PW SKILLS

CHI SQUARE For Goodnes of Fit

In 2010 Census of the city, the weight of the individuals in a small city were found to be the following

<50kg	50 - 75	>75
20%	30%	50%

In 2020, weight of n=500 individuals were sampled. Below are the results

<50	50-75	>75
140	160	200

Using $\alpha = 0.05$, would you conclude the population diffeunces of weights has changed in the last 10 years?

Ans)

2010
Expected

<50kg	50 - 75	>75
20%	30%	50%

2020
n=500
Observed

<50	50-75	>75
140	160	200

Expected

<50	50-75	>75
0.2 x 500 = 100	0.3 x 500 = 150	0.5 x 500 = 250

① Null Hypothesis : H_0 : The data meets the expectation

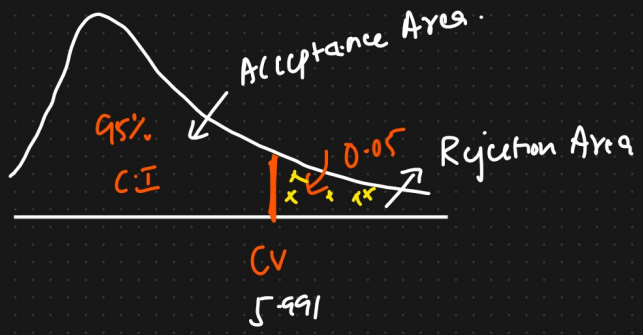
Alternate Hyp : H_1 : The data does not meet the expectation

② $\alpha = 0.05$ C.I = 95%

③ Degree of freedom

$df = K - 1 = 3 - 1 = 2$

④ Decision Boundary



If χ^2 is greater than 5.99, Reject H_0

else

We fail to reject the Null Hypothesis

⑤ Calculate Chi Square Test Statistic

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

$$= \frac{(140-100)^2}{100} + \frac{(160-150)^2}{150} + \frac{(200-250)^2}{250}$$

2020

n=500

	<50	50-75	>75
Observed	140	160	200

	<50	50-75	>75
Expected	0.2 x 500 = 100	0.3 x 500 = 150	0.5 x 500 = 250

$$= \frac{1600}{100} + \frac{100}{150} + \frac{2500}{250}$$

$$= 16 + 0.66 + 10$$

$$= 26.66$$

$$\chi^2 = 26.66$$

If χ^2_{calc} is greater than 5.99, Reject Ho

We fail to reject the Null Hypothesis

$26.66 > 5.99$, Reject Ho

Answer

The weights of 2020 population are different than those expected in the 2010 population