The Association Between Social Factors and Inflammatory Levels Among US Adults

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Introduction
The biological pathways through which social factors influence health are poorly understood. Social scientists have increasingly begun to collect blood markers to more fully characterize disparities in the health of populations and more accurately assess the risk of mortality at the older ages. One important set of markers that may help explain the association between social factors and late life mortality are related to inflammatory processes. We examine the relationship of SES, race, and immigration status with inflammatory levels among US adults.

Research Questions
1) Do inflammatory levels differ across racial and SES groups? What is the nature of this relationship after controlling for other biological risk factors known to be associated with both social factors and old age mortality?
2) Do immigrants from Mexico carry a different inflammatory burden than the native US population?
3) How do quantile regression techniques aid in characterizing the relationship between social factors and inflammatory levels?

Background
Inflammatory markers have been independently linked to cardiovascular disease (Dawson et al., 2004; Pate et al., 2004). They may also be associated with other chronic conditions of the older ages including diabetes (Duncan et al., 2003) and Alzheimer’s Disease.

Disparity in cardiovascular disease mortality among race and SES are persistent in the United States. We hypothesize that inflammatory levels will also differ across population subgroups.

Little is known about inflammatory levels among immigrant populations in the United States, particularly among Mexican immigrants. Mexican immigrants tend to achieve a higher health status than their socioeconomic status would predict (Palloni & Arias, 2004). Therefore, they may show lower levels of chronic inflammation risk of other factors. However, Mexican born individuals may have been exposed to a different environment in their country of origin which may lead to higher chronic inflammatory levels. We compare inflammatory levels between Mexican immigrants and the native US born population.

Quantile regression models have been shown to be useful in examining biological data (Cade & Noon, 2003). We utilize them here to obtain a more thorough examination of how social factors are related to inflammatory processes.

Results

1) OLS regression of C-reactive protein (log-transformed) onracial factors, medical conditions, and other circulating biological markers

<table>
<thead>
<tr>
<th>Race</th>
<th>Poor (PIR&lt;1)</th>
<th>Non-Poor (PIR&gt;1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Hispanic White</td>
<td>0.196</td>
<td>0.295</td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>0.216</td>
<td>0.185</td>
</tr>
</tbody>
</table>

2) Quantile Regressions

<table>
<thead>
<tr>
<th>Quantile</th>
<th>Non-Hispanic White</th>
<th>Non-Hispanic Black</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0.047</td>
<td>0.004</td>
</tr>
<tr>
<td>0.2</td>
<td>0.004</td>
<td>-0.001</td>
</tr>
<tr>
<td>0.3</td>
<td>-0.041</td>
<td>-0.035</td>
</tr>
</tbody>
</table>

3) Cumulative Distribution Function - Predicted from Quantile Regressions

Discussion & Summary
- Our research suggests that in males both Blacks and the poor have significantly higher inflammatory levels than Whites and the non-poor. We did not find this relationship in females.
- We did not find a difference between inflammatory levels in Mexican immigrants as compared with the native born population. This is consistent with other health related studies, which show better health outcomes for this population.
- Quantile regression models highlight the different associations of social factors with inflammation for men in the upper tail of their distribution.

Data and Methods
- National Health and Nutrition Examination Survey (NHANES), 1999-2002
- Sample restricted to adults ages 20-84
- C-reactive protein was collected in 9,824 participants
- Ordinary Least Squares Regression (OLS) and quantile regressions (least absolute value models) are used to analyze how social factors are related to C-reactive protein levels.

Limitations
- Casuality is difficult to infer because of cross-sectional nature of study.
- Measures of medical conditions are self-reported rather than clinically diagnosed.
- No information about medication usage was included in the model.

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