Lead in Spices, Herbal Supplements, and Ceremonial Powders

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NCPH
North Carolina Public Health

1. Last Name			First Name						M I	
2. Medicaid No. or SSN										
3. Date of Birth						4. Hispanic Origin? ☐ Yes ☐ No				
5. Race ☐ White ☐ Asian			☐ Black ☐ Pacific Island.			☐ American Indian ☐ Other				
6. Sex ☐ Male			☐ Female							
7. County of Residence:										
8. Refugee status? ☐ Yes ☐ No										

NC Department of Health and Human Services
Division of Public Health

EXPOSURE HISTORY OF CHILD WITH ELEVATED BLOOD LEAD LEVEL

Current Address of Child: _____ Phone: (____) _____

Length of Residence at Child's Current Address: _____ years _____ months

Parent/Guardian Name: _____

Laboratory Findings: Date:_____ Blood Lead:_____

Date:_____ Blood Lead:_____

Date:_____ Blood Lead:_____

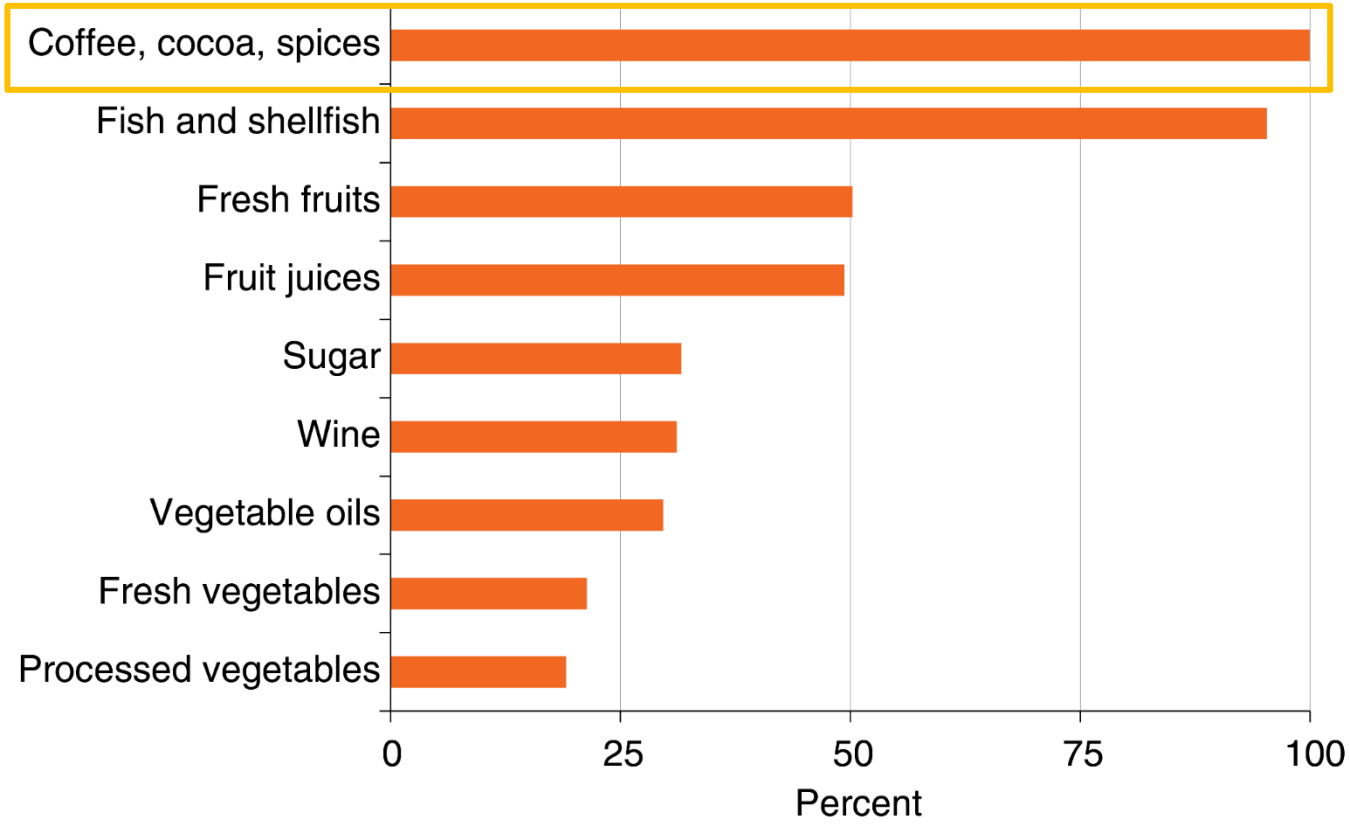
Dietary History:

