CHAPTER -2-

Summarization

COLLEGE OF EDUCATION

DEPARTMENT OF MATHEMATICS

Contents

- ❑ Frequency distribution (for qualitative data) and
- ❑ Frequency distribution (for quantitative data)
- ❑ Proportion
- ❑ Percentage
- ❑ Ratio

Frequency distribution
(for qualitative data)

▶ Distribution of total frequency into possible categories

▶ **Example:**

Below given occupations of 20 randomly selected men-

Student, Student, Public service, Businessman, Day labor, Public service, Private service, Day labor, Student, Public service, Public service, Private service, Businessman, Day labor, Businessman, Private service, Businessman, Public service, Private service, Public service.

Frequency distribution
(for qualitative data)

Student, Student, Public service, Businessman, Day labor, Public service, Private service, Day labor, Student, Public service, Public service, Private service, Businessman, Day labor, Businessman, Private service, Businessman, Public service, Private service, Public service.

Frequency distribution:

Occupation	Tally	Frequency
Businessman		
Day Labor		
Private service		
Public service		
Student		
Total		

Frequency distribution
(for qualitative data)

Student, Student, Public service, Businessman, Day labor, Public service, Private service, Day labor, Student, Public service, Public service, Private service, Businessman, Day labor, Businessman, Private service, Businessman, Public service, Private service, Public service.

Frequency distribution:

Occupation	Tally	Frequency
Businessman	IIII	4
Day Labor	III	3
Private service	IIII	4
Public service	IIII I	6
Student	III	3
Total		**n= 20**

Frequency distribution
(for qualitative data)

Table 1: Frequency distribution table of occupation of the respondent

Occupation	Tally	Frequency	Relative frequency
Businessman	IIII	4	4/20= 0.20
Day Labor	III	3	3/20= 0.15
Private service	IIII	4	4/20= 0.20
Public service	IIII I	6	6/20= 0.30
Student	III	3	3/20= 0.15
Total		**n= 20**	**1**

Frequency distribution
(for qualitative data)

► **Class task:**

Let the blood types of 40 persons are as follows:

O O A B A O A A A O B O B O O A O O A A A A AB A B A A O O A

O O A A A O A O O AB.

Summarize this data in a frequency table.

Frequency distribution
(for quantitative data)

▶ Distribution of total frequency into possible numeric classes

▶ **Example:**

   Below given the total monthly income (in thousand taka) of 30 randomly selected families-

30, 40, 6, 110, 11, 15, 55, 20, 120, 45, 30, 47, 52, 68, 105, 62, 52, 98, 76, 85, 83, 91, 49, 38, 57, 27, 23, 42, 9, 65

Frequency distribution
(for quantitative data)

Steps for finding frequency distributions:

Step1: Decide on the **number of classes** (K), such that, $2^K \geq n$

Here, $(2^5 = 32) \geq (n = 30)$, so K=5

Frequency distribution
(for quantitative data)

Steps for finding frequency distributions:

Step1: Decide on the **number of classes** (K), such that, $2^K \geq n$

Here, $(2^5 = 32) \geq (n = 30)$, so K=5

Step 2: Determine the **class interval** (i).

$$i \geq \frac{Highest\ value\ (H) - Lowest\ value\ (L)}{K}$$

Here, $i \geq \frac{H-L}{K} = \frac{120-6}{5} = \frac{114}{5} = 22.8 \approx 23$

Frequency distribution
(for quantitative data)

Steps for finding frequency distributions:

Step 3: Set the class limits

Classes	Tally marks	Frequency
05-30		
30-55		
55-80		
80-105		
105-130		
Total		

Frequency distribution
(for quantitative data)

Steps for finding frequency distributions:

Step 4: Tally the values into classes and count the number of observations in each class.

Classes	Tally marks	Frequency
05-30	ЖII	7
30-55	ЖЖ	10
55-80	ЖI	6
80-105	IIII	4
105-130	III	3
Total		**n= 30**

Frequency distribution
(for quantitative data)

Table 2: Frequency distribution table of monthly family income

Classes	Tally marks	Frequency	Relative frequency	Percentage
05-30	卌 II	7	7/30= 0.23	(7/30)*100= 23
30-55	卌 卌	10	10/30= 0.34	(10/30)*100= 34
55-80	卌 I	6	6/30 = 0.20	20
80-105	IIII	4	4/30 = 0.13	13
105-130	III	3	3/30= 0.10	10
Total		**n= 30**	**1**	**100**

Frequency distribution
(for quantitative data)

▶ **Class task:**

Age (in years) of 52 people:

34, 67, 40, 72, 37, 33, 42, 62, 49, 32, 52, 40, 31, 19, 68, 55, 57, 54, 37, 32, 54, 38, 20, 50, 56, 48, 35, 52, 29, 56, 68, 65, 45, 44, 54, 39, 29, 56, 43, 42, 22, 30, 26, 20, 48, 29, 34, 27, 40, 28, 45, 21.

