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## How to Present Data in a Dissertation



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# Learning outcomes



At the end of this lesson, you will be able to able to:

- understand the basic concepts in data presentation; and
- know how to present data in a dissertation



# Basic concepts in data presentation

## □ Data and variables:

- **Data** refer to the records of two or more observations, while the record of a single observation is called datum
- An **observation** is an event that is seen to occur
- Data are collected in respect of variables
- **Variables** are characteristics of some events, objects or persons that can take on different values or amounts; e.g. age (25yrs, 45yrs, 70yrs, etc.), Height (1.5m, 1.65m, 1.7m, etc.) sex (male or female), marital status (single, married, separated, divorced, or widowed)



# Basic concepts in data presentation contd.

## □ Data and variables contd.:

- There are 2 types of variables (i.e., **qualitative** and **quantitative** variables)
- **Qualitative variables:** These are variables that are classified by attributes or categories e.g., sex (male or female), marital status (single, married, etc.)

Qualitative variables can be measured on:

- **Nominal scale:** In this case only names are assigned, e.g. sex (male or female)
- **Ordinal or ranking scale:** In this case the variables are listed in a specified order that shows a relationship between them; e.g., the rank of university lecturers (Graduate Assistant < Assistant Lecturer < Lecturer II < Lecturer I < Senior Lecturer < Reader < Professor)

# Basic concepts in data presentation contd.



## □ Data and variables contd.:

- **Quantitative variables:** These are variables that result from counting or measurement. They can be discrete or continuous
  - **Discrete:** These assume whole numbers only, e.g., the number of students in a class (1, 2, 3, 4, etc.). It is not possible to have 3.5 students
  - **Continuous:** These can assume fractions e.g., the weight of the students in a class (45kg, 50.5kg, 64.7kg etc.)

Quantitative variables can be measured on:

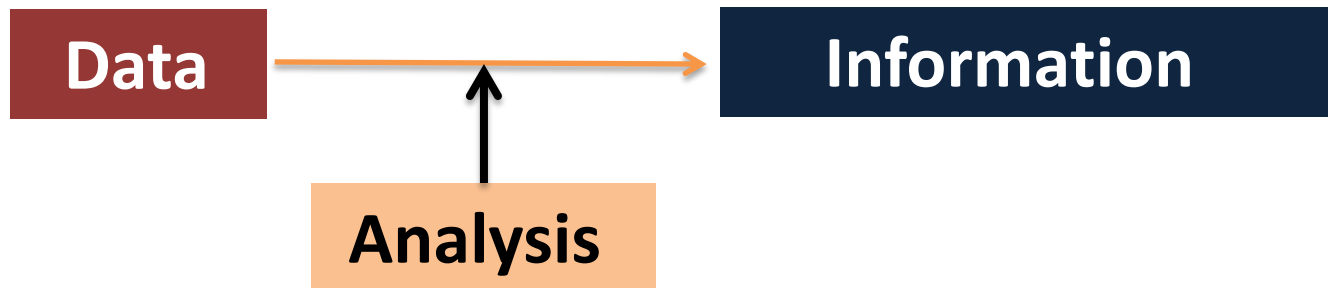
- **Interval scale:** The starting point for this scale is arbitrary, it does not have a true zero point (i.e., zero on this scale does not indicate absence of the quantity being measured (e.g., a temperature of 0°C represents a temperature reading, as it can be -2°C, -10°C, -15°C, etc.)
- **Ratio scale:** This scale has a true zero point as its origin, and zero means absence of the quantity measured (e.g., a weight of 0kg means there is no weight)



# Basic concepts in data presentation contd.

## □ Data presentation:

- **Data presentation** refers to the methods of communicating the **information** generated following **data analysis** to other people



- Data should be presented in concise, simple, and easy to understand forms, but must contain important details, and also stimulate interest in readers



# Basic concepts in data presentation contd.

## □ Data presentation contd.:

The methods of presenting data include:

- **Textual:** This involves presenting data using a combination of texts and numbers
- **Tabular:** This involves presenting data using tables (with the contents arranged in columns and rows)
- **Graphical:** This involves presenting data using charts or figures

The appropriate data presentation method and style to be used depend on the study designs employed and the types of variables involved

