

**Ph. D. Course Work, Sociology****Paper II.****Unit - 5****Topic-Graphic representation****Part-B**

**1. Frequency polygon-** A frequency polygon is almost identical to a histogram, which is used to compare sets of data or to display a cumulative frequency distribution. It uses a line graph to represent quantitative data.

**Let us discuss how to draw a frequency polygon:**

**Step-1:**

Draw a horizontal line at the bottom of graph paper named 'OX' axis. Mark off the exact limits of the class intervals along this axis. It is better to start with c.i. of lowest value. When the lowest score in the distribution is a large number we cannot show it graphically if we start with the origin. Therefore put a break in the X axis ( ) to indicate that the vertical axis has been moved in for convenience. Two additional points may be added to the two extreme ends.

**Step-2:**

Draw a vertical line through the extreme end of the horizontal axis known as OY axis. Along this line mark off the units to represent the frequencies of the class intervals. The scale should be chosen in such a way that it will make the largest frequency (height) of the polygon approximately 75 percent of the width of the figure.

**Step-3:**

Plot the points at a height proportional to the frequencies directly above the point on the horizontal axis representing the mid-point of each class interval.

**Step-4:**

After plotting all the points on the graph join these points by a series of short straight lines to form the frequency polygon. In order to complete the figure two additional intervals at the high end and low end of the distribution should be included. The frequency of these two intervals will be zero.

**Example-**

**Draw a frequency polygon from the following data:**

Marks in Mathematics	40-45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-95	95-99
No. of students	1	3	2	4	5	6	10	8	5	6	2	1

**Solution:**

In this graph we shall take the class intervals (marks in mathematics) in X axis, and frequencies (Number of students) in the Y axis. Before plotting the graph we have to convert the c.i. into their exact limits and extend one c.i. in each end with a frequency of 0

**Class intervals with exact limits:**

c.i.	f.
34.5—39.5	0
39.5—44.5	1
44.5—49.5	3
49.5—54.5	2
54.5—59.5	4
59.5—64.5	5
64.5—69.5	6
69.5—74.5	10
74.5—79.5	8
79.5—84.5	5
84.5—89.5	6
89.5—94.5	2
94.5—99.5	1
99.5—104.5	0

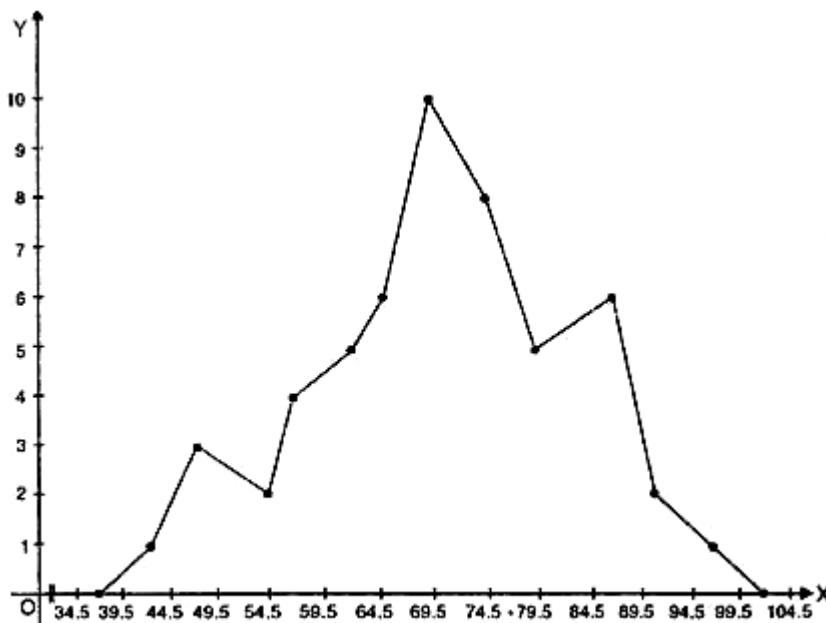


Fig. 7.3 Frequency polygon plotted from the data.

**Advantages of frequency polygon:**

1. It is easy to draw and simple to understand.
2. It is possible to plot two distributions at a time on same axes.
3. Comparison of two distributions can be made through frequency polygon.
4. It is possible to make it smooth.

