

Investigating the Relationship Between Historic Housing Discrimination and Respiratory Health

Haleh Mehdipour^{*1}, Jason von Meding¹, Amer Hamad Issa Abukhalaf¹

1. Florida Institute For Built Environment Resilience, University of Florida, *Email: Haleh.Mehdipour@ufl.edu

Introduction

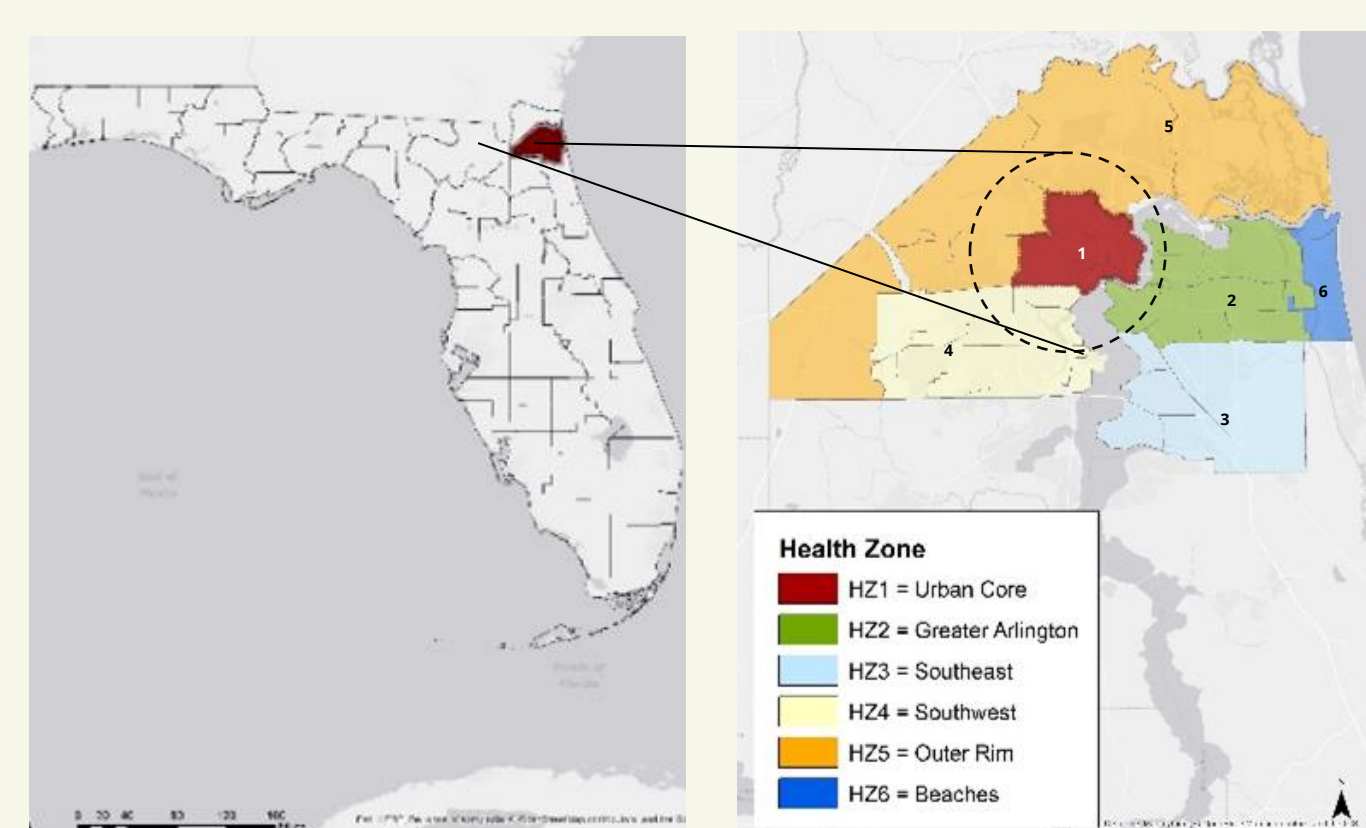
Minorities and racialized populations are disproportionately affected by certain systemic illnesses, especially respiratory diseases. There has been a consistent relationship between respiratory disease prevalence and factors such as substandard housing and indoor environment, low quality of neighborhoods, and ambient air pollutants (Diette et al., 2007).

