

Characterizing Sociodemographic Disparities in the Diagnosis and Evaluation of Co-morbid Atopic Diseases in Children with Atopic Dermatitis

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Food Allergy Background

- Food allergy is a significant public health concern in the United States, affecting at least **8% of children** with evidence of increasing prevalence [Gupta et al., 2011]
- The strong association between atopic dermatitis and the risk of developing food allergy has been well-characterized
- Several prospective cohorts around the country have been investigating racial disparities in food allergy diagnosis/management
 - FORWARD here in Chicago (Food Allergy Outcomes Related to White and African American Racial Differences)
 - Higher adjusted odds of finfish/shellfish allergy in Black children (Mahdavinia et al., 2021)

Asthma Diagnosis/Management Disparities

- Asthma disproportionately affects historically underrepresented races/ethnicities and people living in lower socioeconomic conditions in the US [Perez & Coutinho, 2021]
- Non-Hispanic Black children in the US have much higher mortality from asthma than White children (10.7 deaths per million vs. 1.4 deaths per million) [CDC, Dec. 2022]
- Estimated allergic rhinitis (AR) prevalence of **54-85%** among urban children with persistent asthma [Everhart et al. 2014, Esteban et al. 2014, Hankin et al. 2008]
- Yet **53%** of urban children living with AR were not allergy tested/diagnosed before study enrollment [Meltzer EO 2007]

Atopic March

Specific focus on the diagnosis of additional atopic diseases in patients with known atopic dermatitis:

- Previous investigation in Australia characterized prevalence of food allergy by performing diagnostic testing on an entire population of children with atopic dermatitis (Martin et al., 2015)
- Recent study with focus on racial differences in the atopic march (Biagini et al., 2022)
 - analyzed the Mechanisms of Progression of Atopic Dermatitis to Asthma in Children (MPAACH) cohort with 65% Black participants
 - Black children 6 times more likely to have asthma alone; White children 3 times more likely to develop food allergy or allergic rhinitis without asthma

Aim of Our Study

- Examine the **sociodemographic risk factors** for (1) diagnosis of food allergy, (2) diagnosis of asthma, and (3) diagnosis of allergic rhinitis in a real-world clinical population of **children diagnosed with atopic dermatitis**

Study Methods

- Large single-center retrospective analysis
- 3,365 children aged 0-18 years at the time of data extraction with **physician diagnosis of atopic dermatitis** (per ICD-10 codes) and seen for **primary care** in our healthcare system between **2009-2022**
- Detailed chart review to determine **physician diagnosis of food allergy, asthma, and/or allergic rhinitis** as well as objective **aeroallergen and food allergen test results** (skin, blood)
- Initial statistical analysis using SPSS software (Chi square, logistic regression)

Measuring Socioeconomic Conditions

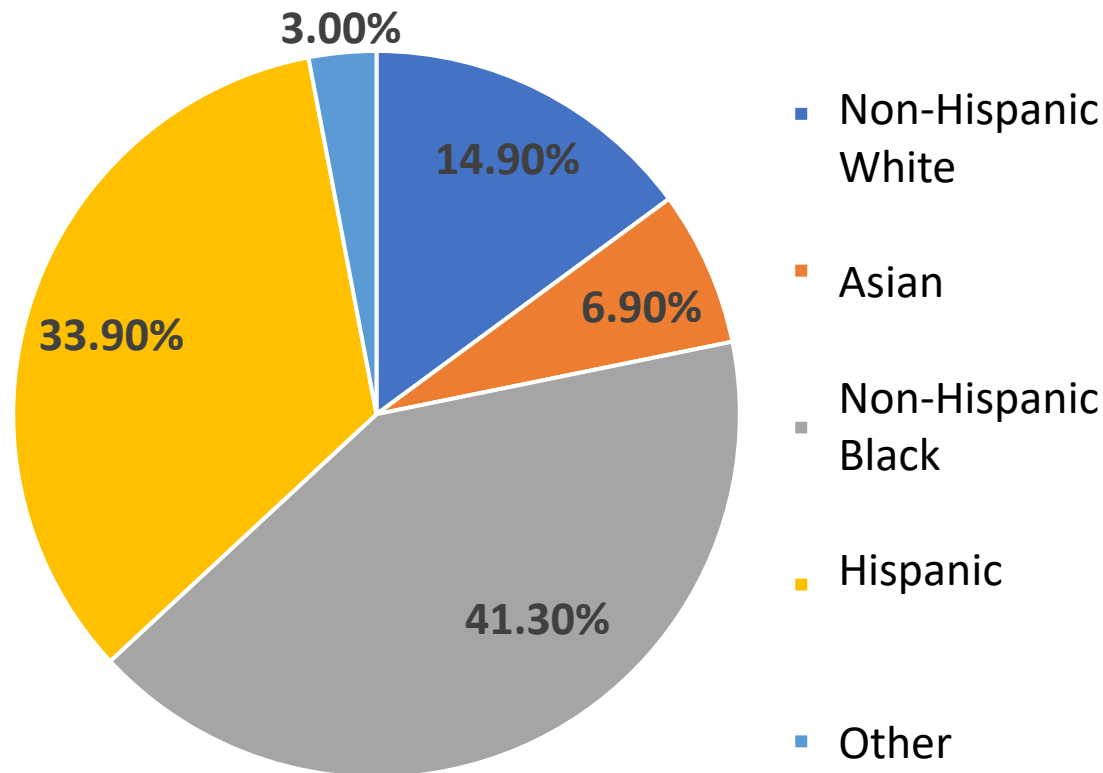
- Insurance status (Medicaid vs. private)
- Area Deprivation Index (ADI)