Yes	No	
☐	☐	Does the family store food in open cans?
☐	☐	Does the family prepare, store, or serve food in homemade or imported ceramic dishes?
☐	☐	Does the family use traditional medicines such as greta, azarcon or pay-loo-ah?
☐	☐	Does the family cook with imported spices?

What discoveries have in common?

- Homes/apartments built after 1978
- Children from many nationalities
- Children and mothers who consumed spices, supplements and foods positive for lead
- Imported spices part of diet

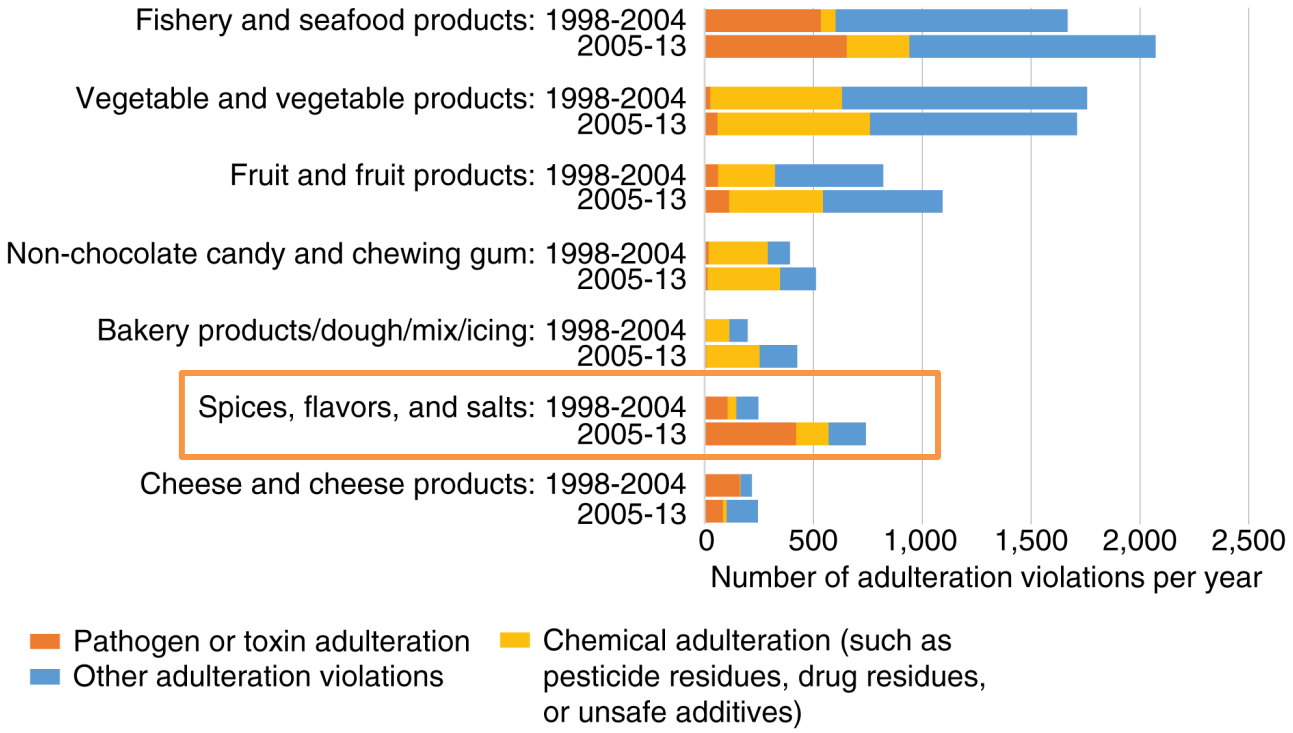
Import share of U.S. food consumption, 2011-13



