

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

CL	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

- The mean and standard deviation for each group
- The coefficient of variation for each group
- which group has less variable distribution.

Soln

for group A

CL	Group A/f	$X_m$	$X_m \cdot f$	$X_m - \bar{x}$	$(X_m - \bar{x})^2$	$(X_m - \bar{x})^2 \cdot f$
1-5	0	$\frac{1+5}{2} = 3$	0	-14.83	219.9	0
6-10	7	$\frac{6+10}{2} = 8$	56	-9.83	96.6	676.2
11-15	10	$\frac{11+15}{2} = 13$	130	-4.83	23.3	233
16-20	2	$\frac{16+20}{2} = 18$	36	0.17	0.029	0.06
21-25	1	$\frac{21+25}{2} = 23$	23	5.17	26.7	26.7
26-30	5	$\frac{26+30}{2} = 28$	140	10.17	103.4	517
31-35	4	$\frac{31+35}{2} = 33$	132	15.17	230.1	920.4
	$n = \sum f$ = 29		$\sum X_m \cdot f$ = 517			$\sum (X_m - \bar{x})^2 \cdot f$ = 2373.36

$$\text{mean } \bar{x} = \frac{\sum X_m \cdot f}{n} = \frac{517}{29} = 17.83$$

$$\text{variance } s^2 = \frac{\sum (X_m - \bar{x})^2 \cdot f}{n-1} = \frac{2373.36}{29-1} = \frac{2373.36}{28} = 84.76$$

$$\text{standard deviation } s = \sqrt{\frac{\sum (X_m - \bar{x})^2 \cdot f}{n-1}} = \sqrt{84.76} = 9.2$$

for group B

cl	Group B/f	$X_m$	$X_m \cdot f$	$X_m - \bar{x}$	$(X_m - \bar{x})^2$	$(X_m - \bar{x})^2 \cdot f$
1-5	2	3	6	-17.1	292.41	584.82
6-10	4	8	32	-12.1	146.41	585.64
11-15	7	13	91	-7.1	50.41	352.87
16-20	20	18	360	-2.1	4.41	88.2
21-25	16	23	368	2.9	8.41	134.56
26-30	10	28	280	7.9	62.41	624.1
31-35	4	33	132	12.9	166.41	665.64

$$n = \sum f = 63$$

$$\sum X_m \cdot f = 1269$$

$$\sum (X_m - \bar{x})^2 \cdot f = 3035.83$$

$$\text{mean } \bar{x} = \frac{\sum X_m \cdot f}{\sum n} = \frac{1269}{63} = 20.1$$

$$\text{variance } s^2 = \frac{\sum (X_m - \bar{x})^2 \cdot f}{n-1} = \frac{3035.83}{63-1} = \frac{3035.83}{62} = 48.97$$

$$\text{standard deviation } s = \sqrt{s^2}$$

$$= \sqrt{48.97}$$

$$= 6.99$$

n) coefficient of variation for group A

$$= \frac{s.d}{\bar{x}} = \frac{9.2}{17.83} = 0.52$$

for group B

$$= \frac{s.d}{\bar{x}} = \frac{6.99}{20.1} = 0.35$$

m) Group B has less variable distribution