



Childhood Lead Exposure

A Public Health Nutrition Perspective

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APE Site: Wilson County Health Department

About Me



- Public Health Nurse - Wilson County Health Department
- WIC & School Nurse
- Maternal-Child Health Focus
- Rural Community Practice
- Mom of three, and step mom of three
- Proud Marine Mom and Wife



Project Overview

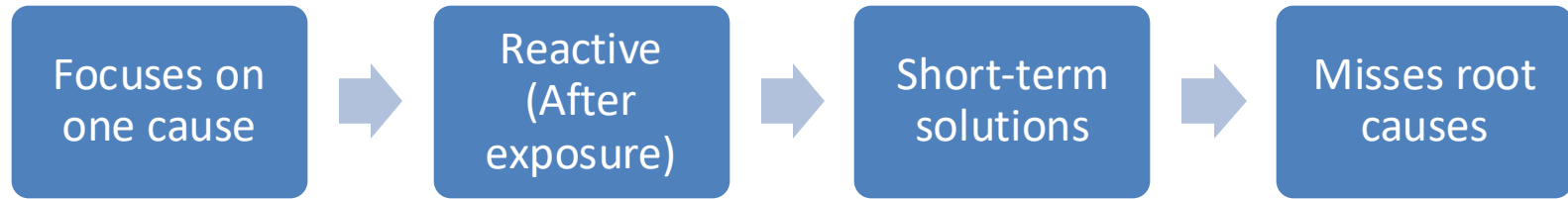
- Childhood lead exposure is preventable
- Children are highly vulnerable
- **Nutrition influences lead absorption**
- Rural communities face increased risk
- Systems thinking guides intervention

Nutrition influences lead absorption!

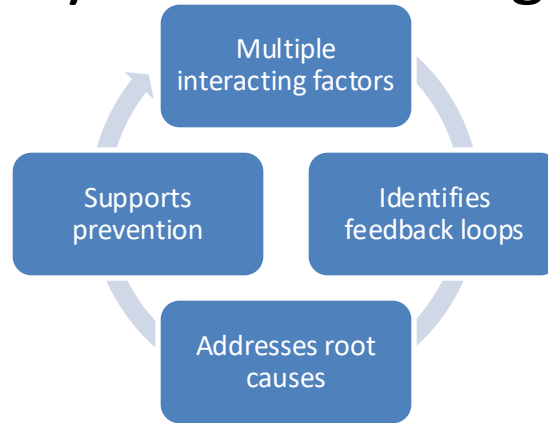


Why Systems Thinking?

Traditional Approach



Systems Thinking



Key Variables Influencing Lead Exposure



Nutrition

- Iron deficiency
- Low calcium intake
- Poor diet quality



Socioeconomic

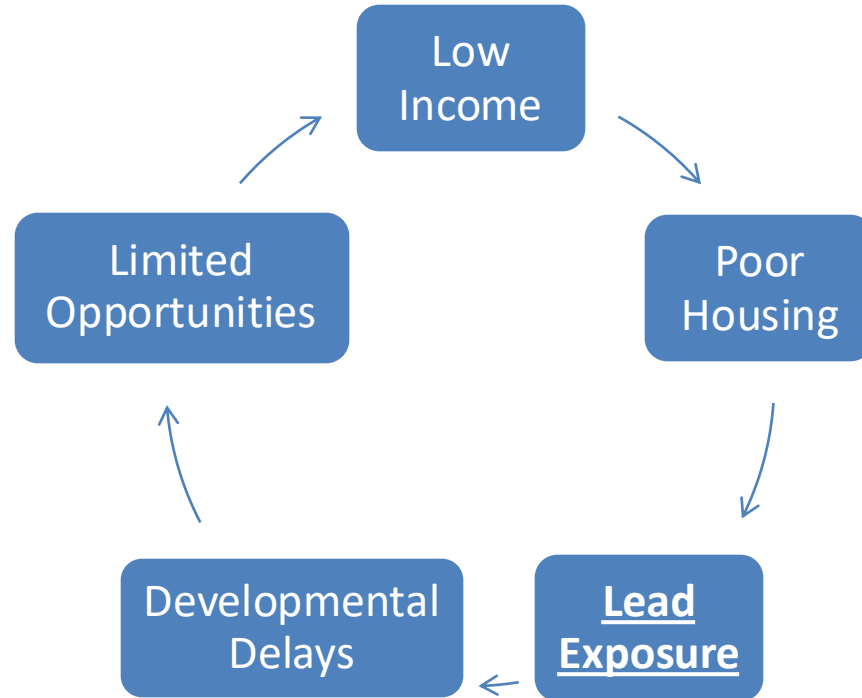
- Poverty
- Food insecurity
- Limited access to care



