The System of EHDI:

A Socioeconomic Analysis in the State of Iowa (2015-2018)

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Findings from the Most Recent Research…

"National estimates for the prevalence of infant HL (*1-3 per 1,000*)."

"HL was more than **2** times higher among minority infants from low-income urban neighborhoods (*OR:2.45*)."

"Families with children who were D/HH were more likely to report poorer health status, live closer to poverty level, single mother households, and recipients of Medicaid."

The Non-Genetic Risk Factors for Infant Hearing Loss that Follow a Socioeconomic Gradient

Low Birth Weight

In the US, the rate for low birth weight is highest among Black infants, followed by Asian Pacific Islanders and American Indian.

NICU > than 5 Days

NICU admissions are most common among lower income brackets. The most common risk factor for NICU is premature birth.

Assisted Ventilation

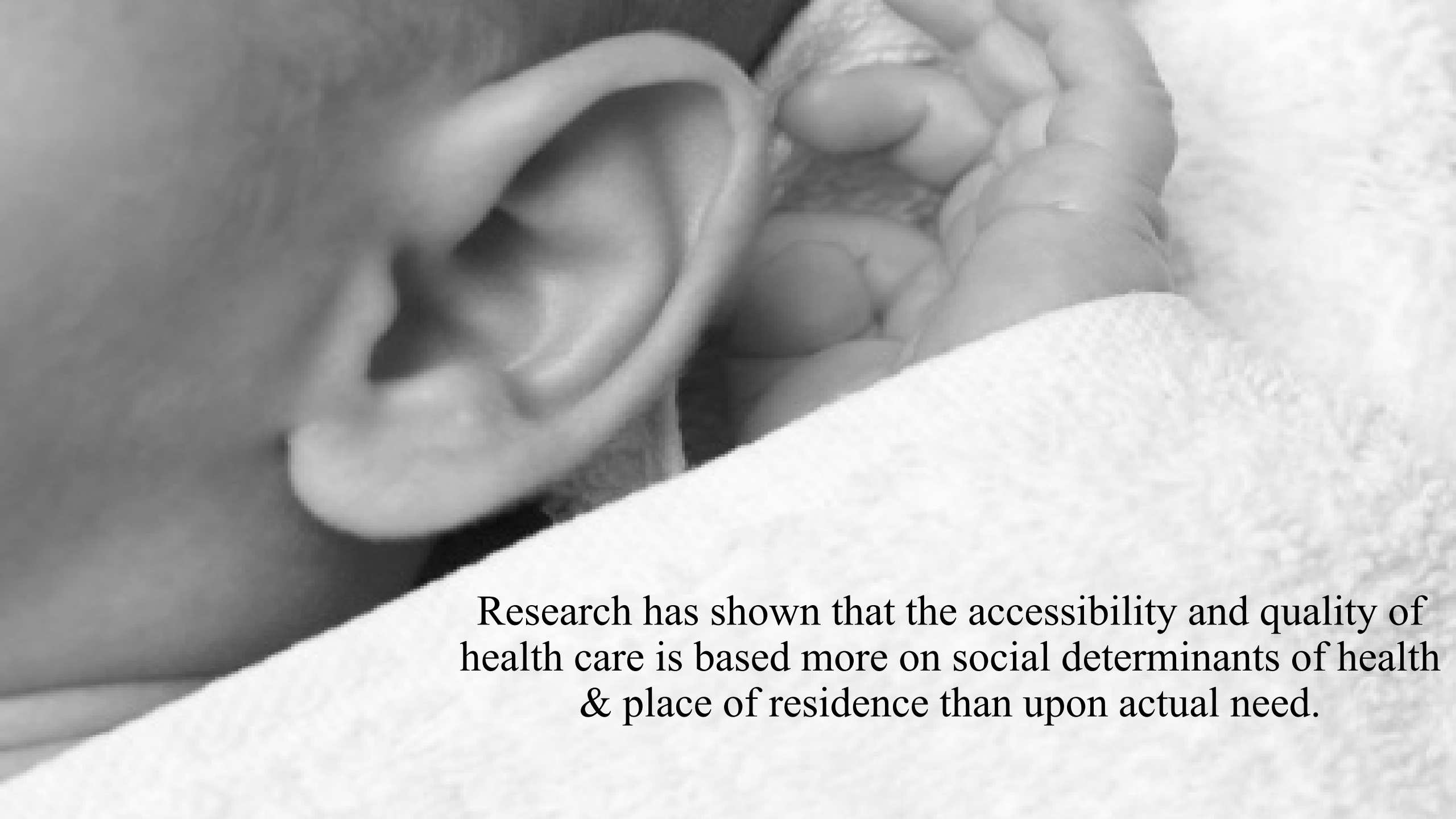
The 2nd most common reason to be admitted to NICU is issues with respiratory development. Most common among premature babies.

Prematurity

Black moms have the highest risk (60% more likely) for preterm delivery followed by American Indian & Hispanic mothers.

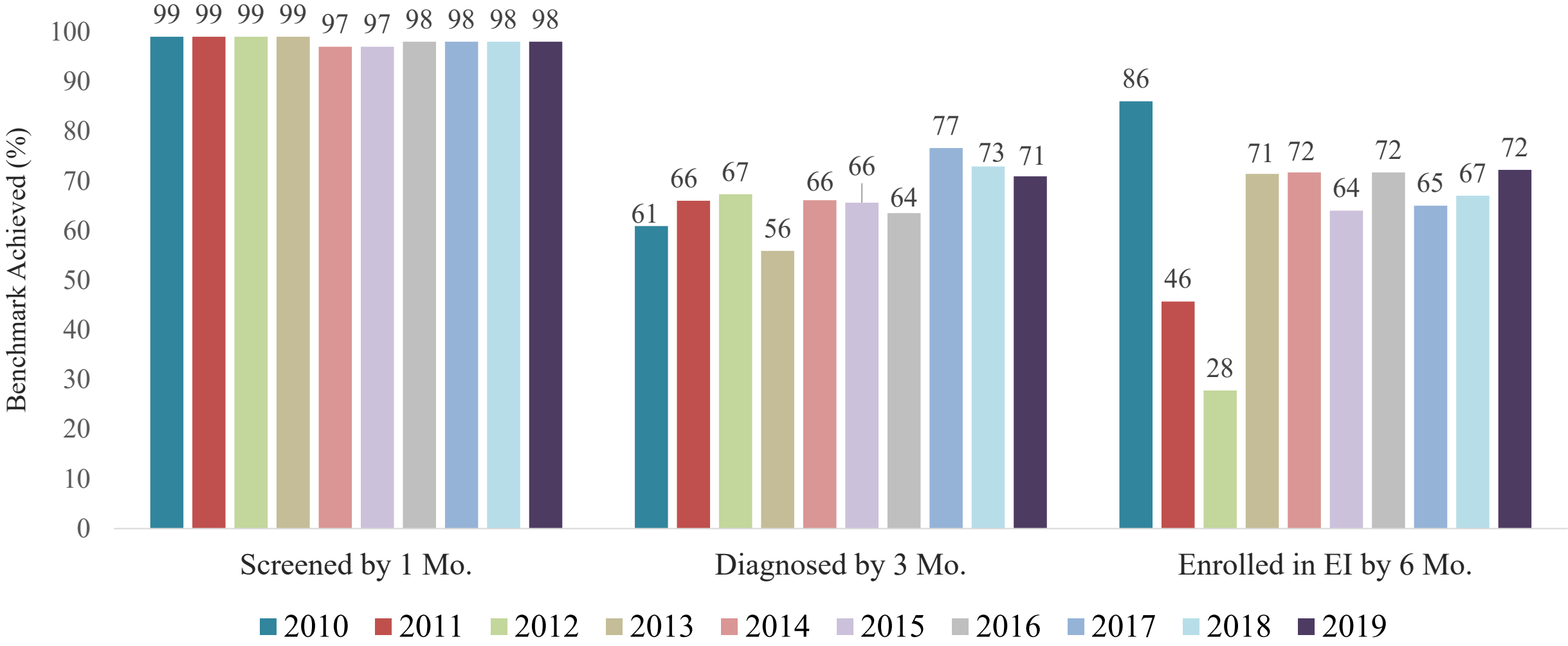
Maternal Infections

(CMV, Herpes, HIV, Hepatitis B, Syphilis) CMV is the most common congenital infection and affects 1 in 200 infants. It is the leading non genetic cause of childhood HL.



Research has shown that the accessibility and quality of health care is based more on social determinants of health & place of residence than upon actual need.