Underrepresented population and low-income individuals are more likely to live in substandard housing, which contributes to health disparities between minority and majority households (Gold, 2016; Oluwaseyi, 2020). Many studies have revealed that this consistent and substantial connection is the result of decades of underinvestment, historical racism in housing, and unjust development policies, such as redlining and the Federal Aid Highway Act (Lane et al., 2022; Tsoulou et al., 2021).

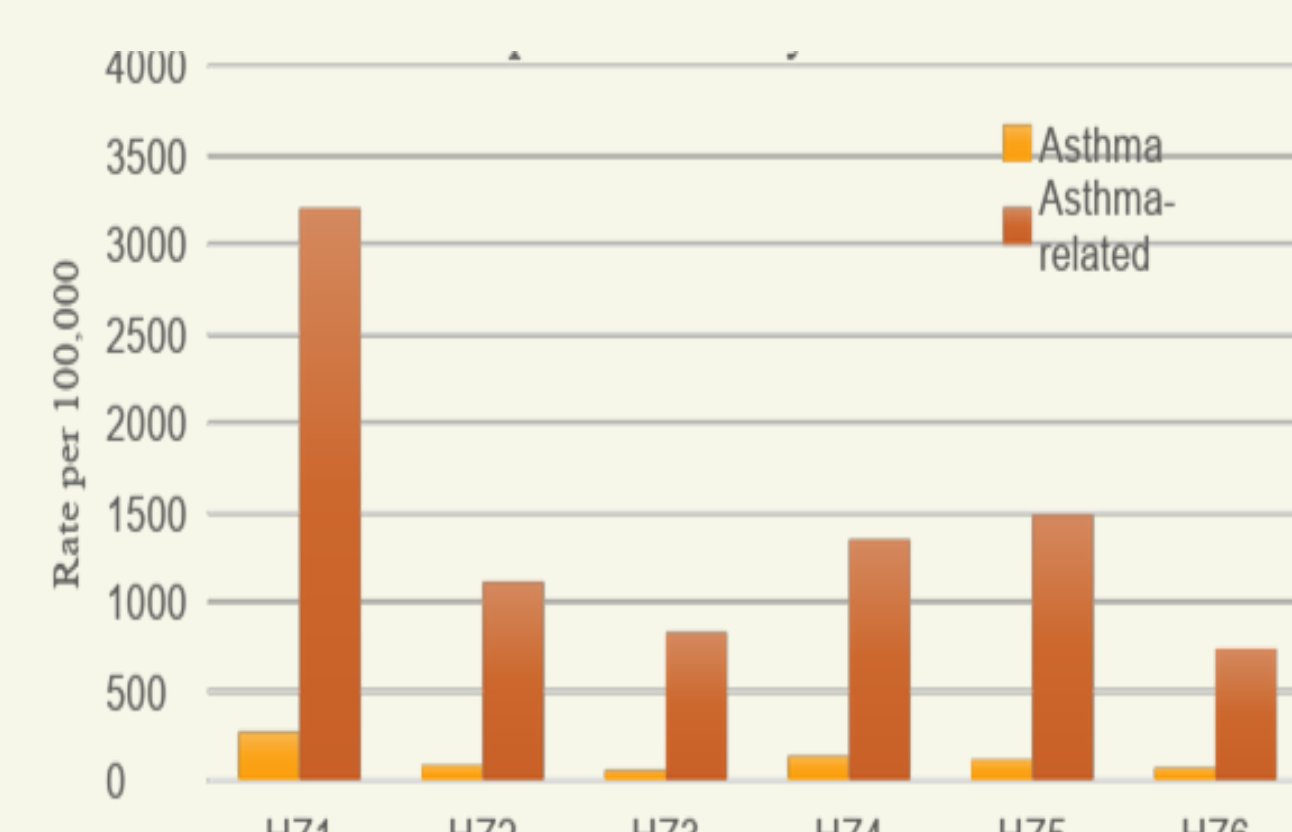
- *Through a health and housing lens, what are the key underlying and central causal factors that contribute to low IAQ?*
- *What are the interconnections between health and housing?*

Study Area

There is a high level of public health concern in Health Zone 1 (HZ1) of Jacksonville, Florida, particularly in connection with asthma and respiratory diseases. Moreover, Home Owners' Loan Corporation (HOCL) played a significant role in shaping HZ1, even though it was defunct in the 1950s, leaving a legacy of housing disparity.



