

Wisconsin Demographic Services Center Population Estimates Program Description

History

The Wisconsin Legislature authorized the Population Estimates Program in 1971. The initial impetus for a formal estimates program was the distribution of state tax revenues to municipalities and counties. Involving several different formulae, these distribution programs are known collectively as the State Shared Revenue Program.

Wisconsin started the shared revenue program in 1911 with the enactment of the state income tax. At enactment, 10% of the proceeds were retained by the state, 70% were paid to the municipality where the taxpayer resided, and 20% were paid to the county where the taxpayer resided. The Legislature altered these percentages over time to reflect changes in state and local fiscal needs. In keeping with this precedent, when the state enacted other taxes, it also shared a percentage of the proceeds with local governments on a return-to-origins basis.

By the late 1960s, it was generally agreed that return-to-origins tax sharing was increasing local fiscal disparities. Communities with high levels of economic activity or high-income individuals received ever increasing state aids, allowing them to provide substantial levels of services at low (or no) property tax rates. In contrast, communities with little economic activity or low-income individuals experienced stagnating or declining state aids, resulting in low levels of services at high property tax rates. Therefore, the state developed the present shared revenue system to shift the focus of state aids from a return-to-origins basis to a distribution based more on need.

Dr. Charles Palit of UW-Madison, working in league with an advisory panel of other professors and state employees who had demographic responsibilities, developed the original estimates methodology. The Department of Administration (DOA) produced the first official set of municipal and county population estimates, using Palit's technique, in 1973. DOA has issued the estimates annually since then.

While crafted initially to support the distribution of state revenues, the population estimates are now used in at least 27 official state functions and many other state processes. In addition, the estimates are used extensively at the regional, county and local levels for planning and other purposes.

Current Estimation Methodology

The Demographic Services Center, established formally within DOA in 1976 or 1977, has made a number of modifications to Wisconsin's estimation methodology since Palit's initial formulation. The current methodology involves both controlled estimates and uncontrolled estimates.

Controlled estimates are premised on a top-down approach. Generally, practitioners of applied demography presume that data that are symptomatic of population change are of better quality at a higher geographic level (or, at least, data errors are muted) than at smaller geographies. Setting a "control total" for larger geographic areas requires that all subareas then add to the control figure. In Wisconsin's current methodology, one technique

controls county estimates to the state, and another technique controls municipal¹ estimates to their respective counties.

Uncontrolled estimates are premised on a bottom-up approach. Data at the lowest level of geography desired (in our case, the municipal level) are presumed to indicate potential change in population regardless of larger area demographic forces. In Wisconsin's current methodology, several estimating techniques based on annual housing unit change produce uncontrolled municipal estimates.

The various techniques are described in the sections below.

State Estimate

The controlled techniques rely first on the setting of a state estimate. Currently, the Demographic Services Center uses four data sets to establish a January 1 state estimate:

- Residential electric customer counts from Wisconsin's 12 largest private utilities;
- Net housing unit change reported by all municipalities;
- Annual resident birth and death data;
- The Census Bureau's annual estimates of population and migration.

The residential electric meter data, collected by the Wisconsin Division of Energy, has shown remarkable consistency in reckoning statewide households when compared with 1980, 1990 and 2000 Census household counts. Demographic Services collects annual housing change data through a survey to all municipalities.

Using the state-level occupancy rate from the most recent Census, and a formulaic predictor of household size based on the last three Censuses, we estimate the state's households and household population. The state's group quarters population, updated annually through data collection and estimation, is added to arrive at a total population estimate.

The birth and death data, from the Vital Records section at the Department of Health and Family Services, is used to check the reasonableness of the estimate that we develop using electric customer counts and net housing change. The natural increase (births minus deaths) is subtracted from our estimated change of the prior year to obtain a residual estimate of net migration.

In some years, the Census Bureau's estimate of Wisconsin's total population and/or net migration are averaged with our state-level estimates. As the creator of estimates for all states, the Bureau has a nationwide picture of migration and immigration activity that our in-state data symptoms are unable to indicate.

County Estimates

Within the bounds of the state total, Demographic Services calculates population estimates for each of the 72 counties in Wisconsin, using a combination of the ratio difference method and the composite method.