How Does Iowa Perform with 1-3-6 Goals?

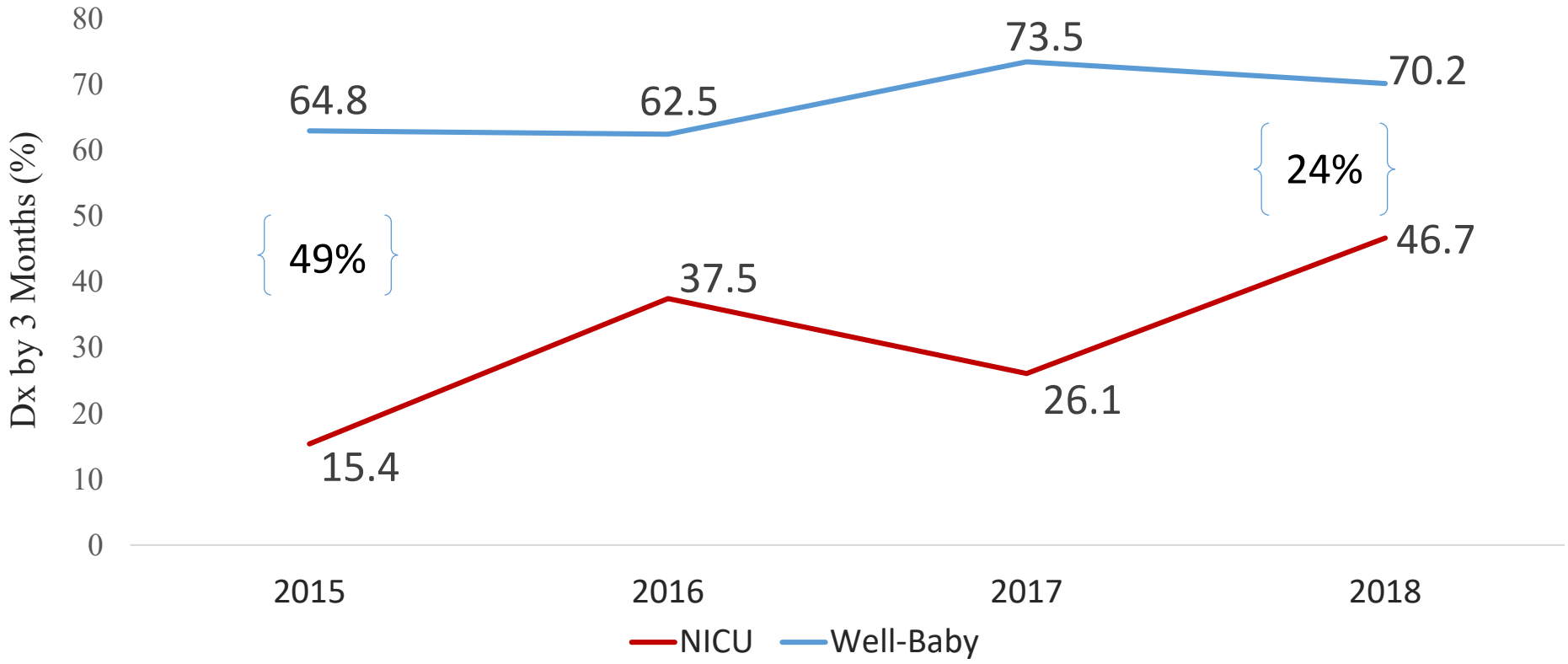


CDC & HRSA require the state must achieve a minimum diagnosis rate or 85% by 2024.

What We Have Learned So Far About Infants That Fail Their Birth Screen (BS) and Need a Diagnostic?

1) Infants who fail their BS are a completely different population compared to those who pass.
2) From 2015-2018, the % of NICU babies born in Iowa was 9.2% compared to infants who failed their final birth screen (16%) & those who were diagnosed with HL (22%).

Chart 1: The % Diagnosed with HL By 3 Months of Age (2015-2018)



What are the Statistically Significant Factors that Increase the Odds for Delayed Diagnosis (> 3 Mo.)?

- NICU infants are **4.5** times more likely to be diagnosed > 3 mo. of age compared to Well-Baby infants.

- Infants with Black mothers are **2.8** times more likely diagnosed > 3 mo. of age with HL compared to infants of mothers who were not Black.

- Infants with mothers less than 25 years are **66%** more likely to be diagnosed > 3 mo. of age for TH compared to mothers who were ≥ 25 years.

What are the Measures and Trends to Explore?

Geographic Variation

County of Birth & Residence &
Metro (>50 k) vs. Non-Metro

Socioeconomic Disparity

Race/Ethnicity, Education, Age of Mother, Marital Status, Medicaid

Loss to Follow Up (LFU):

LFU = Any infant who does not pass their final birth screen (BS) and receive the recommended diagnostic assessment.

Why is LFU so Critical to Address?

1. Represents some of the most underserved populations within EHDI

2. LFU prevents D/HH infants from receiving key intervention services

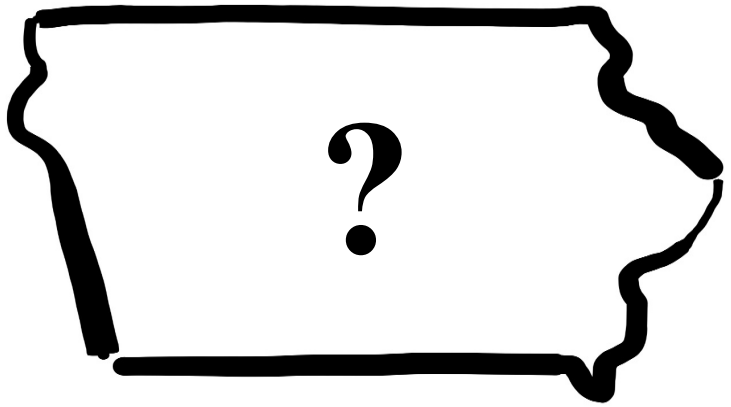
3. Magnifies disparity in communities with already poor social determinants of health

4. Overall, it prevents EHDI programs from achieving their goals

What Factors in the Literature Increase the Likelihood of LFU after a Failed Hearing Screen?

