

17% of youth have asthma $\leftarrow H_0$ $P_1 = .17$
 Claim: 83% of youth don't have asthma. $P_2 = .83$

Categories	Asthma	No asthma
Observed (O) Cases (sample data) $n = 400$	$O = 88$	$O = 312$
Expected (E) Cases (based on H_0)	$E = .17(400) = 68$	$E = .83(400) = 332$

Test Statistic $\chi^2 = \sum \frac{(O-E)^2}{E}$

χ^2 is square
 χ is chi
 Big when H_0 is False

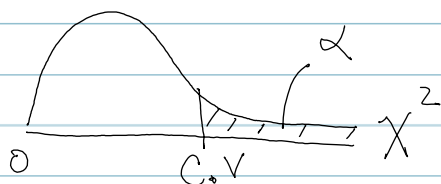
$$\chi^2 = \sum \frac{(O-E)^2}{E} = \frac{(88-68)^2}{68} + \frac{(312-332)^2}{332}$$

Test Stat: $\chi^2 = 7.0872$

$z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}} = 2.66217$
 $z^2 = 2.66217^2 = 7.0871$

- When there are 2 outcomes $\chi^2 = z^2$.
- Advantage of this test → it allows 2 or more outcomes.

→ We need a critical value. Use the χ^2 distribution



This is always a right tailed test since the T.S. is large when H_0 is false.

Degrees of freedom: # of random observations (O).
 one degree of freedom
 We have $O = 88$ & $O = 312$. Only one is random since $312 = 400 - 88$.