How many US citizens are at risk for heart disease?

Haley Moss¹,², Kaigang Li¹,²

¹. CSU - Health & Exercise Science 2. Colorado School of Public Health

Background

One in every four deaths in the U.S. is caused by cardiovascular disease (CVD)⁴. It is the leading cause of death worldwide, accounts for billions of dollars in healthcare spending each year, and affects people of all ethnic backgrounds, ages, and geographic locations to a varying degree⁵. With the increasing age of the US population, the current obesity epidemic, and the underutilization of prevention strategies, CVD related morbidity and mortality may increase in prevalence in the future⁶. The implementation of interventions may reverse this trend, and early prediction of CVD risk may help initiate primary prevention efforts.

Data Source: 1999-2014 National Health and Nutrition Examination Surveys (NHANES)

- Nationally representative data assessing the nutritional and health status of children and adults in the U.S.¹
- 11,553 White and Black participants aged 40-79 years

Procedure

- Score Calculation: Stepwise addition of the equation parameters provided by the ACC/AHA
  - Each parameter value was multiplied by a provided coefficient value before being summed
  - Equation used to calculate the percent risk:
    \[ 1 - \left( \frac{\text{baseline survival rate}}{\text{total-overall mean}} \right)^{\text{total-overall mean}} \]
  - Both the baseline survival rate as well as the overall mean were provided by the ACC/AHA
  - Total value calculated through the stepwise addition

- Categories: Used to estimate total percentage of the population in each 10-Year ASCVD event risk group
  - Less than 5% risk, 5%-10% risk, Greater than 10% risk
- Statistical Analysis
  - Conducted using SAS 9.4 program
  - Complex survey design was taken into account during analysis

Results

We utilized two strategies to handle participants with missing data. In Table 1, we coded all missing data about blood pressure treatment, smoking status, and diabetes diagnosis to no. This led to a risk score that was no more than equal to (likely lower than), the participants actual risk score. Therefore, this data underreports the true population percentages.

<table>
<thead>
<tr>
<th>Risk Categories</th>
<th>%</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Year Risk ≤5%</td>
<td>57.39</td>
<td>55.68 – 59.10</td>
</tr>
<tr>
<td>10 Year Risk 5%-10%</td>
<td>20.63</td>
<td>19.27 – 22.01</td>
</tr>
<tr>
<td>10 Year Risk &gt;10%</td>
<td>21.98</td>
<td>20.94 – 23.01</td>
</tr>
</tbody>
</table>

In Table 2, we excluded all participants with missing data. This led to a more accurate representation of the population risk score, but excluded 11,092 participants, making N very small (N=461).

<table>
<thead>
<tr>
<th>Risk Categories</th>
<th>%</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Year Risk ≤5%</td>
<td>43.35</td>
<td>37.14 – 49.56</td>
</tr>
<tr>
<td>10 Year Risk 5%-10%</td>
<td>25.15</td>
<td>20.16 – 30.14</td>
</tr>
<tr>
<td>10 Year Risk &gt;10%</td>
<td>31.50</td>
<td>25.90 – 37.09</td>
</tr>
</tbody>
</table>

Conclusions

- Given the high percentage of 10-year ASCVD risk ≥10% in the U.S. population aged 40-79 years, and the large rates of morbidity and mortality caused by CVD, steps must be taken to lower individual risk.
- Age, sex, and racial and ethnic disparities need to be considered to tailor programs to each target audience
- Previous studies suggest providing specific diet and exercise guidelines as well as individual and group counseling about eating and exercise behaviors, amongst other activities.
- In addition to improving individual lifestyle choices to fight CVD, improvements must be made to the built environment to help and support individuals in living a health lifestyle by making the healthy choice the easy choice for community members.

Future Directions

- Use more demographic data (such as socioeconomic status, education level, income etc.) to draw conclusions about what other factors influence ASCVD risk
- Develop sex-specific pooled cohort equations for other racial and ethnic groups
- Run longitudinal studies to monitor CVD cases among participants with high ASCVD risk

References