

Calculating Average Annual Growth Rates

Average Annual Growth Rate (AAGR) is often used to evaluate population growth or Christian Growth rates. This is the formula to calculate the Average Annual Growth Rate (AAGR) for a specific population.

$$100 \times \left(\left[\frac{P_2}{P_1} \right]^{1/(Y_2-Y_1)} - 1 \right)$$

P_1 is the population size in year y_1 and P_2 is the population size in year y_2 .

Tables found in the Church Growth Survey Handbook are useful to determine AAGRs (found in the research library). However these tables have limits to precision. So you may wish to use a scientific calculator or a spread sheet to perform this calculation.

The formula for an MS Excel spread sheet is:

$$=100*(POWER((P_2/P_1),(1/(Y_2-Y_1)))-1)$$

It is possible to copy this formula into a spreadsheet to perform individual calculations or a series of calculations.

To perform individual calculations set up a spreadsheet like this:

	A	B	C	D	E
1	Year 1	Year 2	Population 1	Population 2	Formula
2	Input data	Input data	Input data	Input data	=100*(POWER((D2/C2),(1/(B2-A2)))-1)

A spreadsheet configured like this can be found in the Research Download under tools

When using a spreadsheet to perform a series of calculations, use the same formula as above, but replace the cell address that contains the respective data for P_1 and P_2 . It is also may be easier to insert the number for (Y_2-Y_1) than to place this data in each row.

It is a good idea to test that your formula is working correctly by inserting data that you know the answer for. Sample test data follows

Sample Data

Year ₁ : 1970	Population ₁ : 184,000	AAGR = 0.92%
Year ₂ : 2020	Population ₂ : 291,000	

One special situation for calculating growth rates occurs when the starting population is zero. In such cases, to avoid dividing by zero in the rate equation (thus giving an infinite growth rate), an approximation of the growth rate was made by substituting 10 as the starting population (or 1 as the

initial value if the final population value is less than 50). The resulting growth rate estimate is subject to a much wider margin of error than where the true starting value is greater than zero. This is especially true when the number of adherents of a particular religion is reported as 0 for an entire continent.

References:

Bob Waymire and C. Peter Wagner. *The Church Growth Survey Handbook*. OC International, 1984.

The Center for the Study of Global Christianity, "Christianity in its Global Context: 1970-2020." Published June 2013, page 88.

Author: Russ Mitchell, 2013