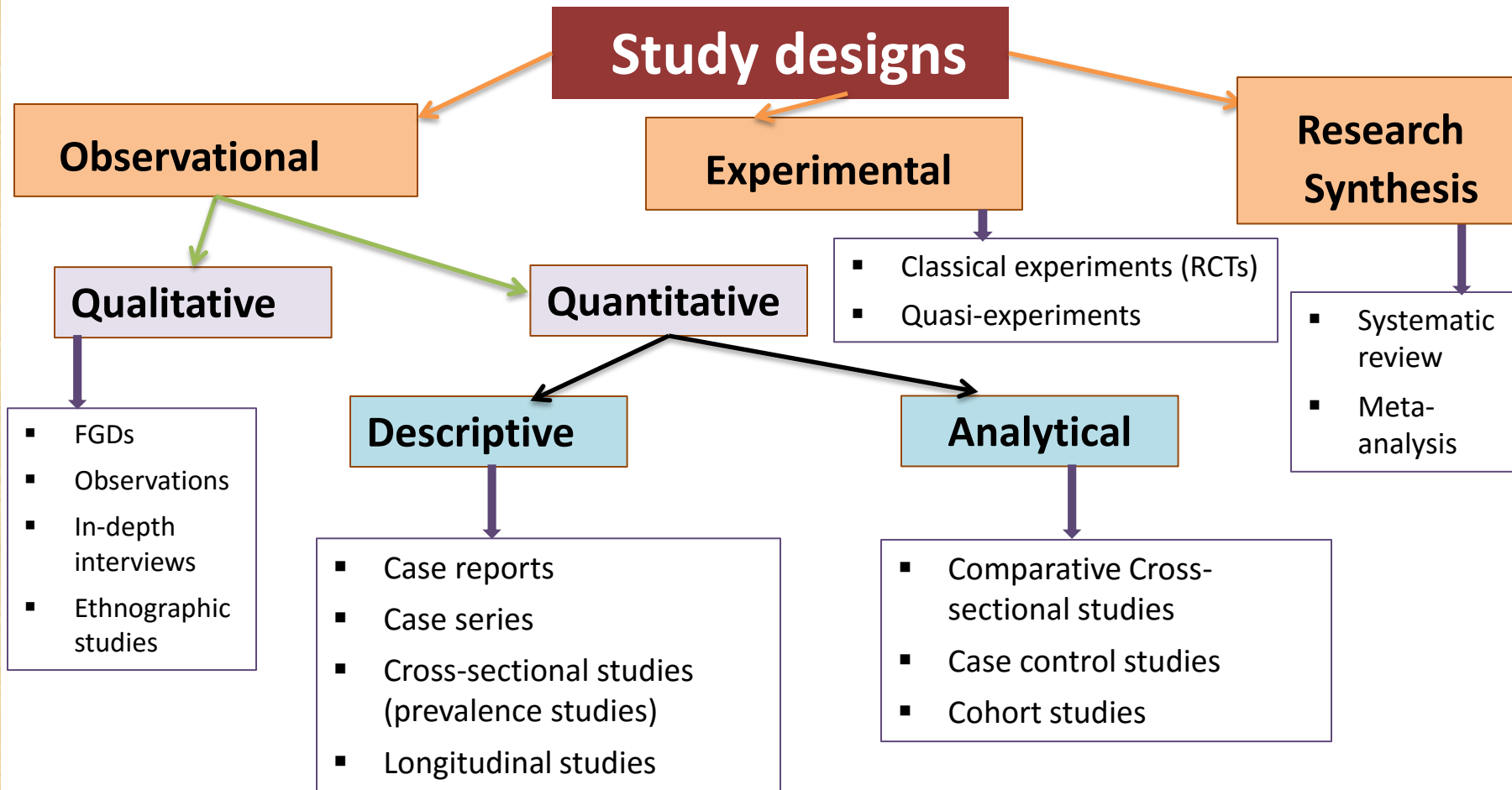
# Basic concepts in data presentation contd.



## □ Data presentation contd.:

- A **study design** is a specific plan for conducting the study, which allows the investigator to translate the conceptual hypothesis into an operational one
- The medical dictionary defines study design as a plan that delineates the precise procedures to be followed in a clinical trial including plan and actual timing of events, choice of control group, method of allocating treatments and blinding methods

# Basic concepts in data presentation contd.



# How to present data in a dissertation



## □ Textual presentation:

- This is the most commonly used data presentation method in all types of studies
- It involves presenting data using a combination of texts and numbers in paragraphs or sentences
- It is used to explain, interpret or emphasize the data being presented
- Whereas, it is mostly used in combination with other methods (i.e., Tabular and Graphical) in quantitative studies, in many qualitative studies, it is often the only data presentation method employed



# How to present data in a dissertation contd.

## □ Textual presentation contd.:

- Data presentation is done in **Chapter Four** of a dissertation
- The first thing that should be done is to account for the study subjects (i.e., the number of questionnaires administered, those that were fully completed, and the response rate)

### CHAPTER FOUR - RESULTS

#### 4.1 Questionnaire response rate

Two hundred and fifty-eight of the two hundred and seventy questionnaires administered were adequately filled and found suitable for analysis giving a response rate of 95.6%.