What is ADI?

- Area Deprivation Index (ADI) includes multiple factors assessing Income/Employment, Education, Housing, and Household Characteristics in a neighborhood (**census block group**)
 - Tabulated for each **patient's home address on file in EMR** as national percentile ranking with **100 = maximal socioeconomic disadvantage**

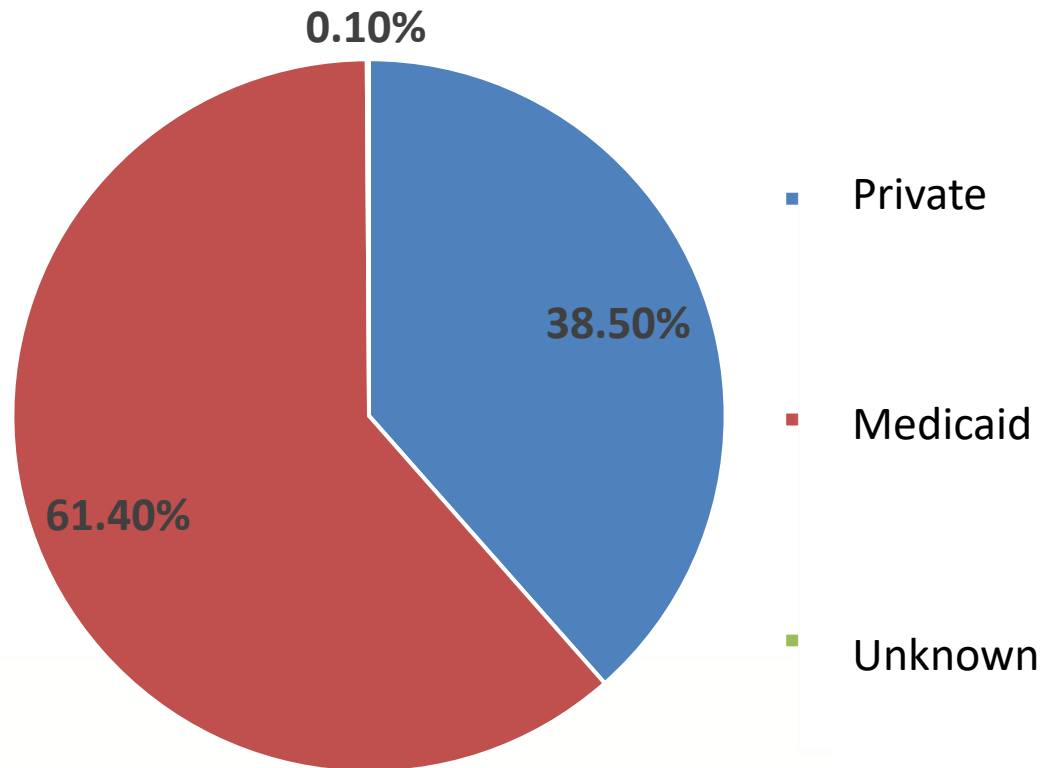
Strong Representation of Historically Under-represented Racial/Ethnic Groups