**Limitations of frequency polygon:**

1. It is less precise.
2. It is not accurate in terms of area the frequency upon each interval

**Uses of frequency polygon:**

1. When two or more distributions are to be compared the frequency polygon is used.
2. It represents the data in graphic form.
3. It provides knowledge of how the scores in one or more group are distributed. Whether the scores are piled up at the lower or higher end of the distribution or are evenly and regularly distributed throughout the scale.

**2. Smoothed Frequency Polygon:**

When the sample is very small and the frequency distribution is irregular the polygon is very jig-jag. In order to wipe out the irregularities and **“also get a better notion of how the figure might look if the data were more numerous, the frequency polygon may be smoothed.”**

In this process to adjust the frequencies we take a series of ‘moving’ or ‘running’ averages. To get an adjusted or smoothed frequency we add the frequency of a class interval with the two adjacent intervals, just below and above the class interval. Then the sum is divided by 3. When these adjusted frequencies are plotted against the class intervals on a graph we get a smoothed frequency polygon.

**Example-**

**Draw a smoothed frequency polygon, of the data given**

**Solution:**

Here we have to first convert the class intervals into their exact limits. Then we have to determine the adjusted or smoothed frequencies.

c.i. (with exact limit)	f	Smoothed frequency
34.5—39.5	0	$0 + 0 + 1 + 3 = .33$
39.5—44.5	1	$0 + 1 + 3 + 3 = 1.33$
44.5—49.5	3	$1 + 3 + 2 + 3 = 2.00$
49.5—54.5	2	$3 + 2 + 4 + 3 = 3.00$
54.5—59.5	4	$2 + 4 + 5 + 3 = 3.67$
59.5—64.5	5	$4 + 5 + 6 + 3 = 5.00$
64.5—69.5	6	$5 + 6 + 10 + 3 = 7.00$
69.5—74.5	10	$6 + 10 + 8 + 3 = 8.00$
74.5—79.5	8	$10 + 8 + 5 + 3 = 7.67$
79.5—84.5	5	$8 + 5 + 6 + 3 = 6.33$
84.5—89.5	6	$5 + 6 + 2 + 3 = 4.33$
89.5—94.5	2	$6 + 2 + 1 + 3 = 3.00$
94.5—99.5	1	$2 + 1 + 0 + 3 = 1.00$
99.5—104.5	0	$1 + 0 + 0 + 3 = .33$

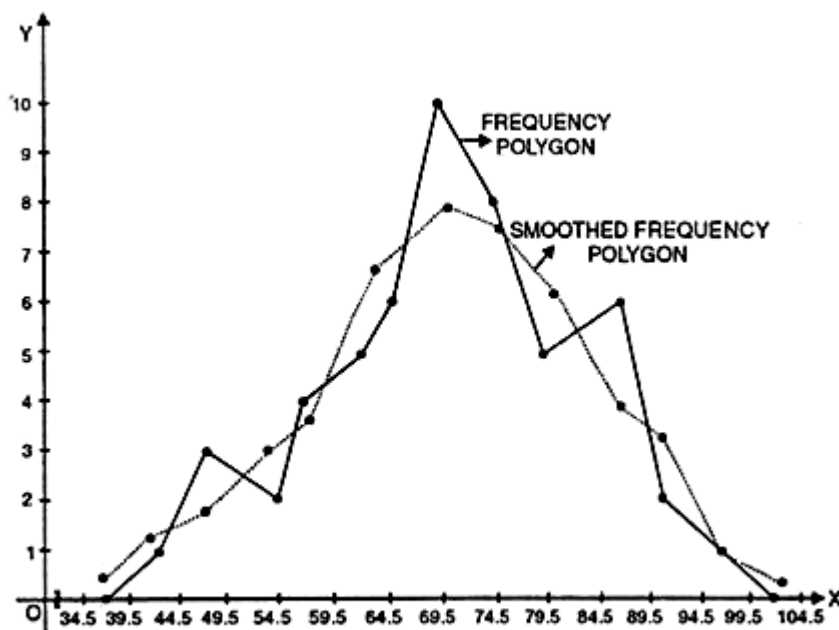


Fig. 7.4. Smoothed frequency polygon plotted from the data.

### 3. Ogive or Cumulative Frequency Polygon:

Ogive is a cumulative frequency graphs drawn on natural scale to determine the values of certain factors like median, Quartile, Percentile etc. In these graphs the exact limits of the class intervals are shown along the X-axis and the cumulative frequencies are shown along the Y-axis. Below are given the steps to draw an ogive.