Environment

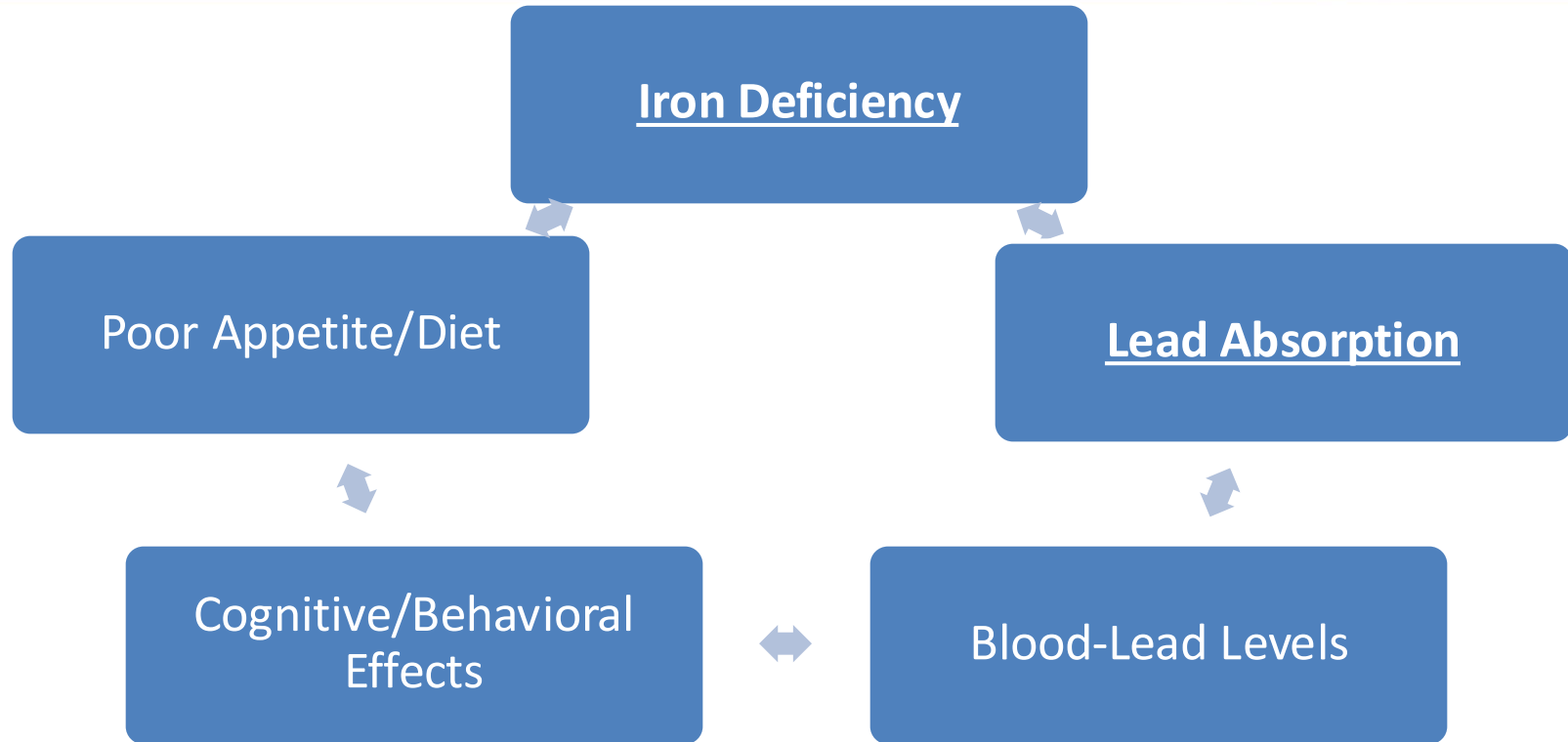
- Aging housing
- Lead-based paint & dust
- Contaminated soil/water

