Trade Area Analysis Block by Block: Why are Small Area Estimates Important?

Nielsen Claritas Demographics
Experience & Innovation

Overview

Real estate professionals need the most accurate and precise demographic data in order to evaluate locations and markets. Businesses need to select sites with the right customer fit using trade area level demographic information in order to efficiently drive revenues and, more importantly, to avoid bad locations. Never has the use of highly accurate small area estimates been more critical than in today's recovering economy. Cautious, scaled back expansion plans and relocations are the rule at many retail and restaurant chains, and every real estate investment is under the tight corporate scrutiny and expected to deliver results quickly.

Nielsen continues to lead and innovate in the area of demographic estimates. We first incorporated micro-level data in our processes in 1980 when we utilized household address information to add granularity to our estimates. Our latest breakthrough is the recent introduction of the Nielsen Master Address File into our demographic estimates. The Nielsen Master Address File is a multi-sourced file of every available address in the U.S., and is extremely valuable for detecting post census shifts in population. By creating and updating this unique dataset and incorporating it as the bedrock of our estimates, Nielsen is able to more accurately estimate population and households. These bottom-up estimates are created from the lowest level of geography—the address—and apportioned to blocks, block groups, and tracts.

While other demographic providers claim to use groundbreaking data sources and techniques involving delivery statistics from the United States Postal Service (USPS) **"derived"** at a Postal ZIP+4 level, the truth is that this data is not provided by the USPS at a ZIP+4 level. In fact, it is not even provided at a block or block group level. The USPS provides delivery statistics at a carrier route level. Therefore, other providers of demographic estimates are incorporating delivery estimates for carrier routes (of which there are approximately 632,469 nationwide as of Feb, 2010) and allocating these into counts for ZIP+4s (of which there are approximately 29 million residential and 50 million in total). This is a very daunting task. How do we know? Well, Nielsen has been receiving USPS data on a monthly basis and incorporating it into its demographic estimates for decades. However, we only feel comfortable in apportioning this data to a block group level and using this information as a key source for measuring trends in small areas via a time series approach, and not as the sole input for developing population estimates.

With Census 2010 and the first release of 5-year period ACS estimates, Nielsen will continue to lead and innovate. At Nielsen, we believe being a leader means not only including new and cutting edge sources of information in our small area estimates, but also holding ourselves to high levels of integrity and realizing the limitations of certain data sources as well.

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Census Geography: A Primer on Tracts, Block Groups and Blocks

Before looking at a specific example, let's review the basics of census geography and why it forms the underpinnings of modern geo-demography. Census geography is important because it is the level for which the U.S. Census Bureau—which conducts a multi-billion dollar effort to count everyone in the U.S. once a decade—reports its findings. Census geography provides a consistent framework for private sector demographic updates, as well as a common standard for geo-demographic applications.

Just prior to the Census 2000, the Bureau split the nation's 3,141 counties into 65,322 tracts, 208,667 block groups and 8,017,735 blocks. It is easy to think of a block as being geographically bounded by four streets. While this definition works well in cities with a traditional grid pattern, it can be less straight forward in suburban and rural areas. The general concept is the same for suburban blocks that confine cul-de-sacs and winding lanes, or town home communities. However, in rural areas, a block can be many miles in size. In all cases though, the Census is trying to achieve a relatively uniform population for blocks of about 30-50 households and 80-120 persons.

Blocks are important as they are the lowest level at which the Census reports population data. Only the Census short form (SF1) data on population and households is reported at this level. Blocks fully nest into block groups—which average about 500 households—and block groups fully nest into tracts. Tracts average 1,700 households and fully nest within counties. The Bureau reports most census findings for the block group and tract geographic levels, including the rich detail in the long-form (SF3) on income, education, commuting patterns and so forth. For Census 2010, the long form has been eliminated and is being replaced by the American Community Survey (ACS), which has many advantages and disadvantages, but will continue to report its findings only at the block group and tract levels.

The private sector produces extensive updates of Census demography at the block group and higher-level geographies using a variety of input data from the postal service, the Bureau itself and other third-party sources.

High Growth Areas: An Example in Will County, IL

Will County, IL, in the Chicago area, is among the fastest growing counties in the nation. It typifies the ex-urban growth pattern often seen on the periphery of America's major cities. In fact, Will County rose from 357,313 persons in the Census 1990 to 502,266 in the Census 2000—41% growth over 10 years. Its population has continued to increase in the past decade. Nielsen's 2009 update reports Will County at 704,463 persons and projects it to reach 812,444 persons in 2014.

