

Asthma is one of the most common chronic illnesses of childhood in the United States, disproportionately affecting historically marginalized populations. Black and Hispanic/Latinx children experience higher rates of asthma morbidity, more emergency department visits, and poorer asthma control than their White peers. While these inequities are well documented in Black children, much less is known about Mexican American children, who represent the largest Hispanic subgroup in the U.S. and may experience distinct risks and barriers. At the same time, widely used spirometry reference equations remain race-specific, which can mask disease severity and perpetuate inequities in care. Together, these challenges point to the urgent need for research that not only documents disparities but also identifies structural drivers and evaluates the tools clinicians use to assess and treat pediatric asthma.

My research program seeks to generate evidence that advances health equity in pediatric respiratory care by focusing on three interrelated objectives:

1. Identify disparities in asthma control and treatment among Mexican American children.
2. Evaluate the role of race-specific versus race-neutral lung function equations in misclassifying disease severity.
3. Examine structural and system-level drivers of inequities in pediatric asthma morbidity.

**Objective 1: Disparities in Pediatric Asthma Control and Treatment.**

Using data from the Texas Home Assessment of Asthma and Lung Exposures (TexHALE) cohort, I investigated racial and ethnic differences in asthma control and medication use among children in Central Texas. I found that Mexican American children, like Black children, had significantly poorer asthma control and were less likely to use controller medications compared to White children. These disparities persisted even after accounting for socioeconomic status and healthcare access, suggesting that additional drivers remain unaddressed.

I have also examined inequities in access to advanced therapies. In an editorial published in the *Journal of Allergy and Clinical Immunology*, I highlighted how race, ethnicity, and insurance type shape initiation of biologic therapy for asthma. This work shows that disparities extend across the treatment spectrum, from undertreatment with basic controller medications to inequitable access to cutting-edge biologics.

**Significance:** By documenting disparities in Mexican American children, my work highlights this population as an emerging asthma disparities group. These findings expand the focus of pediatric asthma inequities beyond the well-established Black–White divide and provide critical evidence of undertreatment across multiple levels of therapy, pointing to clear targets for future intervention research.

**Objective 2: Lung Function Equations and Misclassification**

A second line of inquiry examines how race-specific spirometry reference equations influence the assessment of disease severity. Using NHANES data (2007–2012), I compared outcomes when lung function was interpreted using race-specific versus race-neutral equations. Preliminary findings suggest that Mexican American children may be systematically misclassified when race-specific equations are applied, potentially underestimating severity and delaying treatment escalation.

In TexHALE, I am extending this work by comparing Global Lung Function Initiative (GLI) reference equations to Mexican American–specific models, assessing how these classifications align with measures of asthma control and morbidity. This cross-cohort approach provides a unique opportunity to test whether race-neutral equations more accurately capture disease burden across diverse populations.

**Significance:** These studies address a critical methodological debate in pulmonary medicine and provide empirical evidence to guide the transition toward race-neutral reference standards. They highlight how seemingly technical choices in lung function equations carry profound equity implications for clinical decision-making.

### **Objective 3: Structural and System-Level Drivers**

While my work has shown that disparities in asthma control and lung function persist even after accounting for household-level factors such as income, education, and insurance, these variables explain only part of the inequity. Recent evidence suggests that a broader set of social determinants of health, including occupational exposures, obesity, lack of home ownership, and diet, can explain a greater proportion of racial differences in lung function than previously recognized. Yet a large portion of disparities remains unexplained.

This gap motivates my third line of inquiry, which moves beyond household-level characteristics to examine neighborhood and structural exposures such as area deprivation, housing age and quality, residential crowding, walkability, environmental justice indicators, and historic redlining. I plan to use large, nationally representative, population-based datasets to test how these upstream factors contribute to asthma morbidity across racial and ethnic groups.

**Significance:** By identifying structural drivers of asthma inequities, this work shifts the focus from individual behaviors to upstream conditions. It generates evidence needed to ensure that treatment decisions and clinical guidelines reflect the lived realities of historically marginalized children rather than perpetuating inequities through incomplete measures of risk

### **Long-Term Trajectory and Impact**

My long-term goal is to establish a research program that integrates epidemiology, clinical data, and implementation science to improve equity in pulmonary care. Over the next five years, I plan to pursue an NIH K-series award to expand my work on lung function misclassification and secure funding to evaluate multilevel interventions. I hope to build collaborations across pulmonary, epidemiology, and social work to connect clinical research with policy and community practice, by engaging multidisciplinary teams, fostering relationships with community organizations, and leveraging conferences and professional networks as opportunities to exchange ideas and initiate joint projects.

As a scholar in population health and social work, my research aligns with the mission of academic medicine and public health to reduce inequities and improve outcomes for underserved populations. Ultimately, my work will ensure that the tools we use to interpret and manage pulmonary function reflect the lived realities of historically marginalized populations. By challenging flawed assumptions, refining clinical assessment, and addressing structural barriers, my research will generate evidence that guides policy and practice toward more equitable respiratory health