Introduction

Contingency tables are used to understand the relationship between exposures and disease when both are dichotomous variables.

Contingency Tables

- Contingency Table
- Marginal frequencies appear in the margins of the table. They are the sum of the numbers in the rows or columns.

To obtain the proportion of the sample in each cell, divide the frequencies by the total size of the sample.
Joint Probabilities

- Joint Probability Table: presents the data through proportions or probabilities.
- Joint Probabilities: the probabilities in the cells of the table.
- Marginal Probabilities: the probabilities in the margins of the table.

<table>
<thead>
<tr>
<th>Smoking</th>
<th>Disease</th>
<th>φ</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(S) = .04</td>
<td>P(S) = .12</td>
<td>P(S) = .08</td>
<td></td>
</tr>
<tr>
<td>D(S) = .40</td>
<td>P(S) = .48</td>
<td>P(S) = .88</td>
<td></td>
</tr>
<tr>
<td>P(D) = .44</td>
<td>P(D) = .56</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

P(D/S) = P(S/D) / P(S)

= .04 / .12 = .33

Events A and B are independent if:

\[ P(AB) = P(A)P(B) \]

Conditional Probability

- Conditional Probability: \( P(A|B) = P(A)P(B|A) \)
- the proportion of individuals who smoked (i.e. were exposed) had the disease (i.e. outcome)
- Compute: \( P(D|S) = .04 / .12 = .33 \)

P(A|B) = P(A)P(B|A)

Events A and B are independent if:

\[ P(AB) = P(A)P(B) \]

Any Joint Probability

- ANY joint probability is equal to the product of two marginal probabilities.
- \( P(AB) = P(A)P(B) \) or \( P(AB) = P(A)P(B) \)
- \( P(AB) = P(A)P(B) \)
- \( P(AB) = P(A)P(B) \)
- \( P(AB) = P(A)P(B) \)