¹ To be precise, we make estimates at the "minor civil division" or "county subdivision" level. These terms, used by the Census Bureau, refer to the municipal segments within each county. For example, the city of Appleton—a single municipality—has three minor civil divisions, or MCDs: in Calumet, Outagamie and Winnebago counties. We make estimates for MCDs because we must also prepare county estimates. In this document, "municipality" and "minor civil division" are used interchangeably, but the latter term is more accurate.

In the ratio difference method, we rely on two statewide data sets:

- State income tax filers and dependents;
- Selected categories of motor vehicle registrations.

The tax filers and associated dependents are compiled for the prior calendar year by the state Department of Revenue; the vehicle registrations are a "point-in-time" extraction (January 1) from the state Department of Transportation's records. Both data sets are tabulated at a municipal level and then aggregated to county geography.

We determine the relationships between the enumerated non-institutional population in a county at the time of the last census and the number of tax filers, tax filers plus dependents, and motor vehicles in the censal year. For each estimate year, we update these relationships (ratios) on the basis of changes observed statewide and then apply them to current counts of tax filers, dependents and motor vehicles for each county to determine current estimates. We give separate consideration to the number of institutionalized persons in a county; these people are generally not covered by the tax and motor vehicle indicators, and their number can be obtained from other, relatively accurate records. Thus, the ratio difference method provides three estimates for each county.

To refine the county estimates, we average the three ratio-based estimates with a fourth one based on the composite method. The composite method relies on two data sets, tabulated at the county level:

- Resident births and deaths;
- School enrollments (public, private and home-schooled).

These data—the latter collected via annual school district surveys that are conducted every September and compiled by the state Department of Public Instruction—are employed to estimate county population within three broad age categories.

While the composite method is considered to be an "old" demographic technique and is no longer applied widely, we have found that it reduces the overall error margin.

Municipal Estimates--Controlled

Using the county estimates as control totals, we estimate the non-institutional population for each municipality within each county using the ratio difference method. In a similar manner as described for county estimates, we determine the relationships between the known non-institutional population in a municipality at the time of the last census and the number of income tax filers, filers plus dependents, and vehicles. We update these relationships on the basis of estimated county-wide changes and then apply them to current counts of tax filers, dependents, and vehicles for each municipality to determine current estimates of municipal population. As in the county calculations, we add the number of long-term institutionalized persons residing in a municipality to the non-institutional estimate to produce a whole population estimate.

It is not possible to utilize the composite method at a municipal level because the required data are not available for all municipalities.

Municipal Estimates--Uncontrolled

The ratio difference method relies completely on data that third parties (that is, state agencies other than Demographic Services Center) collect and tabulate. Furthermore, the

agencies compile these data without regard for their use as population estimators. Finally, changes in municipal geography (due to annexations and incorporations), not to mention households' movements, may produce a lag in symptoms moving from one community to another.

The Demographic Services Center's former demographer, Balkrishna Kale, noted increasing problems with symptomatic data quality during the early 1980s. From the mid-1980s into the early 1990s, he developed a number of estimation methodologies based on housing unit data. Originally surveying a selected set of municipalities, he expanded the annual request to all Wisconsin communities in 1990.

It is important to note that, unlike the municipal estimates generated through ratio difference, the housing-based estimates are not controlled to a county or state target. Thus, the housing method estimates for every municipality are "free-standing," uninfluenced by change in other municipalities within a county or within the state.

There are four sub-methods to the housing method. They all involve the recalibration of household size (also called persons per household or PPH), based on certain indicators:

- No Change In PPH: PPH for a municipality is held constant from the most recent Census;
- State Trend In PPH: Based on the calculations of households and household population that were made for the state control total, municipal PPHs are trended at the same rate of change as at the state level;
- Local Trend in PPH: The change in PPH in the previous decade is trended to the current estimation year;
- Regression PPH: The change in state tax filers plus dependents (or "tax persons") from the Census year is regressed in an equation with the Census PPH to estimate a PPH in the estimate year.

In addition, the housing methodologies include changes in local group quarters and the population that is shifted by annexations.

Finally, all four housing-based results are averaged to produce a housing average estimate. In sum, the housing methods produce five different estimates for each municipality.

Preliminary and Final Estimates

Through controlled and uncontrolled procedures, Demographic Services produces eight initial estimates for every municipality. We review this set of estimates for accuracy and discrepancies. Taking account of all variables that could influence population growth or decline, we may select one estimate, or average several of them, to produce the result that appears most reasonable.