Summarize the data in a frequency table.

More…

Consider a frequency distribution table-

Categories	Frequency	
Cat A	f_1	
Cat B	f_2	
Cat C	f_3	
Total	**N**	$(= f_1 + f_2 + f_3)$

- ❑ **Proportion (Relative Frequency):** $Proportion = \frac{f_i}{N}$,   (i= 1, 2, 3)

- ❑ **Percentage:** $Percentage = \frac{f_i}{N} \times 100$,   (i= 1, 2, 3)

More...

Consider a frequency distribution table-

Categories	Frequency	
Cat A	f_1	
Cat B	f_2	
Cat C	f_3	
Total	**N**	$(= f_1 + f_2 + f_3)$

❑ **Ratio:** $Ratio = \dfrac{f_i}{f_j}$, $(i, j = 1, 2, 3$ and $i \neq j)$

More...

Table : Frequency distribution table of occupation of the respondent

Occupation	Tally	Frequency	Percentages
Businessman	IIII	4	$\frac{4}{20} \times 100 = 20$
Day Labor	III	3	15
Private service	IIII	4	20
Public service	IIIII I	6	30
Student	III	3	15
Total		**n= 20**	**100**

Ratio of Day labor to Public service is $\frac{15}{30} = \frac{1}{2}$.   (can write, 1:2)

More on frequency table…

Frequency: The number of observations falling into each class

More on frequency table...

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Class intervals: the frequencies of a particular class is bounded by two values. The width of the class formed by this two values is Class Interval.

Example, if a class is (5 to 25), then the interval is i=20 (=25-5)

More on frequency table…

Frequency: The number of observations falling into each class

Class intervals: the frequencies of a particular class is bounded by two values. The width of the class formed by this two values is Class Interval.

Example, if a class is (5 to 25), then the interval is i=20 (=25-5)

Class limits: The smallest value of a class is technically known as the lower class limit of that particular class and largest value of that class is known as the upper class limit.

Example, for a class (5 to 25), 5 is the lower class limit and 25 is the upper class limit

More on frequency table...

Class mid-point: The mid-point or mid-value of a class is the value that falls in the middle of the class interval.

$$Midpoint = \frac{Upper\ class\ limit\ (U) + Lower\ class\ limit\ (L)}{2}$$

More on frequency table...

Class mid-point: The mid-point or mid-value of a class is the value that falls in the middle of the class interval.

$$Midpoint = \frac{Upper\ class\ limit\ (U) + Lower\ class\ limit\ (L)}{2}$$

Open interval: An open interval is an interval with one of its limits (in either side).

Example, a class like (<30) or (>80) or (75+) are open-ended class intervals

CHAPTER -3-

Graphical Presentation

Contents

- **For qualitative data**
  - Bar chart
  - Pie chart
- **For quantitative data**
  - Histogram
  - Frequency polygon
  - Cumulative frequency curve (Ogive)

