Exploring the Influence of Neighborhood Income and Income Inequality to Resting Blood Pressure in a Diverse Sample of Urban Dwelling Adults

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Background

- It has been well established that cardiovascular disease (CVD) disproportionally affects people of lower socioeconomic status (SES) and hypertension is a key risk factor in the development of CVD.
- There is a growing body of empirical support demonstrating that income inequality has detrimental effects on health. However, little is known about how median neighborhood income and income distribution interact to lead to poor health outcomes.

➢Aim

- Investigate associations of median income and income inequality on resting blood pressure, and its underlying hemodynamic determinants.

Methodology

➢Study Design

- **The Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS)** study is an interdisciplinary, community-based, longitudinal, epidemiologic study examining the influences and interaction of race and socioeconomic status on the development of age-associated health disparities in a socioeconomically diverse cohort initially aged 30-64 residing in the city of Baltimore.

➢Participants

Characteristic	N=731
Age (yrs)	47.5 ± (9.4)
Race (%Black)	62%
Sex (%Male)	44%
Below poverty (%)	52%
Systolic BP (mmHg)	121.6 ± (20.4)
Diastolic BP (mmHg)	68.9 ± (11.4)
Heart rate (beats/min)	74.4 ± (11.0)
Stroke volume Index (ml/beat)	52.4 ± (14.9)
Cardiac index (l/min)	3.8 ± (1.1)
Total peripheral resistance index (dynes/cm^5/sec)	.425 ± (1.1)

Data are presented as mean ± (sd) unless otherwise stated

Fig.1. Median Household Income by CT

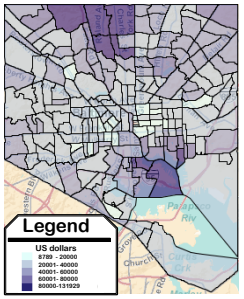
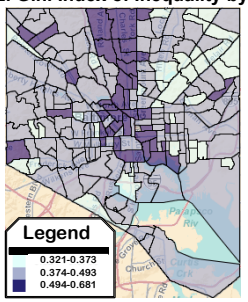
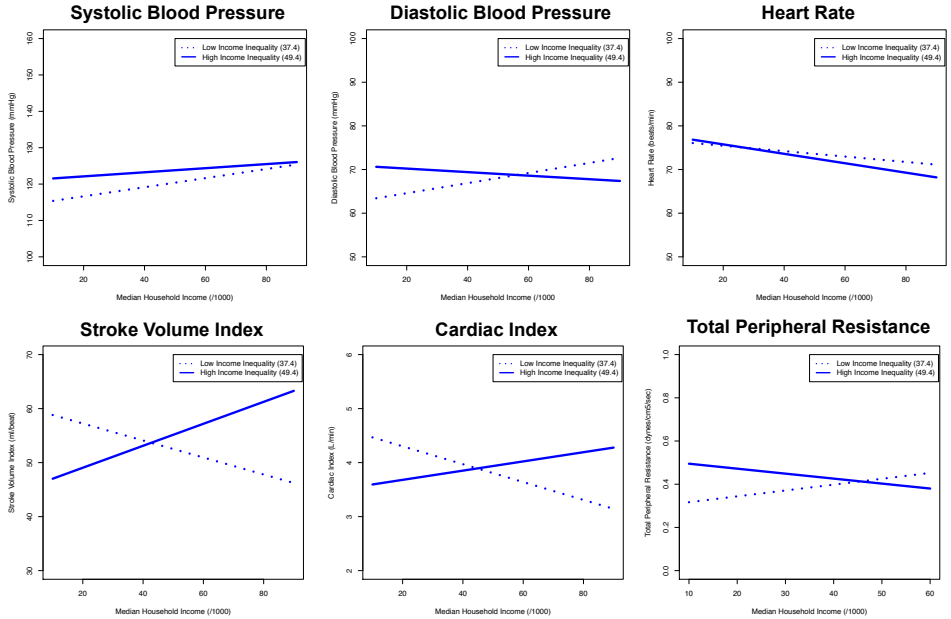


Fig. 2. Gini Index of Inequality by CT



Influence of Income and Income Inequality on Blood Pressure and Hemodynamics

Fig.3.



➢Measurement

➢ *Resting Cardiovascular Indices*

- The Portapres collects continuous blood pressure to produce reliable measures of systolic and diastolic blood pressure (SBP, DBP), heart rate (HR), total peripheral resistance (TPR), stroke volume (SV), and cardiac output (CO). The averages for TPR, SV and CO for five minutes of seated rest were divided by body surface area to produce TPR index, Cardiac Index (CI) and SV index.

➢ *Neighborhood Income*

- **Median Household Income-** Census tract-level median household income were obtained from 2009 American Community Survey 5-year estimates, U.S. Census Bureau
- **Income Inequality:** The Gini Index quantifies how much the household income in a census tract differs from a proportionate distribution. Range: 0 (perfect equality) to 1 (perfect inequality). obtained from 2009 American Community Survey 5-year estimates, U.S. Census Bureau

Analysis

- We computed a series of multiple regression analyses, for each outcome measure (i.e., SBP, DBP, HR, CI, TPR index, SV index).
- **Covariates**-age, sex, race, poverty status, education, BMI, depressive symptoms, antihypertensive use, history of cardiovascular diseases and metabolic diseases, cigarette use, alcohol use and physical activity

Results

- Results revealed a significant interaction between median income and income inequality for DBP (β=-0.70; p<.05), SV(β=1.23; p<.001), CO(β=1.19; p<.001) and TPR(β=-1.24; p<.001).

Conclusions

- People living in low-income/high inequality neighborhoods had significantly worse hemodynamic profiles (i.e., higher DBP, lower SV, lower CO and higher TPR) compared with those living in low-income/low inequality neighborhoods as well as people living in high-income/high inequality neighborhoods.
- The influence of income inequality on blood pressure, and its underlying hemodynamic determinants, was most potent for people living in lower-income neighborhoods.