Rural Residence

Minority Race

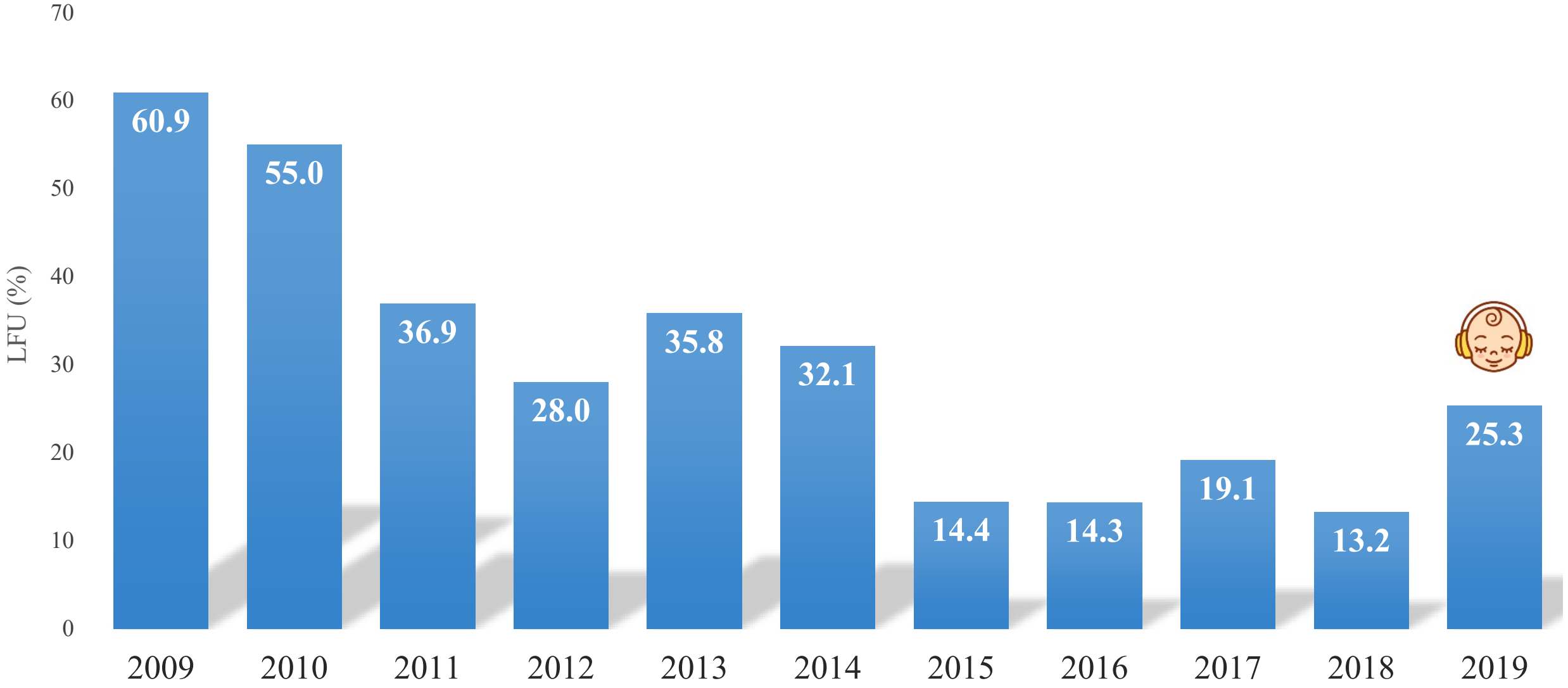


Lower Levels of Maternal Education

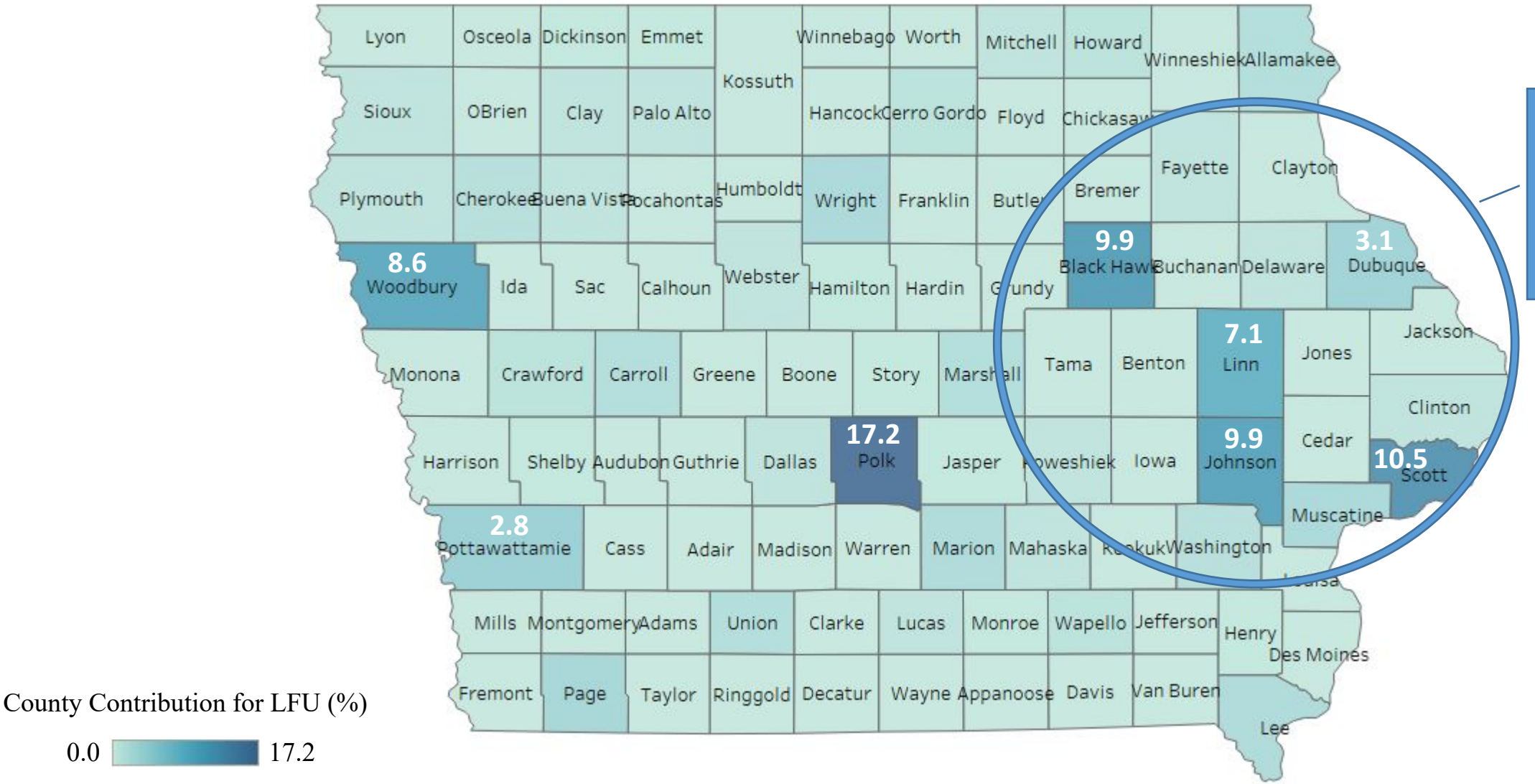
Non-WIC participation

However, few studies have explored the socioeconomic factors at a deeper level, particularly the difference between race/ethnicity among non-metro and metro locations of residence.

The LFU (%) Among Infants Who Fail Their Final Hearing Screen in the State of Iowa By Year



The % of County Contribution for LFU Among Infants who Failed their BS and Need Diagnostics, by County of Final BS

