

Question 34

A total of 1398 children were examined and classified according to their carrier status for the bacterium *Streptococcus pyogenes* and their tonsil size. The resulting data were as follows.

Do not write
in this margin

Tonsil size	Carrier status		Row totals
	Carrier	Non-carrier	
Normal	19	497	516
Large	29	560	589
Very large	24	269	293
Column totals	72	1326	1398

- (a) Assuming that the 1398 children form a random sample from a whole population, use the data to estimate the proportion of the population who are carriers.

$$\frac{72}{1398}$$

- (b) Under the same assumption, use the data to estimate the probability (i) that a child with normal tonsils is a carrier, and (ii) that a child with very large tonsils is a carrier.

$$\text{i) } \frac{19}{516} \quad \text{ii) } \frac{24}{293}$$

- (c) Estimate the probability that a non-carrier has normal tonsils.

$$\frac{497}{1326}$$

- (d) Do these data establish that being a carrier causes a child to have enlarged tonsils? Briefly explain why or why not.

[6]

Chi sq test

0					
19	497	516	26.6	439.4	516
29	560	589	30.3	558.7	589
24	269	293	15.1	277.9	293
72	1326	1398	72	1326	1398

$$\chi^2(2) = 2.17 + 0.06 + 5.25 + 0.12 + 0 + 0.8 = 8.42$$

Therefore data does imply a relationship