

4empowerment® Species Diversity Worksheet
Calculating Standard Deviation (SD)
Biodiversity Step 3

Much of statistics deals with what is termed Parametric Statistics. The underlying theme of parametric statistics is that the population you are studying inherently has a "bell curve" distribution, When a population has a "bell" it is said to be "normally distributed". The two basic descriptive measures of a sample based upon an assumed underlying normal distribution (bell curve) are the mean (m) and the standard deviation (SD). The mean is easy to understand: it is the average value of your observations. However, the mean only tells you the central point of your bell curve and nothing about how much your observations will vary around that mean.

According to accepted statistical convention, 95% is the level of choice for determining statistical significance. This equates to 1.96 SD. The 95% level is accepted because of the features of the bell curve. The tails of the curve move off to the left and right and never really touch zero; they go on for infinity. Since this is impractical to deal with, statisticians have lopped off the outer 5% (2.5% on either side) of the normal curve and only work with the central 95%. Thus, for most statistical measures, 1.96 SD about the mean. One can say with 95% certainty that a random observation will fall within 1.96 SD of the mean.

Formula for calculating Standard Deviation:

m = Mean of H'

y_i = Value of each observation

n = # of replicates

$$\sqrt{\frac{\sum (\mu - y_i)^2}{(n-1)}}$$

1. Find the average value of H' from all of your replicates.
2. Subtract each value of H' from your mean (average) H'. This will yield one value/deviation for each replicate you took.
3. Square each deviation.
4. Sum the squared deviations, which will yield a sum of the squares.
5. Divide the sum of squares by $n-1$ (#of replicates minus 1) yielding the average squared deviation.
6. Take the square root of the average squared deviation to yield average deviation.
7. Multiple by 1.96 to yield the 95% Confidence Interval (CI). According to accepted statistical convention 95% is the level of choice for determining statistical significance. This equates to 1.96 SD. The 95% level is accepted because of the features of the bell curve.