Developing legislation to prevent lead exposure in North Carolina: 

*Housing, drinking water, and blood lead action levels*

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Introduction

Improving state-level action against childhood lead poisoning in NC:

1. Housing lead abatement
2. Testing drinking water for lead in childcare centers
3. Improving blood-lead level monitoring and intervention
Housing Lead Abatement

Jason Lee & Laura Appelt
Success of the Maryland Lead Prevention Program

- Drastic decline in children tested with BLLs > 10 ug/dL
  - 1993: 14,546
  - 2015: 377

- Today, three times as many childhood lead poisoning cases in owned homes vs. rental homes

- An estimated 27,500 children were prevented from having 10+ ug/dL BLLs, 1994-2015
Economic Benefits of the Maryland LPP

- Elevated childhood blood lead levels are correlated with lower IQ and educational achievement
- Effects are correlated with lower lifetime achievement and earnings
- Benefits of lead control are avoided losses in lifetime earnings

Source: Lanphear et al (2005)
Economic Benefits of the Maryland LPP

- Sum up prevented losses from 5-10 ug/dL group and 10+ ug/dL group
- The prevented losses to lifetime earnings from elevated BLLs, 1994 - 2015
  - Base case: $44.5 billion
- Sensitivity analysis using Monte Carlo simulation suggests this is on the low side
Economic Benefits of the Maryland LPP

- 10,000 random simulations in Excel model (Oracle Crystal Ball)
  - Average avoided losses (2017 USD):
    - $63.8 billion
  - Median avoided losses (2017 USD):
    - $62.8 billion

Monte Carlo analysis results of the avoided lost lifetime earnings
### Potential Risks in North Carolina

#### Comparison of MD and NC rental housing stock by risk categories for lead paint presence

<table>
<thead>
<tr>
<th></th>
<th>Maryland</th>
<th>Year Built (% Chance of Lead Paint)</th>
<th>North Carolina</th>
</tr>
</thead>
<tbody>
<tr>
<td>113,030</td>
<td>Pre-1950 (95%)</td>
<td></td>
<td>135,185</td>
</tr>
<tr>
<td>73,580</td>
<td>1950-1959 (80%)</td>
<td></td>
<td>95,417</td>
</tr>
<tr>
<td>216,329</td>
<td>1960-1979 (24%)</td>
<td></td>
<td>340,231</td>
</tr>
<tr>
<td>338,856</td>
<td>Post-1979 (0%)</td>
<td></td>
<td>817,771</td>
</tr>
<tr>
<td>741,775</td>
<td>Total</td>
<td></td>
<td>1,388,604</td>
</tr>
</tbody>
</table>

Comparison of MD and NC rental housing stock by risk categories for lead paint presence.
Lead in Housing: Policy Work with NC Child

- Policy recommendations aimed at decreasing lead exposure risks in housing
  - Maryland as a model
  - Rental housing
  - Owner-occupied housing

- Engagement with stakeholders
  - Community groups
  - Landlords
  - Homeowners associations
Lead in Housing: Abatement Funding Options

- Funding options for lead abatement activities on residential property
  - Grants
  - Loans
  - Tax Credits
- Options for eligibility criteria

Example: Maine Lead Hazard Control Program

- Rental housing: 0% deferred, forgivable, interest-free loans
- Owner-occupied housing: up to $16,000 in grant funding
- Owner or 50% of tenants must be below 80% of the median area income
- Covers paint abatement and window/door replacement
- Pre-1978 housing is eligible
Lead in Drinking Water
Megan Murray
Lead in Drinking Water

- Don’t want to repeat Flint, Michigan crisis
- NC Legislature already thinking about early detection and prevention
Our Work: Drinking Water

Statistics

- 50% built before 1978
- 22% built between 1979 and 1986
- 26% built between 1987 and 2013
- <1% built 2014 and later
Our Work: Drinking Water
Blood Lead Level Monitoring
Jordan Kozal
Blood Lead Action Levels (BLALs)

- CDC 2012 - Revised BLALs for infants and children (<6yrs)
  + Elevated 10-->5 ug/dL
  + Lead poisoning 20-->10 ug/dL

- CDC 2010 - Established BLALs for pregnant and lactating women
  + Same or similar to children’s BLALs
Healthy mothers, healthy babies...
NC was beginning to recognize this issue...