After this review, we control our selected estimates to our original state control total. These controlled estimates are the preliminary estimates that we release by August 10 of each year.

Communities have approximately 35 days to challenge our preliminary estimates. A municipality must provide data that indicate clearly a reason for a change to its preliminary estimate. Demographic Services reviews the local input and decides to revise or retain the preliminary estimate.

The challenge period ends September 15. Demographic Services releases the final population estimates on or before October 10.

The Advent of the American Community Survey

A common difficulty for all applied demographers who employ housing-based estimation methods is determining occupancy rates and average household size in intervening years between the decennial Censuses.

Unless reliable, broad-based indicators on housing occupancy and vacancy can be obtained, it is difficult to determine changes in occupancy rates. While in prior decades, holding municipalities' occupancy rates constant across the decade was reasonable, the surge in housing construction in the early 2000s and subsequent economic slowdown of the past few years led to anecdotal evidence of increased vacancy rates. However, we have lacked a solid measure of local-level occupancy change.

Similarly, the average household size fluctuates between decadal enumerations, and our efforts to adjust these values rely on testing from prior decades and applying generalized formulaic patterns.

The Census Bureau has been implementing its American Community Survey this decade to create updated estimates of demographic characteristics annually. Currently, the Bureau is releasing estimates every year for geographies of 65,000 or more residents and three-year averages for geographies of 20,000 or more.

While "fresh" data might be considered better than increasingly "stale" data from 2000, there are limitations to the ACS estimates. Because the data are based on surveys, all values have a margin of error. (In contrast, the decennial Census results for occupancy and average household size derive from a nearly full count of housing units and households.) Hence, the annual variations indicated by the ACS midpoint estimates may not be significant statistically. In addition, the current population thresholds mean that, in Wisconsin's case, we are lacking updated estimates for 1,813 municipalities (98 percent).

Presently, Demographic Services views the ACS estimated occupancy rates and average household sizes as advisory to its estimation process. ACS has captured, at statistically significant levels, the state-wide and large areas' declines in occupancy rates. The patterns of average household size change have been less convincing. We plan to make a more thorough study of the ACS estimates' usefulness after the 2010 Census.

Other Small-Area Estimates

Municipal Voting Age Estimates

Demographic Services Center estimates the voting age population for municipalities and counties annually. Prior to 2005, this estimate was a simple calculation, multiplying the proportion of persons 18 years and over at the most recent Census by the total municipal population estimate for the current year. Starting with the 2005 Population Estimates, the voting age population for municipalities and counties now uses the proportion of persons 18 years and over at the most recent Census multiplied by a factor of changing portion of 18 years and over in our Population Projections by Single Year of Age. Then we multiply that result by the total municipal population estimate for the current year. Demographic Services identifies these estimates to municipal and

county clerks as "courtesy" figures to assist them in approximating the number of ballots that need to be printed and distributed for elections.

Zip Code Area Estimates

Demographic Services Center estimates the total population for Zip Code areas annually. At the 2000 Census, the Census Bureau defined Zip Code Tabulation Areas (ZCTAs), which correspond roughly to the Zip Code delivery areas delineated by the U.S. Postal Service.²

To calculate these estimates, we begin with data from the most recent Census, cross-tabulating the number of persons within each minor civil division and ZCTA. We then calculate proportions: the population within the ZCTA in an MCD divided by the MCD's population. These proportions are then applied to the current MCD estimate. The data is re-summed based on the ZCTA values to obtain Zip Code area estimates.

Currently, we do not have the means to update Zip Code geography, or to attribute accurately other symptomatic data (e.g. housing starts, motor vehicles and tax returns) to Zip Code areas. Thus, these estimates are not as dynamic as the municipal estimates.

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² From the Census Bureau's Census 2000 Summary File 1 Technical Documentation:

"A ZIP Code® tabulation area (ZCTA™) is a statistical geographic entity that approximates the delivery area for a U.S. Postal Service five-digit or three-digit ZIP Code. ZCTAs are aggregations of census blocks that have the same predominant ZIP Code associated with the residential mailing addresses in the U.S. Census Bureau's Master Address File. Three-digit ZCTA codes are applied to large contiguous areas for which the U.S. Census Bureau does not have five-digit ZIP Code information in its Master Address File. ZCTAs do not precisely depict ZIP Code delivery areas, and do not include all ZIP Codes used for mail delivery."