Poverty & Environmental Exposure Cycle



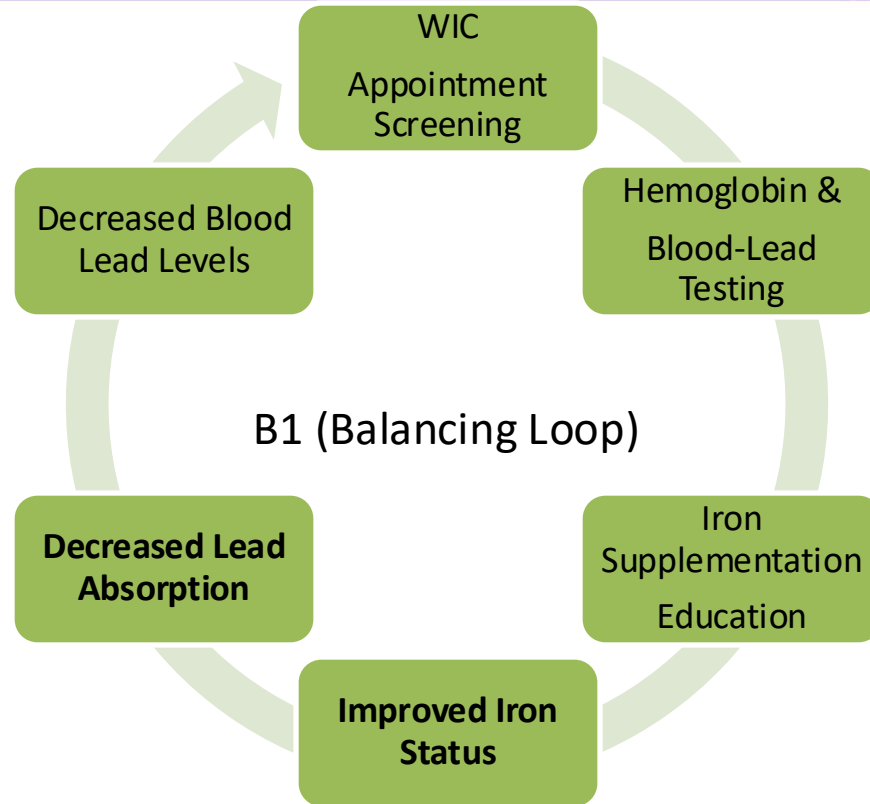
Addressing housing isn't enough, we have to look at the big picture.

