BIOSTATISTICS *for* NURSES



BT BASAVANTHAPPA

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CHAPTER

3 Collection of Data

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Introduction

Statistics generally deals with population and groups of individuals, hence it deals with quantities of information and not with a single datum. The plural form of datum is data. It is necessary to understand the meaning of data and various types of data before discussing details of data collection. The collection of data constitutes the first step in a statistical investigation. Utmost care is required in collecting data because they form the foundation of statistical analysis. If data are faulty, the conclusion drawn can never be reliable. Any group of measurement which provide information is referred as data.

Data are the observable and measurable facts that provide information about phenomenon under study. *For example*, when physical growth of infant is the phenomenon under study, the data to measure about physical growth would be the body weight, height, chest, and head circumferences. In other words, using the data and information, indicators are developed which are the reflection of indirect or partial measures of a real situation. The aim of gathering and summarizing data is to transform this into meaningful information in order to identify and measure variables, describe behavior, and compute empirical evidences that are objective, reliable, and valid.

Once it is decided what type of study is to be made, it becomes necessary to collect information about the concerned study, mostly in the form of data. For this, information has to be collected from certain individuals directly or indirectly. Such a technique is known as survey method. These are commonly used in social sciences, i.e. the problems relating to sociology, political science, psychology and various economic studies. In surveys, the required information is supplied by the individual under study or is based on measurements of certain units. Generally, the respondents or units are selected from a population using some standard sampling techniques. Another way of collecting data is by experimentation, i.e. an actual experiment is conducted on certain individuals or units about which the inference is to be drawn. Such experimental studies are common in agriculture, biology, medical science, nursing, etc.

Classification of Data

Data can be classified on the basis of characteristic, source, field and contents.

Data Based on Characteristics

It includes qualitative and quantitative. Here qualitative relates to attributes and quantitative relates to discrete variates and continuous variates. Whenever an observation is made, it will be recorded and a collective recording of these observations either numerical or otherwise is called as data. These observations may be collected in a simple way like recording the sex of a person in a group or noting down the number of cases of

disease in a community or may be done through an experiment such as, finding vital capacity of an individual or total white blood cell count in a given volume of blood, etc. In each of the above cases a certain observation is made of a characteristic which varies from one observation to other is called variable. Depending upon the nature of the variable, data may be termed as qualitative or quantitative. For example, Qualitative data – sex, type of disease, causes of death, etc. quantitative data – vital capacity of lungs, total WBC count in given volume.

Qualitative data are non-numeric features or experimental units, where as quantitative data are with numerical properties.

Quantitative data can be classified into two kinds, namely discrete and continuous when the variable under observation can take only fixed values in a given range like whole numbers or in other words the variable jumps from one number to another without taking the in-between values, the data is called as 'discrete data'. Instead, if the variable can take any value in the given range, then the data is called 'continuous data'. For example, the number of white blood cells in a given volume of blood is a discrete data as it can be expressed only in whole numbers. And the hemoglobin percentage level of a person is a continuous data as it can be measured to any decimal value depending on the precision of the measuring instruments.

Data Based on the Source

There are two categories of data namely, (i) primary data and (ii) secondary data.

Primary data: The data, which are collected from the units or individual respondents directly for the purpose of certain study or information, are known as primary data. For instance, an enquiry is made from each tax payer in a city to obtain their opinion about the tax collecting machinery. The data obtained in a study by the investigator are termed as primary data. If an experiment is conducted to know the effect of certain fertilizer doses on the yield or the effect of a drug on the patients, the observations taken on each plot or patient constitute the primary data. Hundreds of such examples can be cited.

Secondary data: The data, which had been collected by certain people or agency, and statistically treated. Now the information contained in it is used again from records, processed and statistically analysed to extract some information for other purpose, is termed as secondary data. For instance, if the data given in different census years is again processed to obtain trends of population growth, professional changes, changes in sex ratio, mortality rate, etc. it is termed as secondary data. Usually, secondary data is obtained from year books, census reports, survey reports, official records or reported experimental findings. Different organisations and government agencies publish information (data) in the form of reports, periodicals, journals, etc. Names of organisations and their publications with relevant details are given in the chapter on Statistical Organisation in India.

