Tabular & Graphical Presentation of data

Objectives:

- To know how to make frequency distributions and its importance
- To know different terminology in frequency distribution table
- To learn different graphs/diagrams for graphical presentation of data.

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Resources:

• 436 Lecture Slides + Notes

Important – Notes

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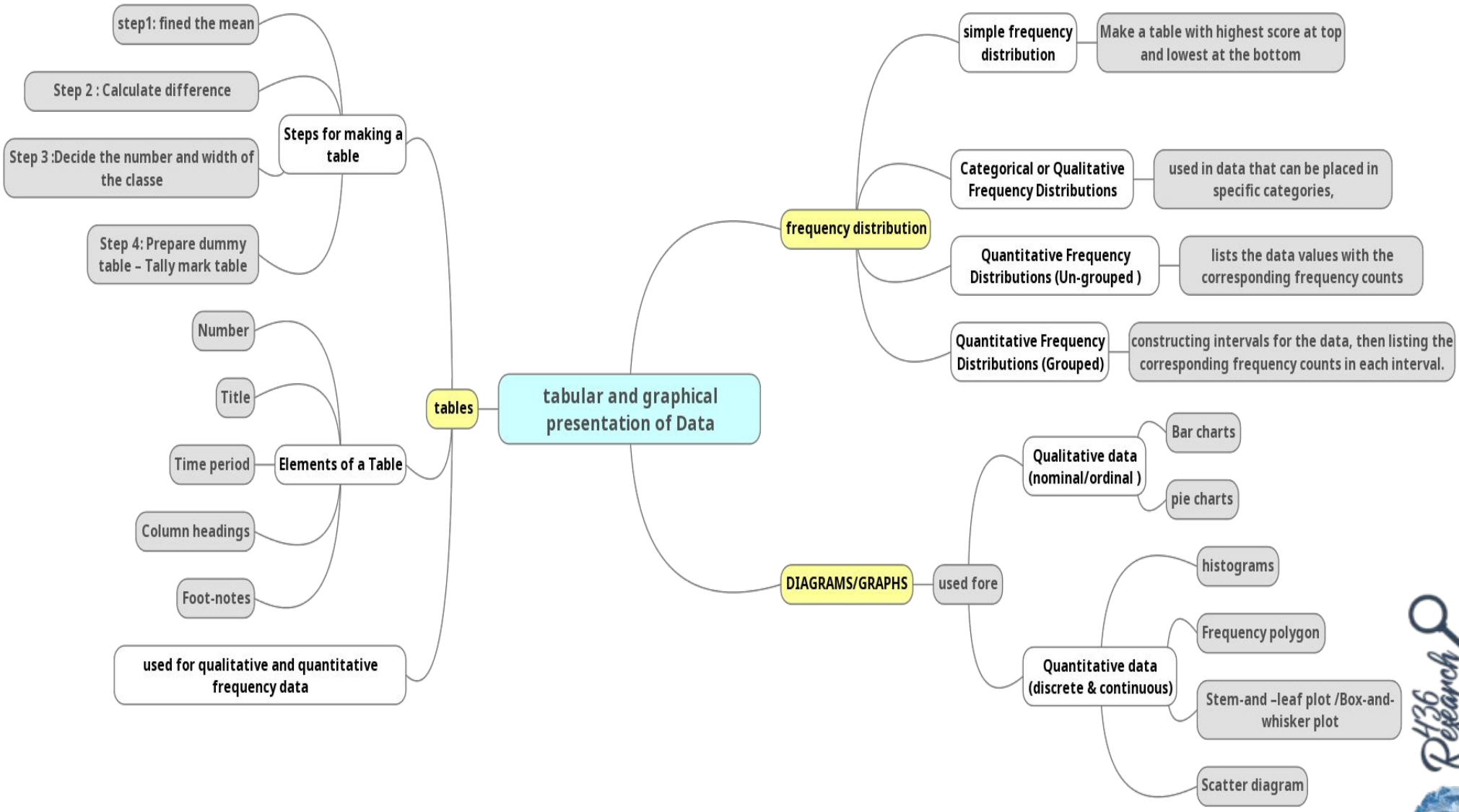
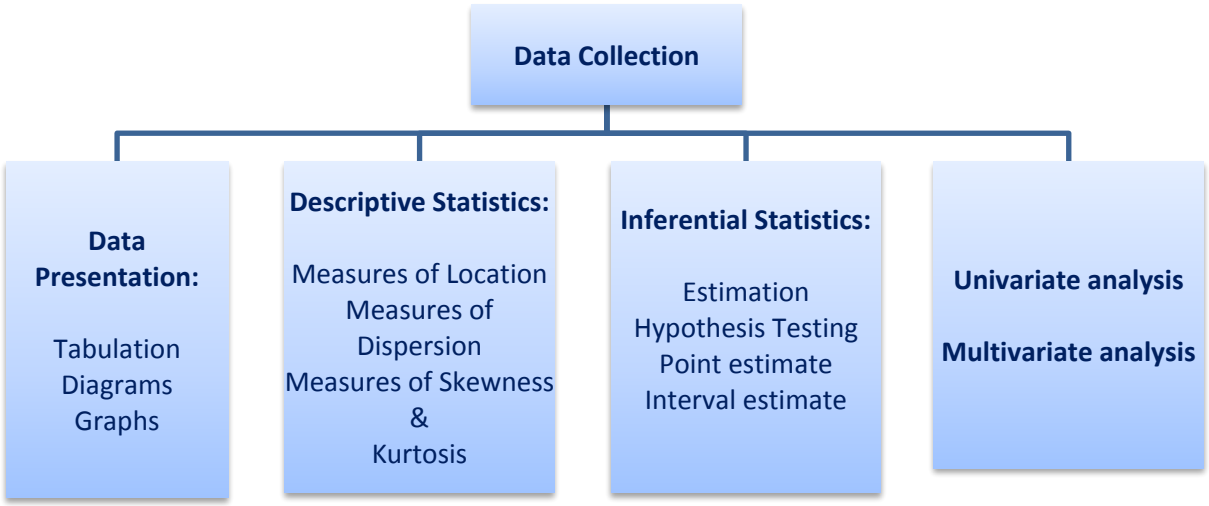
Editing file