Source: USDA, Economic Research Service calculations based on data from U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Database; and USDA, National Agricultural Statistics Service, various reports.

Adulteration violations in FDA import refusals, by violation type and product category

https://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=79063



FDA = U.S. Food and Drug Administration.
Note: FDA uses risk-based criteria to determine which imported food shipments are inspected, rather than a random sample.
Source: USDA, Economic Research Service using data from U.S. Food and Drug Administration, Operational and Administrative System for Import Support database.

Why are some herbs and spices contaminated?

- Lead contaminated soils
  - Airborne emissions from leaded gas
  - Pollution, smelters, battery manufacturing plants
- Contamination during processing
- Exterior lead paint
- Intentional adulteration

How much lead is unhealthy ?

- WHO limit = 0.1 ppm for baby formula
- FDA
  - candies > 0.1 ppm is adulterated
  - action level = 0.5 ppm for food intended for consumption by children
  - 10 ppm for other natural-source food color additives
- State of NY
  - Level of concern= 1 ppm
  - Class 2 recall= 25 ppm

Note: 1 ppm= 1 mg/kg when used for the mass of a solid substance

Benefits of Spices

- **Useful**
  - **Medicinal**
  - **Aromatic**
  - **Flavorful**
- **Historical and cultural significance**
  - **Using spices for thousands of years**
  - **Binds the culture together**

SAMPLING SPICES AND CULTURAL PRODUCTS AT LEAD INVESTIGATIONS

Breaking down cultural barriers

- Number one is to find source of lead so your child gets better.
- Ask, “What do you think is the source of lead?”
- Listen without judgement.
- Show empathy.

Questions for parents

- Does the child/ mother consume any herbs, vitamins, teas, or supplements from other countries?
- Do you use any ceremonial powders?
- Do you grow your own spices or herbs?
- Has your child consumed any imported candy?

Fill out the Spice Survey

- Last page with product information is especially important
- Take a picture of each product
- Attach pictures and completed survey to the Child event in NCLEAD

EHS Interviewer Name: Child NCLEAD ID: Date:

Spice and Home Remedy Survey

Instructions to Interviewers: Please administer this survey to the child's primary caregiver during your lead investigation if you suspect spices, herbal remedies, or imported drinks may be the child's source of lead exposure. If possible, you may want to take pictures of the food labels for any samples you collect. ***If parent cannot tell you exactly how much of a substance they use or eat, please have them show you how they measure it and then you can estimate the amount.***

1. Does your child currently drink any **formula**?
   - ○ Yes
   - ○ No
2. Is your child currently **breastfeeding**?
   - ○ Yes
   - ○ No
3. Does your child currently drink any **tea**?
   - ○ Yes
   - ○ No
4. Does your child currently drink any **coffee**?
   - ○ Yes
   - ○ No

How Should I Sample these Products?