The sources that the student should tap, vary with his/her interests and the type of his/her study. Generally, sources are divided into documentary and field sources. The later includes living persons who have a fund of knowledge about or have been in intimate contact with, social conditions and changes over a considerable period of time. These people are in a position to describe not only the existing state of affairs but also the observable trends and significant change in a social process. These persons regarded as personal sources or direct sources. If discretion is in their selection, various professional and business persons, old residents and community leaders may be utilized as a sources of information. Each person supplying information may often serve as a check on the other until the account is reliably constructed. The documentary sources of information are those which are contained in the published and unpublished documents, reports, statistical accounts, manuscript, letters, diaries, etc. These

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sources are generally divided into '*primary sources*' which provide data gathered at first hand, the responsibility for their compilation and promulgation remaining under the same authority that originally gathered them; and '*secondary sources*' which provide data that have been transcribed or compiled from original sources and of which the promulgating authority is different from that which controlled the collection of the data at first hand, for example, census. In other words, if the data is derived from the direct measurements/observations on the population units, it is 'primary data'. For example, observations based on the actual measurement of height, weight, Hb%, etc. of individuals by the investigator/or his team – when the data is not derived from the primary source, but is derived from sources like search, it is secondary data.

There are two systems of sources of data which include regular or routine and non-routine or ad-hoc data collect system:

- Regular or Routine system: examples: Census Birth and Death registration, notification of disease, cancer registers, reporting under surveillance of diseases
- Ad-hoc or non-routine system: example: National sample survey, investigation of an epidemic, Knowledge Attitude Perception (KAP) on healthy habits, etc.

  i. *Regular system includes the following*
    - Census: It is a population estimate and is a process of complete enumeration of all individuals in a country on a fixed date. It contains aspects like general, economic, social, cultural, migration, establishment, fertility and special information if any.
    - Vital registration: Includes births, deaths, marriages, divorces, adoptions, legitimations, legal separations, recognitions and annulments. These are vital events that need recording and are helpful in day-to-day civilian affair regulations.
    - Notification of disease: It is regulation and policy as a part of prevention and control of diseases. Notifiable disease are cholera, plague, yellow fever, polio, influenza, malaria, typhoid, hepatitis and locally epidemics.
    - Disease registry: Permanent record of specific diseases like cancer, shock, blindness, birth defects, tuberculosis and leprosy.
    - Medical records: Cumulative health record in educational institutions and working places.
    - Hospital records.
    - Environmental health information.

  ii. *Ad-hoc system includes the following*
    - Sample registration system – to get quick required data for policy making and planning
    - Disease surveillance – AIDS surveillance, malaria surveillance, etc.
    - Manpower statistics
    - Surveys – population based surveys, National health survey
    - Additional ad-hoc demographic data – situational analysis of population movement, natural calamities, major epidermis
    - Economic and Fiscal data
    - Security scheme and serial schemes – Medical insurance, sickness, absenteeism, disability benefits and other benefits and welfare scheme.

Data Based on Field

In computer data base management software, data is arranged in tabular form. The columns are called fields and rows are records. Each field can hold record of its' type which needs to be described at the time of creation of data base. The common types of fields are character type, numeric type, date type, and logical type.

- ***Character type***, e.g. Name, address
- ***Numeric type***, e.g. Age, height, weight, blood sugar level, systolic/diastolic BP, serial numbers, etc.

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- ***Date type***, e.g. Date of birth, date of admission, date of discharge, etc.
  - The data can be expressed dd/mm/yyyy (British format)
  - The data can be expressed mm/dd/yyy (American format)
  - The data can be expressed yyyy/mm/dd (ANSE format)
- ***Logical type*****:** This refers to dichotomous data for example, sex (male/female), result of drug trial (cured/not cured, residence (urban/rural).

