Appendix F: Useful formulas for the investigation of varicella outbreaks

1) Varicella vaccination coverage rate

\[
\text{Varicella vaccination coverage rate} = \frac{\text{# of children who have received } x \text{ doses varicella vaccine}}{\text{Total # of children eligible to receive } x \text{ doses of vaccine in the study population}}
\]

2) Attack rate calculations:

<table>
<thead>
<tr>
<th>Varicella during the outbreak</th>
<th>Vaccinated</th>
<th>Unvaccinated</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>a</td>
<td>b</td>
<td>a+b</td>
</tr>
<tr>
<td>No</td>
<td>c</td>
<td>d</td>
<td>c+d</td>
</tr>
<tr>
<td>Total</td>
<td>a+c</td>
<td>b+d</td>
<td>a+b+c+d</td>
</tr>
</tbody>
</table>

- \(a\) = number of vaccinated cases (either with one or two doses)
- \(b\) = number of unvaccinated cases
- \(c\) = number of vaccinated non-cases (either with one or two doses)
- \(d\) = number of unvaccinated non-cases.

\[
ARV = \text{Attack Rate vaccinated} = \frac{a}{a+c}
\]

\[
ARU = \text{Attack Rate unvaccinated} = \frac{b}{b+d}
\]

3) Vaccine effectiveness calculations:

\[
\text{Vaccine effectiveness (VE) \%} = \frac{\text{Attack Rate unvaccinated} - \text{Attack Rate vaccinated}}{\text{Attack Rate unvaccinated}} \times 100
\]

For accurate estimation of the VE, calculations should generally include only persons with: 1) no history of varicella disease (those with unknown history are excluded from the calculation); 2) accurate vaccination information (if vaccinated); and 3) timely vaccination (vaccinated \(\geq 12\) months of age, vaccinated \(\geq 42\) days before the start of the outbreak, and at least 3 month interval between 1\(^{\text{st}}\) and 2\(^{\text{nd}}\) dose in children \(< 13\) years of age; 4-8 week interval in persons \(\geq 13\) years of age).