Nutrition & Lead Absorption Cycle



Nutrition directly influences lead absorption

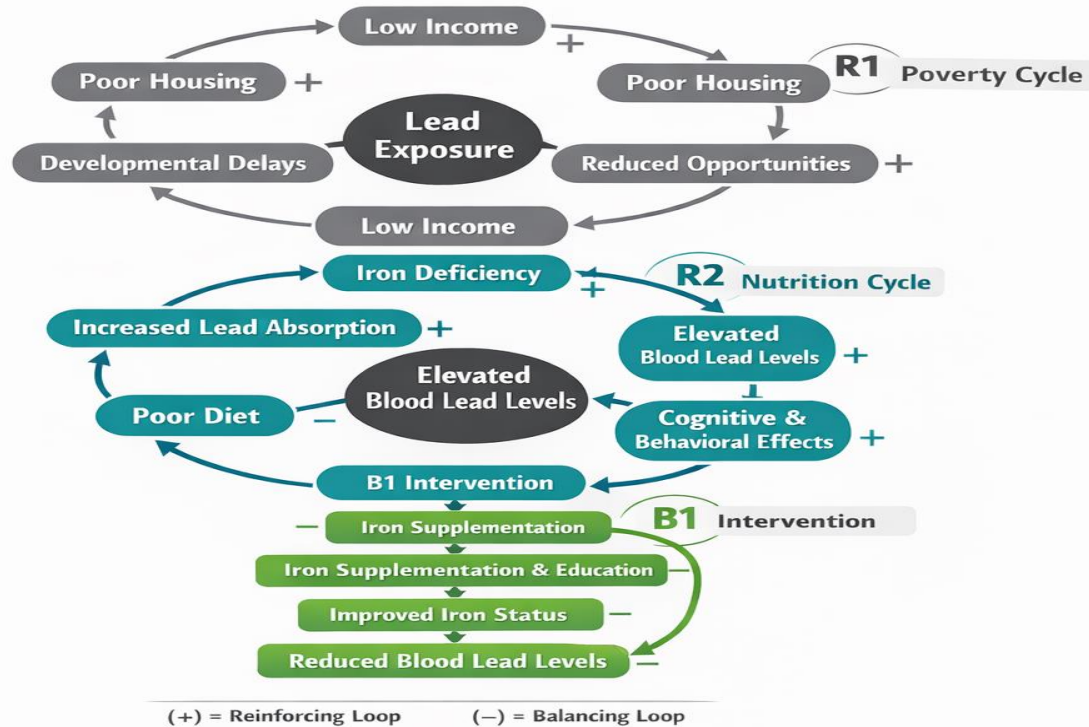
My Public Health Intervention – WIC & Nutrition



Public health interventions can disrupt the cycle!

Causal Loop Diagram of Childhood Lead Exposure

Causal Loop Diagram of Childhood Lead Exposure



Public Health Implications

- Nutrition reduces lead absorption
- Environmental sources must be addressed
- Early screening is critical
- Rural communities face higher risk
- Multi-level interventions are needed

No single intervention is enough.

Now for the FUN! My Project!

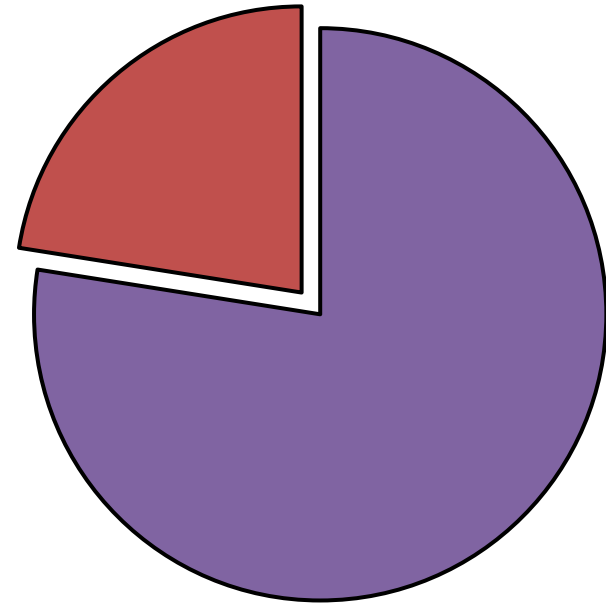
Wilson County, Kansas: Our Community

- Rural county in southeast Kansas
- Population: ~8,000–9,000 residents
- Limited access to healthcare and specialty services
- Higher risk for older housing and environmental exposures
- Transportation and resource barriers for many families
- Strong reliance on local public health programs (WIC, screenings, outreach)