#### Step—1:

Get the cumulative frequency by adding the frequencies cumulatively, from the lower end (to get a less than ogive) or from the upper end (to get a more than ogive).

**Step—2:**

Mark off the class intervals in the X-axis.

**Step—3:**

Represent the cumulative frequencies along the Y-axis beginning with zero at the base.

**Step—4:**

Put dots at each of the coordinating points of the upper limit and the corresponding frequencies.

**Step—5:**

Join all the dots with a line drawing smoothly. This will result in curve called ogive.

Example-

**Draw an ogive from the data given below:**

Marks in History	0—9	10—19	20—29	30—39	40—49	50—59	60—69	70—79	80—89	90—99
No. of Students	3	5	9	12	18	17	10	3	2	1

**Solution:**

To plot this graph first we have to convert, the class intervals into their exact limits. Then we have to calculate the cumulative frequencies of the distribution.

c.i.	f	c.f. (cumulative frequencies)
0—9.5	3	3
9.5—19.5	5	8
19.5—29.5	9	17
29.5—39.5	12	29
39.5—49.5	18	47
49.5—59.5	17	64
59.5—69.5	10	74
69.5—79.5	3	77
79.5—89.5	2	79
89.5—99.5	1	80

Now we have to plot the cumulative frequencies in respect to their corresponding class-intervals.

**Ogive plotted from the data given above:**

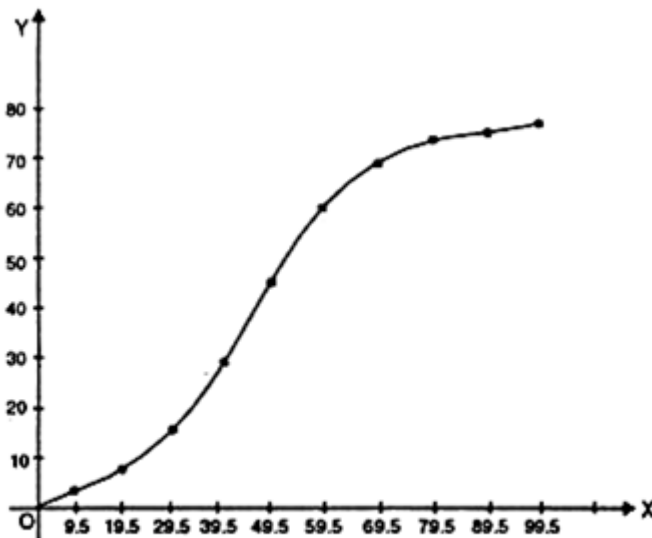


Fig. 7.5.

#### Uses of Ogive:

1. Ogive is useful to determine the number of students below and above a particular score.
2. When the median as a measure of central tendency is wanted.
3. When the quartiles, deciles and percentiles are wanted.
4. By plotting the scores of two groups on a same scale we can compare both the groups.

#### 4. The Pie Diagram:

Figure given below shows the distribution of elementary pupils by their academic achievement in a school. Of the total, 60% are high achievers, 25% middle achievers and 15% low achievers. The construction of this pie diagram

is quite simple. There are 360 degree in the circle. Hence, 60% of 360' or 216° are counted off as shown in the diagram; this sector represents the proportion of high achievers students.

Ninety degrees counted off for the middle achiever students (25%) and 54 degrees for low achiever students (15%). The pie-diagram is useful when one wishes to picture proportions of the total in a striking way. Numbers of degrees may be measured off “**by eye**” or more accurately with a protractor.

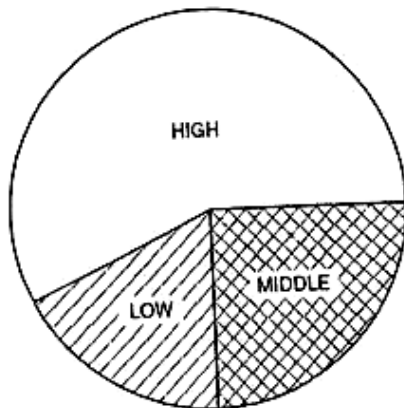


Fig. 7.6. Distribution by academic achievement of pupils in Class VI of a school.

### **Uses of Pie diagram:**

1. Pie diagram is useful when one wants to picture proportions of the total in a striking way.
2. When a population is stratified and each strata is to be presented as a percentage at that time pie diagram is used.

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