# How to present data in a dissertation contd.

## □ Textual presentation contd.:

- In quantitative studies involving human subjects the **“Socio-demographic characteristics of the respondents”** should be presented after accounting for the study subjects
- This is either preceded or succeeded by the details in a table (depending on the guidelines of the institution concerned), and the table concerned should be cited in the text (e.g., Table 1)
- The rest of the results should be presented sequentially according to the specific objectives of the study

Table 1: Socio-demographic characteristics of respondents

Variables	Frequency n = 258	Percentage
<b>Age group (years)</b>		
20-29	121	46.9
30-39	80	31.0
40-49	41	15.9
≥ 50	16	6.2
<b>Sex</b>		
Male	135	52.3
Female	123	47.7
<b>Marital status</b>		
Single	80	31.0
Married	173	67.1
Separated	5	1.9
<b>Religion</b>		
Islam	214	82.9
Christianity	44	17.1
<b>Cadre</b>		
Doctor	28	10.9
Nurse	153	59.3
*Others	77	29.8
<b>Length of practice (years)</b>		
< 10	175	67.8
10 and above	83	32.2

\*Others: Pharmacist, Laboratory scientist, Medical records

### 4.2 Socio – demographic characteristics of respondents

The mean age of the respondents was  $32.64 \pm 9.19$  years, and a larger proportion, 121 (46.9%) of the 258 respondents were aged 20-29 years. Majority of respondents were males (52.3%), and married (67.1%). Most of the respondents (82.9%) practiced Islam as religion; and majority of them were nurses (59.3%), and have practiced for < 10 years (67.8%) [Table 1].



# How to present data in a dissertation contd.

## □ Textual presentation contd.:

- In qualitative studies (such as Focus Group Discussions and In-depth Interviews) the comments made by participants can also be quoted verbatim (italicized, and with quotation marks)

Many of the female participants in the Focus Group Discussion sessions who use a modern Family Planning (FP) method said they use it secretly, the reason being that their spouses objected to its use, and also because users of FP were regarded as being promiscuous by the community members. In addition, in-laws could instigate marital disharmony if they become aware of FP use by the woman. A participant said:

*'They really look down on you when they know you are using FP, you are regarded as a loose woman or even a whore'*



# How to present data in a dissertation contd.

## □ Tabular presentation:

- This is a popular method of presenting data in quantitative observational studies, experimental studies and research synthesis
- It involves presenting data using tables (and the contents are arranged in columns and rows)
- It contains the details of the data presented in the text (as the text usually contains only the highlights of the data presented in the table)
- The design of the table depends on the study design

# How to present data in a dissertation contd.

## □ Tabular presentation contd.:

The parts of a table include:

- **Table heading:** This consists of the table number and title, and it should be above the table
- **Stubs:** This is the column that contains the main variables being considered in the table. It is usually at the extreme left and the heading of the column depends on whether the items are homogenous or not
- **Box head :** This refers to the column header
- **Body:** This refers to the main part of the table
- **Footnotes:** Additional details of symbols or abbreviations used in the table are inserted below the table as footnotes
- **Source note:** The source(s) of tables copied from somewhere else should also be indicated below the table

Table heading →

Table 1: Socio-demographic characteristics of respondents

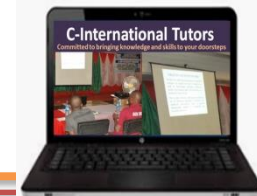
Stubs

Variables	Frequency (%) n = 258
<b>Age group (years)</b>	
20-29	121 (46.9)
30-39	80 (31.0)
40-49	41 (15.9)
≥ 50	16 (6.2)
<b>Sex</b>	
Male	135 (52.3)
Female	123 (47.7)
<b>Marital status</b>	
Single	80 (31.0)
Married	173 (67.1)
Separated	5 (1.9)
<b>Religion</b>	
Islam	214 (82.9)
Christianity	44 (17.1)
<b>Cadre</b>	
Doctor	28 (10.9)
Nurse	153 (59.3)
*Others	77 (29.8)
<b>Length of practice (years)</b>	
< 10	175 (67.8)
10 and above	83 (32.2)

Box head

Body

Foot notes → \*Others: Pharmacist, Laboratory scientist, Medical records



# How to present data in a dissertation contd.

## □ Tabular presentation contd.:

### ❖ Entering data into the stubs' column of the table

- The questions that were used to elicit the responses in the questionnaire should not be entered directly into the stubs' column of the table (i.e., as questions), but instead, they should be presented as simple and comprehensible phrases
- Only the relevant results should be entered into the table

**Table 2: Awareness of antibiotics and antibiotic resistance by respondents**

Variables	Frequency (%) (n=197)
Ever heard of antibiotics	
Yes	192 (97.5)
No	5 (2.5)
Group of diseases curable with antibiotics	
All diseases	39 (19.8)
Viral infections	5 (7.6)
Bacterial infections	141 (71.6)
Parasitic infections	2 (1.0)
Ever heard of antibiotic resistance	
Yes	172 (87.3)
No	25 (12.7)
Conditions that signify antibiotic resistance	
When the packaging of the antibiotic is changed	138 (70.1)
When the cost of the antibiotic increases in the market	138 (70.1)
When a new (or more costly antibiotic) with similar efficacy becomes available in the market	150 (76.1)
When the antibiotic is no longer effective in treating the diseases it used to treat	172 (87.3)

