

Introduction to Quantitative Data Analyses

Statistics: Set of mathematical procedures that are used for two primary purposes

- a. Answering questions
- b. Testing ideas

Information collected for this purpose are called data

Functions to allow us to reduce large amounts of collected information to efficient and usable forms for the purpose of communication (e.g. Percentage of males vs. women on campus)

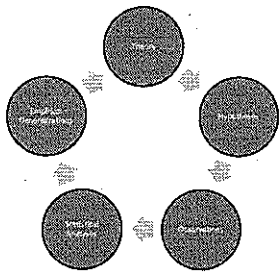
Why Study Statistics?

It is the language of mathematics and provides us the means of communicating.

Four Primary Reasons

- a. Criminal Justice professionals are consumers of information
- b. Criminal Justice professionals are producers of information
- c. Your job marketability will increase
- d. Enables you to have creativity and flexibility in designing research projects

Role of Statistics in Scientific Inquiry (Research)



Basic Elements of Statistics

Units of Analyses: The types of cases the researcher intends to collect or measure

Cases: The individual objects to be studied (Number of drunk driving arrests in Oregon)

Subjects: When the object of study is human (Number of drunk drivers in Oregon)

Quantitative versus Qualitative Data 1 of 2

Qualitative data: Nonnumeric information collected on cases or subjects in a research study. E.g. A person's gender, race, religion, marital status

Qualitative data is often obtained through interview notes or narrative reports, and are usually not quantified in everyday life.

Because statistics is mathematical, this must be quantified (coded) for statistical analyses

Quantitative versus Qualitative Data 2 of 2

Quantitative data: Numeric information collected on cases or subjects in a research study. E.g. Age, number of children, IQ, number of arrests, length of incarceration.

This is quantified in everyday life and is often collected in surveys and datasets

Continuous versus Discrete Variables

Variable: Anything that varies

Attributes: These are the variations that make a variable. E.g. Temperature can be hot or cold; Wealth can be rich or poor.

Continuous variables: Can be sub-divided infinitely. E.g. length of incarceration can be divided into years, months, days, hours, minutes, seconds at the researcher's pleasure (You can decide to measure in any of these units).

Discrete Variables: Cannot be sub-divided infinitely. E.g. Number of children (You cannot have 1.5 children)

Independent versus Dependent Variables

When we formulate a research question or hypothesis, we are often trying to examine whether one variable causes or influences another variable hence two types of variables.

Independent Variable (X) leads to Dependent Variable (Y)

Independent Variable (Cause)

Dependent Variable (Effect)

Research is understanding cause and effect relationships

Descriptive versus Inferential Statistics

Field of Statistics is divided into descriptive and inferential techniques.

Descriptive statistics: Refer to analyses performed to reduce large amount of data down to a few summary pieces of information that describe various features of the data set.

e.g. 100 inmates may produce 1000 data pieces and difficult to communicate without descriptive statistics.

Inferential Statistics: These analyses are performed to test our hypotheses and to make inferences back to a larger population being represented by a sample.

e.g. Inferential statistics allows us to select 100 inmates to represent 1000 total inmates and make conclusions about the 1000 inmates from analyzing data on 100 inmates.

Scales of Measurement

- Four general scales of measurement
 - Nominal/Categorical
 - Variables that represent named categories with no numerical value
 - Gender – male/female
 - Religious Affiliation
 - Ordinal
 - Variables that are based on ranked preferences, that implies one category is better than the other
 - Placement in a track event – 1st, 2nd, 3rd
- Severity of Crime Scale
 1. Vice (Victimless) Crimes
 2. Petty Property Crimes
 3. Serious Property Crimes
 4. Violent Crimes

- Interval
 - Variables that are measured in units that differ from each other by an equal amount
 - Fahrenheit scale – difference between 4° and 5° is exactly the same as 1° and 2°
 - Represents an equal amount no matter where it falls
 - No zero point, below zero represents another interval along the scale
- Ratio
 - Variables that represent equal amounts of change at each unit but can not drop below zero
 - Like interval data but there is a true 0
 - Zero represents a value of nothing
 - Height and weight
