

CTBL32 Version 5.20

Step-By-Step Guide

Base Population Adjustment

- (1) Make sure you have already created separate national-level base population estimates by 5-year age groups for males and females. One CTBL32 workbook is used to adjust males, and another to adjust females.
- (2) Once you have created all preliminary subnational area base populations by 5-year age groups for each sex, you can then adjust them to agree with the national-level population estimates. The estimates for males will be input into the CTBL32 workbook containing the estimates for the national-level males by age, and the estimates for the females will be input into the CTBL32 workbook containing the estimates for the national-level females by age. The number of age groups for the subnational area populations should equal the number of age groups for the national-level populations.
- (3) In the CTBL32 workbook for males, enter the national-level populations into sheet INPUT, column B (Figure 1).

Figure 1. INPUT Sheet: Base Population

	A	B	C	D	E	F	G
3	Table						
4	Republic of Demographica: 2000 male population						
5	Contingency Table Adjustment						
6	A. Initial Population by Subpopulation and Age						
7				Adj.	Region	Region	Region
8	Age	Desired total	Row sum	Factor	1	2	3
9	0-4	2,522,356	2,521,652	1.0003	1,198,884	697,769	625,000
10	5-9	2,512,773	2,472,954	1.0161	1,175,265	685,571	612,117
11	10-14	2,100,841	2,130,534	0.9861	1,110,597	453,305	566,631
12	15-19	2,033,047	2,073,708	0.9804	1,036,854	569,253	467,601
13	20-24	1,688,670	1,587,350	1.0638	810,562	439,054	337,734
14	25-29	1,314,334	1,196,044	1.0989	644,024	276,010	276,010
15	30-34	1,005,099	1,005,099	1.0000	492,499	261,326	251,275
16	35-39	875,681	849,411	1.0309	420,327	227,677	201,407
17	40-44	802,584	818,636	0.9804	417,344	216,698	184,594
18	45-49	699,060	720,032	0.9709	356,521	195,737	167,774
19	50-54	561,363	555,749	1.0101	297,522	117,886	140,341
20	55-59	409,943	401,744	1.0204	188,574	118,883	94,287
21	60-64	310,059	285,254	1.0870	158,130	65,112	62,012
22	65-69	223,745	225,982	0.9901	109,635	62,649	53,699
23	70-74	154,793	147,053	1.0526	72,753	40,246	34,054
24	75-79	88,353	84,819	1.0417	41,526	22,972	20,321
25	80+	64,818	58,984	1.0989	30,464	15,556	12,964
26							
27							
28							
29							
30							
31	Col. sum	17,367,518	17,135,005		8,561,479	4,465,705	4,107,821
32	Alternate col. totals		17,135,005		8,561,479	4,465,705	4,107,821
33	Adjusted col. totals		17,367,518	1.0136	8,677,654	4,526,302	4,163,562

The number of rows for entry will vary, depending on the open-ended age group (e.g., enter data into rows 9 to 25 for open-ended age group 80+ or 9 to 29 for open-ended age group 100+). The number of columns for entry will also vary, depending on the number of subnational areas that make up the country you are working with. Enter the preliminary subnational area populations in columns E through AJ (depending on the number of areas). Perform the same data entry in a CTBL32 workbook for females.

- (4) The CTBL32 workbook will automatically sum populations across ages and place the result in line 31. If the user does not provide an independent set of estimated subarea population totals, the column totals will carry over to line 32 and CTBL32 will provide adjusted area-and-age-specific populations summing to the higher-level control population.
- (5) In each workbook (for males and females), find output in sheet OUTPUT, columns E through AJ (depending on the number of subnational areas). The number of rows of output will again vary with choice of open-ended age group; e.g., rows 10 to 22 for open-ended age group 60+, 10 to 26 for open-ended age group 80+, 10 to 30 for open-ended age group 100+. CTBL32 output is shown in Figure 2.

