Socioeconomic Disparities in Mississippi Head and Neck Cancer Patients

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Disclosures

- No financial conflicts

- Poster presented at AAO-HNS Annual Meeting, Fall 2013, Vancouver, BC
Introduction

- Incidence of squamous cell carcinoma (SCC) of head and neck affected by:
  - Tobacco
  - Alcohol
  - Male sex
  - Old age
  - Race
  - HPV status
  - Socioeconomic status (SES)
Introduction

• Socioeconomic status (SES) defined as:
  - The social standing or class of an individual or group. It is often measured as a combination of education, income, and occupation.

• Examinations of socioeconomic status often reveal inequities in access to resources, plus issues related to privilege, power and control.
Introduction

• Johnson et al (2008 and 2010)
  - U.S. and Canadian studies
  - Head and neck cancer incidence increased in those with:
    ▪ Less education
    ▪ Lower family income
    ▪ Fewer dental visits
    ▪ Single, never married
Introduction

• Lee et al (2011)
  - China
  - Correlated lower SES with poorer outcomes for oral cavity cancer

• Chen et al (2007)
  - Emory University
  - More advanced oropharyngeal cancer (advanced T and N stage) associated with lack of insurance (or Medicaid)
Introduction

• Other studies have shown how SES affects head and neck cancer treatment outcomes and development of 2nd primaries

• Similar socioeconomic correlations shown for United States oral, breast, prostate, and lung cancers

*No studies have correlated geographic location or socioeconomic status with overall head and neck cancer stage
Objectives

1. Correlate SES with overall cancer stage

2. Describe and graphically illustrate geographic locations of various stages of patients within the state of Mississippi
Methods

- Cross-sectional analysis
- 2575 consecutive patients from 1991-2012
- Included:
  - Patients with SCC of the nasal cavity, paranasal sinuses, nasopharynx, oral cavity, oropharynx, hypopharynx, and larynx
Methods

• Excluded:
  - Unknown primaries
  - Pathologic diagnoses other than SCC
  - Other primary sites (such as thyroid, skin, etc)
  - Incomplete TNM staging data
  - Primary address outside the state of Mississippi

• Total included patients: 1435
Methods

• ZIP code of each patient correlated to U.S. Census Bureau Data for various socioeconomic data points for each ZIP code
  - 2007-2011 American Community Survey estimates

• Cancer staging based on AJCC Guidelines
Methods

• Socioeconomic data points for each ZIP code:
  - Median household income
  - % of population with less than 9th grade education
  - % of population with yearly income < $10,000
  - Race
  - Sex
Methods

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  - Median household income
  - % of population with less than 9th grade education
  - % of population with yearly income < $10,000
  - Race
  - Sex

• Spearman rho statistic used to assess correlations between overall tumor stage and the above data points
Methods

- Geographic information system (GIS) used to create maps of the zip code data and distribution of patients within the state by overall tumor stage.
## Results

<table>
<thead>
<tr>
<th>Overall Stage</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Stage 1</td>
<td>152</td>
<td>(10.6%)</td>
</tr>
<tr>
<td>Overall Stage 2</td>
<td>187</td>
<td>(13.0%)</td>
</tr>
<tr>
<td>Overall Stage 3</td>
<td>255</td>
<td>(17.8%)</td>
</tr>
<tr>
<td>Overall Stage 4</td>
<td>841</td>
<td>(58.6%)</td>
</tr>
<tr>
<td>Overall Stage 4a</td>
<td>658</td>
<td>(45.9%)</td>
</tr>
<tr>
<td>Overall Stage 4b</td>
<td>143</td>
<td>(9.9%)</td>
</tr>
<tr>
<td>Overall Stage 4c</td>
<td>40</td>
<td>(2.8%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1435</strong></td>
<td></td>
</tr>
</tbody>
</table>
## Results

<table>
<thead>
<tr>
<th>Site of Disease</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral cavity</td>
<td>358</td>
<td>24.9%</td>
</tr>
<tr>
<td>Oropharynx</td>
<td>404</td>
<td>28.2%</td>
</tr>
<tr>
<td>Nasopharynx</td>
<td>27</td>
<td>1.9%</td>
</tr>
<tr>
<td>Hypopharynx</td>
<td>108</td>
<td>7.5%</td>
</tr>
<tr>
<td>Larynx</td>
<td>504</td>
<td>35.1%</td>
</tr>
<tr>
<td>Nasal cavity</td>
<td>7</td>
<td>4.9%</td>
</tr>
<tr>
<td>Paranasal sinus</td>
<td>27</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>T stage</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>213</td>
<td>14.8%</td>
</tr>
<tr>
<td>T2</td>
<td>375</td>
<td>26.1%</td>
</tr>
<tr>
<td>T3</td>
<td>327</td>
<td>22.8%</td>
</tr>
<tr>
<td>T4</td>
<td>521</td>
<td>36.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1114</td>
<td>77.6%</td>
</tr>
<tr>
<td>Female</td>
<td>321</td>
<td>22.4%</td>
</tr>
</tbody>
</table>
Results