Feedback link


tabular and graphical presentation of Data
tables
Steps for making a table
step1: fined the mean
Step 2 : Calculate difference
Step 3 :Decide the number and width of the classe
Step 4: Prepare dummy table – Tally mark table
Elements of a Table
Number
Title
Time period
Column headings
Foot-notes
used for qualitative and quantitative frequency data
frequency distribution
simple frequency distribution
Make a table with highest score at top and lowest at the bottom
Categorical or Qualitative Frequency Distributions
used in data that can be placed in specific categories,
Quantitative Frequency Distributions (Un-grouped)
lists the data values with the corresponding frequency counts
Quantitative Frequency Distributions (Grouped)
constructing intervals for the data, then listing the corresponding frequency counts in each interval.
DIAGRAMS/GRAPHS
used fore
Qualitative data (nominal/ordinal)
Bar charts
pie charts
Quantitative data (discrete & continuous)
histograms
Frequency polygon
Stem-and –leaf plot /Box-and-whisker plot
Scatter diagram

Investigation



Frequency Distributions "putting the data in table form"
"*A Picture is Worth a Thousand Words*"

Frequency Distributions

- Data distribution – pattern of variability.

  - The center of a distribution

  - The ranges

  - The shapes

- Simple frequency distributions

- Grouped frequency distributions

Simple Frequency Distribution

- The number of times that score occurs "there is no class intervals, we are just counting the number of each class"

- Make a table with highest score at top and decreasing for every possible whole number or from lowest score it doesn't matter but it has to be in order.

- N (total number of scores) always equals the sum of the frequency
  - $\Sigma f = N$

Categorical or Qualitative Frequency Distributions

What is a categorical frequency distribution?

A categorical frequency distribution represents data that can be placed in specific categories, such as gender, blood group, & hair color, etc.