Local 2025 Blood Lead Data

2025 Blood Lead Levels – Wilson County

Kansas



■ Normal <3.3 ■ Elevated >3.5

- ~40 children screened in 2025
- Nine elevated levels
- Highest level: **20.3 $\mu\text{g}/\text{dL}$**
- Most cases are children ages 1–2

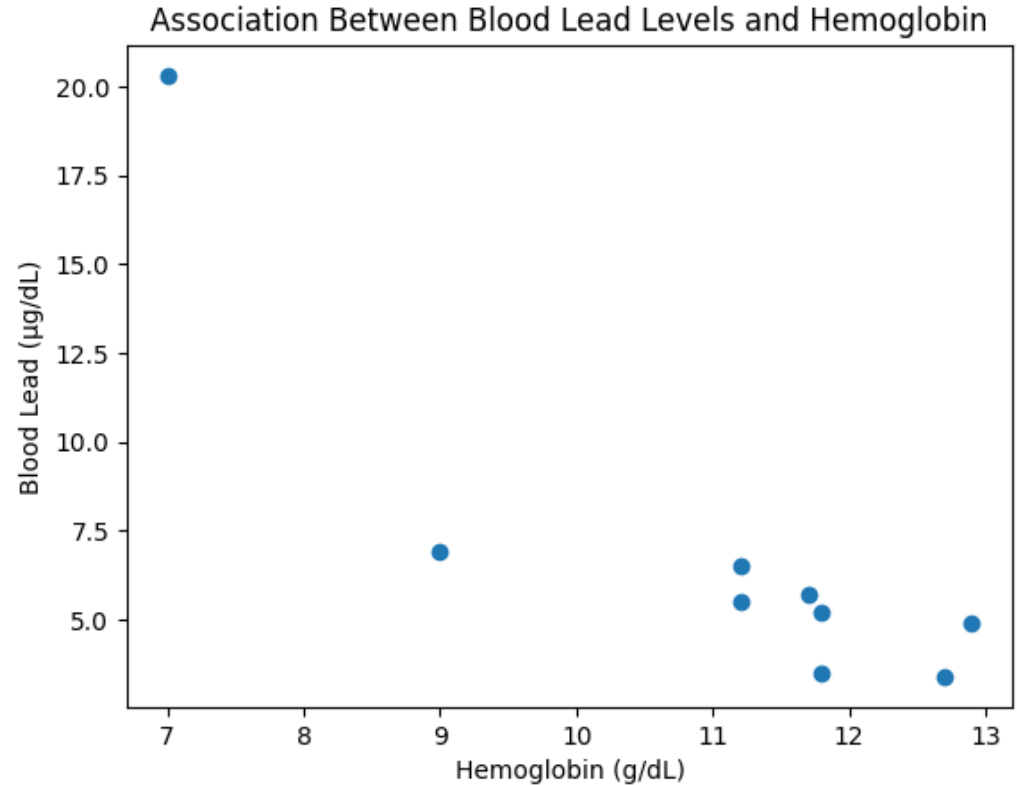
23% of children tested were >3.4

One out of every four children we tested are being poisoned from Lead!

Lead Exposure and Its Impact on Hemoglobin Levels

- Elevated blood lead levels
- Lower hemoglobin
- 20.3 $\mu\text{g}/\text{dL}$ with Hgb 7.0**
- Suggests increased risk for anemia in exposed children

Disalvo et al., 2025



Brochure – Product 1

When to Call Your Child's Healthcare Provider

You should contact your child's doctor if:

- Your child's blood lead level is 3.5 µg/dL or higher
- Your child lives in or regularly visits a home built before 1978
- You have concerns about lead in your home, water, or environment

Call your child's healthcare provider to schedule an appointment to confirm the result and discuss next steps.

What to Say to Your Child's Doctor?