Documented Race/Ethnicity of Study Population



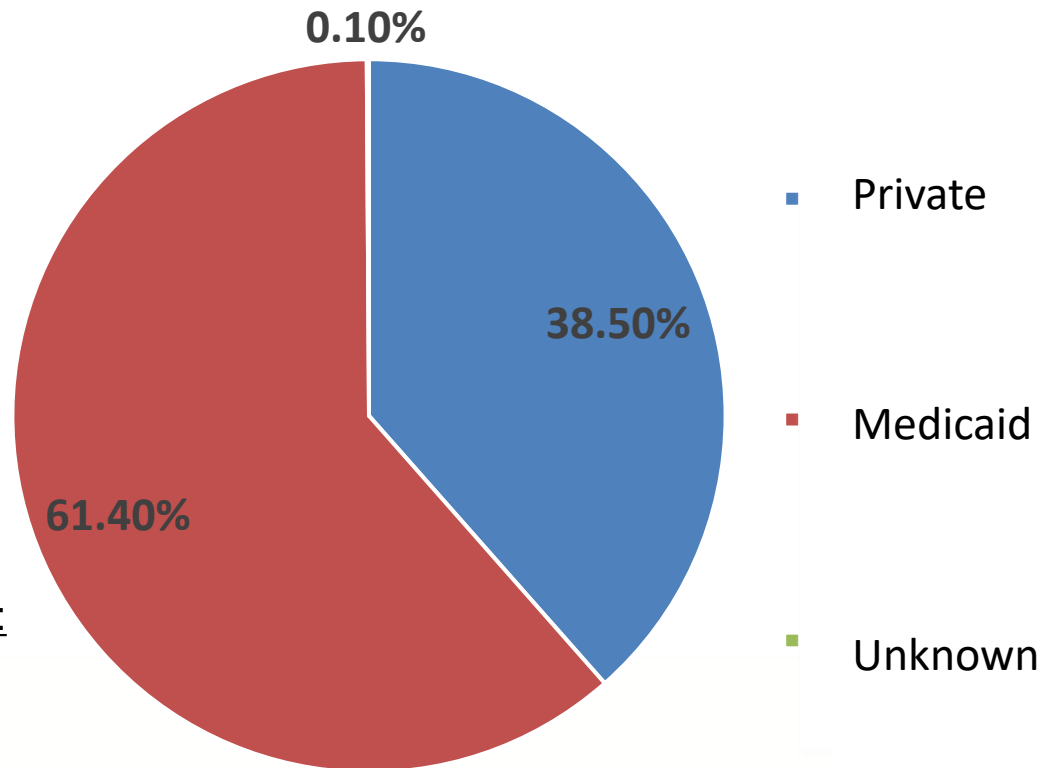
Majority of Patients Have Medicaid (Public) Insurance

Insurance Status of Study Population



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Insurance Status of Study Population



Percentage of Children with Medicaid (by race/ethnicity):