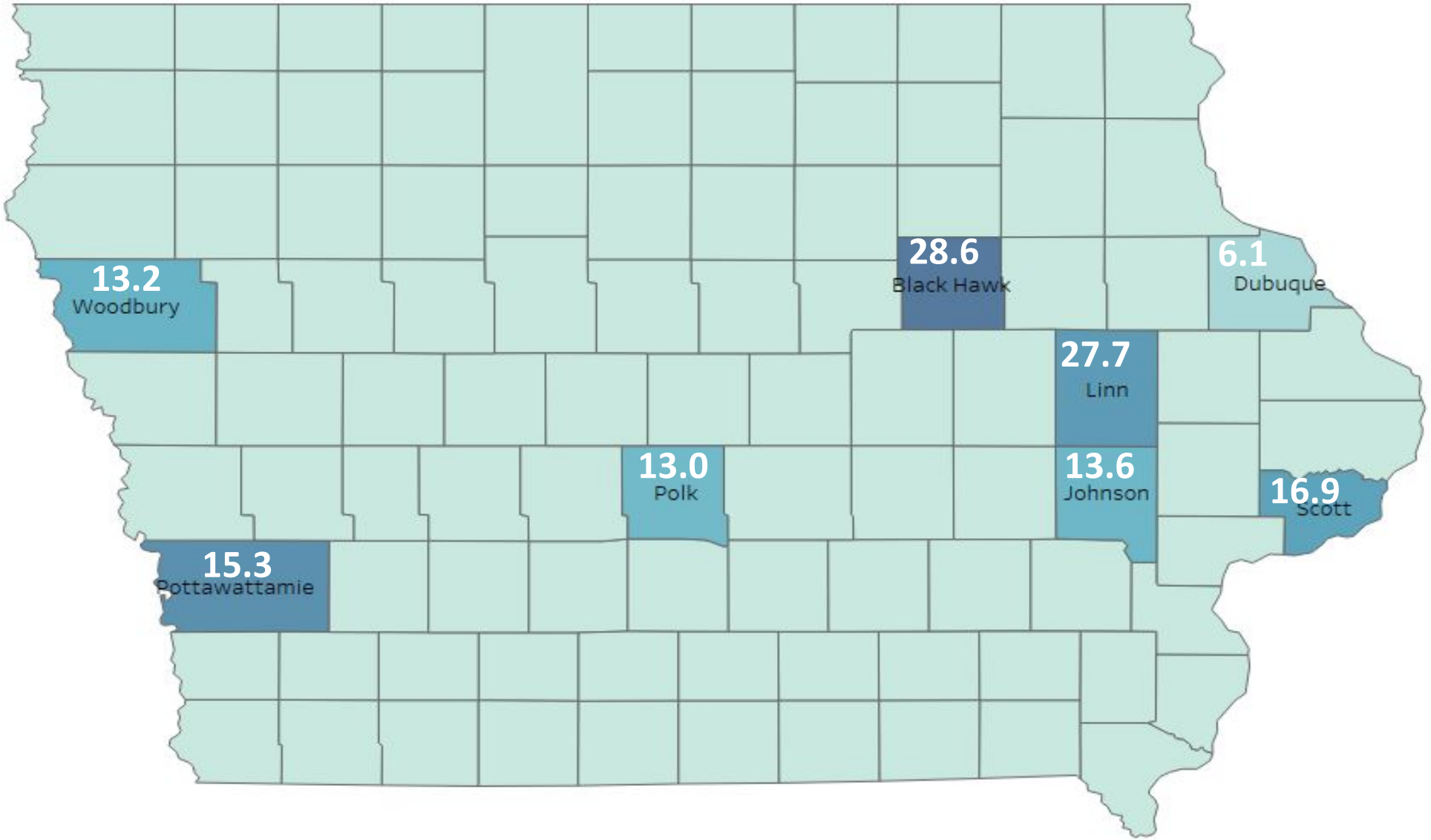


> 40% of LFU comes from infants who fail their screen in this region

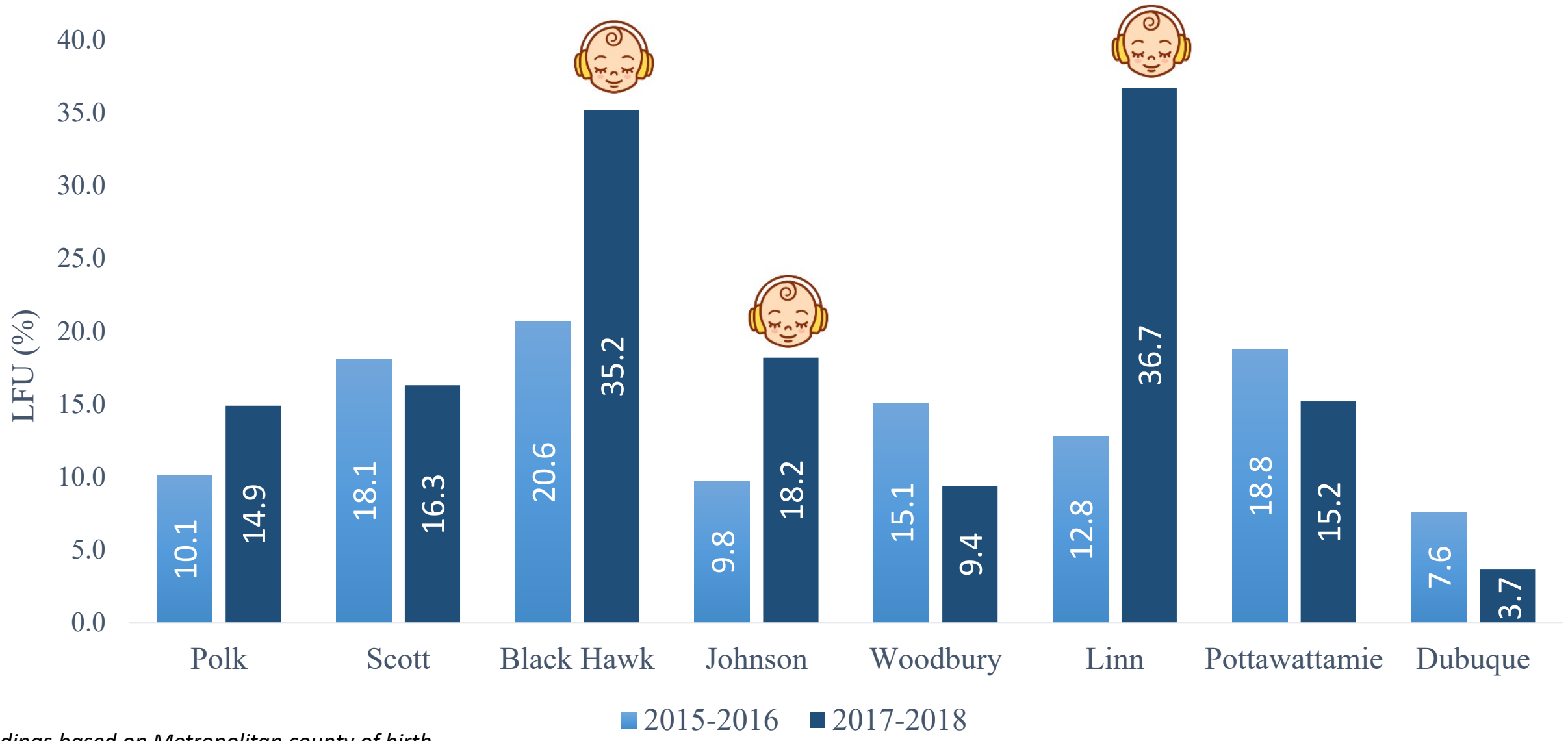
County Contribution for LFU (%)

0.0 — 17.2

The % LFU per County Population of Infants Who Fail Their NHS, By Metropolitan County of Final Birth Screen (2015-2018)



The % LFU per County Population of Infants Who Fail NHS and Need Diagnostics (2015-2018)



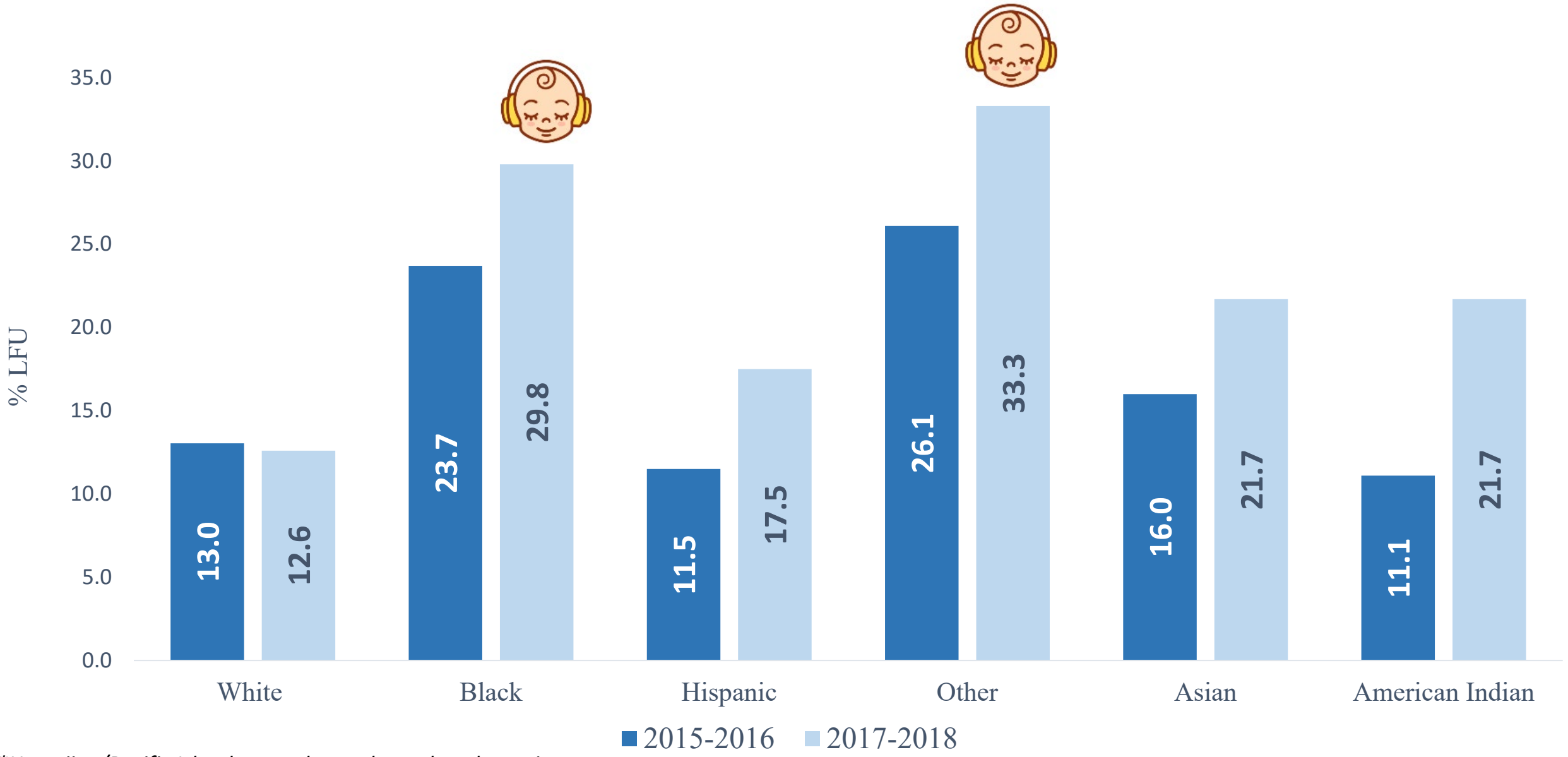
*Findings based on Metropolitan county of birth