Bar Chart

Simple bar chart
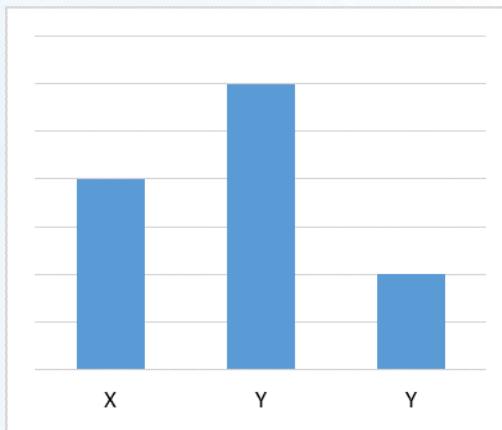
Clustered/ Multiple Bar chart
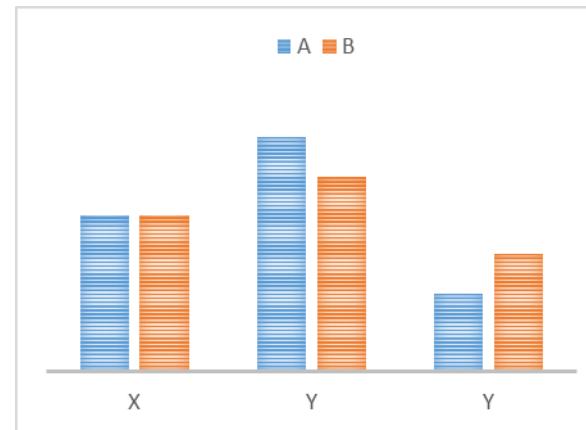
Stacked/ Component bar chart
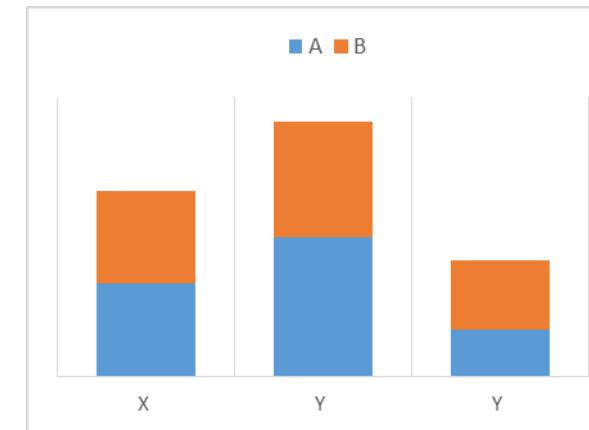
Pie Chart
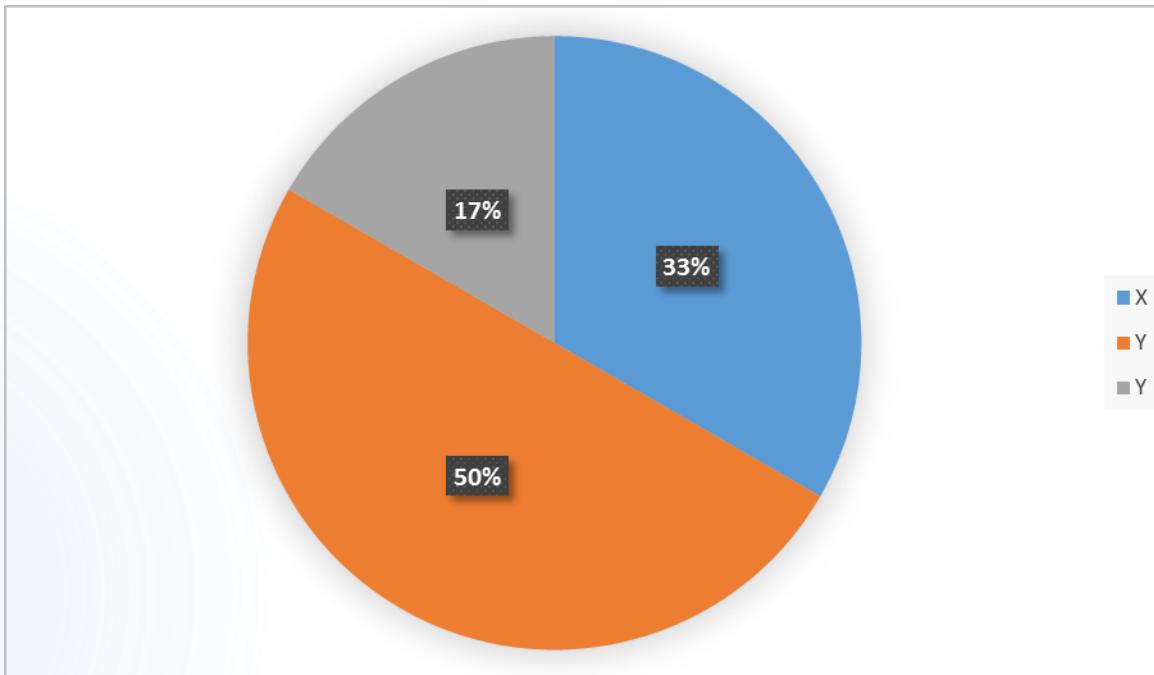
Chart (Diagram) Example

❑ **Example**

The following is the frequency distribution table of highest education level of 145 randomly selected respondents-

Education level	No. of respondents (frequency)
No education	40
Primary	30
Secondary	25
Higher	50