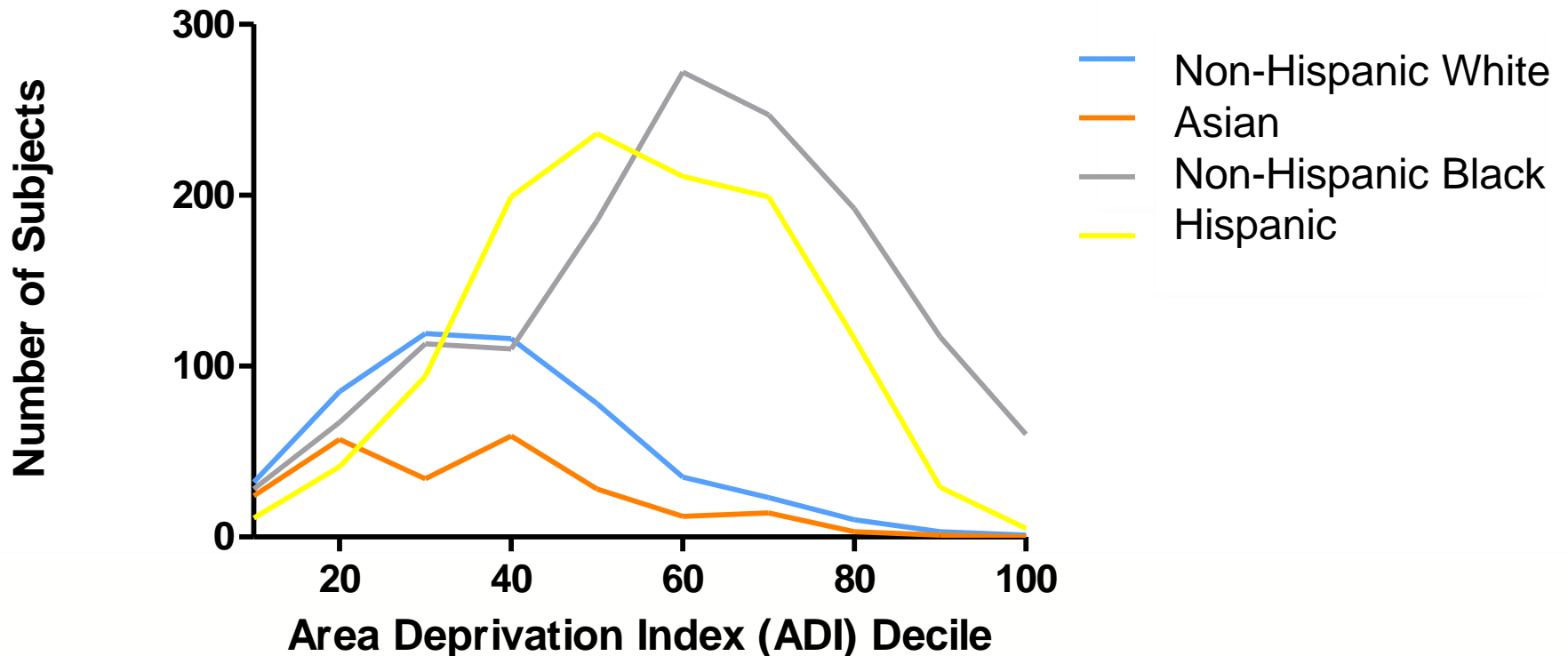
Non-Hispanic Black: **76.3%**

Hispanic: **62.8%**

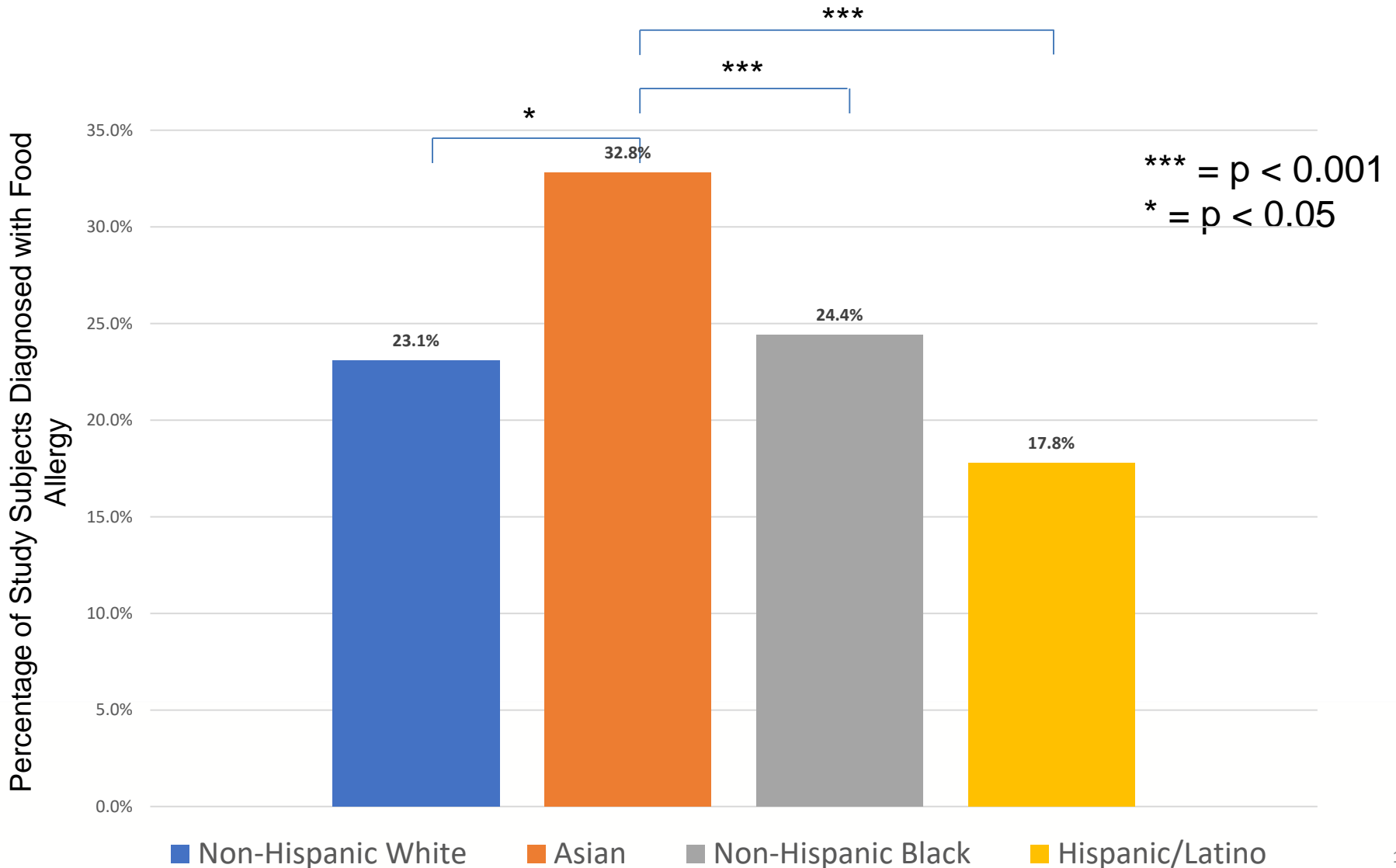
Asian: **37.5%**

White: **29.1%**

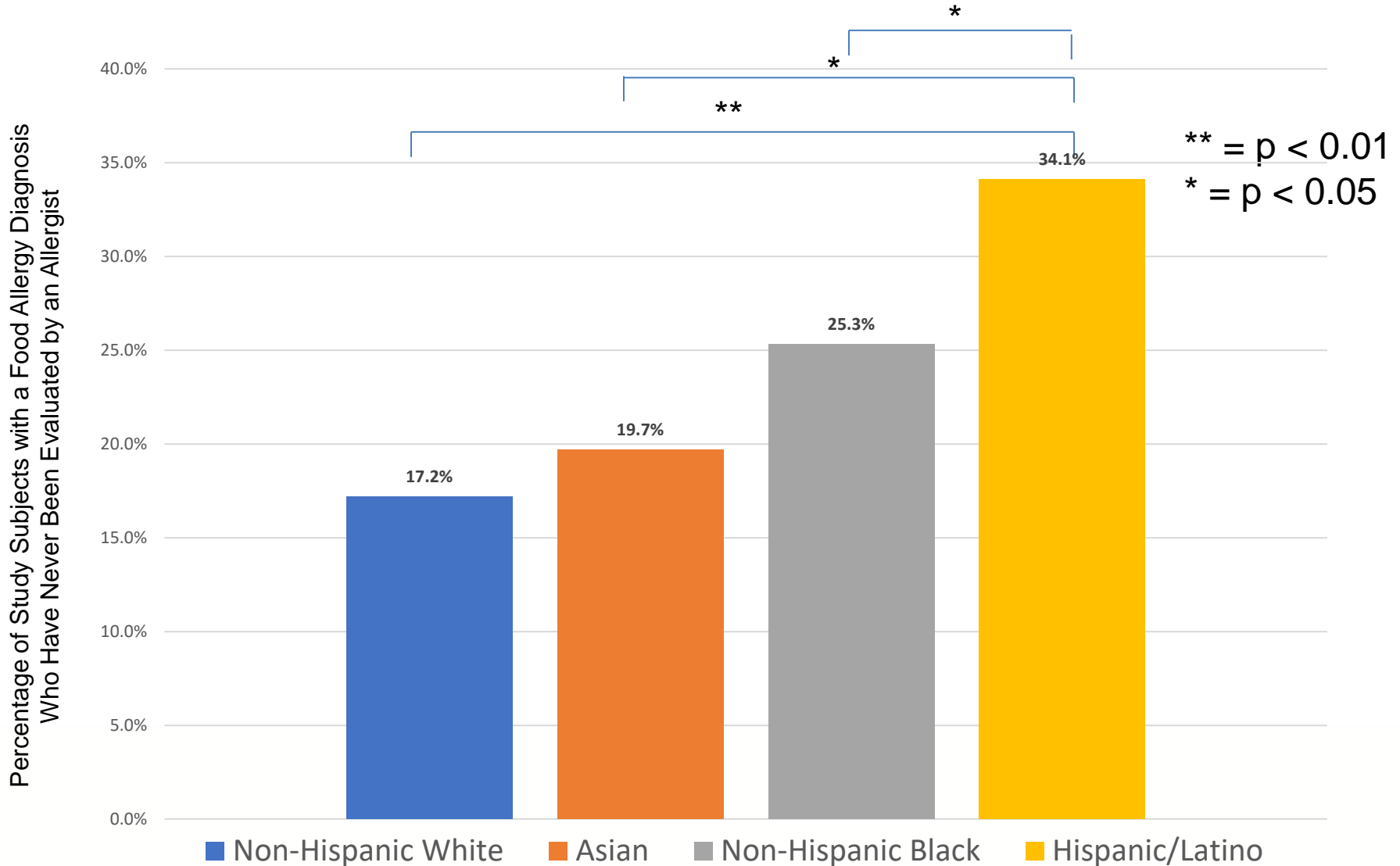
Non-Hispanic Black and Hispanic Children Tend to Live in Neighborhoods with More Socioeconomic Disadvantage Than Non-Hispanic White and Asian Children



Asian Children With Atopic Dermatitis Were Significantly More Likely to Be Diagnosed with Food Allergy than Children of Other Race/Ethnicities



Hispanic Children With Atopic Dermatitis and Food Allergy Diagnosis Were Significantly More Likely to Have Never Been Evaluated by An Allergist

