Tools of the Trade:

COMMON RATIOS

Ratios are commonly used for two purposes, both of which are subject to misinterpretation. In the first, comparisons are made between groups or individuals. For example, "Person A earns twice as much as Person B," or "There are three times as many deaths to cancer as there are to stroke." In the first example we divided Person A's income by Person B's; in the second, we divided the number of deaths due to cancer by the number of deaths due to stroke.

Ratios are also used to indicate change over time. There are two basic variations of this. First, suppose we want to determine the percent of population change in Allegheny County from 1970 to 1980. To do this, take the difference between the 1970 and 1980 population and divide that result by the original figure (the 1970 population). The final ratio looks like this:

(1970 Population - 1980 Population) / (1970 Population)

or

(1,605,133 - 1,450,085) / 1,605,133 = 155,048 / 1,605,133 = 0.0965 or 9.7%

Since the 1970 population was higher than the 1980 population, the result is that "population in Allegheny County declined by 9.7% from 1970 to 1980."

The second variation using the same example is: "Population in Allegheny County in 1980 was approximately nine-tenths of its 1970 level." To do this you divide the 1970 population by the 1980 population. The 1980 population is about 90% of the 1970 population. Converted to a ratio this is 9:10 or nine-tenths.

By using ratios you can report data in interesting, easy-to-understand terms. Keep in mind that all these uses of ratios are subject to a common problem. A ratio does not reveal the absolute difference between two groups or the absolute change over time. Take the example of Person A's and Person B's income. If Person A made $30,000 and Person B made $15,000, that is a substantial difference. On the other hand, Person A could make $200 and Person B $100 which is not a significant difference. In both cases you could say that Person A makes twice as much as Person B; however, the magnitude of difference in the first case is substantially greater. In the example of deaths due to cancer and stroke, if the number of cancer deaths was 27,000 and number of stroke deaths was 9,000, this is clearly an impressive difference. But, what if you were examining data from a small area and the numbers were 3 and 1 for cancer and stroke; this would not be as significant although, in both cases, there are three times as many cancer deaths as stroke deaths.

It should be clear by now that the problem is not one of misstatement; it is one of impact. Ratios can sound very impressive even when representing very trivial absolute differences between groups or changes over time.

When examining data which are reported in terms of ratios, always convert ratios back to the original frequencies. This is the only way to determine the importance of the differences the ratio represents. If absolute counts are not available and you have no idea of their magnitude, remember that the ratio could represent differences ranging from important to trivial.

(Portions of this article have been abstracted from *Social Statistics Without Tears* by Allan G. Johnson, McGraw-Hill, Inc., 1977).