"Hello, I'm calling because my child was seen at the Wilson County Health Department and had a blood lead screening. Their blood lead level tested at _____. I was advised to schedule an appointment to confirm this result and discuss how to reduce lead exposure."

Common Sources of Lead Exposure

- Peeling or chipped paint in homes built before 1978
- Household dust from old paint or renovations
- Soil near older homes or roadways
- Drinking water from lead pipes or fixtures
- Some imported spices, pottery, toys, or cosmetics

How to Reduce Lead Exposure

- Wash your child's hands often, especially before eating
- Wet-clean floors, windowsills, and surfaces to reduce dust
- Use cold tap water for drinking and cooking
- Let tap water run for 1–2 minutes before use
- Avoid sanding or scraping old paint without proper safety measures

Contact Us

Wilson County Health Department
421 N. 7th
Fredonia, KS 66736
620-378-4455 (phone)
620-378-4647 (Fax)
wlhealth@wilsoncountykansas.org



Wilson County Health Department

BLOOD LEAD

Understanding Your Child's Blood Lead Level



Your Child's Blood Lead Result

- Blood lead levels are measured in micrograms per deciliter (µg/dL).
- If your child's blood lead level is 3.5 µg/dL or higher, follow-up testing and guidance are recommended.
- This screening helps us monitor exposure, but it does not replace medical care
- **Most children with elevated levels do not look sick, which is why testing is important.**

Blood Lead Levels in Children: What the Numbers Mean

____ Below 3.5 (CDC reference value). Low lead level, but no amount is completely safe. Continue prevention. Typically, no symptoms.

____ 3.5 – 4.9 - Elevated – Above recommended level. Repeat testing and prevent exposure. Often no symptoms, but it may affect learning or attention over time.

____ 5.0 – 9.9 - Moderately elevated – Concerning level. Medical follow-up and environmental investigation are recommended. May impact learning, behavior, attention, or cause irritability, often no clear symptoms.

____ 10 – 19.9 - High – Significant exposure. Prompt medical follow-up and immediate exposure reduction are needed. May cause developmental delays, learning difficulties, behavior changes, or stomach pain.

____ 20 – 44.9 - Very high – Serious exposure. Urgent medical and environmental intervention required. May cause fatigue, irritability, poor appetite, abdominal pain, headaches, or developmental regression.

____ 45 or higher - Extremely high – Medical emergency. Immediate treatment and possible hospitalization required. May cause vomiting, confusion, seizures, severe anemia, or lasting developmental harm.

What is lead?

Lead is a toxic metal that can be found in old paint, dust, soil, water, and some household items. There is no safe level of lead in the body, especially for children.

What is a blood lead test?

A blood lead test measures the amount of lead in your child's blood. This test helps identify exposure so steps can be taken to reduce future contact and protect your child's health.



Why is lead a concern for children? Most children with elevated levels do not look sick, which is why screening is important.

Lead affects the developing brain and nervous system. Even low levels can impact:

- Learning and attention
- Behavior and impulse control
- Growth and development
- Hearing and speech

Children are more vulnerable than adults because their bodies absorb lead more easily.



Brochure – Product 2

What is hemoglobin?

Hemoglobin is a protein found in red blood cells. It carries oxygen from the lungs to the rest of the body. Oxygen is needed for your child's brain development, growth, energy, and overall health.

Why is hemoglobin important?

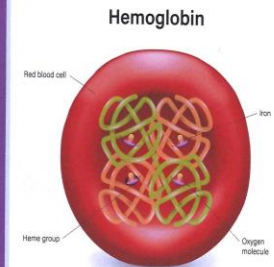
When hemoglobin is low, the body does not get enough oxygen. This can cause:

- Tiredness or low energy
- Pale skin
- Poor appetite
- Trouble with learning, attention, or behavior
- Slower growth and development

Low hemoglobin is often related to low iron levels, which is common in young children.