Data Based on Content

The data can be classified, depending on the contents which include, nominal, ordinal, interval and ratio data, according to scales of measurements

- ***Nominal data:*** It is another name for qualitative data. Here, the data is presented as frequency distribution of some characteristics such as sex, religion, etc. The groups do not have any logical order. There is no implication of order or ratio of the adjacent categories. When there are only two possible categories, the data is named dichotomous for example
  - Smoking—smokers/non-smoking
  - Sex—male/female
  - Outcome of MI—death/survival
  - Goals of NAMP—achieved/not achieved
  - Cause of illness—heredity/environment
- ***Ordinal data:*** In this type, the data is presented according to rank or order. There is thus, a logical order, for example:
  - Frequency, distribution, of student according to the rank in examinations
  - Degree of malnutrition—severe, moderate, mild
  - Socioeconomic status—upper, middle, lower

  Here there no implication of class-interval. The groups are thus not equidistant, since it relates to, true zero does not exist. Ordinal data are with implicit order of inter-relationship.
- ***Interval data:*** In this type, the data is placed in meaningful intervals and order. Here, the number between characters. For example:
  - Body temperature – Degree of Fahrenheit or Celsius
  - Heart rate – per second

  To quote frequency distributions of patients according to temperature groups, like below 37°C and above 37°C. Here the groups are meaningful because, the difference in the temperature of 37°C and 36°C and 38°C and 37°C is equal, i.e. 1°C. however there is no implication of ratio in the sense that 30°C is not twice as hot as 15°C.
- ***Ratio data*****:** Here there is relative magnitude. In this type, the data is presented in frequency distribution in logical order and meaningful groups. In addition a meaningful ratio exists. For example, frequency distribution of pulse rate, height, weight, etc. Thus, pulse rate of 120/minute is twice as fast as that of 60 per minute. Similarly, a person with weight 80 kgs is twice heavy as the one with weight of 40 kg. Further, in this data type, a true zero exists. For example, pulse rate of zero means no pulse at all.

  Thus, identification of the type of data is essential in any statistical exercise for reasons given below:
  - It helps in further analysis
  - It helps selection of data presentation method
  - It helps selection of test of significance.

Methods of Data Collection

The objective of a study, the population under study, the units or individuals from whom the information is to be collected is ascertained first. Then keeping in view the purpose and importance of the investigation and types of respondents, the statistician has to choose one of the three methods of enquiry given below.

1. Personal enquiry method.
2. Correspondence, i.e. mailed questionnaire method.
3. Direct observational method.

Personal Enquiry Method

Before starting the investigation, a question sheet is prepared which is called *schedule*. The schedule

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contains all the questions which would extract a complete information from a respondent. Often, the schedule contains the likely answers also. As a precaution in any method a few schedules are tested by filling them before the commencement of the survey. This pre-testing of schedules removes certain discrepancies like ambiguity of the questions and irrelevant questions in the schedule. Such pre-testing is known as a *pilot survey*.

In this type of enquiry, the investigator contacts the respondent personally and asks him questions given in the schedule one by one and notes down his replies on the schedule. If the unit is a household, the investigator contacts the head of the family to fill up the schedule. Such a practice is called a *direct personal interview method*.

The interview is a process of communication or interaction in which the subjects or interviewee gives the needed information verbally in a face-to-face situation. Although the interview is generally associated with counseling or psychotherapy, it is used effectively to collect useful information about individual in many research situations.

Interviewing is a popular way of gathering information in qualitative research. Interview provides a wide range of data. It provides information about person's feelings, perceptions, and opinions. Interviewers should not make preassumptions about the respondents. Interview requires high-level questioning skills and active participation.

Interviewing requires face-to-face contact or contact over telephone and calls for interviewing skills. Interview may be used either as a main method or as a supplementary one in collection of research-related data.

These are most often used to gather detailed, qualitative data. Interviews are conducted one-on-one, while focus group interviews are conducted in small groups. Both are usually conducted with targeted samples of staff, administrators, youth, families, community members, and so on. These can be conducted in person or by phone. Questions are generally open-ended, and responses are documented.