Of course, that growth is not uniform and certainly not respective of the Census 2000 definitions of block groups, and blocks as these were largely defined prior to the high-growth years of the past decade. Therein lies the challenge of using block level inputs to allocate block group demography to a trade area. In the first few years after Census 2000, a census based allocation method would perform reasonably well, however as time passes its performance will degrade as population growth moves from the former population center of the Census 2000 defined block groups into the outer fringes.

The image on the right is a good example of this phenomenon, where the block group shown in the gray shaded area consists of 52 census blocks. A few of these census blocks were being developed during Census 2000, but most were still farmland. Our subject census block within this group, shown in the brown shaded area, is physically large, yet in 1998 there were fewer than 50 persons occupying this block. As seen from the satellite image, this area was farmland with only a dozen or so households. By 2002, construction of a new subdivision had started and

Will County Statistics

County seat: Joliet, IL

County contains 82 tracts, 264 block groups and 11,006 blocks and covers 849 square miles.

Current year demographics:		**U.S. Average**
Growth 2000-2009	40.26%	8.96%
Population	704,463	306,624,699
Households	234,796	115,306,103
Median income	$73,020	$51,430
Income $100K+	30.5%	19.3%
Married w/kids	36.2%	24.1%
Homeownership	84.5%	67.1%
Median home value	$225,260	$172,350
Single family home	76.4%	60.8%
Built since 1999	33.9%	15.2%
Percent white	76.4%	72.5%
Drive alone to work	83.1%	76.2%
Average commute	35.2 min	27.8 min

the population rose to 394 persons. By 2009, the subdivision was largely built and occupied, and the population had increased to 2,402 persons.

There are no direct means to update a given block's population apart from its parent block group. Some may create a simple allocation of the parent block group's population to its constituent blocks based on the blocks' share of the block group's population, as observed in the Census 2000. While that method could be acceptable in slow or no growth areas, it can be very inaccurate for a high growth area like this example in Will County. Nielsen methodology has always mitigated this effect by tracking growth for entire blocks and block groups.

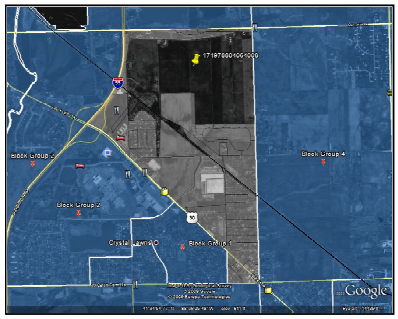
Nielsen incorporates both USPS delivery statistics as well as actual household-level data leveraging partnerships with major list compilers such as Equifax, Experian and Valassis (ADVO), as key input sources to our Master Address File (MAF) and subsequently to our small area updates. Given these resources, Nielsen can append census block codes to the MAF and then summarize by block group to generate more up-to-date block-to-block group allocation ratios. Nielsen performs this block-to-block group ratio update on an annual basis aligning with the annual update of our cartographic data assets. While Nielsen has used household level inputs for many years, recent improvements in address geo-coding have improved the accuracy of assigning census blocks to address lists and, therefore, enable the use of household data in updating the block-to-block group allocation ratios.

Re-examining our example in Will County, in Census 2000, the shaded block represented about 10% of the parent block group population, however, it increased to 60% in 2009. The census based allocation method would have estimated fewer than 400 persons in the block. By using the Nielsen MAF, we estimate over 2,400 persons: 6 times more people (and potential customers), and more accurate as the satellite images show.

Reviewing satellite images to assess the accuracy of population estimates is not feasible across the entire country. Updated satellite images are not available everywhere and no one person could possibly do this type of analysis block by block. Automated, documented and repeatable methods are required. For nearly 40 years, Nielsen has developed the most rigorous and accurate methodology for updating our annual demographic estimates.