Follow-up

- WIC will re-check hemoglobin at the next appointment if levels are 11.5 or lower
- Medical follow-up is important to confirm results and address your child's individual needs
- If you have questions, please contact the Wilson County Health Department or your child's healthcare provider.



Contact us

WILSON COUNTY HEALTH
DEPARTMENT
421 N. 7TH
FREDONIA, KS 66736
620-378-4455 (PHONE)
620-378-4647 (FAX)
WLHEALTH@WILSONCOUNTYKANSAS.ORG



Hemoglobin Levels in Children



Hemoglobin Levels in Children: What the Numbers Mean

____ 12.0 or higher - Normal - Hemoglobin level is healthy for most children. Usually no symptoms. A child typically has normal energy, appetite, and growth.

____ 11.6 – 11.9 - Low-Normal - Slightly low but not concerning at this time. Often no symptoms. May watch diet and iron intake.

____ 11.0 – 11.5 - Mildly Low - Below the recommended range. Needs monitoring and follow-up. Mild tiredness, pale skin, picky eating, lower energy, may get sick more often.

____ 10.0 – 10.9 - Moderately Low - More noticeable low hemoglobin. Medical follow-up is important. Fatigue, pale skin, poor appetite, irritability, slower growth, trouble concentrating.

____ 8.0 – 9.9 - Low - Significant anemia. Needs prompt evaluation by a healthcare provider. Very tired, weak, shortness of breath with activity, pale lips or gums, fast heartbeat.

____ Below 8.0 - Very Low - Serious level. Requires urgent medical evaluation. Extreme fatigue, rapid breathing, fast heart rate, dizziness, poor appetite, and possible fainting.

When to Call Your Child's Healthcare Provider

You should contact your child's doctor if:

- Your child's hemoglobin is 10.9 or below
- Your child appears very tired, pale, or is not eating well
- You have concerns about iron intake or nutrition

Call your child's doctor's office to schedule an appointment to confirm this result and discuss next steps.

What to say?

You may use the script below when calling:

"Hello, I'm calling because my child was seen at the Wilson County Health Department during a WIC appointment. Their hemoglobin level tested at _____. I was advised to schedule an appointment to confirm this number and discuss my child's health and possible iron needs."

How to Help Raise Low Hemoglobin Levels

If recommended by your healthcare provider or our Registered Dietitian, hemoglobin levels may improve with:

Iron-Rich Foods

- Iron-fortified cereal
- Lean meats (beef, turkey, chicken)
- Eggs
- Beans and lentils
- Peanut butter
- Dark green vegetables (spinach, broccoli)

Vitamin C Helps Iron Absorption

Pair iron foods with:

- Oranges or orange juice
- Strawberries
- Tomatoes
- Bell peppers

Iron Supplements

- Only give iron supplements if prescribed by your child's healthcare provider
- Too much iron can be harmful

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Prenatal Vitamins – Product 4

Vitamin Angels:

Supporting Women of Childbearing Age

- Provides **multivitamins** to women in need
- Targets women of **childbearing age, pregnancy, and postpartum**
- Helps prevent **micronutrient deficiencies** (iron)
- Supports **healthy pregnancies and fetal development**
- Improves access in **rural and underserved communities**

Application to My APE

- Wilson County Health Department
- WIC nutrition services & education
- Lead screening and follow-up
- Prenatal & infant health education
- Serving a rural population



Bridging nutrition and environmental health in practice



Competency ILE

Public Health Foundational Objective #7

Effects of environmental factors on population health

How I Met This Competency:

- Conducted lead screenings
- Identified rural environmental risk factors
- Recognized needs in underserved populations



Competency ILE

Public Health Foundational Objective #9

Design a public health intervention

How I Met This Competency

- Developed a lead exposure prevention project
- Created a community flyer for education and awareness
- Focused on practical, easy-to-understand prevention strategies

Competency ILE

Public Health Foundational Objective #11

Evaluate public health programs

How I Met This Competency

- Evaluated lead screening outcomes in the community
- Tracked blood lead levels (WNL vs elevated)
- Participated in follow-up and monitoring processes



