

1) A study of Yellow fever disease (YFD) was conducted. The study was restricted to patients under the age of 40. One purpose was to compare the distribution of cases by age in group A to that of group B. The group data are given below:

| C-T. | Group A | Group B |
|-------|---------|---------|
| 1-5 | 0 | 2 |
| 6-10 | 7 | 4 |
| 11-15 | 10 | 7 |
| 16-20 | 2 | 20 |
| 21-25 | 1 | 16 |
| 26-30 | 5 | 10 |
| 31-35 | 4 | 4 |

Calculate:

- i) The mean and standard deviation for each group
- ii) The coefficient of variation for each group.
- iii) Which group has less variable distribution

I) Group A

| C-I | F | midpoint (u) | F(u) | $ u - \bar{x} $ | $(u - \bar{x})^2$ | $f(u - \bar{x})^2$ |
|-------|-----------|--------------|------------|-----------------|-------------------|--------------------|
| 1-5 | 0 | 3 | 0 | 15 | 225 | 0 |
| 6-10 | 7 | 8 | 56 | 10 | 100 | 700 |
| 11-15 | 10 | 13 | 130 | 5 | 25 | 250 |
| 16-20 | 2 | 18 | 36 | 0 | 0 | 0 |
| 21-25 | 1 | 23 | 23 | 5 | 25 | 25 |
| 26-30 | 5 | 28 | 140 | 10 | 100 | 500 |
| 31-35 | 4 | 33 | 132 | 15 | 225 | 900 |
| | <u>29</u> | | <u>517</u> | | | <u>2375</u> |

$$\text{Mean} = \frac{\sum fu}{\sum f} = \frac{517}{29} = 17.8$$

$$\approx 18$$

$$\text{Standard deviation} = \sqrt{\text{var}}$$

$$\text{variance} = \frac{\sum f(u - \bar{x})^2}{\sum f} = \frac{2375}{29} = 81.9$$

$$= 81.9$$

$$s.d = \sqrt{81.9}$$

$$= 9.05$$

$$\approx 9.1$$

Ib) Group B

| C-T | F | Midpoint (x) | Fx | x - \bar{x} | (x - \bar{x}) ² | F(x - \bar{x}) ² |
|-------|-----------|--------------|-------------|---------------|-------------------------------|--------------------------------|
| 1-5 | 2 | 3 | 6 | 17 | 289 | 578 |
| 6-10 | 4 | 8 | 32 | 12 | 144 | 576 |
| 11-15 | 7 | 13 | 91 | 7 | 49 | 343 |
| 16-20 | 20 | 18 | 360 | 2 | 4 | 80 |
| 21-25 | 16 | 23 | 368 | 3 | 9 | 144 |
| 26-30 | 10 | 28 | 280 | 8 | 64 | 640 |
| 31-35 | 4 | 33 | 132 | 13 | 169 | 676 |
| | 63 | | 1269 | | | 3037 |

$$\text{Mean}(\bar{x}) = \frac{\sum fx}{\sum f} = \frac{1269}{63} = 20.14 \approx 20$$

Standard deviation = ~~Standard deviation~~ $\sqrt{\text{Variance}}$

$$\text{Variance} = \frac{\sum f(x - \bar{x})^2}{\sum f} = \frac{3037}{63} = 48.21$$

$$= \frac{3037}{63} = 48.21$$

$$\text{Standard deviation} = \sqrt{48.21}$$

$$= 6.94$$

$$\approx 6.9$$

ii) Group A

$$C.V = \frac{\text{Standard deviation}}{\text{mean}} \times 100$$

mean

$$= \frac{9.1}{18} \times 100 = 50.55$$

$$\approx 50.6$$

Group B

$$C.V = \frac{\text{Standard deviation}}{\text{mean}} \times 100$$

mean

$$= \frac{6.9}{20} \times 100 = 34.5$$

iii) The group with the less variable distribution is group B.