Represent this in a bar and a pie chart

Chart (Diagram) Example

❑ **Example**

The following is the frequency distribution table of highest education level of 145 randomly selected respondents-

Education level	No. of respondents (frequency)	Percentages	Angle (°)
No education	40	27.6	=(40/145)*360=99.3
Primary	30	20.7	=(30/145)*360=74.5
Secondary	25	17.2	=(25/145)*360=62.1
Higher	50	34.5	=(50/145)*360=124.1
Total	**145**	**100**	**360**

Represent this in a bar and a pie chart

Chart (Diagram) Example

Bar Chart

No. of respondents (frequency)

Pie Chart

No. of respondents (frequency)
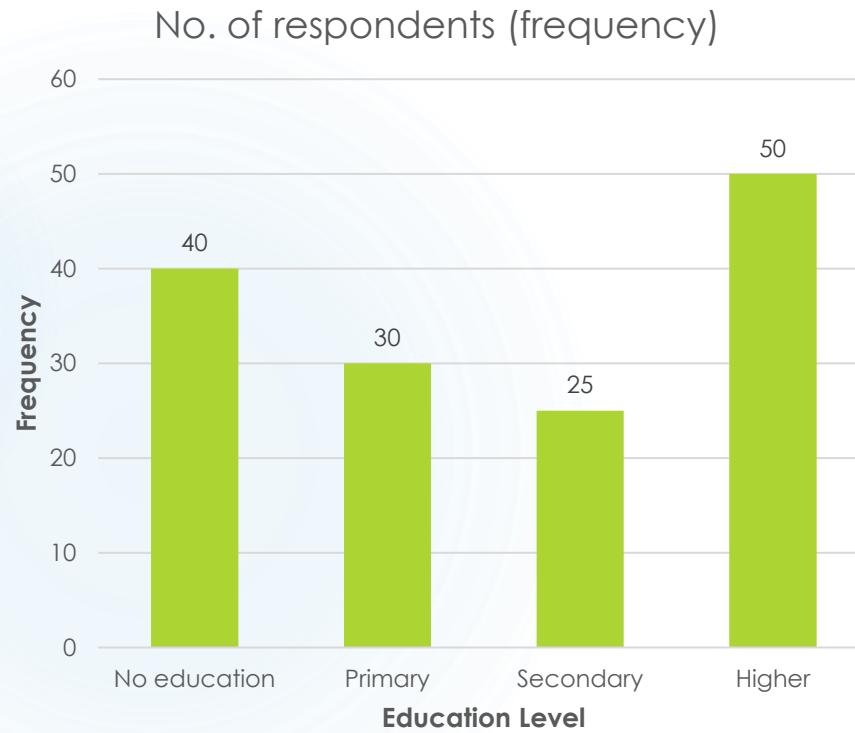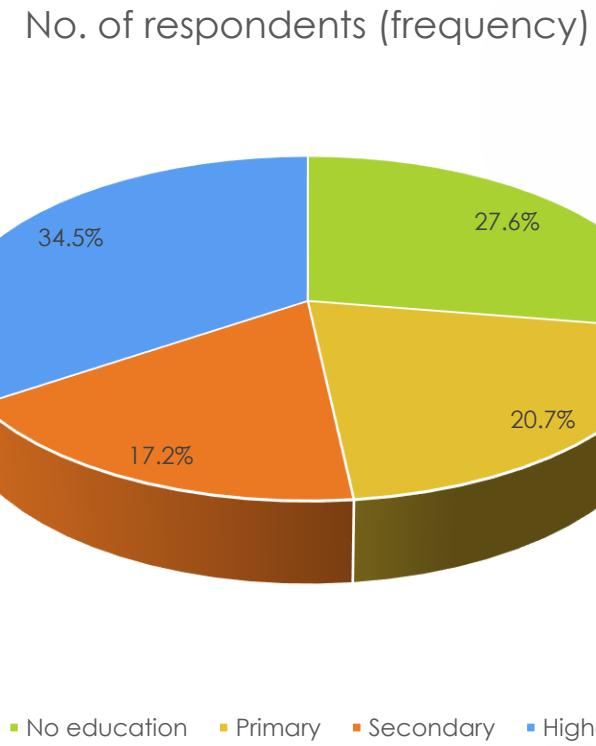
Chart (Diagram) Example

❑ **Example**

The following is the Cross-tabulation of **Highest education level** by **Gender** of 145 randomly selected respondents-

Education level	Gender		Total
	Male	Female	
No education	25	15	40
Primary	12	18	30
Secondary	10	15	25
Higher	26	24	50
Total	**73**	**72**	**145**

