

## Column: Methods in Psychiatric Research

### DESCRIPTIVE STUDIES

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#### ABSTRACT

Descriptive studies are observational studies which range from the case and case series report to extensive epidemiological studies. The essential features of the descriptive studies are its cross-sectional nature. From an epidemiological perspective, there are two types of descriptive studies; prevalence studies and ecological studies. In prevalence studies, the focus is on describing disease and exposure variables with reference to person, place and time on an individual level. They help to assess the disease and sometimes the exposure burden. Sequentially conducted descriptive studies can give time trends. Case-control analysis of descriptive studies can help identify an association, which could be tested by true analytical studies like case-control and cohort studies. The essential validity threats to descriptive studies are selection bias and information bias. Using appropriate random sampling methods, taking steps to prevent response failure and administering validated questionnaires for data collection are the measures to circumvent them. Cross-sectional designs are also used to validate diagnostic tests and research instruments, staging of illnesses and deriving normative values.

**Keywords:** descriptive studies, cross-sectional, ecological study, prevalence studies

#### INTRODUCTION

Descriptive studies include a spectrum of research designs from case report and case series study to extensive population-based surveys. The common characteristic is its cross-sectional nature. The previous sections of the series had indicated how a case report and case series are classified as descriptive studies. The emphasis in this section is descriptive studies from an epidemiological perspective.<sup>1, 2, 3</sup>

From an epidemiological perspective, descriptive studies focus on the general characteristics of the distribution of a disease or condition, especially in relation to person, place and time.<sup>3</sup> Good descriptive studies answer basic "W" questions regarding the phenomenon studied – by describing "who," "what," "when," "where," rather than "why". Who are affected

by the disease? (Age and sex are generally described along with other features like religion, education, occupation etc.). What is the condition studied? (Explicit, measurable, stringent diagnostic criteria are developed for case definition in descriptive studies).

When and where is the condition seen commonly or less frequently? (Time and geography provide important clues regarding health events).<sup>4</sup>

Based on whom the data is collected from, descriptive studies can be individual-based or population-based. Individual-based descriptive studies are clinic-based as well as population-based cross-sectional studies. In ecological studies, population-based or group based aggregate exposure or disease data are analysed.<sup>3</sup>

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## CROSS-SECTIONAL STUDIES

They are also known as prevalence studies, epidemiologic studies and surveys. In these studies, data collected on a group of subjects at one time, rather than a period are described.<sup>5</sup> Information is collected on the presence or level of one or more variables of interest – exposure or outcome – in a defined population at one particular time. Usually, cross-sectional studies are conducted to estimate the prevalence of an outcome of interest in a defined population. Along with the information regarding the outcome, data can also be collected regarding exposure to risk factors. Thus, they provide a 'snapshot' of the outcome and the characteristics associated with it, including exposure variables, at a specific point of time.<sup>6</sup> Sometimes, these studies may investigate the association between risk factors and the outcome. As the risk factor and outcome are measured simultaneously, the temporal sequence of events cannot be delineated. Hence, causal inferences cannot be made.<sup>7</sup> But they provide clues regarding the cause, which can be addressed using other true analytical research designs, like case-control, cohort or experimental study designs.

### Importance of cross-sectional studies

Generally, a cross-sectional study design provides the prevalence of disease, traits or risk factors. Thus they are very good at assessing disease burden and health care needs.<sup>6</sup> They also help assess the prevalence of health-related attitudes, knowledge or behaviour among patients and health personnel. Such surveys are a useful research design to employ when new insight is to be gained about a puzzling topic or people's attitude about an issue is to be understood. Such information helps in planning interventions.<sup>8</sup>

To assess changes in exposure and outcome variables in a particular population, "serial cross-sectional studies" or "serial surveys" can be conducted in the same population over time (for, e.g., the National HIV Sentinel Surveillance). They are less expensive compared to cohort studies.<sup>9</sup> Surveillance refers to "the ongoing systematic collection, analysis and interpretation of health data essential to planning, implementation and evaluation of public health practice."<sup>3</sup> Ongoing surveillance studies can help in time-trend analysis, where data collected from a population over time can be used to look for changes and trends.

In short, prevalence studies are useful to assess the burden of disease and risk factors and time trends of health events. This helps in planning interventions. They may also be useful in generating theories of causation.

