

Appendix F: Useful formulas for the investigation of varicella outbreaks

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

2) Attack rate calculations:

Varicella during the outbreak	Vaccination status at start of outbreak		
	Vaccinated	Unvaccinated	Total
Yes	a	b	a+b
No	c	d	c+d
Total	a+c	b+d	a+b+c+d

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.

$$\text{ARV} = \text{Attack Rate}_{\text{vaccinated}} = a/(a+c)$$

$$\text{ARU} = \text{Attack Rate}_{\text{unvaccinated}} = b/(b+d)$$

3) Vaccine effectiveness calculations:

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

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 at ≥ 12 months of age, vaccinated ≥ 42 days before the start of the outbreak, and at least 3 month interval between 1st and 2nd dose in children < 13 years of age; 4-8 week interval in persons ≥ 13 years of age).