Sometimes, the information is not collected directly from the respondent, but from a third person who is expected to know him well. Such an approach is useful in case where the respondent is expected to conceal information about himself. For instance, a person who is addicted to alcoholic drinks or suffering from some infectious disease may hide correct information about certain things. Hence, an indirect enquiry will give better information. Such a method of enquiry is known as *indirect personal enquiry method*. The main advantage of this method is that the information is likely to be complete, more correct and some additional information can be retrieved. The person may be persuaded to reply to some of the more personal questions too.

Mailed Questionnaire Method

Questionnaires are one of the most popular methods of conducting research. They provide a convenient way of gathering information from a target population. They are cost-effective and easy to construct and analyse. A questionnaire is a planned self-reported form designed to elicit information though written or verbal responses of the subjects. In other words, a questionnaire is a research instrument used for data collection. It is a set of questions that may or may not provide with response alternatives which are to be answered by subject.

When a survey is spread over a vast area and the respondents are educated, a mailed questionnaire method is preferred in comparison to the personal interview method. In this method, a questionnaire is mailed to each and every respondent. They are requested to fill up the questionnaire and send it back. This method is less costly and less time consuming. The difficulty in this method is that a large number of respondents do not return the duly filled in questionnaires.

Direct Observational Method

Observation is a way of gathering data by watching behavior, events, or noting physical characteristics in their natural setting. Observation is a method of

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data collection that can be used to gather such information as characteristics and conditions of individual, verbal and nonverbal communication, etc. Observation method of data collection is particularly well suited to nursing research. There are several situations that require nurses to use the observation method for data collection such as behavior and attributes of the patients, their families, and hospital staff, and so on.

In this approach an investigator stays at the place of survey. He does not make enquiries, but notes down the observations himself. For instance, to understand the migratory habits of a variety of birds, the investigator stays at the birds sanctuary and notes down the movements to and fro every day. This method of survey is not used frequently.

Observation may be defined as systematic viewing, coupled with consideration of the seen phenomena. That is, consideration minor be given to the larger unit of activity in which the specific observed phenomena occur. Overall phenomena of course are open to observations, not all those open to observation find a ready observer at hand. Not all occurrence lend themselves to study by observational techniques.

Research observation involves the systematic selection, observation and recording of behaviors, events and settings relevant to a problem under study. When nurse researchers observe an event – such as nurse interacting with a patient – they have to know at least broadly what to observe. Nurse researchers make observations of human behavior or the characteristics of individuals, events, environments or objects. The common observable phenomena involved in nursing research are:

1. *Characteristics and conditions of individual:* By direct observation investigator can get lots of information about person's attributes and states, which include both enduring traits such as, physical appearance and more temporary conditions such as rashes. Physiologic conditions can be observed either directly through the senses or with the help of observational apparatus such as, radiograph, MRI, ECG, etc.
2. *Activities and behavior:* Number of actions are amenable to observation and constitute valuable data for nurse researchers. Activities and behavior that indicate health status physical status and emotional functioning are particularly important. For example, activities or behaviors that lend themselves to observational study, include patient's eating habits, length and number of visits by friends and relatives and aggressive actions among children in the hospital play room.
3. *Skill attainment and performance:* Nurses are routinely called on to develop skills among clients. Skill attainment is often demonstrated behaviorally and is therefore amenable to observation. For example, diabetic patients skill in testing their urine for sugar and acetone or infants ability to suck when positioned for breast feeding and also nurses on-the-job performance and decision-making behaviors.
4. *Verbal communication:* The content and structure of people's conversation are readily observable, easy to record. A nurse researcher may be interested in observing information given by nurses to patients, exchange of information among nurses at change-of-shift reports, conversation among patients about health-care services of hospitals.
5. *Non-verbal communication:* Individuals communicate their attitudes and emotions in many ways, other than just with words. The kind of non-verbal behavior amenable to observational methods include, facial expressions, touch, posture, gestures and other body movements, crying or laughing and extra linguistic behavior, i.e. the manner in which people speak aside from the content, such as the intonation, loudness and continuity of speech.
6. *Environmental characteristics:* Individuals surrounding can be affect their behavior. For example, observable environmental attributes includes hospital noise levels, nursing homes' decor, safety hazards in schools or the cleanliness of the households in a community.