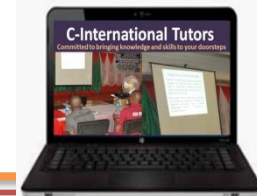
Source: Awosan et al., 2018

### QUESTIONNAIRE ON

KNOWLEDGE, ATTITUDE AND PRACTICE RELATED TO ANTIBIOTIC RESISTANCE AMONG PATENT MEDICINE VENDORS IN SOKOTO, NIGERIA

#### SECTION B: INDICATIONS FOR USE OF ANTIBIOTICS AND ANTIBIOTIC RESISTANCE

- 8) Have you ever heard of drugs called antibiotics? (a) yes  (b) no
- 9) If your answer to question 8 is yes, which of the following group of diseases is curable with antibiotics? (a) All diseases  (b) Viral infections  (c) Bacterial infections  (d) Parasitic infections.
- 10) Which of the following diseases do you believe to be curable with antibiotics?
  - (i) Common cold with sore throat: (a) yes  (b) no  (c) I don't know
  - (ii) Simple wounds: (a) yes  (b) no  (c) I don't know
  - (iii) Acute diarrhea: (a) yes  (b) no  (c) I don't know
  - (iv) Carbuncle (boil): (a) yes  (b) no  (c) I don't know
  - (v) Malaria: (a) yes  (b) no  (c) I don't know
  - (vi) Typhoid fever: (a) yes  (b) no  (c) I don't know
  - (vii) Stomach ache / Peptic ulcer: (a) yes  (b) no  (c) I don't know
  - (viii) Toilet disease/ STIs: (a) yes  (b) no  (c) I don't know
  - (ix) Constipation: (a) yes  (b) no  (c) I don't know
  - (x) Menstrual pain: (a) yes  (b) no  (c) I don't know
- 11) Have you ever heard of antibiotic resistance? (a) yes  (b) no
- 12) If your answer to question 11 is yes, which of the following do you believe indicates antibiotic resistance?
  - (i) When the packaging of the antibiotic is changed:
    - (a) yes  (b) no  (c) I don't know
  - (ii) When the cost of the antibiotic increases in the market:
    - (a) yes  (b) no  (c) I don't know
  - (iii) When a new (or more costly) antibiotic with similar efficacy becomes available in the market: (a) yes  (b) no  (c) I don't know
  - (iv) When the antibiotic is no longer effective in treating the disease it used to treat: (a) yes  (b) no  (c) I don't know



# How to present data in a dissertation contd.

## □ Tabular presentation contd.:

The design of the tables depends on the study design as shown below:

### A: Descriptive cross-sectional study:

- The frequency distribution table of a cross-sectional study requires at least **3 columns**. These include:
  - The **stubs**' column for the main variables being considered in the table. Please note that they should not be presented in the form of questions (i.e., as they appears in the questionnaire)
  - The column for **frequency** (i.e., the number of subjects in the subgroups under each variable)
  - The column for **percentage** (i.e., the proportion of subjects in the subgroups under each variable)

**Table 1: Socio-demographic characteristics of respondents**

Variables	Frequency n = 258	Percentage
<b>Age group (years)</b>		
20-29	121	46.9
30-39	80	31.0
40-49	41	15.9
≥ 50	16	6.2
<b>Sex</b>		
Male	135	52.3
Female	123	47.7
<b>Marital status</b>		
Single	80	31.0
Married	173	67.1
Separated	5	1.9
<b>Religion</b>		
Islam	214	82.9
Christianity	44	17.1
<b>Cadre</b>		
Doctor	28	10.9
Nurse	153	59.3
*Others	77	29.8
<b>Length of practice (years)</b>		
< 10	175	67.8
10 and above	83	32.2

\*Others: Pharmacist, Laboratory scientist, Medical records

Please ensure that the frequencies and percentages presented are accurate because examiners usually verify them using online calculators (<https://ncalculators.com/statistics/grouped-data-standard-deviation-calculator.htm>)



# How to present data in a dissertation contd.

## □ Tabular presentation contd.:

The design of the tables depends on the study design as shown below contd.:

### B: Comparative cross-sectional study:

- The frequency distribution table of a comparative cross-sectional study requires at least **4 columns**. These include:
  - The **stubs**' column for the main variables being considered in the table [1]
  - The column for the **first group** (e.g., **Rural group**). The frequencies and percentages are usually merged together, and the percentage sign is in round brackets (%) [2]
  - The column for **second group** (e.g., **Urban group**), also as above [3]
  - The column for **test of significance** (which contains the values of the test statistics and the p-values) [4]