1. **Collect at least 5 – 10 grams** to allow sufficient amount for retesting if necessary

(up to the 5 to 10 ml mark on the digestion bottles)

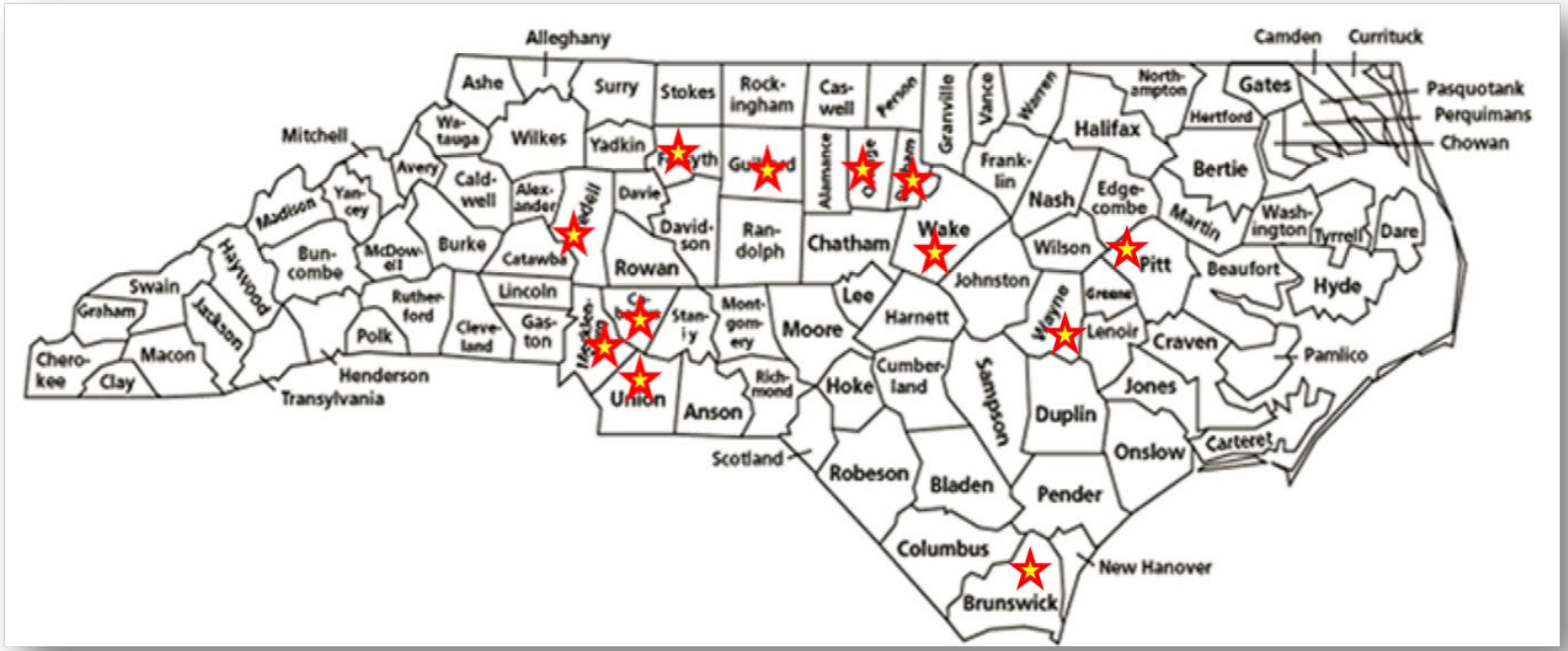
2. **Fill out a <u>separate</u>** chain of custody **form**
3. **Write Sample type= O** for “Other” for all sample types outside the wipes, paints and soil matrices.
4. **Write the name** of the spice or other product in the Sample description field.