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In selecting behaviors, attribute or situations to be observed the researcher must decide what constitute a unit. There are two apparatus as given below. The choice of approach depends mostly on the nature of the probe.

- The most approved entails, observing large units of behavior and treating then as a whole. For example, Psychiatric nurse researcher might study patients' mood swings. An entire constellation of verbal and non-verbal behavior might be construed as signaling aggressive behavior
- The molecular approach uses small, highly specific behavior, as observational units. Each movement, action, gesture or phrase is treated as a separate entity.

The types of observation used are unstructured and structured observation

In case the observation is characterized by careful definition of the units to be observed, the style of recording the observed information, standardized condition of observation and the selection of pertinent data of observation, then the observation is called as "structured observation". But when the observation is to take place without these characteristics to be thought in advance, the same is termed as 'unstructured observation'. Descriptive studies use "structured observation". Exploration studies use mostly "unstructured observation".

Unstructured Observation

Unstructured observational data are most often gathered in field setting, through a process known as "Participant observation". Participant observes and participates in the functioning of the social group under investigation and strive to observe, ask questions and record information within the contexts, structures and symbols that are relevant to group members. Most of the qualitative studies use this approach. When the observer observes by making himself, more or less, a member of the group he is observing so that he can experience what the members of the group experience, thus the observation is called as the participant observation. But when the observer observes as a detached emissary without any attempt on his part to experience through participation what others feel, the observation of this type is often termed as "non participant observation". When the observer is observing in such a manner that his presence may be unknown to people he is observing, such observation is described as "disguised observation".

The most common form of record keeping participant observations are logs and field notes, but photographs and videotapes may about be used

- A log book or field book daily records events and conversation in the field
- Field notes are much broader, more analytic and more interpretive than a simple listing of occurrences. Field notes are both descriptive and reflective
  - Descriptive or observational notes are objective descriptions of observed events, conversations; information about actions, dialogue contexts which are recorded as completely and objectively as possible
  - Reflective notes which document the researcher, personal experience, reflections and progress while in the field, can serve a number of different purposes; which include methodological notes, theoretical notes and personal notes.

Structured Observation

Researchers using structure/observational methods specify in advance the behavior or events to be observed and use record-keeping forms that yield numeric information. Observers using structured observation are still required to make some inferences and exercise judgement; but they are restrained with regard to the kinds of phenomena than will be watched and recorded.

In structured observation investigator uses category, checklists and rating scale.

- A category system represents an attempt to designate in a systematic or quantitative fashion, the qualitative behaviors or events transpiring

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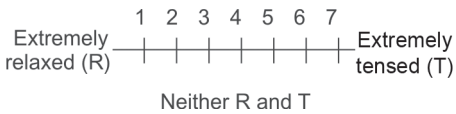
in observational setting. It requires the careful and explicit definitions of behavior and characteristics to be observed. Each category must be explained in detail with an operational definition, so the observers have a relatively clear-cut criteria for determining the occurrence of specified phenomena. For example, interaction between mother and infants during periods of feeding and sleeping. Here for the observer categorized sleep – wakeful states are made into mutually exclusive categories: Sleep, Drowse/Transition, Alert and active waking. Here the 'alert' category is defined as "the infant's eyes are open and scanning, motor activity is typically low, etc.

- Checklist referred to an instrument that the observer uses to record observed phenomena, which is constructed on the basis of the category system. In an exhausting checklist usually formatted with a list of behaviors or events from the category system on the left and space for tallying, the frequency or duration of occurrence of behaviors is placed on the right. The observer's task, with an exhaustive checklist, is to place behavior in only one category for each element. The element refers to either a unit of behavior, such as a sentence in a conversation, to a time interval, checklist for non-exhaustive systems is referred to as a sign system, begins with a list of behaviors (or symptoms) that subjects may manifest or may not manifest. The observers task is to watch for instances of behavior on the list.
- Rating scales – an alternative to checklist for recording structure observations is a rating scale. This requires the observers to rate a phenomena along a descriptive continuum, that is typically bipolar. The ratings are quantified for subsequent statistical analysis. A seven-point scale or a five- point scale can be used:



Self-Report

The self-report is a method of collecting data that involves a direct report of information by the person who is being studied. This method is used by the nurse researcher in both quantitative and qualitative research. The self-report data usually are collected by an oral interview or written questionnaire.