1 2 3 4

Table 1: Socio-demographic profile of respondents

Variables	Rural group n = 202 Frequency (%)	Urban group n = 199 Frequency (%)	Test of significance
<b>Age groups (in years)</b>			
15 – 19	32 (15.8)	20 (10.1)	$\chi^2 = 17.782,$ $p = 0.007$
20 – 24	30 (14.9)	46 (23.1)	
25 – 29	46 (22.8)	65 (32.7)	
30 – 34	46 (22.8)	44 (22.1)	
35 and above	48 (23.7)	24 (12.0)	
<b>Marital status</b>			
Single	1 (0.5)	6 (3.0)	$\chi^2 = 5.560,$ $p = 0.135$
Married	189 (93.6)	187 (94.0)	
Divorced	6 (3.0)	3 (1.5)	
Widowed	6 (3.0)	3 (1.5)	
<b>Religion</b>			
Islam	202 (100.0)	192 (96.5)	$\chi^2 = 7.239,$ $p = 0.007$
Christianity	0 (0)	7 (3.5)	
<b>Educational status</b>			
None	7 (3.5)	0 (0)	$\chi^2 = 71.839,$ $p < 0.001$
Quranic only	173 (85.6)	100 (50.3)	
Primary	14 (6.9)	16 (8.0)	

Please ensure that the values of the test statistics and p-values presented are accurate because examiners usually verify them using online calculators

# How to present data in a dissertation contd.

## □ Tabular presentation contd.:

The design of the tables depends on the study design as shown below contd.:

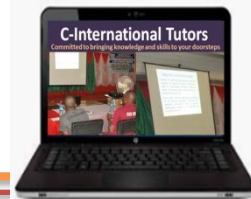
### C: Experimental study (pre-intervention):

- The frequency distribution table of the **pre-intervention** results section of an **experimental study** in a dissertation requires at least **4 columns**. These include:
  - The **stubs**' column for the main variables being considered in the table [1]
  - The column for the **Intervention group**. The frequencies and percentages are usually merged together, and the percentage sign is in round brackets (%) [2]
  - The column for the **Control group** (also as above) [3]
  - The column for **test of significance** (which contains the values of the test statistics and the p-values) [4]

Table 1. Socio-demographic characteristics of participants

Variables	Intervention group n = 108 Frequency (%)	Control group n = 108 Frequency (%)	Test of significance
<b>Age group (years)</b>			
20 - 29	36 (33.3)	35 (32.4)	$\chi^2=0.215$
30 - 39	41 (38.0)	43 (39.8)	p=0.975
40 - 49	24 (22.2)	22 (20.4)	
50 - 59	7 (6.5)	8 (7.4)	
<b>Sex</b>			
Male	63 (58.3)	65 (60.2)	$\chi^2=0.077$
Female	45 (41.7)	43 (39.8)	p=0.445
<b>Marital status</b>			
Single	32 (29.6)	44 (40.7)	$\chi^2=2.923$
Married	76 (70.4)	64 (59.3)	p=0.058

Please ensure that the values of the test statistics and p-values presented are accurate because examiners usually verify them using online calculators



# How to present data in a dissertation contd.

## □ Tabular presentation contd.:

The design of the tables depends on the study design as shown below contd.:

### D: Experimental study (post-intervention):

- The frequency distribution table of the **post-intervention** results section of an **experimental study** in a dissertation requires at least **5 columns**. These include:
  - The **stubs**' column for the main variables being considered in the table [1]
  - 2 column for the **Intervention group** results (i.e., a column each for the pre- and post-intervention results. The frequencies and percentages are usually merged together, and the percentage sign is in round brackets (%) [2 and 3]
  - 2 column for **Control group** results (also as above) [4 and 5]
  - The results of the **Statistical Test** done to check for any significant difference between the **pre- and post-intervention** results are placed in a row below the results of each group [6]

Table 14. Knowledge of the risk factors of coronary heart disease among participants at post-intervention

Variables	Intervention group		Control group	
	Pre-intervention n = 108 Frequency (%)	Post-intervention n = 101 Frequency (%)	Beginning of study n = 108 Frequency (%)	End of study n = 99 Frequency (%)
Knowledge grade				
Adequate	34 (31.5)	81 (80.2)	28 (25.9)	28 (28.3)
Inadequate	74 (68.5)	20 (19.8)	80 (74.1)	71 (71.7)
	$\chi^2 = 50.05, p < 0.001$		$\chi^2 = 0.145, p = 0.0703$	



# How to present data in a dissertation contd.

## □ Graphical presentation:

- This involves presenting data using charts or figures
- Charts are used to display series of numeric data in a graphical format to make it easier to understand large quantities of data and the relationship between different series of data
- The appropriate chart to be used depends on the data being presented
- The commonly used types of charts include bar chart, pie chart, histogram, line graph, scatter plots, box and whiskers plot, etc.

# How to present data in a dissertation contd.

## Graphical presentation contd.:

The components of a chart include:

1. **Chart area:** This is the entire chart and all its elements.
2. **Plot area:** This is the area of the chart bounded by the axes.
3. **Data points:** These are individual values plotted in a chart represented by bars, columns, lines or pies.
4. **Horizontal** (category) and **vertical** (value) **axes** along which the data is plotted in the chart.
5. **Legend:** This identifies the patterns or colors that are assigned to the data series or categories in the chart.
6. **Axes titles:** These are descriptive text for the axes.
7. **Data label:** This provides additional information about a data marker that you can use to identify the details of a data point in a data series.