NC State Laboratory of Public Health Process

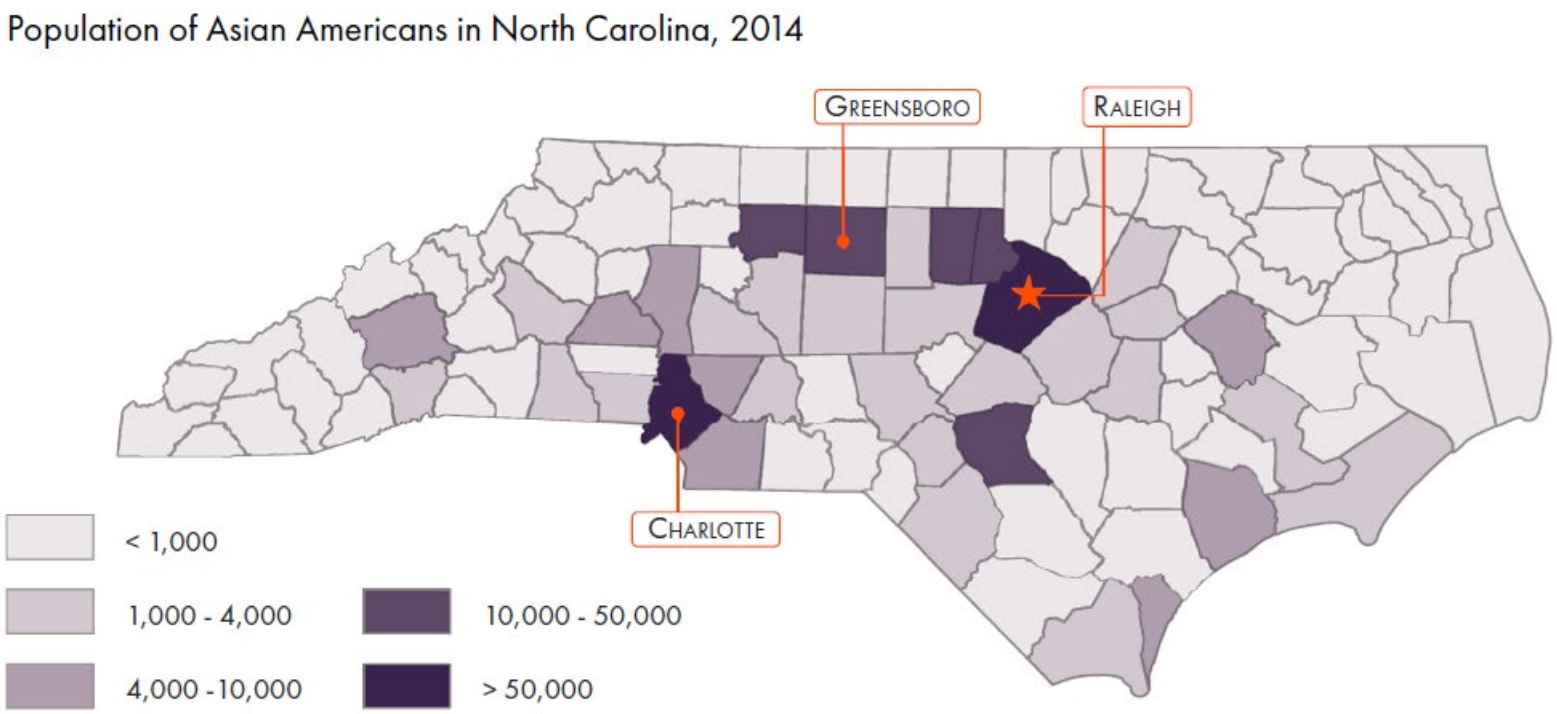
1. Initial screening using AA-MS
   - LOD= 15 mg/kg
   - Results available on https://celr.ncpublichealth.com/environmental
2. If result is < 15 mg/kg, then run sample through ICP-MS
   - LOD= 0.10 mg/kg
   - Results sent to lead investigator

LOD= Limit of detection
AA-MS= Atomic absorption mass spectrometer
ICP-MS= Inductively coupled plasma mass spectrometer

What do we know about Lead in spices in NC?