Competency ILE

Public Health Foundational Objective #19

Communicate public health information to non-academic audiences

How I Met This Competency

- Developed a blood lead prevention flyer for community use
- Provided WIC counseling using simple, practical language
- Delivered community education on lead exposure and prevention



Competency ILE

Public Health Foundational Objective #22

Apply systems thinking to a public health issue

How I Met This Competency

- Developed a blood lead exposure model
- Identified connections between:
 - Housing conditions → exposure → health outcomes
- Examined long-term impacts on:
 - Neurodevelopment, education, and income



Competency ILE – Public Health Nutrition

PHN Competency #1

Information literacy of public health nutrition

How I Met This Competency

- Applied evidence-based nutrition guidance in lead exposure prevention
- Incorporated iron and calcium education to reduce lead absorption
- Utilized Vitamin Angels program to address nutrient deficiencies



Competency ILE – Public Health Nutrition

PHN Competency #2

Compare and relate research into practice

How I Met This Competency

- Applied nutrition research to WIC counseling and education
- Incorporated prenatal nutrition recommendations into practice
- Connected research to real-world interventions in maternal and child health



Competency ILE – Public Health Nutrition

PHN Competency #3

Population-based health administration

How I Met This Competency

- Worked within WIC program to support maternal and child health
- Implemented Vitamin Angels program in an underserved rural community
- Identified gaps in access to nutritious foods in a food desert



Competency ILE – Public Health Nutrition

PHN Competency #4

Analysis of human nutrition principles

How I Met This Competency

- Applied nutrition principles to reduce lead absorption risk
- Educated on the role of:
 - Iron
 - Calcium
- Connected nutrition to disease prevention in children and pregnant women



Competency ILE – Public Health Nutrition

PHN Competency #5

Analysis of nutrition epidemiology

How I Met This Competency

- Interpreted hemoglobin and blood lead levels
- Identified trends and risk factors within the population
- Used data to guide education and intervention strategies

Conclusion



- Lead exposure is preventable
- Influenced by multiple systems
- Nutrition plays a critical role
- Rural communities face added challenges
- Integrated interventions are essential

Prevention requires addressing both environment and nutrition

Acknowledgements

- Committee members:
- Mark Haub – Major Professor
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- Priscilla Brenes MPH, Ph.D
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- Wilson County Health Department Team
- Amy Lell Administrator
- Stephany Hufford Administrative Assistant
- Shanette Smith LPN
- Brenda Stoneburner RD WIC

And Especially all my professors!

Ready to serve: Building a 'Day 1 Ready' public health workforce scholarship

Thank you for the opportunity to grow as a public health professional through this program. This experience has helped me become more confident in applying public health knowledge to real-world settings and better prepared to serve my community.

Thank You Wilson County Health Department Friends!

**Thank you to my wonderful friends at the Wilson
County Health Department!**

**Thank you for your listening ears, support with this
project, and help picking up where there just wasn't
enough of me to go around.**

I couldn't have done this without you.

Thank You Friends and Family!

Thank you to my family and friends for your constant support, encouragement, and patience throughout this journey.

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References

- Disalvo L, Varea A, Matamoros N, Sala M, Fasano MV, González HF. Blood Lead Levels and Their Association with Iron Deficiency and Anemia in Children. *Biol Trace Elem Res*. 2025 Jan;203(1):69-75. doi: 10.1007/s12011-024-04163-y. Epub 2024 Apr 3. PMID: 38568334.
- Hegazy AA, Zaher MM, Abd El-Hafez MA, Morsy AA, Saleh RA. Relation between anemia and blood levels of lead, copper, zinc and iron among children. *BMC Res Notes*. 2010 May 12;3:133. doi: 10.1186/1756-0500-3-133. PMID: 20459857; PMCID: PMC2887903.

Questions



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