

Tools of the Trade:

MEDIAN of a FREQUENCY DISTRIBUTION

The median is the midpoint value of a specific data set. For example, the median age - or the age at which half the population is older and half is younger - is an indicator of the age composition of a population. There are many times that we need to calculate a median but only have access to an aggregate data table, cross tabulation or frequency distribution. However, one can easily estimate the median of aggregated data values.

If you were to divide a frequency distribution in half such that 50% of the observations have a value less than the median, and 50% have a value greater than the median, then you would have the median value.

The following data table on live births by age of mother will illustrate this basic concept. We will use it to compute the median age of Pennsylvania mothers giving birth in 1984.

LIVE BIRTHS BY AGE OF MOTHER, PENNSYLVANIA, 1984			
AGE OF MOTHER RANGE (IN YEARS)	NUMBER OF BIRTHS	CUMULATIVE NO. OF BIRTHS	CUMULATIVE PCT. OF BIRTHS
Under 15	352	352	0.22
15-24	63,151	63,503	40.50
25-34	84,006	147,509	94.08
35-44	9,254	156,763	99.98
45+	36	156,799	100.00

By dividing the total number of births (156,799) in half, we find that 78,400 is the midpoint of this distribution. Glancing down the "Cumulative No. of Births," we see that we reach this number in the 25-34 year age group.

More specifically, we reach the midpoint at 14,897 births into this age group. This number (14,897) results from subtracting the cumulative number below this age group (63,503) from the midpoint number of 78,400.

In order to determine how far we must go into the age of mother category to reach the midpoint age, we must turn the figure 14,897 into a percent. Divide 14,897 by 84,006 - the total number of births in the 25-34 year age group. The resulting percentage is 17.7%.

Multiply this percentage by the year span of the age group (10) to estimate the number of years into the age group one must go to reach the age midpoint (Example: $0.177 \times 10 = 1.77$ or 1.8). Add this figure (1.8) to the starting value of the age group (25) to yield the midpoint, or median age of 26.8. We can then say that the median age of women who gave birth in 1984 was 26.8.

This method is frequently used to compute a median, although there are other and more complex ways.