- 59.9% of Mississippi residents identify as white
- 37.4% identify as Black or African-American
- All other races making up the small (less than 3%) remainder

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Count (N)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>701</td>
<td>(49.5%)</td>
</tr>
<tr>
<td>Black</td>
<td>700</td>
<td>(49.5%)</td>
</tr>
<tr>
<td>Other ethnicities</td>
<td>14</td>
<td>(1.0%)</td>
</tr>
</tbody>
</table>

Source: US Census Bureau
## Results

<table>
<thead>
<tr>
<th>Overall Stage</th>
<th>N</th>
<th>Median income per household ($)</th>
<th>Percent below poverty level</th>
<th>% Less than 9th grade education</th>
<th>% White</th>
<th>% Black</th>
<th>Percent of Households Making Less than $10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>152</td>
<td>41008.66</td>
<td>20.69</td>
<td>6.52</td>
<td>57.85</td>
<td>40.47</td>
<td>10.69</td>
</tr>
<tr>
<td>Stage 2</td>
<td>187</td>
<td>36968.50</td>
<td>23.92</td>
<td>7.51</td>
<td>52.07</td>
<td>46.69</td>
<td>12.88</td>
</tr>
<tr>
<td>Stage 3</td>
<td>255</td>
<td>37868.40</td>
<td>23.61</td>
<td>7.38</td>
<td>52.06</td>
<td>46.40</td>
<td>12.50</td>
</tr>
<tr>
<td>Stage 4</td>
<td>841</td>
<td>36019.46</td>
<td>24.69</td>
<td>7.74</td>
<td>51.80</td>
<td>46.47</td>
<td>13.15</td>
</tr>
</tbody>
</table>
## Results

<table>
<thead>
<tr>
<th>Socioeconomic Predictors</th>
<th>Correlation coefficient (Spearman's rho)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Income per Household</td>
<td>-0.87</td>
<td>0.001</td>
</tr>
<tr>
<td>Percent of Household Making Less than $10,000</td>
<td>0.091</td>
<td>0.001</td>
</tr>
<tr>
<td>Percent with less than 9th grade education</td>
<td>0.072</td>
<td>0.007</td>
</tr>
<tr>
<td>Percent below poverty level</td>
<td>0.033</td>
<td>0.221</td>
</tr>
<tr>
<td>Race*</td>
<td>-0.17</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Sex*</td>
<td>-0.112</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Correlation is significant at the 0.01 level (2-tailed)
Results

- Pair-wise comparisons by Mann-Whitney U tests indicated that African-American males had significantly more advanced cancer stages \((p<.001)\) at presentation than African-American females, white males and white females.
Head/Neck Cancer Cases per 100,000 Persons
Stage 1

Cases per 100,000 Stage 1
- 0 - 5
- 6 - 100
- 101 - 935

Head/Neck Cancer Cases per 100,000 Persons
Stage 4

Cases per 100,000 Stage 4
- 0 - 5
- 6 - 100
- 101 - 2,440
Discussion

- AA males present with more advanced disease
  - Particularly vulnerable
  - Future efforts at reducing this disparity

- Maps illustrate distributions of advanced staged head and neck cancer patients outside of population centers
Cause for These Disparities?

- Likely multifactorial
  - Tobacco
  - Alcohol
  - HPV
  - Insurance status
  - Access to care
    - Financial status
    - Disability
    - Age
    - Location
    - Myths regarding healthcare
Limitations

- Confounding variables (alcohol, tobacco, etc)
- Data based on patient’s address
  - Not individual patient income
- Single southern state
Directions for Further Study

• Analysis of:
  - T stage, N stage, M stage
  - Individual patient reported data for income

• Effects of the following on cancer stage:
  - HPV
  - Tobacco/alcohol
  - Access to care
Conclusions

• Within Mississippi, patients with advanced head and neck cancers are more likely to:
  1. Be African-American males
  2. Live in economically disadvantaged areas

• Data useful from public health standpoint to hopefully reduce disparities
References

Questions?