Spice and cultural product sample locations



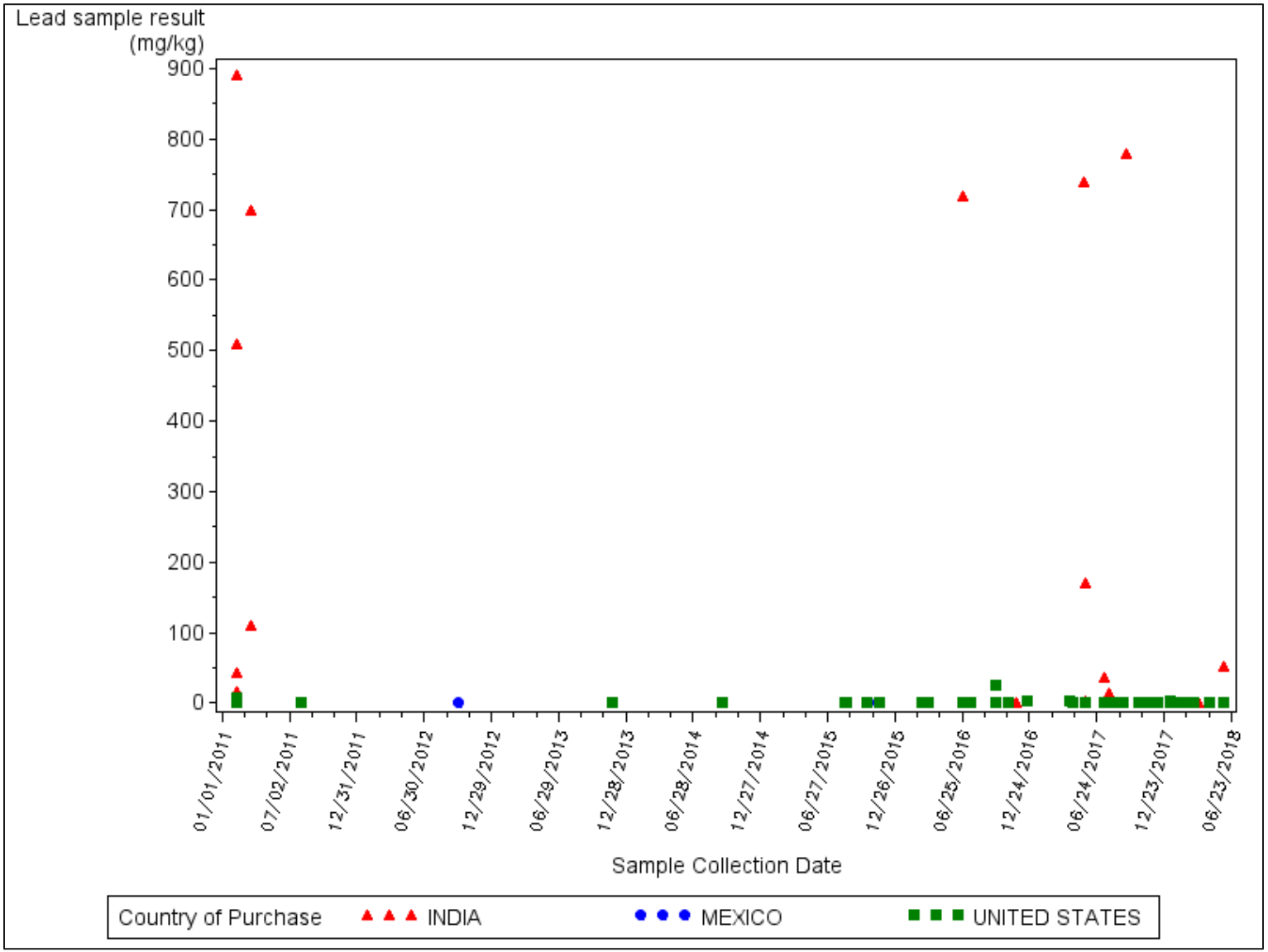
From 2000-2010, our population of Asian Americans grew by 85%!