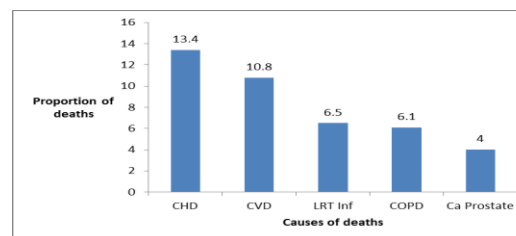
# How to present data in a dissertation contd.

## Graphical presentation contd.:

The appropriate chart to be used depends on the type of data being presented as shown below:

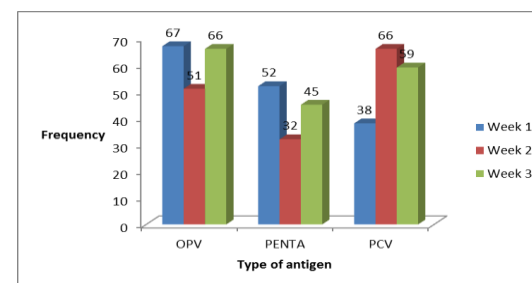
### A: Bar chart:

- A bar chart is used in presenting a set of categorical data
- It displays the data using rectangles of the same width
- The length of each rectangle is proportional to the number or proportion (%) of cases in the category it represents
- The **Figure number** and **Title** should be inserted below the chart
- The types of bar charts include; **simple**, **multiple** (or **compound**) and **composite** bar charts



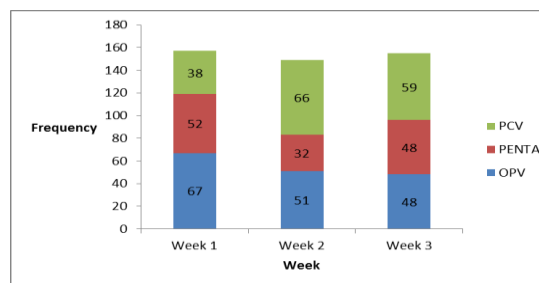
Simple bar chart

Figure 1: Leading causes of deaths in men aged 60 years and over in the African region



Multiple or compound bar chart

Figure 2: Uptake of antigens among children attending child health clinic of a teaching hospital in Nigeria



Composite bar chart

Figure 3: Uptake of antigens among children attending child health clinic of a teaching hospital in Nigeria

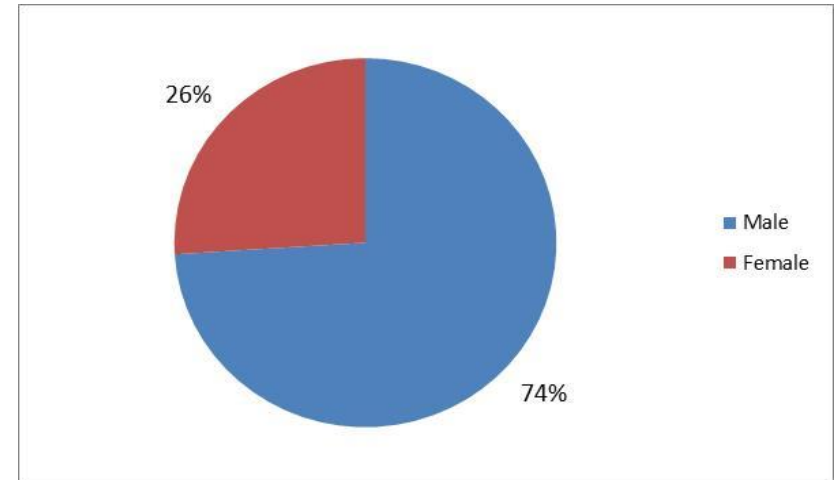
# How to present data in a dissertation contd.

## Graphical presentation contd.:

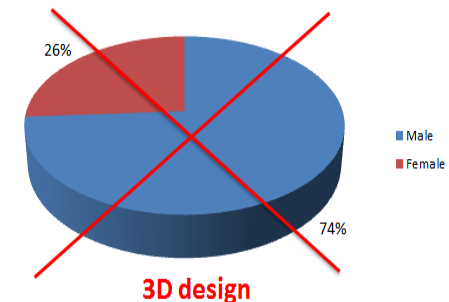
The appropriate chart to be used depends on the type of data being presented as shown below contd.:

### B: Pie chart:

- A pie chart is a circular statistical graphic which is divided into slices to illustrate numerical proportions
- The central angle and area of each slice is proportional to the quantity it represents
- In scientific publications, the simple 2D design should be used (and not a 3D design)



**Fig 4: Sex distribution of final year medical Students in a university in northern Nigeria**





# How to present data in a dissertation contd.

## □ Graphical presentation contd.:

The appropriate chart to be used depends on the type of data being presented as shown below contd.:

### C: Histogram:

- A histogram is used for presenting quantitative data measured on interval or ratio scale (e.g age, weight and height)
- Class groups are represented by rectangles whose widths represent class intervals and whose areas are proportional to the corresponding frequencies
- Unlike the bar chart, there is no gap between the rectangles