The Demographics of Infants Who Fail Their Final Screen, By County of Birth (2015-2018)

County of Birth	White (Not Hispanic)	Hispanic	Black	Other	American Indian	LFU %
Polk	63.5	16.2	11.6	3.0	0.3	12.3
Woodbury	38.3	32.4	8.1	2.3	14.9	12.6
Johnson	69.8	8.4	16.3	2.5	1.0	14.5
Dubuque	86.8	1.7	6.9	1.1	0.6	5.8
☆ Scott	68.1	7.6	19.4	4.2	0.7	20.8
☆ Black Hawk	65.0	4.3	25.6	4.3	0.0	27.4
☆ Linn	69.8	7.3	18.8	2.1	0.0	25.0
Pottawattamie	69.2	20.0	3.1	4.6	0.0	16.9

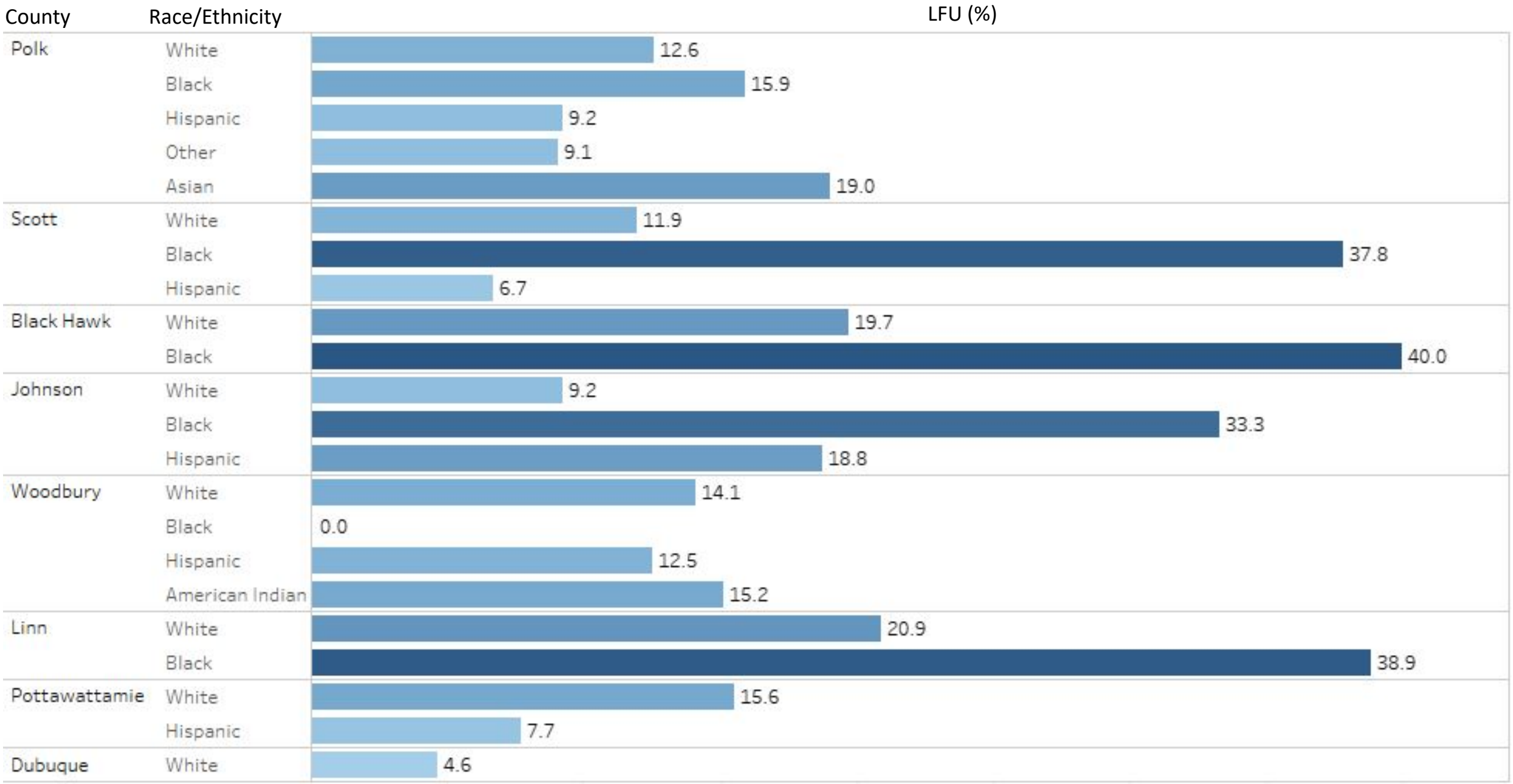
Among mothers of infants fail their final HS in Iowa, 32.5% were from the BIPOC (Black, Indigenous, and People of Color) communities.

The % LFU Among Race and Ethnicity (2015-2018)



*Hawaiian/Pacific Islander not shown due to low denominator

The % LFU for Race & Ethnicity By Metropolitan County of Birth (2015-2018)



Black /African American

Medicaid

Single Mom

< 25 Years of Age

Well-Baby Infants

The Socioeconomic Differences Between Mothers who are LFU vs. Those Who are Not (2015-2018)

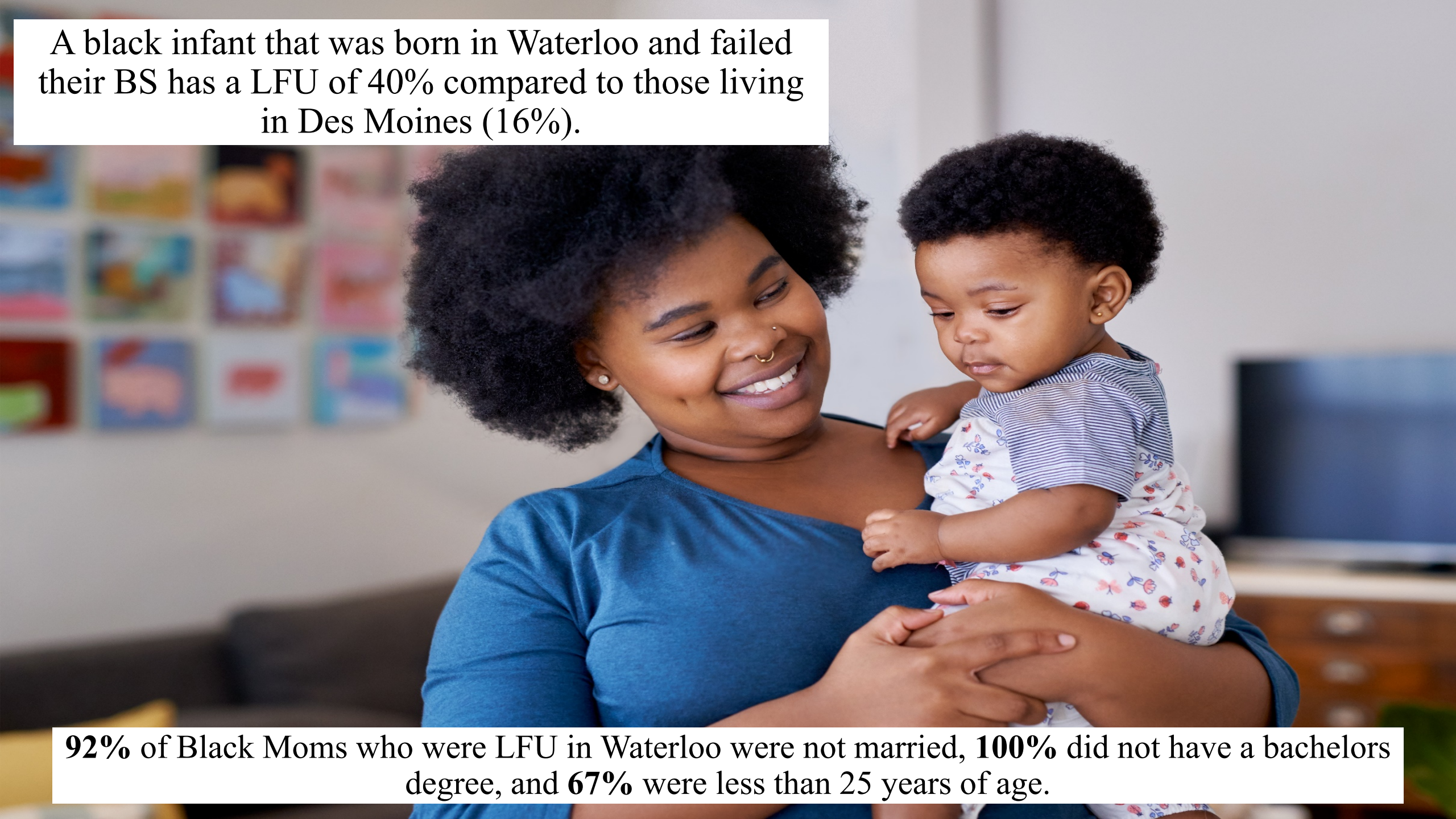
	Medicaid (%)		Single Mom (%)		< 25 Years Age (%)	
Race/Ethnicity	**LFU**	**Not LFU**	**LFU**	**Not LFU**	**LFU**	**Not LFU**
White (Not Hispanic)	35.4	14.7	44.9	22.2	35.7	18.7
Black	63.6	45.3	68.2	54.6	50.0	25.0
Hispanic	56.5	37.9	63.6	44.3	50.0	33.6

Asian, American Indian, & Hawaiian/Pacific Islander not shown due to low denominator

So What???