Yee, A. “Asian Americans in North Carolina.” March 2016. *Institute for Southern Studies.*

Methods

- **Lead investigations**: 75 investigations conducted January 1, 2011 to August 1, 2018 where spices, herbal remedies, or ceremonial powders were sampled
  - NC State Laboratory of Public Health (SLPH) purchased ICP-MS in 2011
  - Gathered from NCLEAD
    - Childhood blood lead levels
    - Lead hazard information from investigation reports
    - Laboratory sample results from NC SLPH
- **Market Basket Samples**: Purchased August 23- November 14, 2017
  - Gathered from NC SLPH
    - Laboratory sample results for 50 spices and teas purchased by NC Child intern in 9 Research Triangle area stores

Lead Contamination (mg/kg) of Spices and Teas with Known Country of Purchase (n=155)



Spices/ food items containing an average of ≥1 ppm of lead

Spice	Number of samples	Average lead content (ppm)	Range (ppm)
Coriander	10	4.37	0.07-39.0
Cumin	22	1.46	0.07-9.80
Cinnamon	3	1.76	0.07-2.70
Candy	5	10.6	0.04-25.9
Turmeric	38	117	0.06- 890
Baby cereal	2	17.6	1.2-34.0
Salt	4	6.63	0.07-26.0

Turmeric from India

890 ppm

Turmeric from India

- Grown near Nepal
- Root crushed in iron container with a hammer
- Dried in the sun for 3-4 days
- Mailed to family and consumed for > 1 year
- Used on dried beans, vegetables and lentils
- .16 - .79 ppm sold in retail stores

Ground Cloves

- 23 ppm from Indian Store locally
- Grown in India, Pakistan, Sri Lanka
- Consumed for digestive problems
- Used to treat morning sickness with ginseng.

Cinnamon

2.5ppm

- Infant consumed ¼ tsp to ½ tsp on mashed sweet potato, oatmeal, mashed bananas for 6 months
- Ate oatmeal 1 X a day, mashed bananas, sweet potato 3 X per week

Chilies

1.4 ppm

21 ppm chilito en polvo

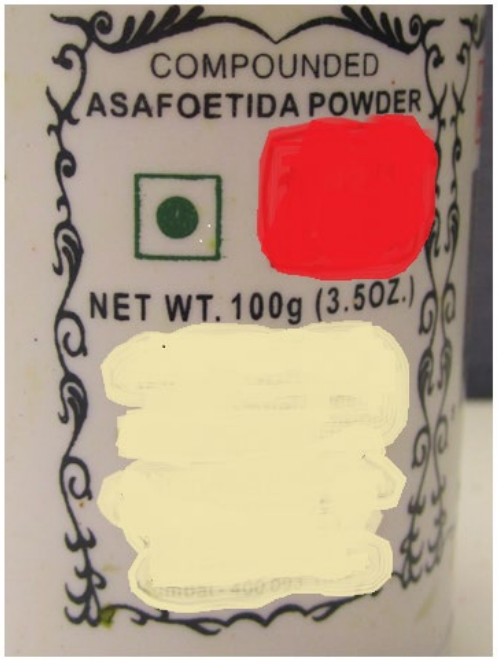
3.99 ppm chili garlic sauce

Stone Flower

- Lichen used to flavor and thicken meals
- Also known as dagad phool, poota, kalpasi, Rathipachi, Kallupachi, Celeyam
- Result=37.5 ppm lead

Asafoetida powder

- Aids digestion, relieves colic, and other medicinal uses
- Ground giant fennel
- 1 ppm



Teas

- Chamomile, tilia, orange pekoe tea .26-.78 ppm
- Mojhat ceremonial drink-31ppm
  - Aids digestion and milk production; pregnancy

Masala

.96 ppm
Sindhi Briyani

.401 ppm
Chole Masala

.246 ppm
Garam Masala

Malunggay leaves

Nursing mom
.337 ppm

Kabsa spice

- 19 ppm
- black pepper,
  saffron, cinnamon,
  cloves, nutmeg,
  bay leaves

Dietary Supplement
Balguti Kesaria

- Child consumed 2 pills/day for 3 months for cough and digestion

- Did not reach milestones

- 220ppm of lead

FDA warns consumers not to use Balguti Kesaria Ayurvedic Medicine due to high levels of lead

[8/4/2017] The U.S. Food and Drug Administration is warning parents and caregivers not to use “Balguti Kesaria (or Kesaria Balguti) Ayurvedic Medicine” due to the risk of lead poisoning.