Figure 2. OUTPUT Sheet: Base Population

	A	B	C	D	E	F	G
3	Table						
4	Republic of Demographica: 2000 male population						
5	B. Adjusted Population by Subpopulation and Age						
6					Region	Region	Region
7	Age	Desired total	Row sum	Adj. Factor	1	2	3
8	All ages	17,367,518	17,367,518		8,677,654	4,526,302	4,163,562
9							
10	0-4	2,522,356	2,522,356	1.0000	1,198,462	698,124	625,770
11	5-9	2,512,773	2,512,773	1.0000	1,193,436	696,770	622,566
12	10-14	2,100,841	2,100,841	1.0000	1,094,458	447,102	559,282
13	15-19	2,033,047	2,033,047	1.0000	1,015,921	558,240	458,886
14	20-24	1,688,670	1,688,670	1.0000	861,804	467,212	359,654
15	25-29	1,314,334	1,314,334	1.0000	707,319	303,398	303,617
16	30-34	1,005,099	1,005,099	1.0000	492,193	261,389	251,517
17	35-39	875,681	875,681	1.0000	433,064	234,778	207,839
18	40-44	802,584	802,584	1.0000	408,921	212,507	181,156
19	45-49	699,060	699,060	1.0000	345,928	190,085	163,048
20	50-54	561,363	561,363	1.0000	300,353	119,110	141,900
21	55-59	409,943	409,943	1.0000	192,302	121,338	96,303
22	60-64	310,059	310,059	1.0000	171,788	70,797	67,474
23	65-69	223,745	223,745	1.0000	108,483	62,044	53,219
24	70-74	154,793	154,793	1.0000	76,536	42,375	35,882
25	75-79	88,353	88,353	1.0000	43,230	23,935	21,188
26	80+	64,818	64,818	1.0000	33,458	17,100	14,260
27							
28							
29							

The resulting adjusted subnational area populations can then be used as cohort-component projection base populations.

Non-cohort Component Projections of Subnational Populations by Age and Sex

CTBL32 has been introduced as a tool for adjusting base populations by sex and age to match a distribution for a higher level of geography or aggregation. However, CTBL32’s strength is in its ability to do “two-way raking” (Shryock, Siegel, and Associates 1971).

As part of the process of preparing population projections with mathematical (or ratio) extrapolation, two-way raking may be used to generate smaller area age distributions that are consistent with the age distribution of the population of a higher-level geography to which the areas belong. For example, CTBL32 can generate age distributions for second administrative level (ADM2) populations that are consistent with the age distribution of their corresponding, or “parent,” first administrative level (ADM1) population.

If, as would normally be the case, and as was noted earlier, age and sex consistency is the goal, two CTBL32 tables should be used, one for males and one for females.

- (1) In applying two-way raking to develop ADM2 projected age structures, CTBL32 uses (a) a higher-level (e.g., ADM1) projected age distribution for a specified future date,

Figure 3. INPUT Sheet: Projected Populations with Totals

	A	B	C	D	E	F	G
3	Table 23						
4	Region 1 of the Republic of Demographica: 2015 males						
5	Contingency Table Adjustment						
6	A. Initial Population by Subpopulation and Age						
7					District	District	District
8	Age	Desired total	Row sum	Adj. Factor	1	2	3
9	0-4	2,488,460	2,662,652	0.9346	1,318,884	696,769	647,000
10	5-9	2,448,469	2,472,954	0.9901	1,175,265	685,571	612,117
11	10-14	2,266,525	2,130,534	1.0638	1,110,597	453,305	566,631
12	15-19	2,033,047	2,073,708	0.9804	1,036,854	569,253	467,601
13	20-24	1,688,670	1,587,350	1.0638	810,562	439,054	337,734
14	25-29	1,314,334	1,196,044	1.0989	644,024	276,010	276,010
15	30-34	1,005,099	1,005,099	1.0000	492,499	261,326	251,275
16	35-39	875,681	849,411	1.0309	420,327	227,677	201,407
17	40-44	802,584	818,636	0.9804	417,344	216,698	184,594
18	45-49	699,060	720,032	0.9709	356,521	195,737	167,774
19	50-54	561,363	555,749	1.0101	297,522	117,886	140,341
20	55-59	409,943	401,744	1.0204	188,574	118,883	94,287
21	60-64	310,059	285,254	1.0870	158,130	65,112	62,012
22	65-69	223,745	225,982	0.9901	109,635	62,649	53,699
23	70-74	154,793	147,053	1.0526	72,753	40,246	34,054
24	75-79	88,353	84,819	1.0417	41,526	22,972	20,321
25	80+	64,818	58,984	1.0989	30,464	15,556	12,964
26							
27							
28							
29							
30							
31	Col. sum	17,435,003	17,276,005		8,681,479	4,464,705	4,129,821
32	Alternate col. totals		17,276,005		8,681,479	4,464,705	4,129,821
33	Adjusted col. totals		17,435,003	1.0092	8,761,379	4,505,795	4,167,829