Duval County and Jacksonville Urban Core



Rate of Asthma Hospitalization by Health Zone

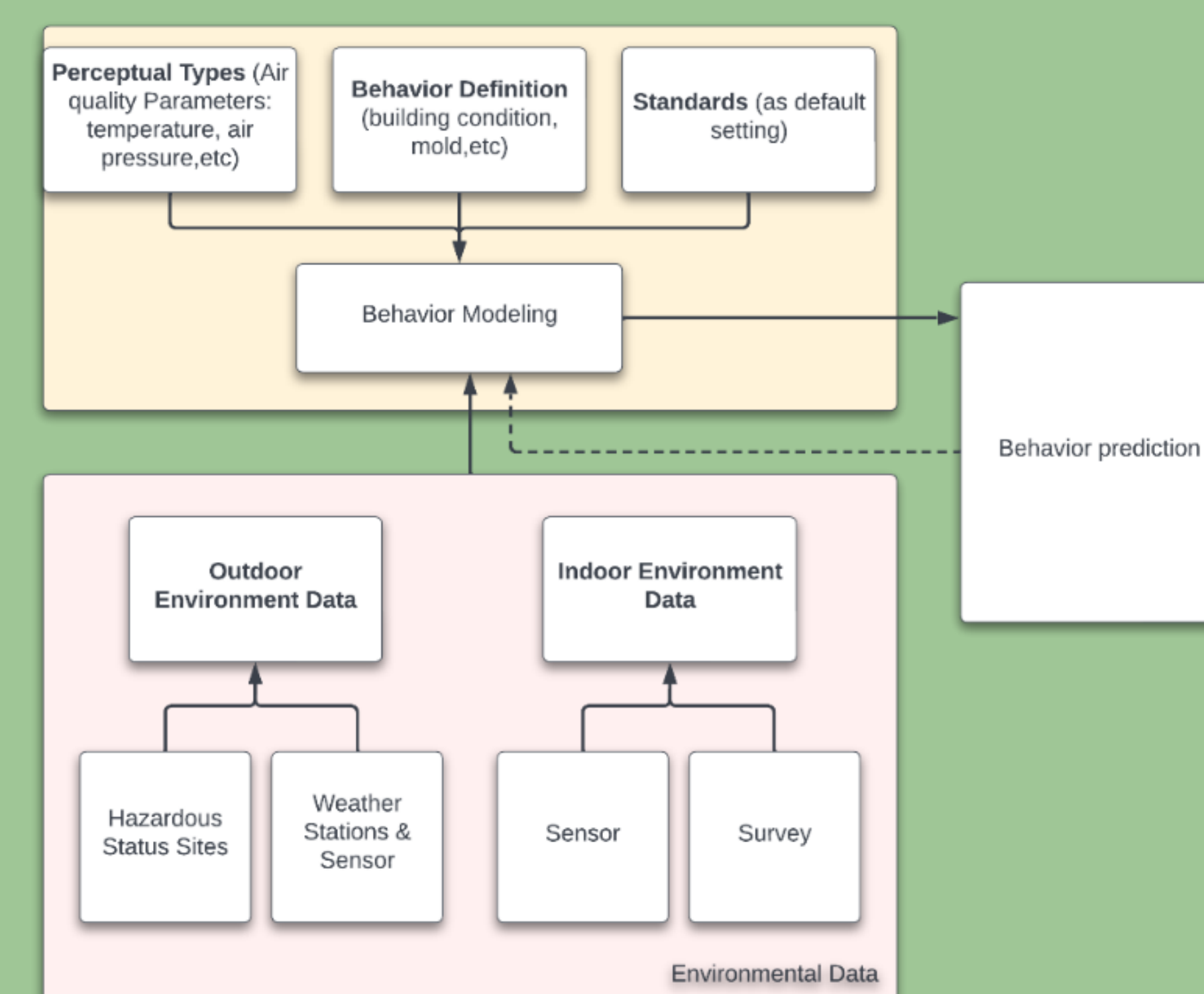
Methodology

Multi-scale Agent-Based Model (ABM) has been used to simulate the location of residents in a representative population of HZ1 within a realistic environment for the purpose of investigating the dynamics of health and housing disparities.