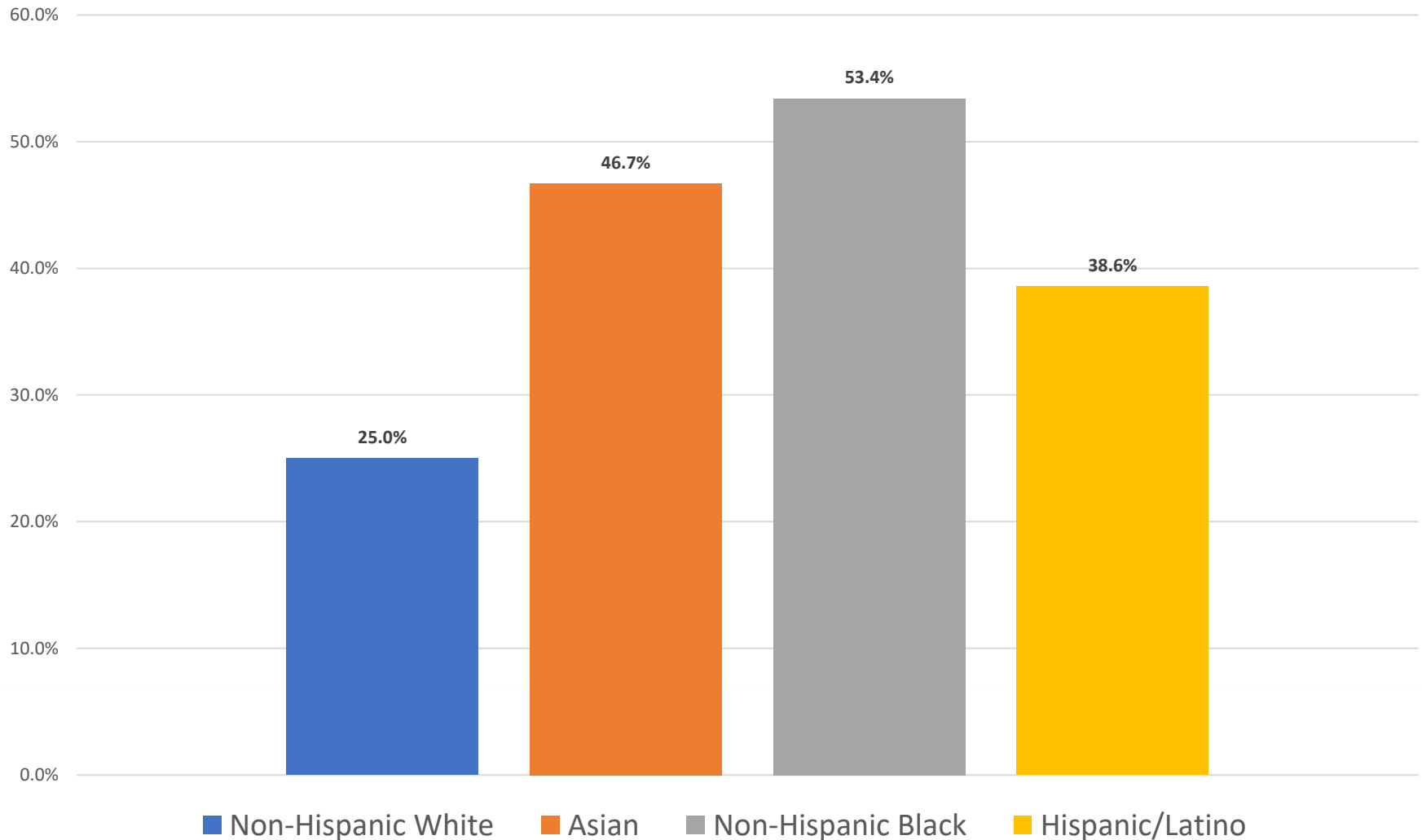


Need for Referral in Study Population

- Among all patients in our study who saw an allergist, what percentage had a referral?
 - Non-Hispanic White: 56.0%
 - Asian: 64.4%
 - Black: 83.5%
 - Hispanic: 73%

Many Children with Atopic Dermatitis and Food Allergy Diagnosis Who Never Saw an Allergist Did Have a Referral Order Placed

Percentage of Study Subjects Never Evaluated by an Allergist
Who Did Have Allergist Referral Placed



Factors Influencing Presence of a Food Allergy Diagnosis

- Logistic regression incorporating potential contributory factors of age, sex, BMI, race/ethnicity, insurance status, ADI, whether seen by an allergist, and whether allergist referral was ever placed