- (b) ADM2 projected population totals for the same date, and (c) preliminary age distributions for the component ADM2s taken, for example, from the latest census or from a recent survey.
- (2) In the CTBL32 INPUT sheet, place the age detail for the higher level geography (e.g., Region 1) in column B, rows 9 up to 29 (depending on the open-ended age group; see Figure 3). Enter the smaller area preliminary age detail in columns E up to AJ, and rows 9 up to 29. Ignore columns to the right of those needed; that is, for three districts being raked to a region, ignore columns H through AJ.
 - (3) Place smaller area total population extrapolations, which could be taken from the POP sheet of Subnational Projections Toolkit workbook SALGST, in line 32 (columns E up to AJ, depending on the number of subareas).

Figure 4. OUTPUT Sheet: Projected Populations with Totals

	A	B	C	D	E	F	G
3	Table 23						
4	Region 1 of the Republic of Demographica: 2015 males						
5	B. Adjusted Population by Subpopulation and Age						
6	Age	Desired total	Row sum	Adj. Factor	District 1	District 2	District 3
7	All ages	17,435,003	17,435,003		8,761,379	4,505,795	4,167,829
9							
10	0-4	2,488,460	2,488,460	1.0000	1,231,072	652,627	604,761
11	5-9	2,448,469	2,448,469	1.0000	1,162,115	680,245	606,109
12	10-14	2,266,525	2,266,525	1.0000	1,180,182	483,373	602,970
13	15-19	2,033,047	2,033,047	1.0000	1,015,242	559,315	458,490
14	20-24	1,688,670	1,688,670	1.0000	861,221	468,108	359,341
15	25-29	1,314,334	1,314,334	1.0000	706,928	304,017	303,390
16	30-34	1,005,099	1,005,099	1.0000	491,886	261,903	251,311
17	35-39	875,681	875,681	1.0000	432,783	235,235	207,663
18	40-44	802,584	802,584	1.0000	408,658	212,922	181,004
19	45-49	699,060	699,060	1.0000	345,700	190,452	162,908
20	50-54	561,363	561,363	1.0000	300,202	119,359	141,801
21	55-59	409,943	409,943	1.0000	192,163	121,565	96,215
22	60-64	310,059	310,059	1.0000	171,693	70,942	67,424
23	65-69	223,745	223,745	1.0000	108,410	62,163	53,172
24	70-74	154,793	154,793	1.0000	76,485	42,457	35,851
25	75-79	88,353	88,353	1.0000	43,201	23,981	21,170
26	80+	64,818	64,818	1.0000	33,437	17,133	14,248
27							
28							
29							
30							
31							
32	Note: Computed by 5 cycles of row and column raking.						

- (4) In each CTBL32 workbook used, find output in sheet OUTPUT, columns E up to AJ, rows 10 up to 30 (Figure 4).
- (5) To calculate gender-specific age detail for one future year or age detail for multiple years, you will need to use CTBL32 for each gender-and-year-specific derivation of age detail.