - Housing adjacent to fields
- Residential pesticides
  - Housing judged difficult to clean

Housing Quality

Houses near Fields

Urinary Metabolite Results

- Two first morning voids
- Measured 6 metabolites of organophosphorus pesticides (OPs)
- Spaced throughout year
  - NOT always when OPs being applied
- Compared to national age- and gender-specific reference standards

Arcury TA et al. Organophosphate pesticide exposure in farmworker family members in western North Carolina and Virginia: Case comparisons. Human Organization. 2005.

Results Show Pesticides Endemic

- All persons had measurable OP metabolites
- Only one person (1 yr old) was below the 50th percentile compared to reference data
- Most were at the 50th percentile for 3+ of the 6 metabolites
- All households had at least one person who was at the 90th percentile
- Only two households did not have at least one child above the 90th percentile

Predictors of Urinary Metabolites

- Extra farmworkers in residence
- Renting, not owning
- Longer time in residence
- Carpeted floors
- Residential pesticide application

Qualitative Interview Results

- Interviewed mother
- Knowledge about pesticides
- Beliefs about pesticides
- Pesticide-related practices

Agricultural Pesticide Knowledge

- Little overall knowledge about pesticides
- Varying knowledge about pesticide exposure
- Vague ideas of how families can be exposed
  - Easier to understand exposure at work
  - Few thought about how families could be exposed at home

Rao, P. et al. Pesticides in the home of farmworkers: Latino mothers' perceptions of risk to their children's health. Health Education & Behavior, in press.

Agricultural Pesticide Beliefs

- Most believed that children were more susceptible than adults
- Few aware that they and their child could be exposed to agricultural chemicals in their homes

Residential Pesticide Practices

- Farmworkers report infestations of insects and rodents.
- Many use pesticides to control pests.
- Many do not recognize household products (e.g., Raid) as pesticides.
- A few use agricultural herbicides around the house and yard.
- Most try to protect children when using pesticides, but methods are ineffective.

Pesticide Health Effect Beliefs

- Aware of short-, not long-term effects
- Concluded their families were safe as no one had become sick (experienced short-term effects)

Three Important Concepts

- A powerful **smell** indicates exposure
- Pesticide viewed as **infectious** disease
- **Confusion** about treatment

Summary

- Evidence of exposure from dust and urine samples
- Environment promotes exposure
  - Agriculture
  - Poor housing
- Knowledge, beliefs, and household practices promote exposure
- Results probably transferable to non-farmworkers

So…what should we do next?

- Policy change
- Public education

Policy Changes to Protect Children

- Reduce pesticide use through regulation or change in practice
  - Use integrated pest management
    - Farms
    - Schools
    - Residential
  - Restrict pesticide application
    - Aerial spraying
    - Application proximity to residential zones

Policy Changes to Protect Children

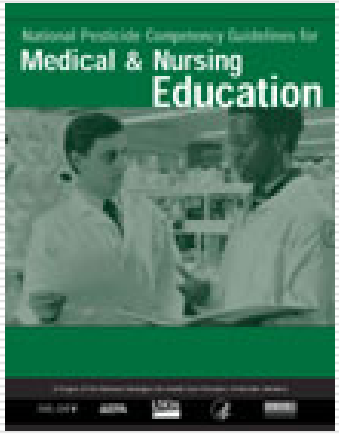
- Enforce existing regulation on pesticide safety training
  - EPA Worker Protection Standard
    - Agricultural workers and applicators
  - OSHA Hazardous Materials Right-to-Know
    - Other industries
    - E.g., landscaping, golf course workers
- Extend existing regulations
  - Train spouses of farmworkers, applicators

Policy Changes to Protect Children

- Improve and enforce existing housing regulations
  - Crowding
  - Insufficient bathing and laundry facilities
  - Housing quality

Policy Changes to Protect Children

- Educate health care providers about pesticides
- The National Environmental Education & Training Foundation
  - www.neetf.org



Policy Changes to Protect Children

- On-line continuing education
  - http://northwestahec.wfubmc.edu/learn/pesticide/index.htm
  - “Pesticide Exposure and Treatment Education for Health Care Providers”
  - A CME course designed for health care providers who deal with farmworkers or other rural populations

Policy Changes to Protect Children

- Address behavior change among farmworkers and other parents
  - Must be culturally and educationally appropriate
  - Cannot “blame the victim”

Policy Changes to Protect Children

- La Familia program translates research results to IPM curriculum
  - Active learning
  - Lay health advisor delivered
  - Low literacy
    - Cartoon, comic books, brochures

La Familia Pesticide Lessons 1-6

- Protect your family
- Keep them out!
- Clean them out!
- Controlling pests without pesticides
- Use pesticides as a last resort
- Talking about change

Wrap-up

- Farmworker children represent all children
- Pesticides are ubiquitous in the environment
- Precautionary Principle
  - Minimize exposure
- Parents lack accurate information
- Reducing exposure requires policy changes
  - Education of families is only one component