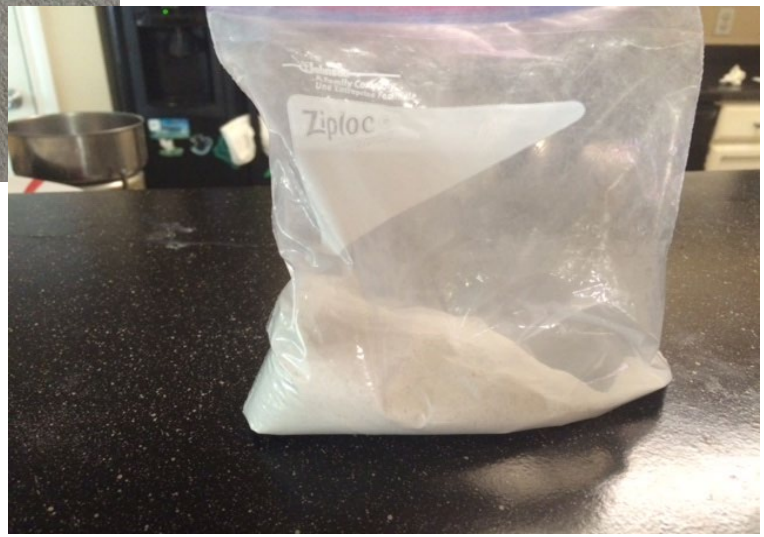
Folk Art and Ceremonial Powder

Rangoli

- Indian Folk art
- Rice, flour, sand
- Turmeric, sindoor (facial cosmetic) - colors can be added

4.15 ppm

Rangoli



Lead Levels:

- 110 µg/ft^2 on sidewalk
- 54 µg/ft^2 inside apartment, front entry
- Sample tested 1.6 ppm
- Used specialized cleaning techniques
- Now using sidewalk chalk

Kumkum

- Ceremonial powder from India
- Results as high as 140,000 ppm of lead

- 38 µg/ft^2 floor by worship table combination of kumkum and saffron

- Saffron - 16% lead by weight

Non-food substances also containing ≥ 1 ppm of lead

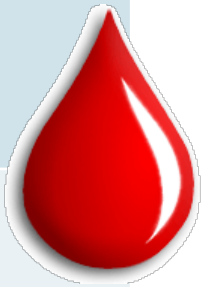
Substance	Number of samples	Average lead content (ppm)	Range (ppm)
Rangoli (chalk)	2	2.88	1.60- 4.15
Sindoor	7	47,315	1.9- 130,000
Kum kum	13	11,379	0.41- 140,000
Surma/ Kohl	1	68,000	N/A
Incense	4	6.98	1.9-15.7
Pooja Powder	1	65	N/A
Vibuti	3	80.3	2.9-140

The Dilemma: Modeling vs. Real Life

Amounts and frequency of consumption

Blood lead levels of Children (BLL) (n=78)

Test Type	Average (µg/dL)	Minimum (µg/dL)	Maximum (µg/dL)
Screening	17.3	5	64
Diagnostic	15.0	4	46



Samples for the child with the highest levels all came back < 1 ppm. No paint hazards were found.

Next Steps

- ✓ Lead investigators use survey to measure spice and herbal remedy intake in children during lead investigation

- ✓ Re-evaluate dietary and laboratory data with better source data

Acknowledgements

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Questions

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