Not all disparity is =

A black infant that was born in Waterloo and failed their BS has a LFU of 40% compared to those living in Des Moines (16%).



92% of Black Moms who were LFU in Waterloo were not married, **100%** did not have a bachelors degree, and **67%** were less than 25 years of age.

How Do These Findings Compare to Non-Metro Areas?

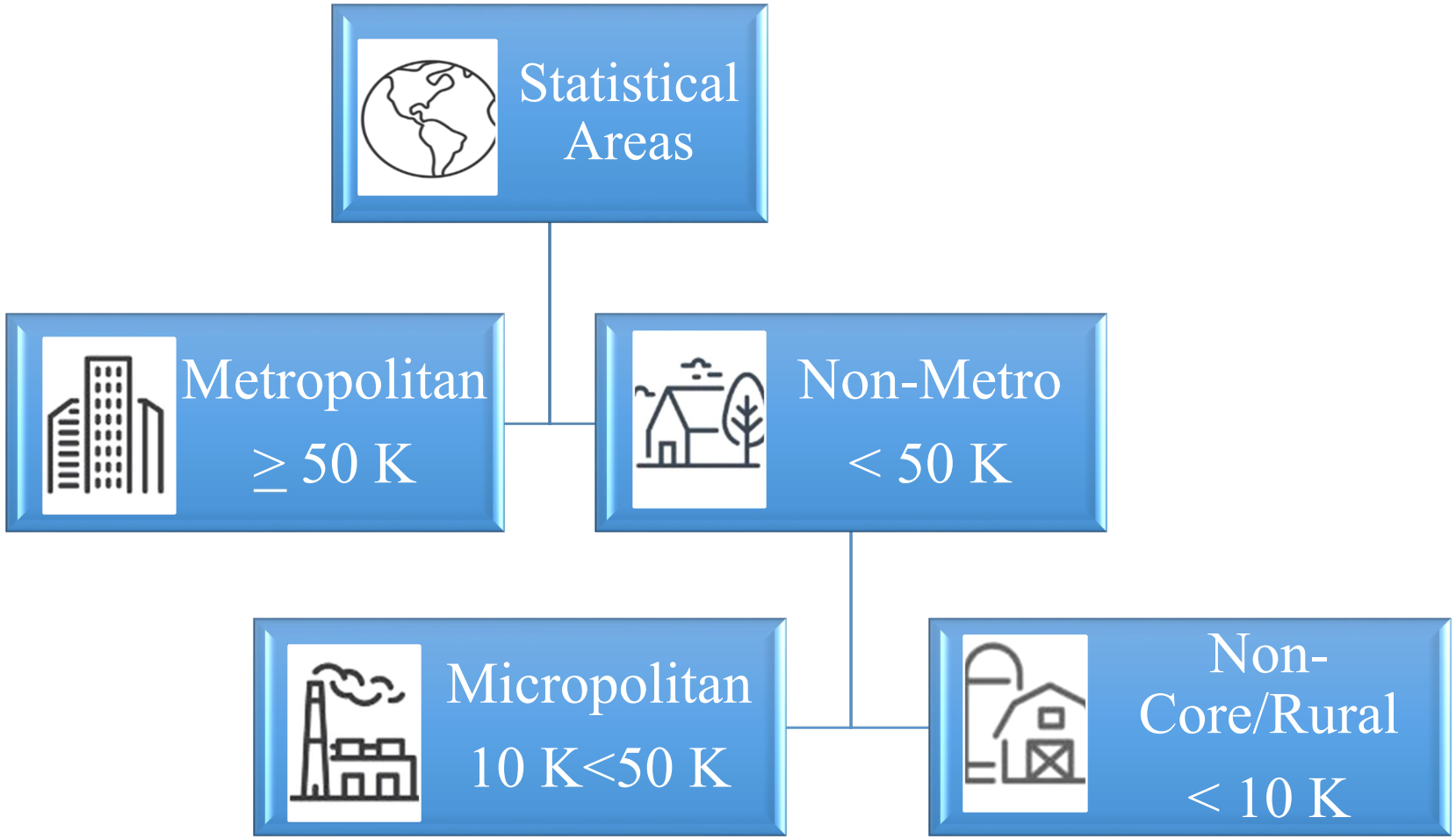
Why Would I Prefer to Not Use Binary Categories (Ex: Urban vs. Rural) When Looking at Geographic Data?

"Non-Metro/Rural Locations" = < 50,000 people

It places counties that have 45 k in the same bucket as a county less than 500.

So we need a third category!

The Definitions for Statistical Areas



**Statistical Areas defined by The Office of Management and Budget (OMB)*

Why are Micropolitan Communities So Important to Explore?