Example: The blood types of 25 blood donors are given below. Summarize the data using a frequency distribution.

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

Class (Blood Type)	Frequency, f
A	5
B	8
O	8
AB	4
Total	n = 25

Note: The classes for the distribution are the blood types.

Quantitative Frequency Distributions -- Ungrouped

"because the sample size is small we are using ungrouped data"

What is an ungrouped frequency distribution?

An ungrouped frequency distribution simply lists the data values with the corresponding frequency counts with which each value occurs.

Example: The at-rest pulse rate for 16 athletes at a meet were 57, 57, 56, 57, 58, 56, 54, 64, 53, 54, 54, 55, 57, 55, 60, and 58. Summarize the information with an ungrouped frequency distribution.

Class (pulse Rate)	Frequency, f
53	1
54	3
55	2
56	2
57	4
58	2
60	1
64	1
Total	n = 16

Note: The (ungrouped) classes are the observed values themselves.

Example of a simple frequency distribution (ungrouped)

- 5 7 8 1 5 9 3 4 2 2 3 4 9 7 1 4 5 6 8 9 4 3 5 2 1 (No. of children in 25 families)

	f
9	3
8	2
7	2
6	1
5	4
4	4
3	3
2	3
1	3

e.g. there are three families that have nine children.
two families that have eight children and so on.

$\sum f = 25$ *(No. of families)*

Relative Frequency Distribution related to total frequency

this is the continuation of the above equation

- Proportion of the total N
- Divide the frequency of each score by N
- Rel. f = f/N
- Sum of relative frequencies should equal 1.0 or = 100% by percentage
- Gives us a frame of reference

Class (pulse Rate)	Frequency, f	Relative Frequency
53	1	0.0625
54	3	0.1875
55	2	0.1250
56	2	0.1250
57	4	0.2500
58	2	0.1250
60	1	0.0625
64	1	0.0625
Total	n = 16	1.0000

Note: The relative frequency for a class is obtained by computing f/n.

1/16=0.0625
3/18=0.1875
2/16=0.1250

Example of a simple frequency distribution

- 5 7 8 1 5 9 3 4 2 2 3 4 9 7 1 4 5 6 8 9 4 3 5 2 1

	f	*rel f*	
9	3	.12	$= 100 \times \frac{3}{25}$
8	2	.08	
7	2	.08	
6	1	.04	
5	4	.16	
4	4	.16	
3	3	.12	
2	3	.12	
1	3	.12	

$\sum f = 25$ $\sum$ rel $f = 1.0$

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Cumulative Frequency Distributions

- *cf* = cumulative frequency: number of scores at or below a particular score
- A score's standing relative to other scores
- Count from lower scores and add the simple frequencies for all scores below that score

Example of a simple frequency distribution

•5 7 8 1 5 9 3 4 2 2 3 4 9 7 1 4 5 6 8 9 4 3 5 2 1

•	*f*	*rel f*	*cf*
•9	3	.12	3
•8	2	.08	5=2+3
•7	2	.08	7 = 3+2+2
•6	1	.04	8=3+2+2+1
•5	4	.16	12
•4	4	.16	16
•3	3	.12	19
•2	3	.12	22
•1	3	.12	25
	$\sum f = 25$	$\sum \text{rel } f = 1.0$	

how many families have 7 or more children?

from *cf* =7

so we can know any number above or below any data without counting. (the advantage)

if they ask you how many family have 5 and above children? 12

how many family have 4 and above children ?16

Example of a simple frequency distribution (ungrouped)

- 5 7 8 1 5 9 3 4 2 2 3 4 9 7 1 4 5 6 8 9 4 3 5 2 1

	f	*cf*	*rel f*	*rel. cf*
• 9	3	3	.12	.12
• 8	2	5	.08	.20
• 7	2	7	.08	.28
• 6	1	8	.04	.32
• 5	4	12	.16	.48
• 4	4	16	.16	.64
• 3	3	19	.12	.76
• 2	3	22	.12	.88
• 1	3	25	.12	1.0
	$\sum f = 25$		$\sum \text{rel } f = 1.0$	

Quantitative Frequency Distributions -- Grouped

➢ What is a grouped frequency distribution? A grouped frequency distribution is obtained by constructing classes (or intervals) for the data, and then listing the corresponding number of values (frequency counts) in each interval.

