

Calculating Racial/Ethnic Diversity using the Shannon-Wiener Index with Census Table QTP4

Step 1: Select

- Column B (Id2)
- Column H (Total - Number; Total population - One race)
- Column J (Not Hispanic or Latino-Number; Total Population – One Race)
- Column N (Not Hispanic or Latino-Number; Total Population – One Race – White)
- Column R (Not Hispanic or Latino-Number; Total Population – One Race – Black or African American)
- Column V (Not Hispanic or Latino-Number; Total Population – One Race – American Indian and Alaska Native)
- Column Z (Not Hispanic or Latino-Number; Total Population – One Race – Asian)
- Column AD (Not Hispanic or Latino-Number; Total Population – One Race – Native Hawaiian and Other Pacific Islander)
- Column AH (Not Hispanic or Latino-Number; Total Population – One Race – Some Other Race)
- Column AJ (Total - Number; Total Population – Two or More Races)

Step 2: Subtracting Column J from Column H to determine Total Hispanic Population

Step 3: Using the neighborhood definition file columns for Block and Neighborhood, assign Neighborhoods to the Census Blocks

Step 4: Using the Excel Pivot Table function, sum the number of residents for each race/ethnic group for every neighborhood.

Step 5: Create the diversity Spreadsheet using the following steps (see model on next page):

- a) Divide the population of each race/ethnic group by the total population (at both the city level and for each neighborhood).
- b) If the resulting number is zero for a race/ethnic group, the value is zero; otherwise find the natural logarithm of the value (i.e., IMLN in excel) using the following if/then excel function:
=IF (COLUMN/ROW=0, 0, IMLN(COLUMN/ROW [e.g., =IF(L2=0,0,IMLN(L2)]
- c) Multiple the results found in Step b) by the results of Step a) [e.g., =L2 X T2]
- d) The inverse sum of the races/ethnicities represents the diversity index [e.g., =-SUM(AB2:AI2)

The following calculations determine the Index (repeat column/equation for each race/ethnic group within the city/neighborhood):

A	B	C	D	E	F	G
City/ Neighborhood	TOTAL POPULATION	TOTAL POPULATION RACE/ETHNICITY (One column for each Race/Ethnic Group)	PERCENT of OVERALL POPULATION (One column for each Race/ Ethnic Group)	ALGORITHM for RACE/ETHNICITY (Excel Function: One column for each Race/ Ethnic Group)	RACIAL/ETHNIC DIVERSIFICATION (Excel Function: One column for each Race/ Ethnic Group)	DIVERSITY INDEX (Inverse Sum of Columns "F")
City XX	XXXX	XXX	= C/B	=IF(D=0,0,IMLN(D))	=C*E	=-Sum(F:X)
Neighborhood A	XXXX	XXX	= C/B	=IF(D=0,0,IMLN(D))	=C*E	=-Sum(F:X)
Neighborhood B	XXXX	XXX	= C/B	=IF(D=0,0,IMLN(D))	=C*E	=-Sum(F:X)

Excel Sample:

City / Neighborhood	Total Population	DIVERSITY INDEX	White	Black/ African American	Hispanic or Latino (any race)	American Indian/ Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other Race	Two or More Races
ANY CITY, ANY STATE	3095313	=D22	1500047	146600	927866	14098	328058	13504	6715	158425
NEIGHBORHOOD A	6530	=D23	3495	1155	973	60	449	40	26	332
NEIGHBORHOOD B	15035	=D24	11811	159	2014	185	303	36	8	519
Step 1:										
Calculate what percent of overall population is each race/ethnicity										
			White	Black/ African American	Hispanic or Latino (any race)	American Indian/ Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other Race	Two or More Races
		ANY CITY, ANY STATE	=D2/\$B2	=E2/\$B2	=F2/\$B2	=G2/\$B2	=H2/\$B2	=I2/\$B2	=J2/\$B2	=K2/\$B2
		NEIGHBORHOOD A	=D3/\$B3	=E3/\$B3	=F3/\$B3	=G3/\$B3	=H3/\$B3	=I3/\$B3	=J3/\$B3	=K3/\$B3
		NEIGHBORHOOD B	=D4/\$B4	=E4/\$B4	=F4/\$B4	=G4/\$B4	=H4/\$B4	=I4/\$B4	=J4/\$B4	=K4/\$B4
Step 2:										
a) Divide the population of each race/ethnic group by the total population (at both the city level and for each neighborhood).										
			White	Black/ African American	Hispanic or Latino (any race)	American Indian/ Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other Race	Two or More Races
		ANY CITY, ANY STATE	=F(D7=0,0,IMLN(D7))	=F(E7=0,0,IMLN(E7))	=F(F7=0,0,IMLN(F7))	=F(G7=0,0,IMLN(G7))	=F(H7=0,0,IMLN(H7))	=F(I7=0,0,IMLN(I7))	=F(J7=0,0,IMLN(J7))	=F(K7=0,0,IMLN(K7))
		NEIGHBORHOOD A	=F(D8=0,0,IMLN(D8))	=F(E8=0,0,IMLN(E8))	=F(F8=0,0,IMLN(F8))	=F(G8=0,0,IMLN(G8))	=F(H8=0,0,IMLN(H8))	=F(I8=0,0,IMLN(I8))	=F(J8=0,0,IMLN(J8))	=F(K8=0,0,IMLN(K8))
		NEIGHBORHOOD B	=F(D9=0,0,IMLN(D9))	=F(E9=0,0,IMLN(E9))	=F(F9=0,0,IMLN(F9))	=F(G9=0,0,IMLN(G9))	=F(H9=0,0,IMLN(H9))	=F(I9=0,0,IMLN(I9))	=F(J9=0,0,IMLN(J9))	=F(K9=0,0,IMLN(K9))
Step 3:										
Multiple the results found in Step 1 by the results of Step 2										
			White	Black/ African American	Hispanic or Latino (any race)	American Indian/ Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other Race	Two or More Races
			=D7*D12	=E7*E12	=F7*F12	=G7*G12	=H7*H12	=I7*I12	=J7*J12	=K7*K12
			=D8*D13	=E8*E13	=F8*F13	=G8*G13	=H8*H13	=I8*I13	=J8*J13	=K8*K13
			=D9*D14	=E9*E14	=F9*F14	=G9*G14	=H9*H14	=I9*I14	=J9*J14	=K9*K14
Step 4:										
The inverse sum of the races/ethnicities										
			DIVERSITY INDEX							
			=SUM(D17:K17)							
			=SUM(D18:K18)							
			=SUM(D19:K19)							