60% of Iowans Live in These Areas

Site of International & Domestic Migrations

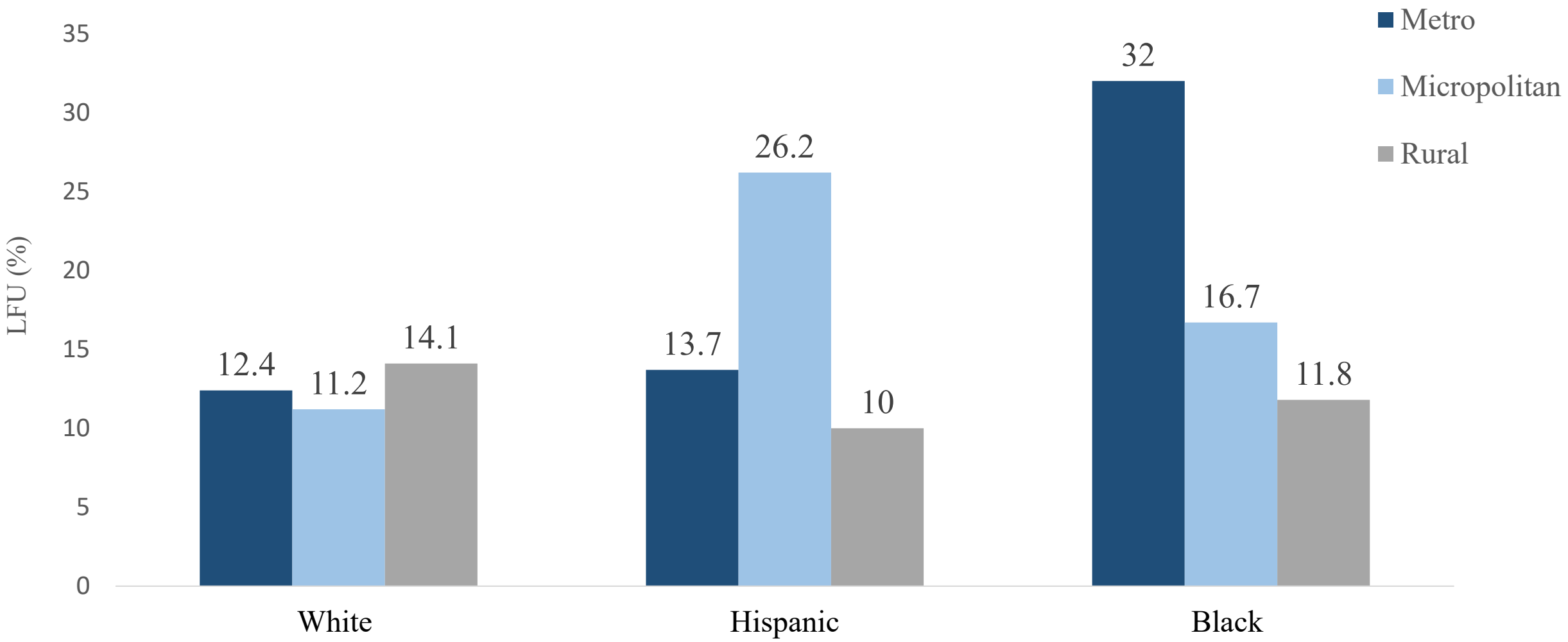
Very Diverse

Poorest Social Determinants of Health

Highest Rates for Unemployment & Poverty

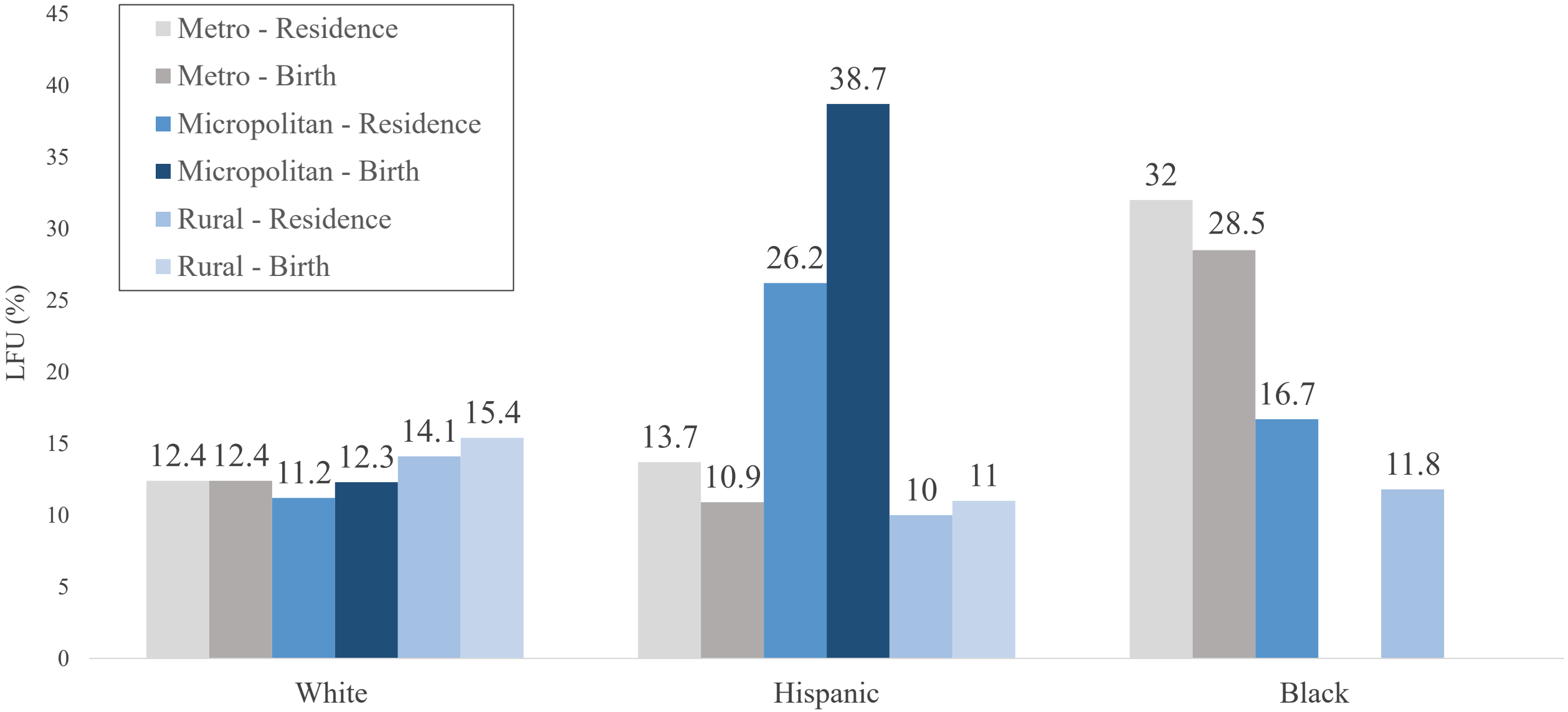
Receive Little Funding

The LFU (%) Based on Mother's Statistical Region of Residence



**Asian, American Indian, & Hawaiian/Pacific Islander not shown due to low denominator*

LFU for Race & Ethnicity by Region of Residence and Region of Birth



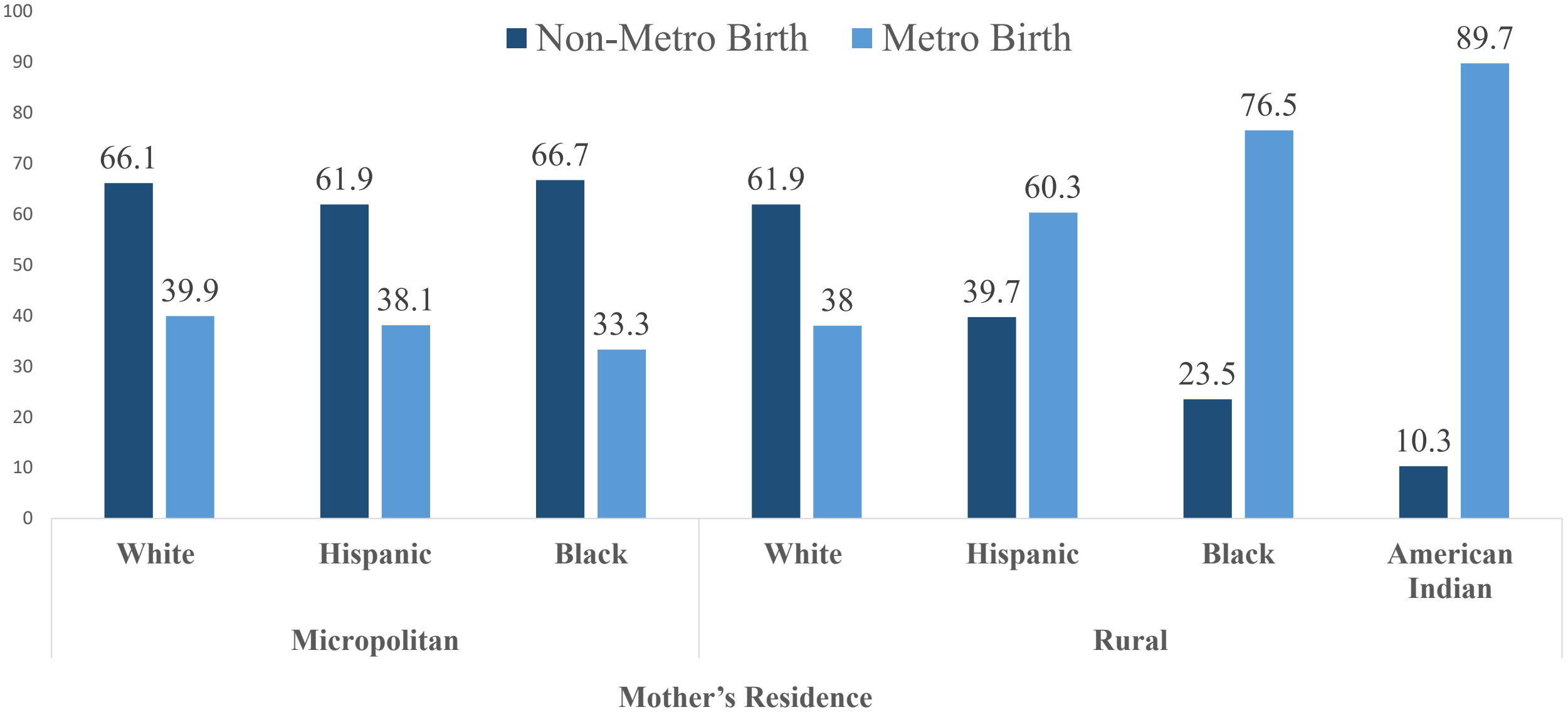
**Non-Metro Births for Black infants & outcomes for Asian, American Indian, & Hawaiian/Pacific Islander not shown due to low denominator*

Compared to non-metro mothers who gave birth in Metropolitan areas, **non-metro births** were were **80%** more likely to be LFU.

So What???

Just because a mother resides in a non-metro location does not necessarily mean they have an increased likelihood for LFU, a big factor is where they travel for healthcare to have their baby/failed BS!

Where Are Micropolitan & Rural Mothers Traveling for their Birth?

