What Are the Four Levels of Measurement?— by: Pamela Crary, PhD, RN

When collecting data in a quantitatively designed study, variables are conceptually defined with words similar to a dictionary definition. They are also operationally defined through ways of measurement using numbers. There are different levels of measurement depending on the research question being asked and the types of statistical analyses planned. Collecting the correct levels of measurement is necessary to assure that appropriate analyses can be done.

There are four levels of measurement: **Nominal, Ordinal, Interval,** and **Ratio**. One level of measurement is not necessarily better than another.

**What is nominal level of measurement?**
The nominal level of measurement is the most primitive or lowest level of classifying information. Nominal variables include categories of people, events, and other phenomena that are named, are exhaustive in nature, and are mutually exclusive. These categories are discrete and non-continuous.

**Example:** gender - Male or Female can be scored with 1 for Male and 2 for Female; likewise a patients' blood type could be categorized as 1=AB, 2=A, 3=B, 4=O.

No one category is more or less than another; they are simply categorized with a number for statistical analyses. They are not manipulated mathematically.

**What is ordinal level of measurement?**
The ordinal level of measurement is second in terms of its refinement as a means of classifying information. Ordinal implies that the values of variables can be *rank-ordered* from highest to lowest. Data are measured on an ordinal scale and subjects are ranked from lowest to highest and from most to least.

**For example, household income:** 1=$0-$4999, 2=$5000-$9999, 3=$10000-$19999, 4=$20000-$29999, and 5=$30000-$49999.

Ordinal data are not manipulated mathematically and the distance or interval between data is not always equal.

**What is interval level of measurement?**
Interval level of measurement is *quantitative* in nature. Interval level of measurement refers to the third level of measurement in relation to complexity of statistical techniques that can be used to analyze data. Variables within this level of measurement are assessed incrementally, and the increments are equal. Many nursing, social and psychological science studies measure data using tools or instruments that consist of a Likert type scale such as the one below.

**For example:** Respondents are asked to select from a series of statements that reflect agreement or disagreement on a 5-point scale. 1=strongly agree, 2=agree, 3=undecided, 4=disagree and 5=strongly disagree.

The individual units are equally distant from one point to the other. Interval data do not have an absolute zero.
What is ratio level of measurement?
Ratio level of measurement is characterized by *variables that are assessed incrementally with equal distances between the increments and a scale that has an absolute zero*. Ratio variables exhibit the characteristics of ordinal and interval measurement and can also be compared by describing it as two or three times another number or as one-third, one-quarter, and so on. Variables like time, length, and weight are ratio scales but can also be measured using nominal or ordinal scale. The mathematical properties of interval and ratio scales are very similar, so the statistical procedures are common for both of the scales.

Ratio level data meets all the rules of other forms of measure; it includes mutually exclusive categories, exhaustive categories, rank ordering, equal spacing between intervals, and a continuum of values. Ratio level measurement also includes a value of zero.