Represent this in a multiple bar chart and a component bar chart

Chart (Diagram) Example

Multiple Bar Chart

Education level by Gender

Component Bar Chart

Education level by Gender

Chart (Diagram) Example

Multiple Bar Chart

Gender by Education level

Component Bar Chart

Gender by Education level
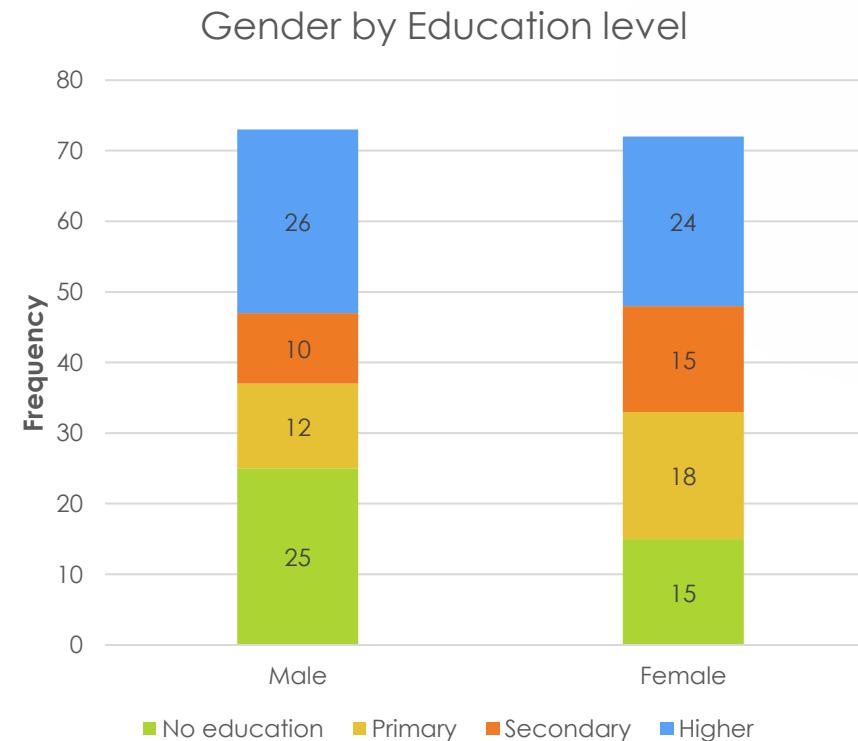
Chart (Diagram) Example

Multiple bar chart taking percentages for each x-axis category-

Education level	Gender	
	Male	Female
No education	=25/73*100%= 34.2%	=15/72*100%= 20.8%
Primary	=12/73*100%= 16.4%	=18/72*100%= 25.0%
Secondary	=10/73*100%= 13.7%	=15/72*100%= 20.8%
Higher	=26/73*100%= 35.6%	=24/72*100%= 33.3%
Total	**73**	**72**

Multiple Bar Chart

Percentage distribution for educational level

(Percentages calculated for each x-axis category)
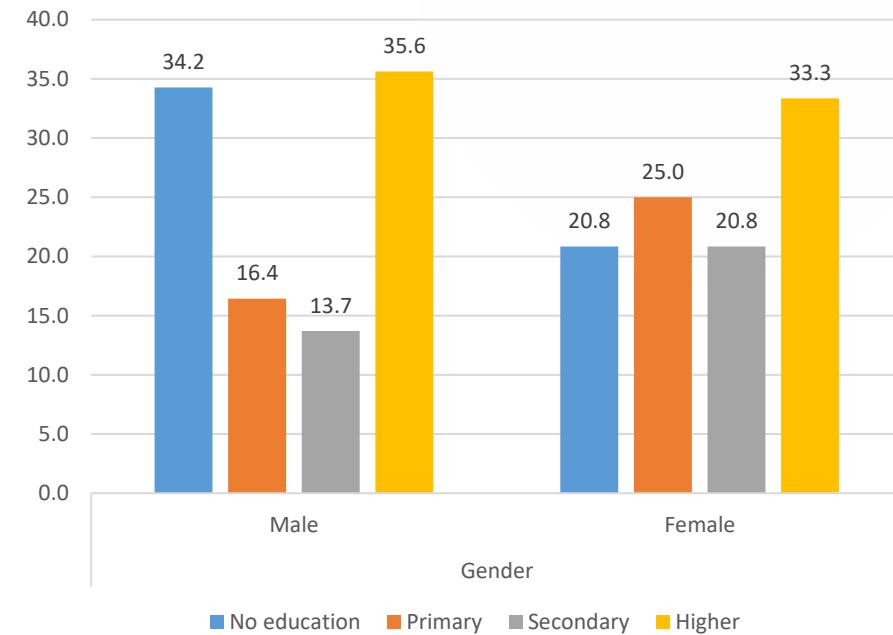
Graphs (Plots)

