

MEASURES OF CENTRAL TENDENCY

By:

Mrs. RINKI KUMARI
DEPTT.OF EDUCATION
MMHA&PU,PATNA



WHAT IS CENTRAL TENDENCY

- ❖ In statistics, a central tendency is a central or typical value for a probability distribution . It may also be called a center or location of the distribution.
- ❖ The term central tendency refers to the “Middle” value or perhaps a typical value of the data, and is measured using the mean, median, or mode. Each of these measures is calculated differently, and the one that is best to use depends upon the situation

MEASURES OF CENTRAL TENDENCY

Three types of averages are useful for analysing data. They are:--

- ✓ MEAN
- ✓ MEDIAN
- ✓ MODE

Arithmetic Mean

(Marks)

X

65

55

42

58

94

86

$\Sigma X = 400$

Individual Series

$$\bar{X} = \frac{\Sigma X}{N}$$

$$\bar{X} = \frac{400}{6}$$

$$\bar{X} = 66.67$$

Arithmetic Mean

(Marks)	Freq	Fx
X		
20	8	160
30	12	360
40	20	800
50	10	500
60	6	360
70	4	280
	N=60	$\Sigma fx=2460$

Discrete Series

$$\bar{X} = \frac{\Sigma fx}{N}$$

$$\bar{X} = \frac{2460}{60}$$

$$\bar{X} = 41$$

Arithmetic Mean (Continuous Series)

(Marks)	f	Mv=(LL+UL/2)	f.mv
CI			
0-10	5	5	25
10-20	10	15	150
20-30	25	25	625
30-40	30	35	1050
40-50	20	45	900
50-60	10	55	550
	N=100		$\sum fmv=3300$

$$\bar{X} = \frac{\sum fmv}{N}$$

$$\bar{X} = \frac{3300}{100}$$

$$\bar{X} = 33$$

MEDIAN

The median of a distribution is the value of the middle variable when the variables are arranged in ascending or descending order. In other words the median is that central number which divides the whole ordered collection into two equal parts, the numbers on one side of it are all less than the median and those on the other side are all greater than it. Thus median is an average of position of the **numbers**.

MEDIAN OF UNGROUPED DATA

Method for finding the median of an ungrouped data

Arrange the data in increasing or decreasing order of magnitude. Let the total number of observations be n .

Step 1–when n is odd :

median =value of $\frac{1}{2} (n+1)$ th term.

Step 2–when n is even :

median = $\frac{1}{2} \left\{ \left[\frac{n}{2} \right] \text{th term} + \left[\frac{n}{2} + 1 \right] \text{th term} \right\}$

EXAMPLE 1 OF ODD METHOD

The runs scored by 11 members of a cricket team are

25,39,53,18,65,72,0,46,31,8,34

Find the median score.

Solution : arranging the number of runs in ascending order, we have :

0,8,18,25,31,34,39,46,53,65,72

Here $n = 11$, which is odd.

\therefore median score = value of $\frac{1}{2} (11+1)$ th term =
value of 6th term = 34

Hence, the median score is 34.

EXAMPLE 2 OF EVEN METHOD

The weight of 10 students (in kg) are

40,52,34,47,31,35,48,41,44,38.

Find the median weight.

Solution:- arranging the weights in ascending order, we have:-

31,34,35,38,40,41,44,47,48,52

Here $n = 10$, which is even.

$$\therefore \text{median weight} = \frac{1}{2} \left\{ \left[\frac{10}{2} \right] \text{th term} + \left[\frac{10}{2} + 1 \right] \text{th term} \right\}$$

$$\frac{1}{2} \{ 5^{\text{th}} \text{ term} + 6^{\text{th}} \text{ term} \}$$

$$\frac{1}{2} \{ 40 + 41 \} \text{kg} = \frac{81}{2} \text{kg} = 40.5 \text{kg}$$

Hence, median weight = 40.5 kg

MEDIAN OF GROUP DATA

The Mathematical formulae for computing median is:

$$\text{Median} = l + \frac{\frac{N}{2} - C}{f} \times h$$



where l = lower limit of the median class

N = total frequency

C = cumulative frequency of the class previous to the median class

f = frequency of the median class

h = class interval of the median class

Example:

- From the following dataset, let us compute the median

Ages (in years)	25-30	30-35	35-45	45-50	50-55	55-60	60-65
No. of Employees	13	17	14	16	7	3	2

In order to obtain the median we construct the following table:

Class	f_i	Cumulative frequency
25-30	13	13
30-35	17	30
35-45	14	44
45-50	16	60
50-55	7	67
55-60	3	70
60-65	2	72
	$N=72$	

Now,
$$Median = l + \frac{\frac{N}{2} - C}{f} \times h$$

Here,
$$\frac{N}{2} = \frac{72}{2} = 36$$

from the cumulative frequency column we find that 35-45 is the median class, so we have, $l = 35$, $C = 30$, $f = 14$, $h = 10$.

$$\begin{aligned} \text{Thus median} &= 35 + \frac{36 - 30}{14} \times 10 \\ &= 39.28 \text{ years} \end{aligned}$$