Tabulate the hemoglobin values of 30 adult male patients listed below

Patient No	Hb (g/dl)	Patient No	Hb (g/dl)	Patient No	Hb (g/dl)
1	12.0	11	11.2	21	14.9
2	11.9	12	13.6	22	12.2
3	11.5	13	10.8	23	12.2
4	14.2	14	12.3	24	11.4
5	12.3	15	12.3	25	10.7
6	13.0	16	15.7	26	12.5
7	10.5	17	12.6	27	11.8
8	12.8	18	9.1	28	15.1
9	13.2	19	12.9	29	13.4
10	11.2	20	14.6	30	13.1

Steps for making a table

- Step1 Find Minimum (9.1) & Maximum (15.7)
- Step 2 Calculate difference 15.7 – 9.1 = 6.6
- Step 3 Decide the number and width of the classes (7 c.l) 9.0 -9.9, 10.0-10.9,---
- Step 4 Prepare dummy table – Hb (g/dl), Tally mark, No. patients

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we have to know the difference in magnitude and the sample size to decide the number and the width of class intervals.

the intervals should not be less than 5 or more than 10.

the intervals should not overlap each other.

Dummy table

Hb (g/dl)	Tall marks	No. patients
9.0 – 9.9 **10.0 – 10.9** **11.0 – 11.9** **12.0 – 12.9** **13.0 – 13.9** **14.0 – 14.9** **15.0 – 15.9**		
Total		

Tall marks TABLE

Hb (g/dl)	Tall marks	No. patients
9.0 – 9.9	1	1
10.0 – 10.9	lll	3
11.0 – 11.9	llll 1	6
12.0 – 12.9	lll lll	10
13.0 – 13.9	lll	5
14.0 – 14.9	lll	3
15.0 – 15.9	ll	2
Total	-	30

Table Frequency distribution of 30 adult male patients by Hb

Hb (g/dl)	No. of patients
9.0 – 9.9 **10.0 – 10.9** **11.0 – 11.9** **12.0 – 12.9** **13.0 – 13.9** **14.0 – 14.9** **15.0 – 15.9**	**1** **3** **6** **10** **5** **3** **2**
Total	**30**

Table Frequency distribution of adult patients by Hb and gender (two variable)

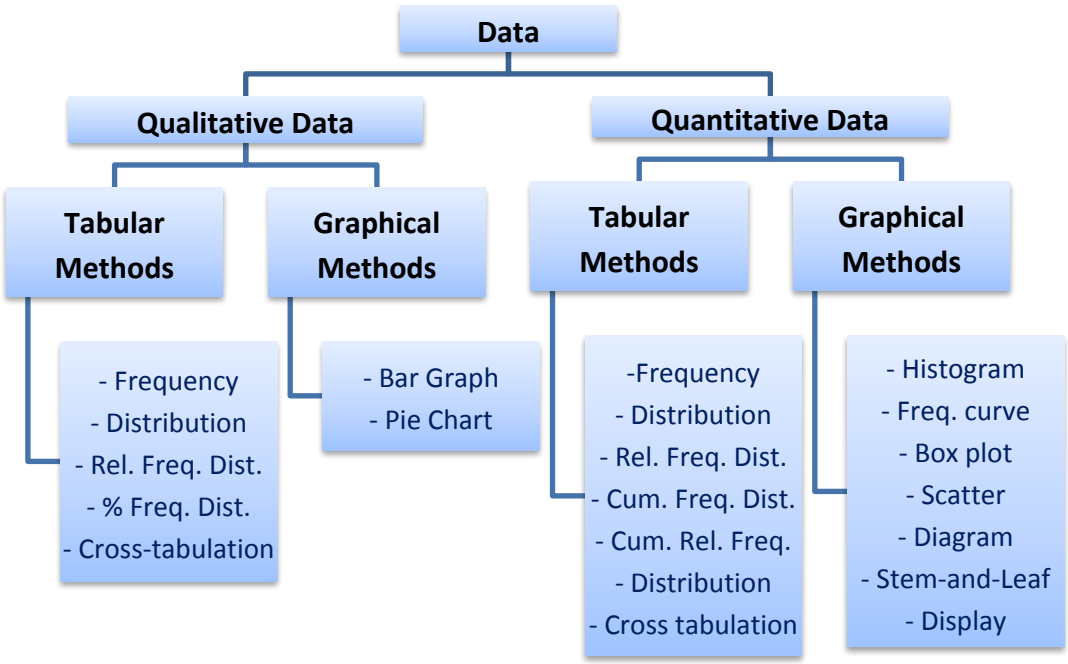
Hb (g/dl)	**Gender**		**Total**
	Male	**Female**	
<9.0	**0**	**2**	**2**
9.0 – 9.9	**1**	**3**	**4**
10.0 – 10.9	**3**	**5**	**8**
11.0 – 11.9	**6**	**8**	**14**
12.0 – 12.9	**10**	**6**	**16**
13.0 – 13.9	**5**	**4**	**9**
14.0 – 14.9	**3**	**2**	**5**
15.0 – 15.9	**2**	**0**	**2**
Total	**30**	**30**	**60**