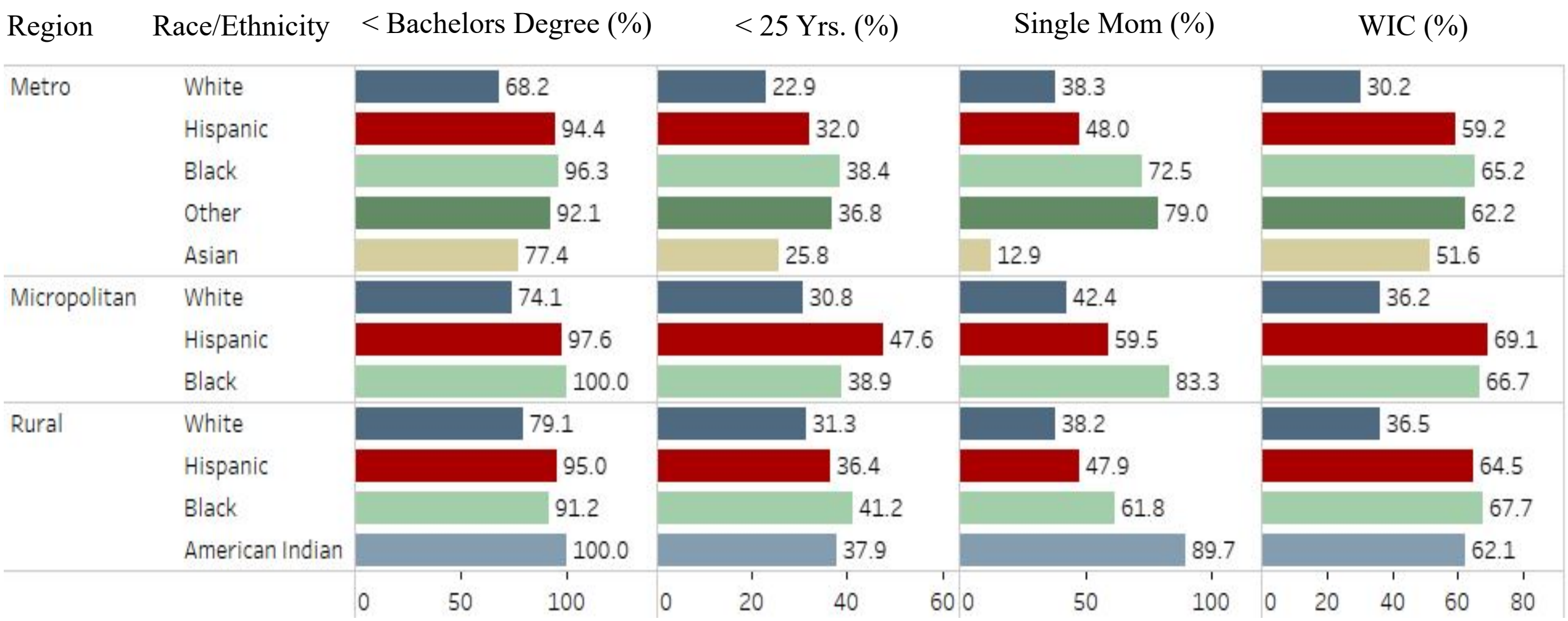


What are Other Factors that Increase the Odds for LFU After a Failed BS among Non-Metro Mothers of Residence?

- Compared to mothers with at least a bachelors degree, mothers with lower education were approximately **3** times more likely to be LFU.

- Compared to mothers who were married, single mothers were **63%** more likely to be LFU.

Socioeconomic Factors for Race & Ethnicity By Statistical Area of Residence Among Mothers of Infants Who Need Diagnostics



Conclusion

For the most part, LFU is improving in the state of Iowa but certain demographics are left behind.

Many of the factors that increase the odds for delayed dx also increase the odds for LFU.

Women who are LFU have significantly higher rates of single mother households, lower maternal age (< 25 years), Medicaid recipients, and lower levels of maternal education.

Mothers of infants who identify as Black have the highest LFU in Metropolitan areas, particularly in the Eastern counties of the state (> 40%).

Infants born to Hispanic mothers in Micropolitan communities and fail their BS have the highest LFU (~38%).

Moving Forward…

- Underserved communities need extra support after a failed hearing screen. Providers may need to be more active on communication/education after a failed hearing screen.

- Programming needs to address maternal characteristics

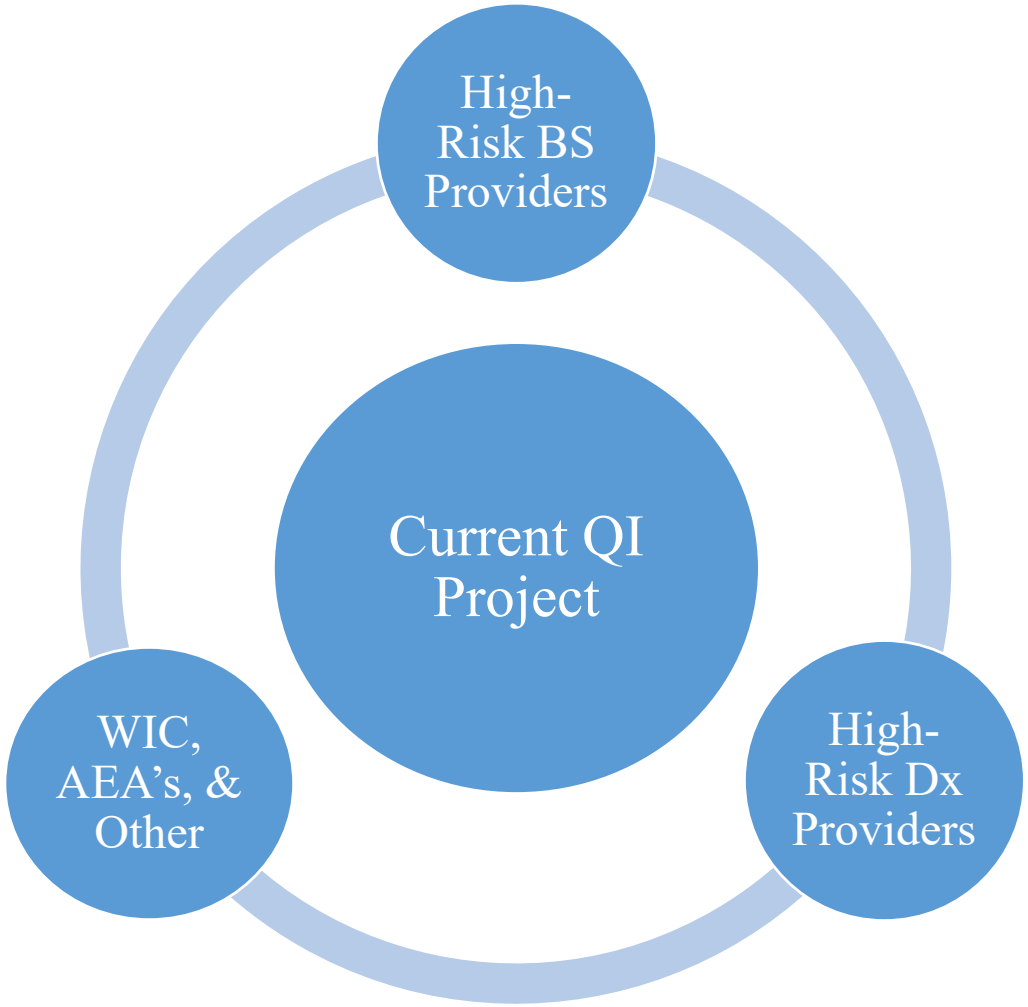
- Hispanic mothers that give birth in Micropolitan areas may have less access to interpreters, transportation, and there could be fear in seeking healthcare.

- > 60% of mothers who identified as a race/ethnicity other than White were in enrolled in WIC, which suggests WIC could be an integral component in EHDI programming, however, partnering with WIC may be a challenge.

- The challenges may be magnified among these communities during COVID

How Do We Take the Data & Influence Real Change?

Data → Action → Strengthening Iowa's EHDI System



Iowa's EHDI is currently targeting the counties and providers that serve communities with an increased likelihood for LFU.

The Game Changing Protocols…

Diagnose NICU Infants Before Discharge (*JCIH Protocol*)

Schedule Diagnostic Appt. Before Family Leaves Hospital/OP

Questions???

Sources

1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6456438/
2. https://pubmed.ncbi.nlm.nih.gov/21433023/
3. https://www.cdc.gov/ncbddd/hearingloss/data.html
4. https://pubmed.ncbi.nlm.nih.gov/28549746/