Cumulative frequency distributions

Often times, the researcher may need to know the number of observations that are less than a certain value or greater than a certain value, and then the researcher resorts to creating ascending or descending cumulative tables. The following is an explanation of how to create each of these two types separately:

Ascending cumulative frequency distribution

To create Ascending cumulative frequency table, the sum of the frequencies (number of values) below each class term is calculated.

Example (6)

The following frequency table shows the distribution of 40 cows on a farm according to the amount of milk produced by the cow per day in liters.

Amount of milk	18-	22-	26-	30-	34-38	Sum
No. cows	4	9	15	8	4	40

What is required:

1- Construct an ascending cumulative frequency distribution table.

2- Construct a percentage ascending cumulative frequency distribution table.

3- Draw the percentage ascending cumulative frequency curve.

4- From the cumulative curve, find the following:

· Percentage of cows whose production is less than 28 litres.

· Production quantity of less than 25% of cows.

· The production quantity is less than 50% of production.

The solution

1- Ascendant cumulative frequency distribution.

Amount of milk	No. Cows	Less than	Ascendant cumulative frequency	Percentage ascendant cumulative frequency
18-	4	18	0	0.00
22-	9	**22**	4	0.10
26-	15	**26**	13	0.325
30-	8	**30**	28	0.70
34-38	4	**34**	36	0.90
Sum	40	**38**	40	1.00

2- Percentage ascendant cumulative frequency distribution: The percentage ascendant cumulative frequency is calculated by dividing the ascending cumulative frequency by the sum of the frequencies, as shown in the last column in the ascendant cumulative frequency distribution table.

3- Drawing the percentage ascendant cumulative frequency curve: The percentage ascendant cumulative frequency curve is the graphical representation of the Percentage ascendant cumulative frequency distribution, where the boundaries of the classes are represented on the horizontal axis, and the percentage ascendant cumulative frequency on the vertical axis, and the curve is smoothed to pass through the coordinates, as shown in the following figure. :

· The percentage of cows whose production is less than 28 liters is approximately 0.47.

· The production quantity, which is less than 25% of the production values, is: approximately 25 litres.

· The production quantity that is less than 50% of the production values is: 28.5 liters, and it is called the median:

Descendant cumulative frequency distribution

To create a descending cumulative frequency table, the sum of the frequencies (number of values) that are equal to or greater than each class term is calculated.

Example (7)

Use the frequency table data in Example (6), and find the following:

1- Create the descending cumulative frequency distribution.

2- Draw the percentage descending cumulative frequency curve.

the solution:

1- Construct the descending cumulative frequency distribution.

Amount of milk	**No. Cows**	**greater than**	**Ascendant cumulative frequency**	**Percentage ascendant cumulative frequency**
18-	4	18	40	1.00
22-	9	**22**	36	0.90
26-	15	**26**	27	0.675
30-	8	**30**	12	0.30
34-38	4	**34**	4	0.10
Sum	40	**38**	0	0.00

Draw the descending frequency curve.

comments:

1- The two curves can be drawn in one graphical form, and it is noted that they intersect at a point called the median.

2- we can use of the ascending cumulative frequency curve is more practical.

Graphical display of descriptive data

Data for a descriptive variable can be displayed in the form of a pie chart or bar chart, through which groups or levels of this variable can be described and compared.

Pie chart

To display the descriptive variable data in the form of a circle, the 360^o degrees are distributed according to the percentage frequency of the variable groups, where the angle of the group number r is determined by applying the following equation:

r = The value of the angle (360^o) × the percentage frequency

Example (8)

The following frequency table shows the distribution of a sample of 500 families according to the region to which they belong.

Region	**Baghdad**	**Mosul**	**Duhuk**	**Basrah**	sum
No. Families	150	130	50	170	500

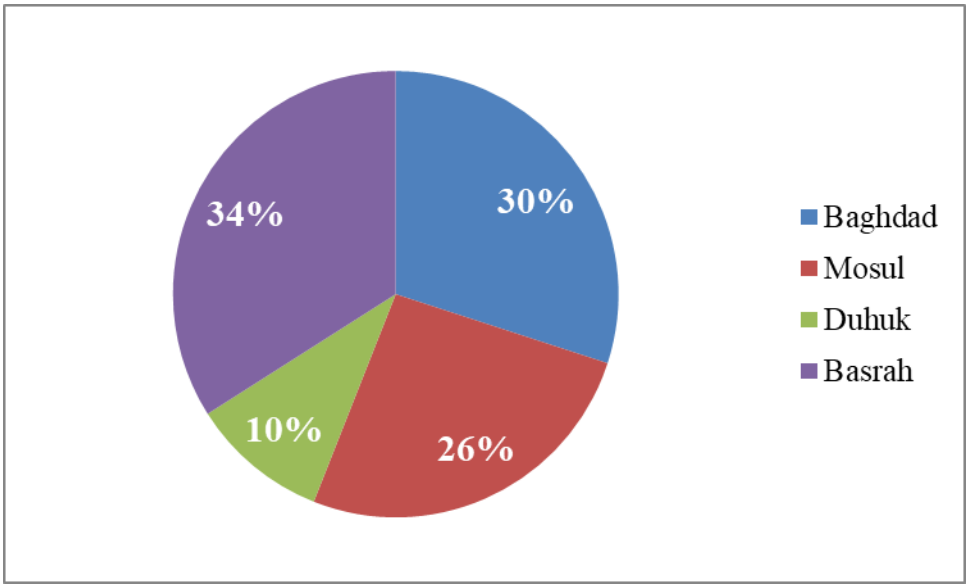
Present the above data in the form of a pie chart.

The solution:

Region	No. Families	Percentage frequency	The amount of angle
Baghdad	150	0.30	360 ×0.30 = 108°
Mosul	130	0.26	360 ×0.26 = 93.6°
Duhuk	50	0.10	360 ×0.10 = 36°
Basrah	170	0.34	360 ×0.30 = 122.4°
Sum	500	1.00	360°

2- Draw the circle

A circle (pie chart) is drawn and divided into four parts. Each area has a part proportional to the amount of its angle, as shown in the following figure:



The pie chart is for a sample size of 500 families distributed by regions