we can put age group also (3 ways classification) more than 3 variables would be confusing.

Elements of a Table

- **Ideal table should have** : Number, Title, Column headings and Foot-notes
- **Number** : Table number for identification in a report
- **Title, place** : Describe the body of the table, variables
- **Time period**: (What, how classified, where and when)
- **Column Heading** : Variable name, No. , Percentages (%), etc.,
- **Foot-note(s)** : to describe some column/row headings, special cells, source, etc.,

Tabular and Graphical Procedures



DIAGRAMS/GRAPHS

Qualitative data (Nominal & Ordinal)

- Bar charts (one or two groups)
- Pie charts

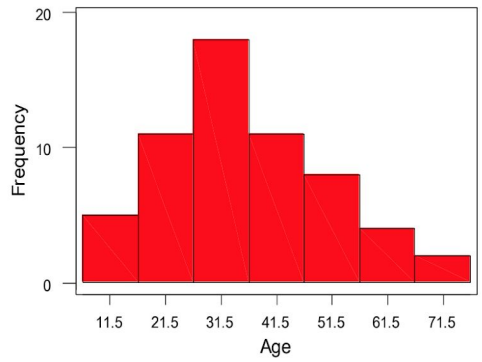
Quantitative data (discrete & continuous)

- Histogram
- Frequency polygon (curve)
- Stem-and –leaf plot
- Box-and-whisker plot
- Scatter diagram

Example data

68	63	42	27	30	36	28	32
79	27	22	28	24	25	44	65
43	25	74	51	36	42	28	31
28	25	45	12	57	51	12	32
49	38	42	27	31	50	38	21
16	24	64	47	23	22	43	27
49	28	23	19	11	52	46	31
30	43	49	12				

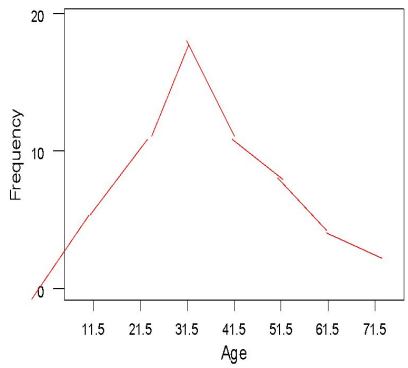
Histogram



Histogram of ages of 60 subjects

the height of the bar is proportional to that class's absolute frequency (number of individuals in the class)