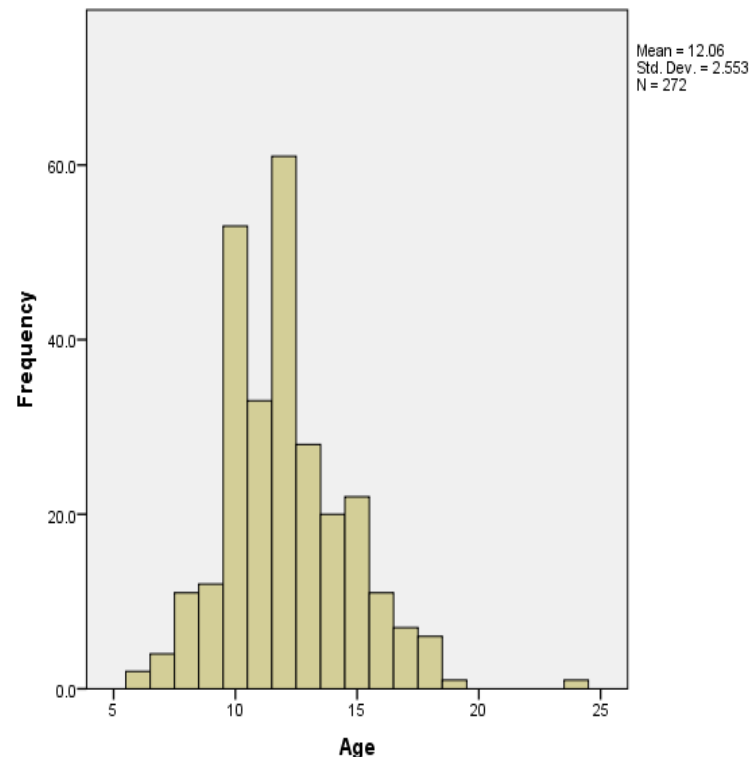


Figure 5: Age distribution of “Almajiri” Integrated School pupils in a northern Nigerian city



# How to present data in a dissertation contd.

## □ Graphical presentation contd.:

The appropriate chart to be used depends on the type of data being presented as shown below contd.:

### D: Line graph:

- A line graph (or line chart) is a graphical display of information that changes continuously over time
- It uses horizontal (x) and vertical (y) axes to plot data points. The vertical (y) axis contains the scale of the variable that changes over time, while the horizontal (x) axis contains the time period (e.g., days, weeks, months or years) under consideration
- The data points are connected with a line (which can ascend or descend based on the data) to display the changes in the variable over time