❑ **Example**

Below given a frequency distribution table of monthly family income of the respondent-

Monthly family income	No. of respondents
05-30	7
30-55	10
55-80	6
80-105	4
105-130	3

Show this in a histogram, a frequency polygon and an Ogive

Histogram
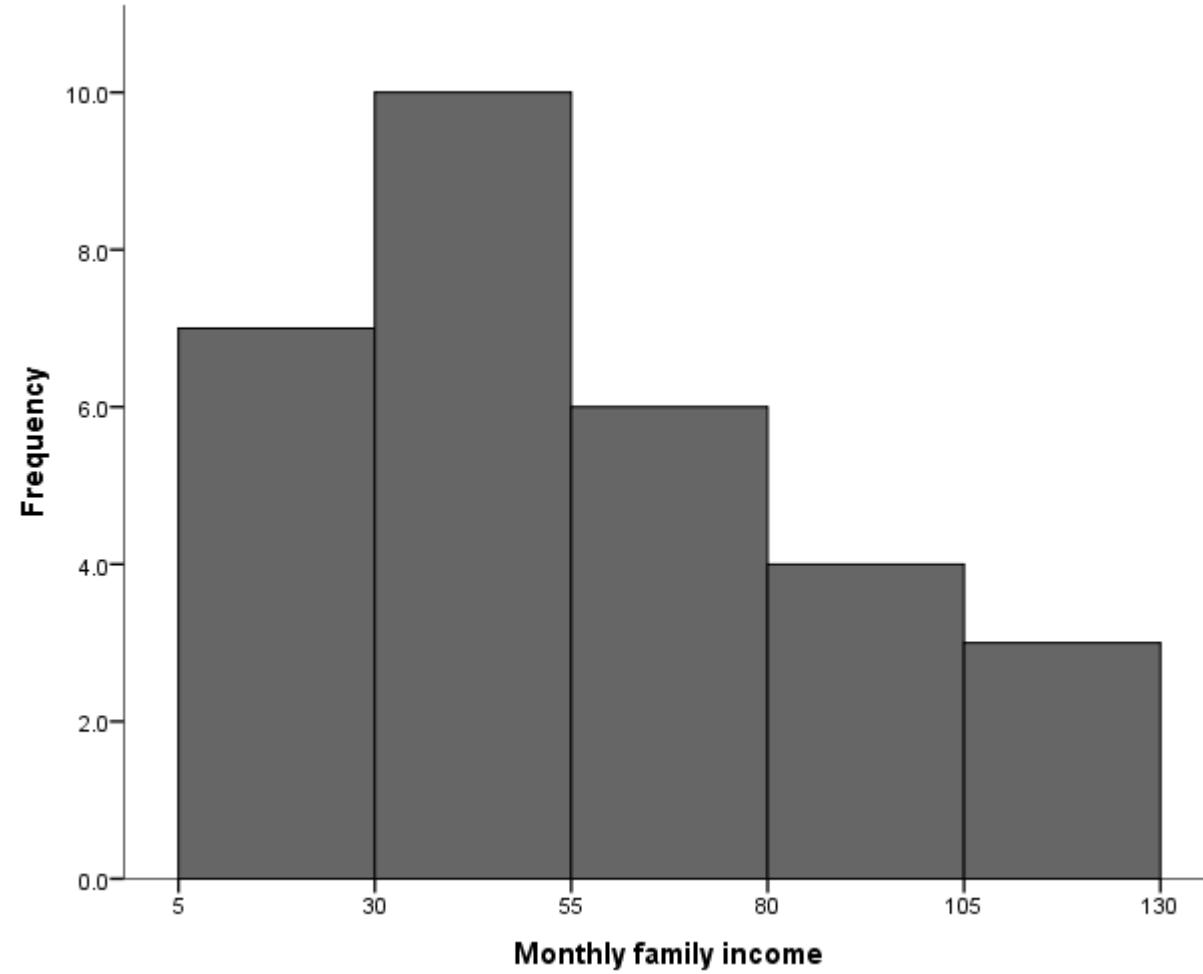
Frequency Polygon

Monthly family income	Class Midpoints	No. of respondents
05-30	17.5	7
30-55	42.5	10
55-80	67.5	6
80-105	92.5	4
105-130	117.5	3