Blood Lead Levels are elevated in women from minority communities of lower socioeconomic status

- NC State Lab Pilot Study
  - Women of childbearing age with elevated BLLs are similar to national estimate (1%)

- Title V Maternal and Child Health Block Grant Program
  - High Risk Maternity and Maternal Health Clinics required to provide screening, testing, and education related to lead exposure

Adapted with modification from King et al. 2015
Issue Briefs and Infographics for lawmakers

Maternal Transmission of Lead
Why NC needs a Blood Lead Action Level for pregnant women

Statement of Problem
- Lead is a heavy metal that can be harmful to human health, especially to the developing brain. According to the Centers for Disease Control and Prevention (CDC), exposure to lead can cause neurological damage, developmental delays, and behavioral problems in children. Lead poisoning can also cause miscarriage, stillbirth, and premature birth in pregnant women.

Lead builds up in people's bodies throughout life.

- Lead is toxic because our bodies cannot tell the difference between lead and calcium. Our bodies need calcium, an important nutrient, for building strong bones. When we are exposed to high levels of lead, we may not get enough calcium, and our bones begin to eat lead instead of calcium. Lead that is passed to our babies is stored in our bodies, where it can stay for decades.

Lead resurfaces during pregnancy, with harmful effects.

- When a woman is pregnant or breastfeeding, her body begins taking calcium from her bones to support her baby's development. If a woman has been exposed to lead, the lead can be released from her bones and enter her bloodstream, affecting her baby's health.

Lead freely passes through the placenta from mother to fetus.

- Blood lead levels of the developing baby are nearly identical to those of the mother, and lead passes directly across the placenta. A mother who has dangerously high blood lead levels, such as this woman...

The CDC recommends the same blood lead action level for pregnant women as for infants and children (5 ug/dL).

NC should establish a Blood Lead Action Level of 5 ug/dL for pregnant women.

Primary prevention of the neurodevelopmental toxicity of lead in children can be achieved by intervening with pregnant mothers.

ISSUE AREA: BLOOD LEAD ACTION LEVEL FOR PREGNANT WOMEN

Statement of Problem
- Lead is a heavy metal that can be harmful to human health, especially to the developing brain. According to the Centers for Disease Control and Prevention (CDC), exposure to lead can cause neurological damage, developmental delays, and behavioral problems in children. Lead poisoning can also cause miscarriage, stillbirth, and premature birth in pregnant women.

Lead starts to harm a child's neurodevelopment in the womb, and the effects last a lifetime.

- Lead has been detected in fetal brains as early as the first trimester. This happens because the blood lead barrier in the fetus is immature and does not provide an effective barrier to lead. Maternal and cord blood lead levels are linked to increased risk of neurodevelopmental problems in children. The developmental neurotoxicity of lead is irreversible; children are generally exposed to lead after the time appropriate for your performance in school, reduced cognitive function, and increased behavioral symptoms that may continue into adulthood.

Without intervention, lead exposures will continue after the child is born.

- Once the baby is born, a woman begins to produce breast milk to feed her baby. To make the milk, her body mobilizes calcium (lead) stored in her bones, even more than during pregnancy. Thus, mothers with high blood lead levels may continue to expose their children during breastfeeding.

The same lead loads that the woman was exposed to during pregnancy will continue to expose the child. Identifying and stopping these hazards when the woman is pregnant will prevent additional exposures and protect the child's health.

NC should establish a Blood Lead Action Level of 5 ug/dL for pregnant women.

Primary prevention of the neurodevelopmental toxicity of lead in children can be achieved by intervening with pregnant mothers.

06/17/17
Infographics for pregnant women
Main Effects
- Lowers BLALs for infants and children (<6yrs)
- Included pregnant women as a group the law is intended to protect

NC is now up to date with CDC guidelines for children and is one of the first states to provide statutory protection for pregnant women!
Any Questions?

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