Qualitative Self-report Tools

Methods of collecting qualitative self-report data include the following:

1. Unstructured interviews are conversational discussions on the topic of interest. They are the mode of choice when researchers do not have a clear idea of what it is that they do not know. In conducting unstructured intervals, it is critical to let participants tell their stories, with little interruptions. Phenomenological, grounded theory and ethnographic studies usually rely heavily on unstructural interviews. These interviews are characteristics by a flexibility of approach to questioning.
2. Semi-structural interviews are in which interviewers are guided by a topic guide of questions to be asked. Here the researchers know what they want to ask, but cannot predict what the answers will be. Their role in the process is somewhat structured, where as, the participant is not. The interviewers function is to encourage the participant to talk freely about all the topics on the list and tell the stories in their own words. In preparing the list of questions, care needs to be taken to order questions in a logical sequence, perhaps chronologically or perhaps from the general to the specific.
3. Focus group interviews are which involve discussions with small, homogeneous groups about topics covered in a topic guide. These types of interviews are becoming increasingly popular in the study of health problems. In this group four or more persons are assembled for a discussion. People selected for a group

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usually through purposive or snowball sampling are a fairly homogenous group. The interviewer (moderator) guides the discussion according to a written set of questions or topic, to be covered, as in a semi-structural interview…FCG sessions are carefully planned discussions that take advantage of group dynamics for accessing rich information in an efficient manner.

4. Joint interviews, which involve simultaneously talking with members of a family, e.g. a couple. Nurse researchers are sometimes interested in phenomena that involves a relationship between two or three people or that require understanding the perspective of more than one person, e.g. the experiences of cancer patients and their caretaker.
5. Life histories are narrative self-disclosures about individual life experiences. The life-history encourage respondents to narrate in chronological sequence, their experiences. Ethnographers frequently use individual life histories to learn about cultural patterns. Comparative life stories are especially valuable for the study of the patterns, meanings of health and health-care particulars among elderly persons.
6. Oral histories, are used to gather personal recollections of events and their perceived causes and consequences. These are very important methods for the historical researcher. When the topic under study and scrutiny is not too distant past and people who experienced that event can still be asked to narrate those experiences.
7. Critical incidents interviews, involve probes about the circumstances surrounding a behavior or incident that is critical to an outcome of interest. For example, understanding humor in clinical practice of sample of nurses about an incident that took place in the hospital.
8. Diaries and journals, are in which respondents are asked to maintain daily records about some aspects of their lives.
9. Think aloud method, involves having people use audio-recording devices to talk about decisions as and when they are making them. This method has been used in both natural and simulated settings.
10. Photo-elicitation interviews, involve, interviews stimulated and guided by photographic images. It is often used in ethnographics.
11. Self-report narratives on the internet – it is available through the internet.

When preparing for in-depth interviews researchers learn about the language and customs of participants, formulate broad questions, make decisions about how to present themselves, develop ideas about interview settings, and take stock of equipment needs. When conducting in-depth interviews researchers require considerable interviewer skill in putting people at ease, developing trust, listening intently and managing possible crises in the field.

Quantitative Self-report Tools

To obtain self-report data for quantitative study usually formal, written instruments are used. The instrument is an interview schedule. When questions are asked orally either face-to-face, as telephone interviews. It is called a questionnaire or an SAQ (Self-administered Questionnaire) when respondents complete the instrument themselves, usually in a paper-and-pencil format and occasionally directly onto a computer.

Structured instrument consists of a set of questions (also known as items) in which the wording of both questions and in most cases, response alternative is predetermined. When structured interviews or questionnaires are used, subjects are asked to responds to the same questions, in the same order and with the same set of response options. In developing structured instruments, much effort is usually devoted to the content, form and wording of questions. Structured self-report instruments may include open or closed-ended questions.

