Analyzing Heart Failure Progression Across Different Demographic and Socioeconomic Groups

Shayan Mazhar, Electrical Engineering BSE
Mentor: Dr. Md Mobashir Hasan Shandhi, Ph.D., Assistant Professor
Ira A. Fulton School of Engineering

Introduction

This project examines the underlying factors of healthcare inequality to identify underserved populations. This is done by grouping heart failure (HF) patients by demographic and socioeconomic factors and examining clinical biomarker trajectories using statistical analysis and unsupervised learning.

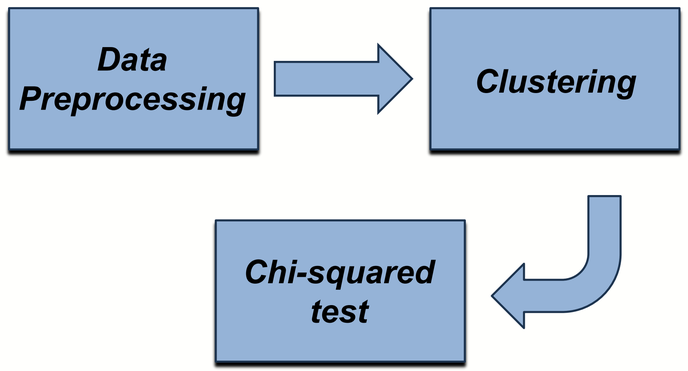
Materials & Methods

Materials

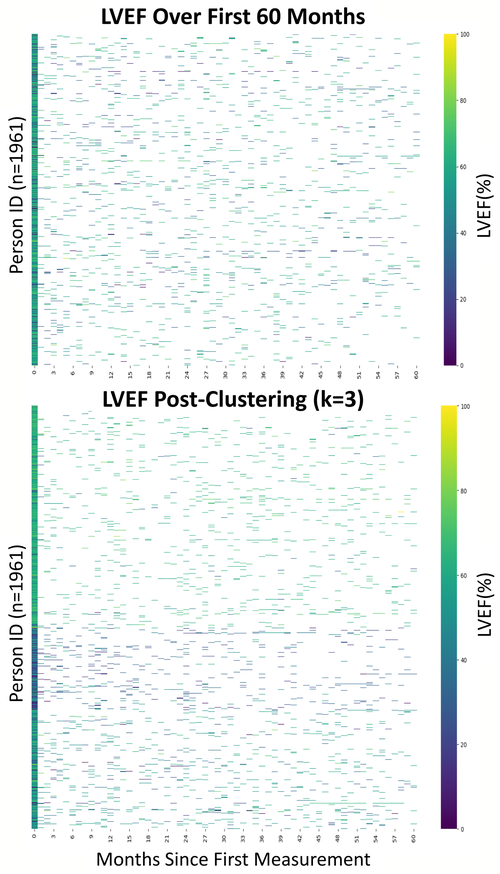
- All of Us dataset – NIH funded dataset with clinical, wearable and genomic data from over 800,000 people

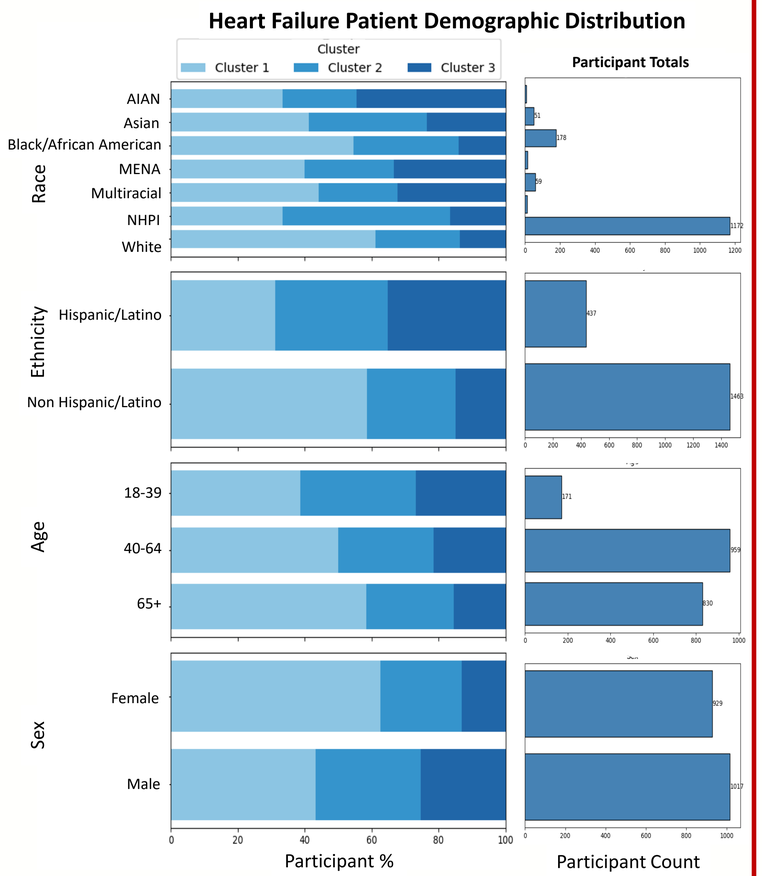
Methods

- Data Preprocessing – querying and cleaning data as needed
- Clustering – separating the population into three clusters based on left ventricular ejection fraction (LVEF) trajectory and observing the resulting population distribution within different social groups
- Chi-square test – investigating if the division of populations based on clusters is statistically significant or not



Results





χ^2 Results	Race	Ethnicity	Age	Sex	Income	Job	Education	BMI
HF								
HFrEF								
HFpEF								

p-value > 0.05

p-value < 0.05

HFrEF: HF with reduced EF

HFpEF: HF with preserved EF

Conclusion

From the 28 χ^2 test results, 24 resulted in a p-value < 0.05, indicating an overall statistical significance in the demographic & socioeconomic population distributions studied. From the individual factors analyzed, the Hispanic population, the male population, and the population with a lower education level had a declining long-term LVEF trajectory, indicating worse cardiac health progression.

Future Work

There are many future research directions from this project. One potential experiment is the creation of a machine learning model which could use demographic and socioeconomic factors to determine heart failure risk and disease progression. Additionally, an investigation into the causes of healthcare inequality across the social groups analyzed in this study can be conducted.

FURI

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Ira A. Fulton Schools of Engineering
Arizona State University