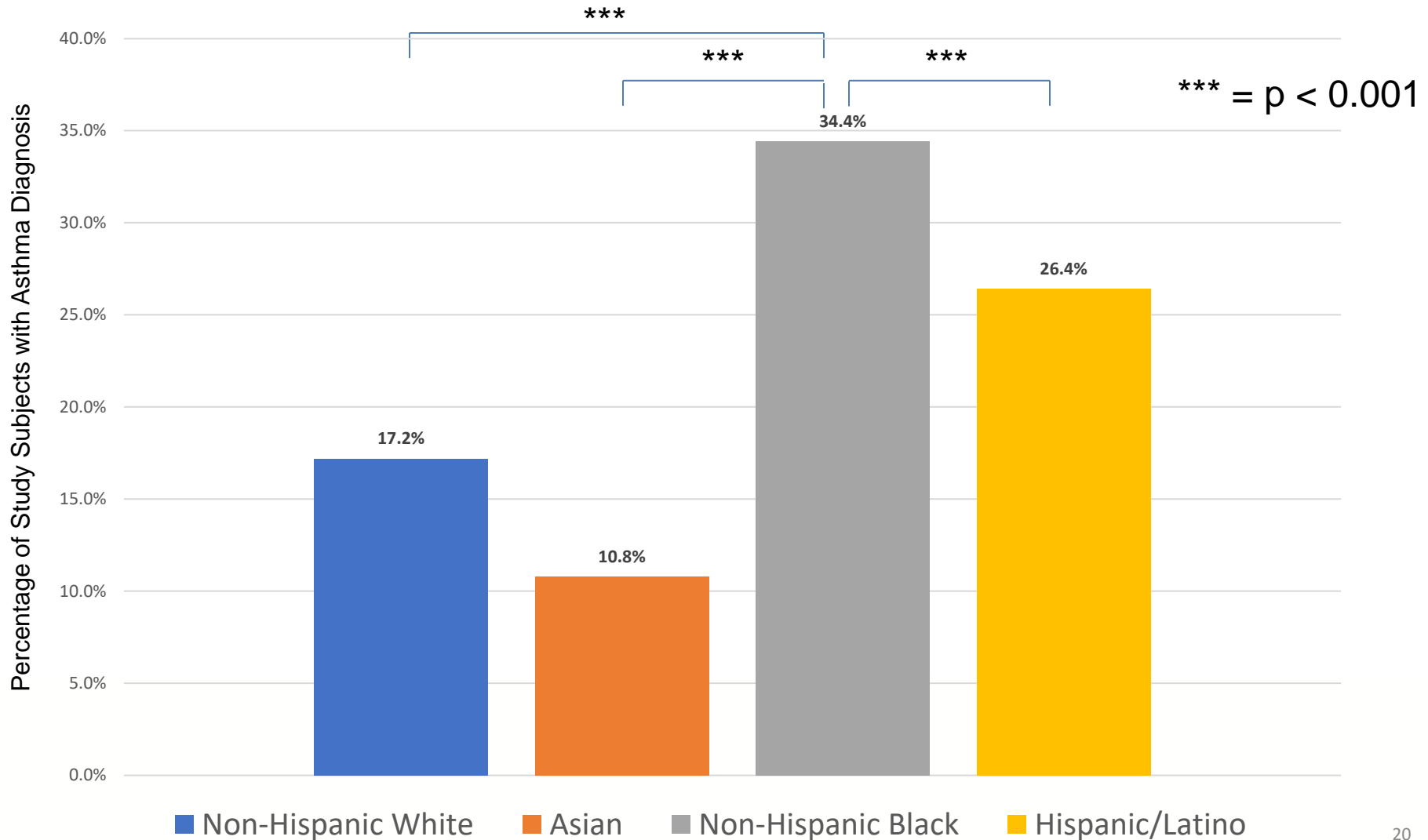
Factors Influencing Presence of a Food Allergy Diagnosis

- Statistically significant ($p < 0.05$) by logistic regression:
 - **Insurance status** - Children with private insurance (non-Medicaid) were MORE LIKELY to be diagnosed with a food allergy: OR 1.37 [95% CI: 1.10 – 1.72]
 - **Referral to allergist** – Children who were never referred to allergist were LESS LIKELY to have a food allergy diagnosis: OR 0.31 [95% CI: 0.25-0.39]
 - **Whether seen by allergist** – Children never seen by an allergist were LESS LIKELY to have a food allergy diagnosis: OR 0.14 [95% CI: 0.11 - 0.18]
 - **Age** – Children of older age were MORE LIKELY to have a food allergy diagnosis: OR 1.04 [95% CI: 1.01 - 1.06]
 - **BMI** – Children of higher BMI were LESS LIKELY to have a food allergy diagnosis: OR 0.98 [95% CI: 0.961 – 0.998]