Polygon



Stem and leaf plot

Stem-and-leaf of Age N = 60

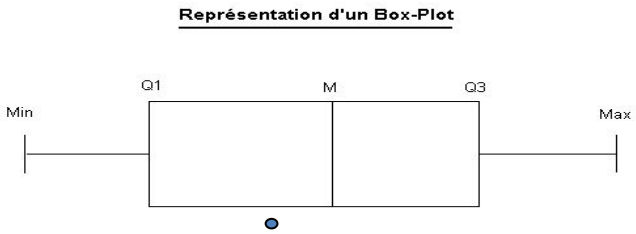
Leaf Unit = 1.0

f	stem	leaf
6	1	122269 = 11 , 12,
19	2	1223344555777788888
11	3	00111226688
13	4	2223334567999
5	5	01127
4	6	3458
2	7	49

in all these graphs we can see the shape of distribution and maximum and minimum scores. in addition of that we can show all the data in stem and leaf plot.

Descriptive statistics report: Boxplot "for very large data"

- minimum score
- maximum score
- lower quartile
- upper quartile
- median
- mean

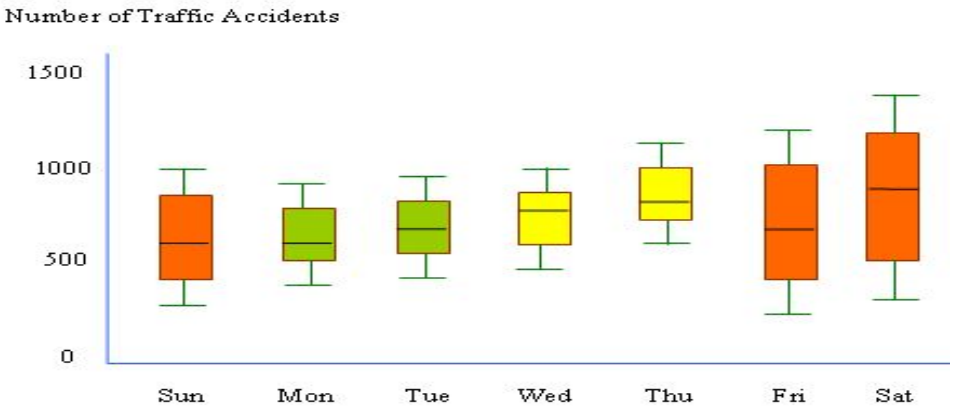


- The skew of the distribution

positive skew: mean > median & high-score whisker is longer

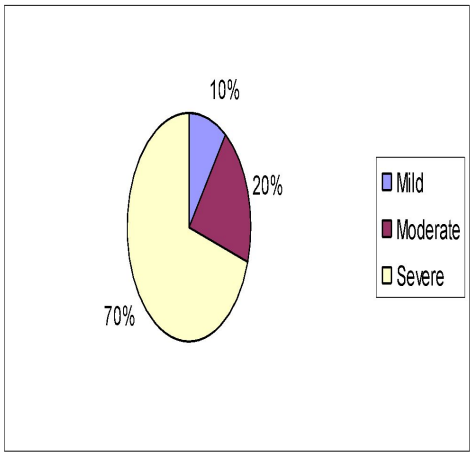
negative skew: mean < median & low-score whisker is longer

Application of a box and Whisker diagram



all sundays in a particular year

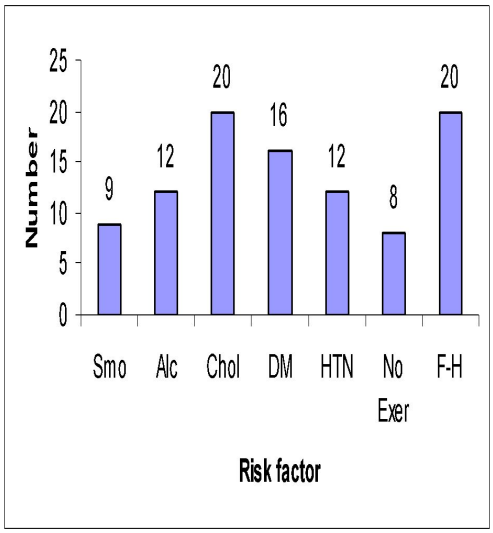
Pie Chart for categorical data



The prevalence of different degree of Hypertension in the population

- Circular diagram – total -100%
- Divided into segments each representing a category
- Decide adjacent category
- The amount for each category is proportional to slice of the pie