- Open-ended questions permit respondents to reply in narrative fashion, which allow respondents to respond in their own words. For

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example, what was the main problem you face in your nursing college.

- Closed-ended questions or fixed alternatives questions offer respondents alternative replies, from which subjects must choose the one that most closely matches the appropriate answer. Types of close-ended questions include:
  i. Dichotomous questions, which require a choice between two options. For example, have you ever been hospitalized. (a) yes (b) No. These types of questions are considered most appropriate for gathering factual information.
  ii. Multiple-choice questions, are which offer a range of alternatives. MCQ's usually offer three to seven alternatives. For example, How important is it to you to avoid a pregnancy this time?
     a. Extremely important
     b. Very important
     c. Somewhat important
     d. Not important?
  iii. Cafeteria questions, in which respondents are asked to select a statement best representing their view. For example, people have different opinions about the use of chemotherapy in cancer which of the following statements best represents your point of view?
     a. Chemotherapy is dangerous
     b. Chemotherapy has undesirable side-effects that suggest need for caution in its use
     c. I am undecided about my views on chemotherapy
     d. Chemotherapy has many beneficial effects that merit its use
     e. Chemotherapy is a wonder treatment that should be administered routinely to all cancer victims
  iv. Rank order questions, in which respondents are asked to rank a list of alternatives along a continuum. For example: students want to select some course for their career in life. Below is a list of things that many students want. Please indicate their order of importance to you by placing a "1" beside most important '2' beside the second most important are so on:
     a. Medical
     b. Dental
     c. Nursing
     d. Engineering
     e. Management
     f. Law
  v. Forced choice questions, which require respondents to choose between two competing questions used in personality tests. For example: which statement closely represents your point of view?
     a. I feel very bored in my dealings
     b. Sometimes I feel I do not have control over my dealings
  vi. Rating questions which ask respondents to make judgments along an order, bipolar dimension. For example, on a scale from 0 to 10, where '0' means "extremely dissatisfied and '10' means "extremely satisfied", how satisfied were your with the nursing care you received during your hospitalization.

     Checklist or matrix questions, in which several questions requiring the same response format are listed. For example, Table 3.1.
  viii. Calendar questions, which ask the stop and start dates of various events, recorded on a calendar of grid (Fig. 3.2). Page 68.
  viiii. Visual analog scales (VAS), are continuously used to measure subjective experience such as pain.

No pain 0_____10 Severe pain.

Composite Scales

A scale is a device designed to assign a numeric score to people to place them on a continuum with respect to attributes being measured, like a scale for measuring attitude or weight or so on.

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Table 3.1

Response data of a checklist or matrix questions regarding some of the aspects of a person's career

	Yes within a year	*Yes 2 years*	*Yes more than 2 years*	*No never*
a. Has any one harassed you in your career	1	2	3	4
b. Has some one helped you in your career	1	2	3	4
c. Has any one threatened you in your career	1	2	3	4
d. Has any one counselled you in your career	1	2	3	4

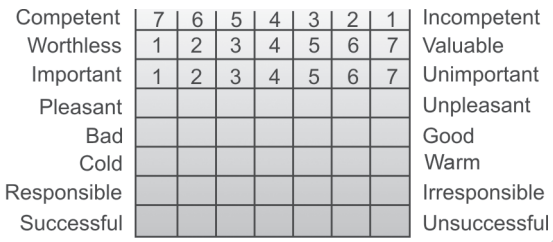

Fig. 3.1: An example of semantic differential

Note: This is an example, but when administering actual subjects, the score values should not be printed

These rating scales can also be used to assess the attitudes or feelings of self-concept. The expressions of the any point of view are accounted as measurements towards any item, object, or concept; they show the person's positive or negative attitude towards any concept. Measuring the score between two opposite concepts tells us about the attitude, feeling, and perception of a person or study subject towards the directions of positive or negative attitude in a scale. Visual scales illustrate visual depiction of any culture; photographs are given to get the feelings, beliefs, opinions about contrast, texture, color, and elements.