Projection of Multi-scale ABM Structure to the Context of Built Environment

In this case, a model with multi-scale capabilities will facilitate the investigation of health and housing disparities patterns at both macro-disparities (e.g., Zip Codes areas) and meso-disparities (e.g., Buildings), based on micro-cases (e.g., family and person).

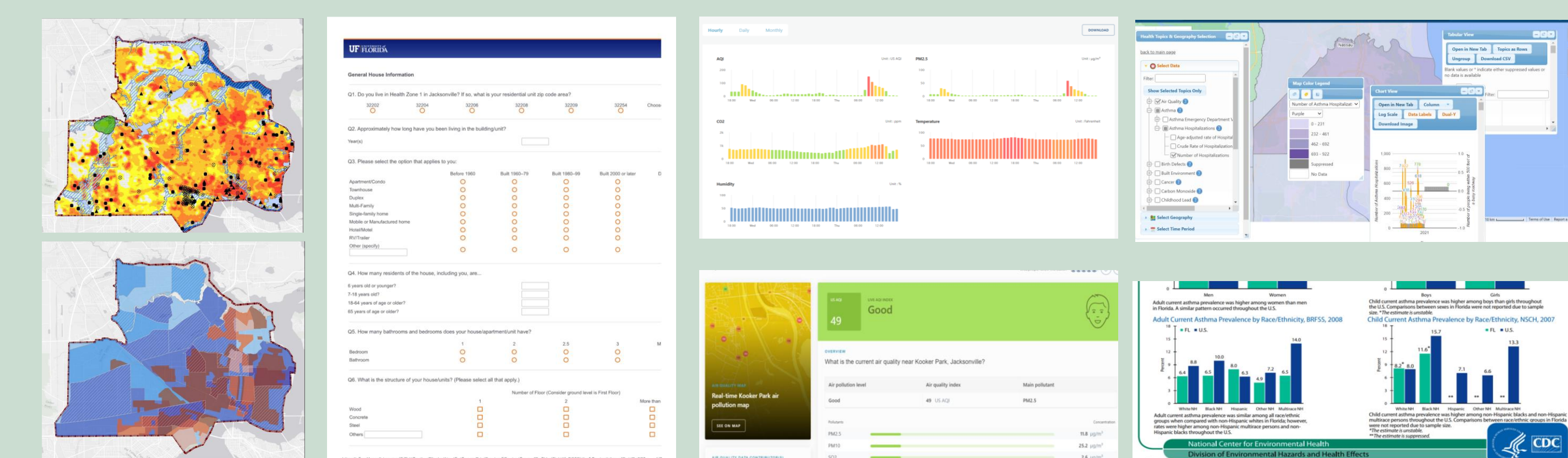


Initial Workflow of ABM

A family agent may also have an attribute indicating the family's occupation status (owner or renter), the percentage of income spent on mortgages or rents, the income per capita, and the number of occupants. The proposed initial workflow of ABM is illustrated in figure below. There is a parallel relationship between the simulated environment and the physical environment in the initial workflow. As part of the simulation process, virtual models has been developed based on reality.

Data Collection

The main database for this study is divided into the following categories: geospatial, temporal air quality data, the health status of the population (quantitative and qualitative), and housing survey.



Geospatial

House

Air Quality

Health

Considering the nature of ABM and SD, the process of collecting data and feeding models will continue through model development over time.

Discussion

The developed model consists of four main levers: quality and safety, neighborhood, affordability, and stability. The model can then be used to analyze how changes in these four levers affect asthma rates in the study area. Each lever can be updated if a specific intervention occurs (for example, physical modifications, policy modifications, or emerging new phenomena such as climate gentrification). This model can enhance future asthma reduction decisions based on community concerns and existing policies.

Acknowledgements



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