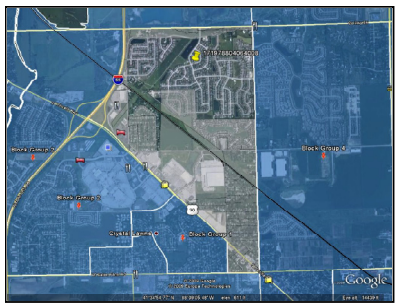
Satellite Image of Defined Block Groups

1998 Population <50



2002 Population ~394

2009 Population 2,402



Impact on Allocation of Demography to Trade Areas

While the above method addresses the difference in a traditional census based approach versus using household-level inputs, it does not address the impact on reporting population estimates and projections for a trade area. There are several ways to define trade areas: radial distance, 'hand drawn' polygon, drive time or distance and customer catchment areas are all common. Trade area definitions vary by retailer and there is little uniformity between concepts.

For trade areas that do not evenly align with block groups or even blocks, the challenge is how to assign a given block group's population and characteristics. If the trade area contains the entire block group, then all of its population is included. If the trade area contains only a portion, then only a portion of the block group's demography should contribute to the reported demography of the trade area. This is where block-level data adds great value and accuracy. The rich characteristic data such as income, education, home value and others is only available at the block group level. This data needs to be assigned from the block group to the trade area using the block-to-block group population ratios. See illustration as an example.

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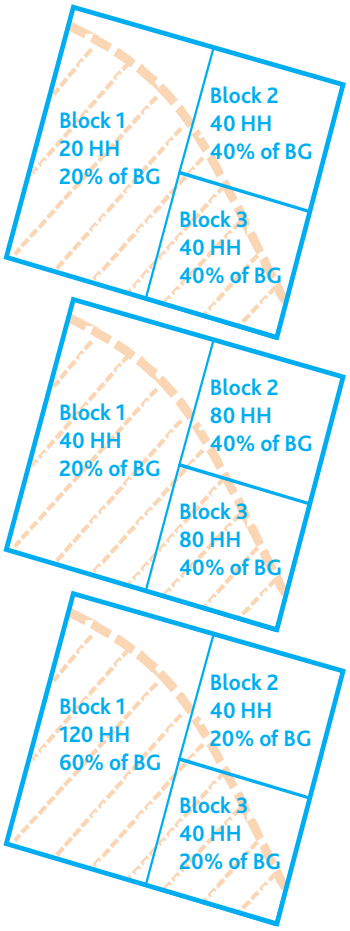
In the example, after Census 2000, the number of households in the block group doubled. Under a census-based method, those additional 100 households are allocated to the blocks using the same ratio as exhibited in the Census 2000. This method would work if the block-level growth was uniform. If all of the growth actually occurred within the geographically larger Block 1, this would change the allocation of the block-to-block group ratio observed in Census 2000 to a new ratio, resulting in a major shift of the population assigned to the trade area.

Blocks can experience a different growth rate from the block group. In this example, the trade area has 37% more households than reported using the Census 2000-based block-to-block group ratios. While this example is greatly simplified, it does illustrate the potential impact of the two different allocation approaches and serves to substantiate the need for an update to the block-to-block group allocations post-census. Updated block-level data is critical to ensure accurate and precise trade area allocation methods.

Conclusion

Nielsen has worked with the Census Bureau as an advisor in documenting and developing business uses and applications of this national resource. We have nearly 40 years of expertise with census and postal data. Census 2010 represents the biggest change in census methods in modern times. Nielsen has used Census data for five decennial periods and Census 2010 will be our fourth census transition. We have compared our update demographics to four actual Census results. No other company in the marketplace can make that distinction.

Population in a Block Group and a Trade Area



Census 2000

Block group population = 100 households

Trade area population = 20*90% + 40*80% + 40*10% = 54

2009 Post-Census

Block group population = 200 households (100% growth over 2000)

Trade area population = 40*90% + 80*80% + 80*10% = 108

2009 MAF-Based

Block group population = 200 households (100% growth over 2000)

Trade area population = 120*90% + 40*80% + 40*10% = 148

Over the past few decades, Nielsen has not only remained an industry leader, but has acquired other companies to create a best of breed approach to our demographic update. We continue to innovate and add new data inputs and statistical processes into our methods. We insist on consistently releasing the best data, even if that means taking the extra time to ensure that the data is a result of a proven, stable, repeatable process. That is the recipe for success in producing the best update demographics in the business.

About The Nielsen Company

The Nielsen Company is a global information and media company with leading market positions in marketing and consumer information, television and other media measurement, online intelligence, mobile measurement, trade shows and business publications. The privately held company is active in approximately 100 countries, with headquarters in New York, USA. For more information, please visit, www.nielsen.com.

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