### Conducting a cross-sectional study: Points to keep in mind.

The research question has to be formulated; the study population has to be described explicitly. The outcome of interest and the characteristics or variables to be studied should be defined clearly. Cross-sectional studies may be based on the entire population's data (e.g., the census) or a sample of a sub-population of interest (e.g., married women of reproductive age group).<sup>8</sup> Whether based on the entire population or a sample drawn from it, they aim to estimate the prevalence of an outcome of interest for the whole population. Hence, the sample drawn from a sampling frame has to represent the entire population to which the findings are to be generalised. For this, the sampling frame and the sampling strategy have to be appropriate. Different types of random sampling techniques can be used to ensure high representativeness and reduce sampling bias.<sup>7</sup> The sample should also be of sufficient size to ensure results with required precision; for this, the sample size can be calculated before the study. Data collection or measurement of the outcome and exposure variables is also important. The variables have to be defined conceptually and operationally. Psychosocial research employs validated questionnaires or data collection tools to measure abstract concepts like the quality of life or patient satisfaction. They help to bring down measurement bias and improve the response rate. Repeated attempts to collect data is also important to enhance the response rate.<sup>10</sup>

### Advantages and disadvantages

The advantages of cross-sectional studies are that they are quick and relatively less expensive than long-duration cohort studies. As the study population is assessed only at one point of time and no follow-up is required, less time and resources are required for this study design.<sup>7,10</sup> They help estimate the prevalence of diseases or other outcomes of interest and public health planning. Hypotheses can be generated regarding the probable risk factors for a disease, even associations can be studied, but hypothesis testing requires analytical

study designs.<sup>11</sup> These studies are more susceptible to selection bias like non-response bias and information bias like recall bias.<sup>7,12</sup> If the association of exposure to outcome is assessed in these studies, confounding can distort the findings.<sup>12</sup>

### ECOLOGICAL STUDIES

They are also known as correlational studies; are population-based descriptive studies, and use data from entire populations rather than individuals. They compare frequencies of diseases or data regarding factors like health, behaviour, attitude, economic status or other exposure variables between different populations during the same period or in the same population at different points in time.<sup>3</sup> The data used in these studies are secondary data, usually obtained from government databases or reports of international agencies. (E.g., the sales of alcohol and frequency of deaths due to road traffic accidents in a specific population at different points of time or the rate of exposure to pesticides and incidence of mental retardation in different geographical areas.)

They help to generate hypotheses regarding exposure and outcome, but cannot be used to test them. As these studies assess whole populations rather than individuals, the exposure cannot be linked to disease occurrence in an individual. Any probable association observed from these studies could be due to the effect of some other underlying factor.<sup>11</sup> When data collected at a group level are analysed, and conclusions are drawn to apply to associations at the individual level, it is called an ecological fallacy.<sup>13</sup>

#### Advantages and disadvantages

The advantages of ecological studies are that they are quick, inexpensive, and help generate hypotheses that can be tested using more stringent research designs. The ecological fallacy has to be kept in mind while drawing inferences from these studies.

### REPORTING DESCRIPTIVE STUDIES

In reporting descriptive studies, the CARE guidelines provide a checklist of information to include while writing a case report.<sup>14</sup> The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement gives the guidelines for reporting observational studies in general – including cross-sectional studies.<sup>15</sup> Lack of clear, specific and

reproducible definition of cases and other characteristics or variables, and conclusions which go beyond the data are frequent fallacies observed while reporting descriptive studies. It is imperative to remember that causal inferences cannot be drawn from studies which do not have a comparison group.

### OTHER CROSS-SECTIONAL STUDIES

Other than prevalence and ecological studies, some other cross-sectional designs are also worth mentioning in this context.

1. The usefulness of a diagnostic test procedure can also be examined using this study design. Validation of measurement instruments like questionnaires also utilises cross-sectional design. For both, optimum cut-off scores can be calculated using Receiver Operating Characteristic curves; sensitivity, specificity, predictive values and reliability can be calculated.<sup>9,16</sup> They can also contribute to developing the staging of a disease or establishing normative values (for, e.g., establishing normative values for heart rate variation to deep breathing or the norms for serum glucose levels).<sup>5</sup>
2. Generally, cross-sectional study designs involve a single sample without any comparison group. But a cross-sectional comparative design can be used to compare group differences based on the outcome studied. The comparisons try to determine whether significant differences exist for some characteristics or variables between groups based on the outcome evaluated.<sup>16</sup>
3. Cross-sectional studies can sometimes be clinic-based, they do not give a true prevalence.<sup>9</sup>

### STATISTICS IN DESCRIPTIVE STUDIES

The data could be summarised as mean/ median (with SD/Interquartile range) for continuous variable and proportion(or per cent) for categorical variables. Comparison or association could be tested by t-test or chi-square test or other similar statistical methods. The correlation could be attempted to establish the relationship between continuous variables. If one adopts an analytical paradigm odds ratio with its confident intervals, it could show the magnitude of the association. Some researchers even attempt a multivariate analysis of a set of variables against the outcome variable.<sup>16</sup>

## CONCLUSION

Descriptive studies are the first scientific "toe in the water," when a new disease or domain of interest is evaluated in medical research. They help to estimate the burden of disease in a population. Such studies are undertaken in the same population at different points of time, or in different populations at the same time can help in identifying temporal changes or geographic trends in disease frequencies.<sup>4</sup> This can help health administrators to monitor trends and plan the utilisation of resources.<sup>2</sup> Irrespective of the subtype, they are easy to conduct, quick and inexpensive. They help to generate hypotheses, which can be tested using more complex study designs.<sup>4</sup>

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