Frequency Polygon
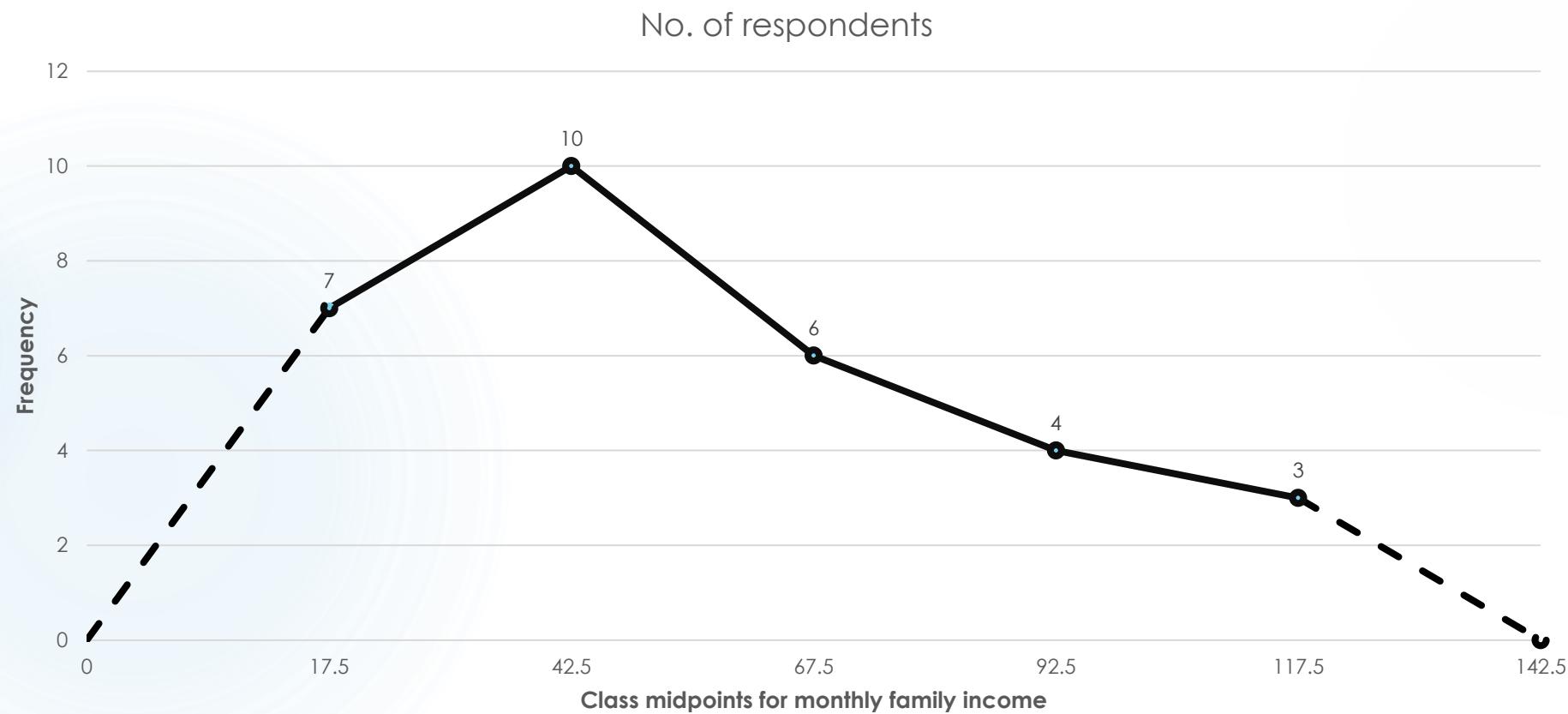
No. of respondents

Cumulative Frequency Curve (Ogive)

| Monthly family income	No. of respondents	Cumulative Frequency	
		Less than type	Greater than type
05-30	7	7	30
30-55	10	17	23
55-80	6	23	13
80-105	4	27	7
105-130	3	30	3

Cumulative Frequency Curve (Ogive)

