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Estimating the Economic Burden of Hypertension in Mississippi

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Hypertension Prevalence

- Hypertension, also known as high blood pressure – a condition in which the blood vessels have persistently raised pressure (WHO)

Source: Behavioral Risk Factor Surveillance System
Hypertension Prevalence by Household Income in Mississippi

Hypertension Prevalence by Education Attained in Mississippi

Source: Behavioral Risk Factor Surveillance System
Estimating the Economic Burden

• Goal of study
  • Direct medical expenditures attributable to hypertension
  • Cost of burden, or the indirect cost due to absenteeism and disability

• Methods used
  • Prevalence-based approach
  • Regression analysis using Stata

• Outcome
  • Better understanding of the burden this chronic health condition places on the state’s economy
Direct Medical Expenditure Data

• Medical Expenditure Panel Survey (MEPS)
• Historical trends – 2015-2017
• Utilized 99% of data due to unexplained outliers

• Data Summary Statistics
  • Number of observations: 71,543 from weighted MEPS combined surveys (population 719,073,610)
  • High Blood Pressure Diagnosis
    • No: 47,796
    • Yes: 23,734 (33.2%)
  • Explanatory variables controlled for socio-economic, health status, and risk factors (region, gender, age, race, marital status, education, income, ethnicity, insurance coverage, health status, other illnesses/diseases)
Direct Medical Costs to Consumers

• Direct Medical Cost Estimation Model
  • Survey weights and variance estimations
  • Two-part model – used to account for excess number of reported zero expenditures
    • First part Probit
    • Second part OLS Regression
  • Log transformation – used to control for skewed data
  • Duan smearing – used to transform margins
  • Bootstrapping – 2,000 replications used to correct standard errors after log transformation
Direct Medical Costs to Consumers

• First part: Probit
  • All illnesses/diseases increase probability of positive expenditures
  • As perceived health status decreases from “Excellent” to “Poor,” the probability increases
  • Higher education status results in a higher probability

• Second part: Regression Log
  • Effect of hypertension = 18.5% higher expenditures
  • Differences across race

• Margin
  • Effect of hypertension = $1,217.98
### Annual Medical Expenditures by Age Group and Year Attributable to Hypertension in Mississippi

<table>
<thead>
<tr>
<th>Age Group</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-24</td>
<td>$30,234,730</td>
<td>$34,957,240</td>
<td>$35,154,204</td>
<td>$35,456,246</td>
</tr>
<tr>
<td>25-34</td>
<td>$88,345,153</td>
<td>$90,044,981</td>
<td>$91,466,497</td>
<td>$92,991,431</td>
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<tr>
<td>35-44</td>
<td>$135,238,004</td>
<td>$136,983,618</td>
<td>$138,672,704</td>
<td>$141,587,411</td>
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<tr>
<td>45-54</td>
<td>$205,841,141</td>
<td>$205,680,738</td>
<td>$206,211,412</td>
<td>$206,749,577</td>
</tr>
<tr>
<td>55-64</td>
<td>$267,482,205</td>
<td>$274,860,568</td>
<td>$282,403,016</td>
<td>$290,024,507</td>
</tr>
<tr>
<td>65+</td>
<td>$330,478,970</td>
<td>$345,372,564</td>
<td>$359,828,138</td>
<td>$376,578,770</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1,057,620,204</strong></td>
<td><strong>$1,087,899,709</strong></td>
<td><strong>$1,113,735,970</strong></td>
<td><strong>$1,143,387,942</strong></td>
</tr>
</tbody>
</table>
Hypertension Prevalence and Direct Cost

Average real % increase = 0.925%
Average nominal % increase = 2.633%

Sources
Population Data: US Census Bureau
Direct Costs: Estimated
Costs of Absenteeism

• Absenteeism – the number of days missed from work due to the adverse health conditions

• Data obtained from the National Health Information Survey (weighted survey)

• OLS regression with multiple imputations for family income
  • Missed Workdays = f(Socio-economic factors, chronic diseases and conditions)

• Hypertension is estimated to account for 1.41 days of missed work per year
  • Given a 2019 hypertension prevalence of 40.6% for adults, this results in 695,938 days missed or 1,907 man-years

• Hypertension absenteeism burden on businesses with average total earnings (wages and supplements) of $48,607 per year per worker is $92,693,549 per year in productivity costs to business
Costs of Disability

• Disability – being unable to participate in the labor force due to the adverse health condition or its associated co-morbidities

• Data obtained from the National Health Information Survey (NHIS)

• Logistic regression
  • \( P(\text{Disability}) = f(\text{Socio-economic factors, chronic diseases and conditions}) \)

• Persons with hypertension are 1.19% more likely to be disabled
  • Calculations based on age-specific prevalences (Behavioral Risk Factor Surveillance Survey) and disability proportions (NHIS)
  • Average total earnings of $47,595 from EMSI (proprietary economic dataset)

• The economic burden of disability due to hypertension results in lost wages of $379,189,365 per year
Conclusions

• Further work to be done in the mortality and presenteeism areas
• Hypertension results in the following economic costs
  • Direct medical costs to consumers – $1,143,387,942
  • Indirect costs to employers due to absenteeism - $92,693,549
  • Indirect cost of lost wages due to disability - $379,189,365
• While direct medical costs can be viewed as a transfer of funds from consumer purchasing to healthcare, hypertension exacts a large toll on the Mississippi economy
• Previous research indicates that education is the most effective strategy in addressing chronic disease/condition issues
• Improving local nutrition and physical environments