Bar Graphs for categorical data



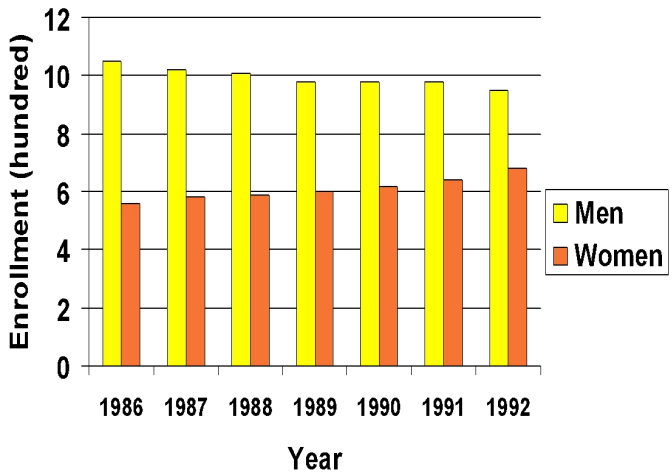
The distribution of risk factor among cases with Cardiovascular Diseases

- Heights of the bar indicates frequency
- Frequency in the Y axis and categories of variable in the X axis
- The bars should be of equal width and no touching the other bars

هنا نلاحظ ان الاعمدة متباعده شوي عن بعض عكس الـ histogram يكونون الاعمدة قريبين من بعض لان الـ histogram يستخدم quantitative data