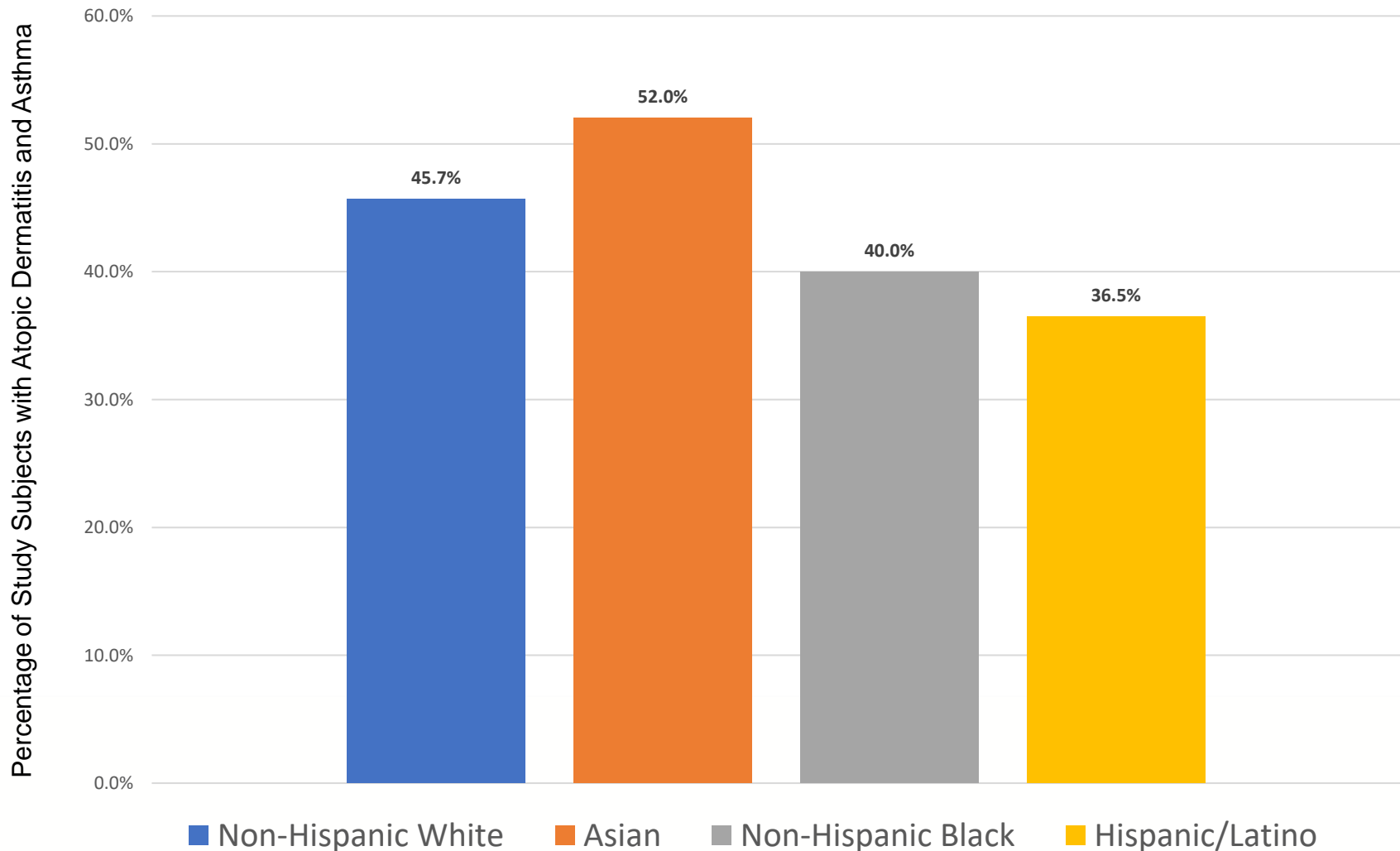
Factors Influencing Presence of a Food Allergy Diagnosis

- NOT statistically significant factors in this model:
 - Area Deprivation Index (ADI)
 - Race/Ethnicity

Black Children with Atopic Dermatitis were Significantly More Likely to Be Diagnosed with Asthma



Trend Toward Decreased Aeroallergen Testing Among Non-Hispanic Black and Hispanic Children with Atopic Dermatitis and Asthma



Limitations

- Retrospective analysis – limited by information accessible in the medical record
- Loss to follow up – home addresses may not be accurate, will re-analyze data including only patients seen within last 3 years
- Race/Ethnicity identity not documented for 127 patients

Summary

- Non-Hispanic Black and Hispanic children with atopic dermatitis and food allergy diagnosis were **less likely to undergo evaluation by an allergist**
 - However, many of them (over ½ of Black children and 1/3 of Hispanic children) did have an allergist referral placed
- Non-Hispanic Black were **more likely to be diagnosed with asthma** than White or Asian children
 - Yet, they trended toward being significantly **less likely to have undergone objective aeroallergen testing** as part of their asthma workup

Conclusions

- Our study showed that many children from under-represented racial/ethnic backgrounds are referred to an allergist for food allergy evaluation but are never seen
- We also observed that children from historically under-represented backgrounds may be less likely to undergo objective aeroallergen testing, which is an important component of asthma evaluation and can guide management
 - Potential barriers: Insurance / financial, knowledge of available testing, difficulty of obtaining time/transportation for office visit

Future Directions

- Examine whether racial/ethnic disparities in allergist evaluation & objective testing have changed over time at our institution
- Larger goal of minimizing care disparities in diagnosis and management of food allergy
 - Potential to transition to prospective study design – could intervention at primary care office level minimize disparities in access to allergist evaluation / allergy testing?

- **Research Team**

- Mahboobeh Mahdavinia, MD PhD (Principal Investigator)
- Anandu Dileep, MD
- Shannon Manz, MD
- Niki Mirhosseini
- Manali Shah, MD
- Sven Wang, MD
- Akhil Pulumati, MD



- **RUSH Clinical Research Analytics**

- Sairam Sutari (data extraction)
- Yanyu Zhang (statistician)

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