Less Than Type Ogive

Less than type Ogive for monthly family income
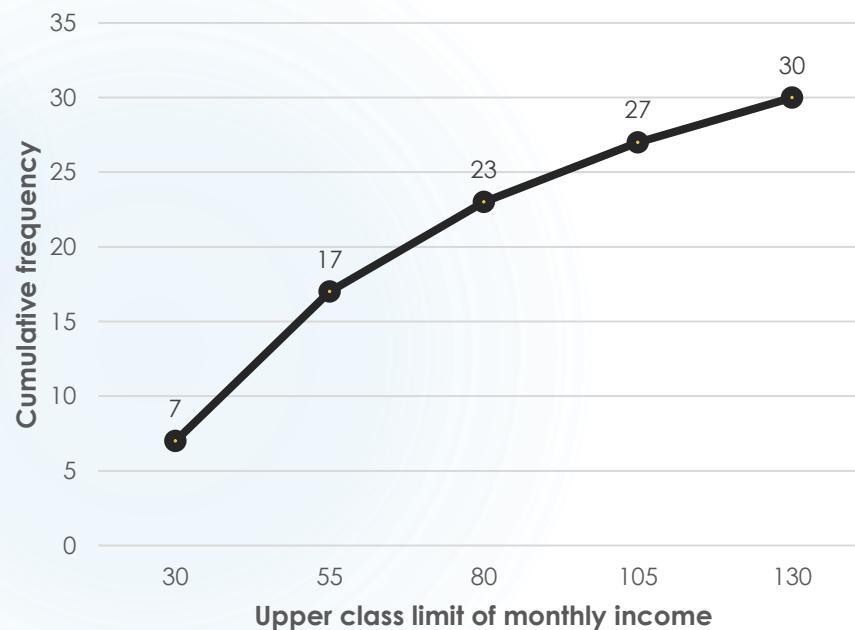
Greater Than type Ogive

Greater than type Ogive for monthly family income
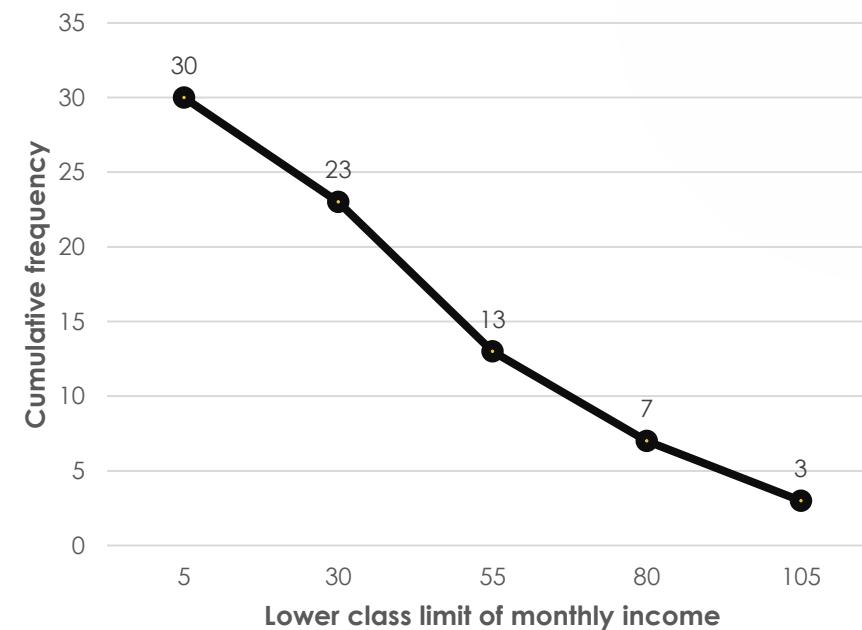
Assignment

Question 1: Below given the frequency distribution of wealth status of the respondents of a sample of size 200.

Wealth Status	Frequency (Number of respondents)
Poorest	45+ last 1 digit of ID
Poor	35+ last 1 digit of ID
Middle	60+ last 1 digit of ID
Rich	40+ last 1 digit of ID
Richest	20+ last 1 digit of ID
Total	**200**

Draw a Bar chart showing the above information. What can you interpret from the chart?

Assignment

Question 2: Below given the age distribution of 150 respondents

Age Groups	Frequency (Number of respondents)
0-20	25+ last 1 digit of ID
20-40	35+ last 1 digit of ID
40-60	45+ last 1 digit of ID
60-80	30+ last 1 digit of ID
80-100	15+ last 1 digit of ID
Total	**150**

Draw a Histogram and a less than type Ogive. What can you say from these graphs?