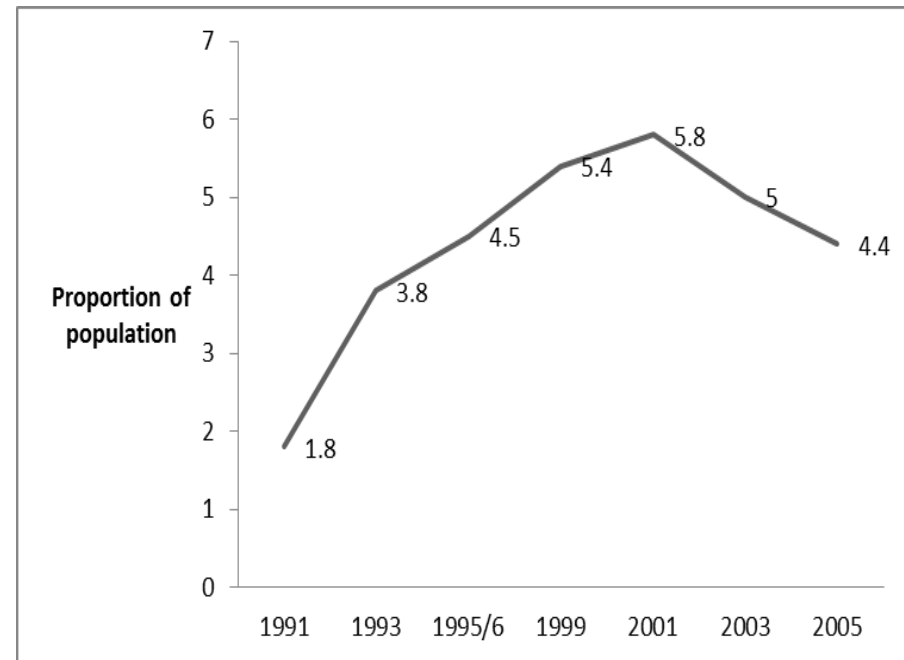


Figure 6: Trend of HIV prevalence in Nigeria

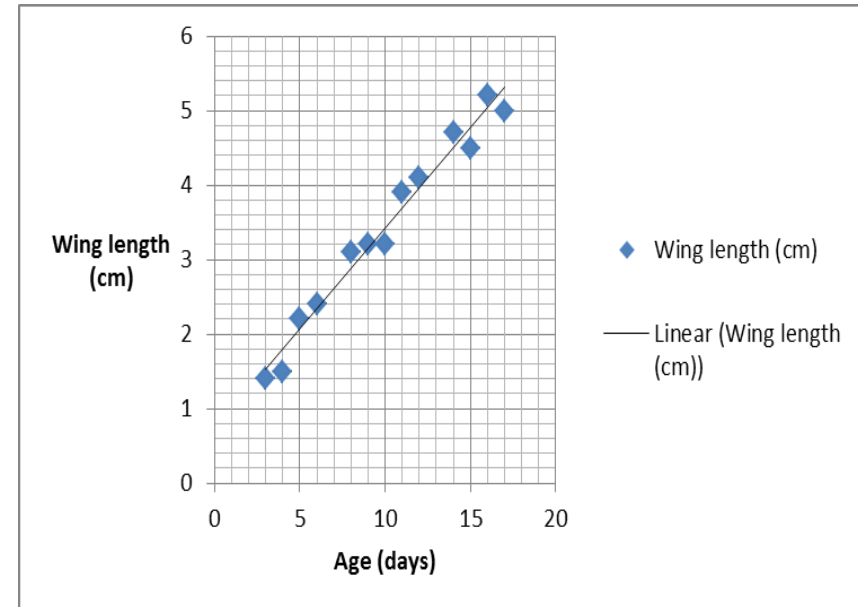
# How to present data in a dissertation contd.

## □ Graphical presentation contd.:

The appropriate chart to be used depends on the type of data being presented as shown below contd.:

### E: Scatter plots:

- Scatter plots are similar to line graphs in that they use horizontal (x) and vertical (y) axes to plot data points. They show how much one variable is affected by the other. The relationship between two quantitative variables is called their **correlation**
- A line of best fit (or trend line) can be drawn, with the line being as close as possible to all the points on the scatter plot. Using this line, **linear interpolation** can be made (i.e., to estimate a value inside the set of data points)
- The estimation can also be made using the equation of the **regression** line of **y** on **x** (i.e.,  **$y = a + bx$** ), where **a** is the **y intercept**, and **b** is the **regression coefficient** of y on x



**Figure 7: Relationship between the age and wing length of a bird**

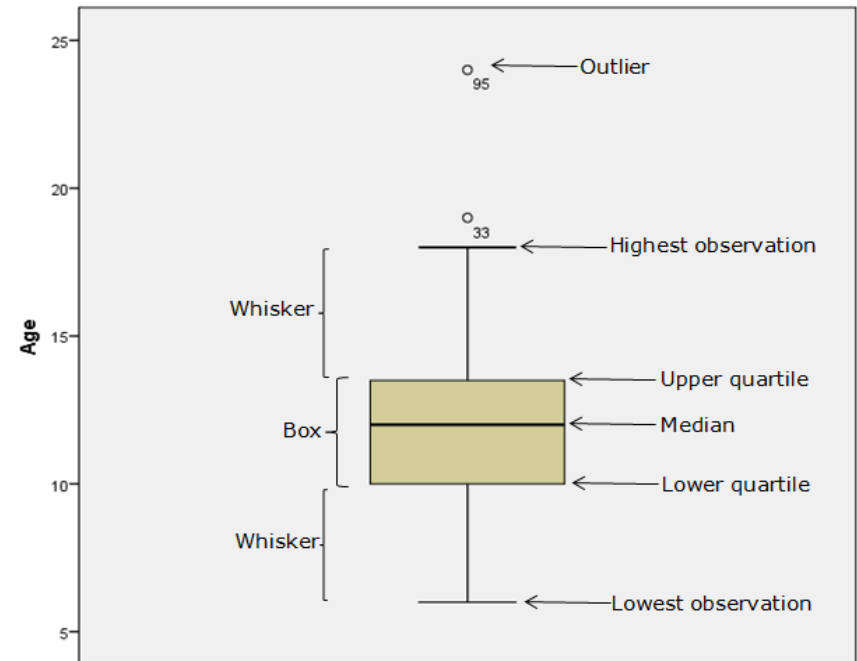
# How to present data in a dissertation contd.

## □ Graphical presentation contd.:

The appropriate chart to be used depends on the type of data being presented as shown below contd.:

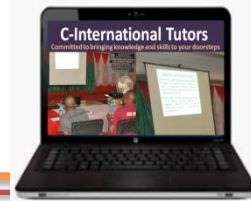
### F: Box and whiskers plot:

- A box and whiskers plot is a type of graph used in summarizing a set of data measured on an interval scale. It is useful in indicating whether a distribution is skewed, and whether there are potential unusual observations (i.e., outliers) in the data set
- Box and whiskers plots are also very useful when large numbers of observations are involved and when two or more data set are being compared
- In a box and whiskers plot:
  - The ends of the box are the upper and lower quartiles, so the box spans the interquartile range
  - The median is marked by a horizontal line inside the box
  - The whiskers are the two lines outside the box that extend to the highest and lowest observations



**Figure 8: The ages of the pupils in an “Almajiri” Integrated School in a northern Nigeria city**

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