'Composite scales are socio-psychological measurements, which are directed towards quantifying the qualitative attributes such as feelings, attitude, self-concept, perceptions, and beliefs etc.'

'Composite scales are socio-psychological rating scale, which are generally used for qualitative measures and discriminate people with different attribute, perception, fears, motives, personality traits and needs those are often incorporated into interviews or questionnaires.'

A scale provides a numeric score to place respondents on a continuum with respect to attributes being measured, like a scale for measuring peoples' weight. Many studies that collect data through self-report use a psychological scale, which is used to discriminate quantitatively among people with different attitudes, fears, motives, perceptions, personality traits and needs. Scales are usually created by several close-ended items into a single composite score.

1. Likert scale—named after the psychologist Rensis Likert. It is also called summated rating scale. It consists of several declarative items that express a view point on a topic. Respondents are asked to indicate the degree to which they agree or disagree with the opinion expressed by the statement (e.g. Table 3.2).
2. Semantic differential scales—consists of a series of bipolar rating scales on which respondents indicate their reaction toward some phenomenon; scales can measure an evaluative (e.g. good/bad) activity (e.g. active/passive), potency (e.g. strong/weak) dimension (Fig. 3.1).

Biophysiologic Measurement Data

'Biophysiological method involves the collection of biophysiological data from subjects by using the specialized equipments to determine physical and biological status of subjects.' *For example*, blood pressure measurement by using special equipments such as sphygmomanometer and stethoscope.

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Biostatistics for Nurses

Biostatistics for Nurses is based on course and curricula of nursing students. This book is designed to provide nursing students and nurses with the knowledge and skill in applying statistics on their practice settings. In view of these changes, the book is organized into 20 chapters. Ideally, the text is flowed sequentially, but every effort has been made to respect the differing needs of diverse curricula and students. Thus, each chapter stands on its own merit and may be read independently of others. Every attempt has been made to maintain simple and lucid language and style,so that students can grasp the subject very clearly and completely.

BT Basavanthappa MN PhD attained superannuation from Karnataka State Government service and retired as Principal of Government College of Nursing, Bengaluru, Karnataka, India in 2006. He has vast experience in the field of nursing and worked as staff nurse for 16 years at District McGann Hospital, Shimoga, Karnataka. And he did BSc Nursing (1978), Master of Nursing (1988) and Doctoral Degree in Nursing, i.e. PhD in Nursing (1993). He is the first person, who earned and awarded PhD in Nursing in the State of Karnataka. With over 38 years of experience as nurse clinician and academician, Dr Basavanthappa has taught all the areas of nursing in undergraduate and postgraduate programs and guided many PhD candidates. Some of them are already awarded with Doctoral degree in Nursing. He is the PhD guide recognized by the Indian Nursing Council and Indian Universities. He is the examiner or evaluator of undergraduate, postgraduate and doctoral level degrees in nursing.

Dr Basavanthappa has already published 22 titles in nursing, i.e. *Fundamentals of Nursing, Community Health Nursing, Medical Surgical Nursing, Midwifery and Reproductive Health Nursing, Pediatric Child Health Nursing, Psychiatric Mental Health Nursing, Nursing Education, Nursing Administration, Nursing Research, Nursing Theories, Essential of Medical Surgical Nursing, Essential of Midwifery and Obstetrics, Essential of Mental Health Nursing, Essential of Community Health Nursing, Communication and Education Technology for Nurses, Management of Nursing Services and Education, Psychology for Nursing,* and *Practical Record for BSc (N)*, etc. He served at universities in various capacities and his professional development and contribution are well documented at local as well as national levels. He attended, participated and conducted many workshops and conferences. And he has been selected for prestigious award and gold medals for his contribution. He is also one among the founder executives of Government Nurses Association, Karnataka and held various positions in Nurses Association and Karnataka State Government Employees Association. At present, he is the Founder President of Rajiv Gandhi University of Health Sciences, Nursing Teachers Association, Karnataka. He takes it as a matter of pride to shoulder any responsibility in the interest of nursing profession.

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