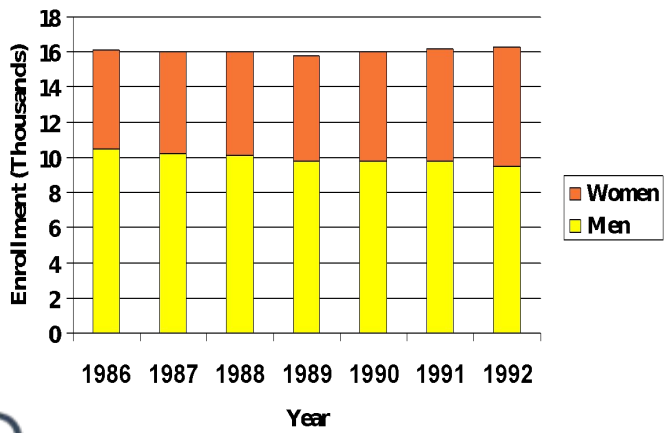
HIV cases enrolment in USA by gender

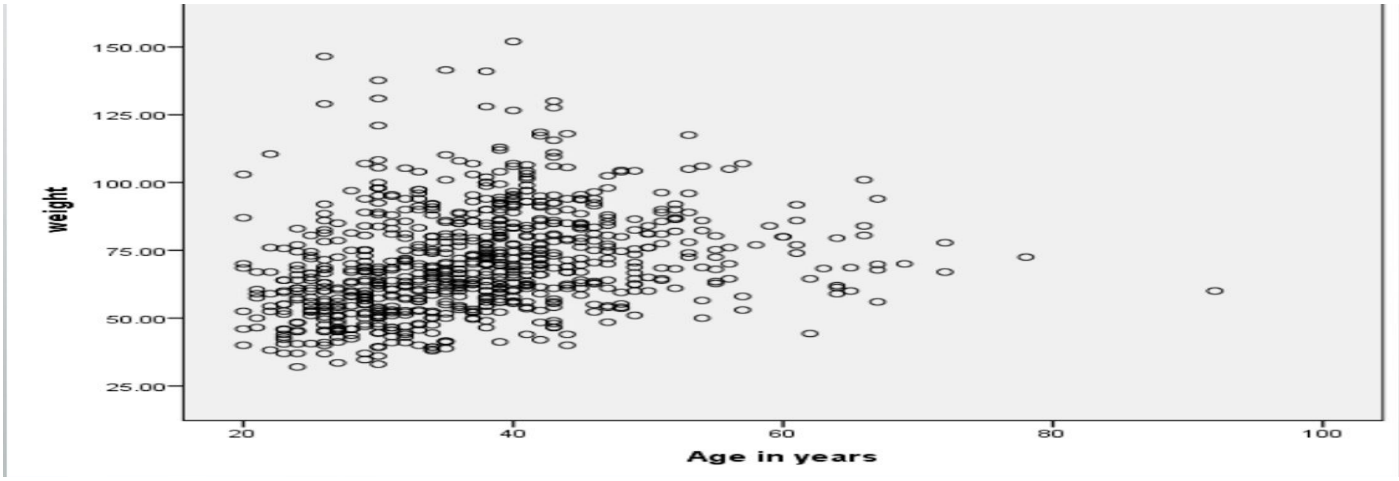
multiple Bar chart



HIV cases Enrollment in USA by gender

Stocked bar chart





each dot represents 2 quantitative variables,
so we use the scattered data when we want to study the relation between 2 quantitative variables.

DISPLAYING CONTINUOUS DATA 57

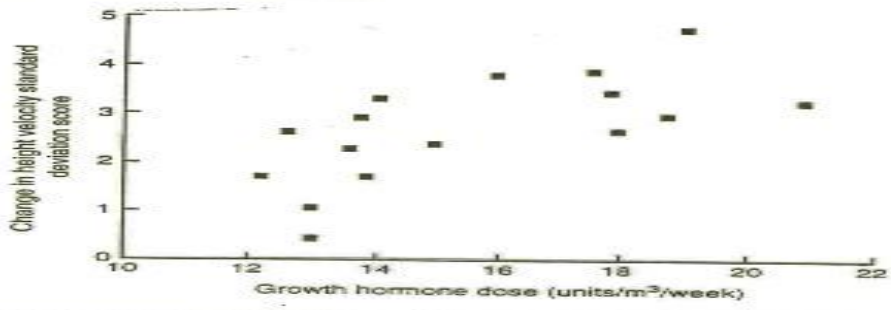


Figure 4.7 Relation between dose of growth hormone and change in height velocity standard deviation score over one year (after Hindmarsh and Brook, 1987, with permission)

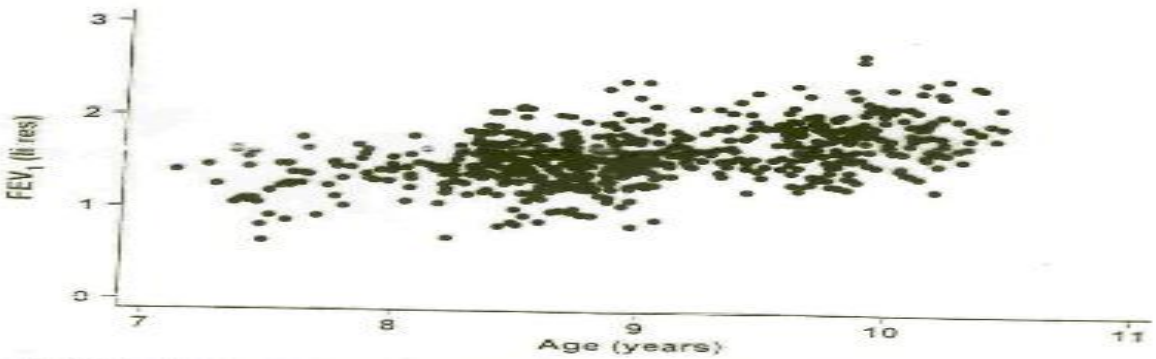


Fig. 3.9 Scatter plot showing the relationship between FEV_1 and age in 636 children living in a deprived suburb of Lima, Peru.

General rules for designing graphs

- A graph should have a self-explanatory legend by the title of the table or graph
- A graph should help reader to understand data
- Axis labeled, units of measurement indicated
- Scales important. Start with zero (otherwise // break)
- Avoid graphs with three-dimensional impression, it may be misleading (reader visualize less easily

THE END