RETAIL GRAVITY

Methodology for Demographic Data Production

This demographic dataset was developed using a hybrid approach that integrates bottom-up and top-down methodologies, drawing on established practices from major data providers. This combined framework ensures accuracy at the block group level while maintaining consistency with national and regional aggregates. Primary data sources included the U.S. Census, American Community Survey (ACS) estimates, Public Use Microdata Samples (PUMS), OpenStreetMap (OSM) for geospatial features, and the Multi-Resolution Land Characteristics (MRLC) Consortium for land cover classifications and annual change. All data processing adhered to rigorous quality assurance protocols, including multiple audits to validate consistency, completeness, and plausibility.

Bottom-Up Approach: Cohort-Component Methodology for Population

The foundation of the dataset was constructed via a bottom-up cohort-component model. This method builds population structures from the ground up by disaggregating and projecting age-sex cohorts.

- **Base Population Establishment**: Starting with base populations from the 2020 Decennial Census and supplemented with ACS, cohorts were defined by five-year age groups, sex, and other relevant variables. PUMS microdata were utilized to impute detailed household structure/composition.
- **Survival**: Age-specific survival rates were applied to advance cohorts forward in time, and adjusted for local variations and socioeconomic factors. Rates are the latest from CDC and NCHS.
- **Fertility**: Births were projected using age-specific fertility rates, and adjusted for local variations and socioeconomic factors. Rates are the latest from CDC and NCHS.
- **Migration**: Net migration flows were estimated at the cohort level and block group geography level, incorporating domestic and international population changes.

Throughout this phase, audits were conducted, including cohort balancing checks to ensure that summed components equaled observed totals, and plausibility reviews against historical trends from prior data vintages.

Top-Down Approach: Allocation and Reconciliation

To align the bottom-up outputs with broader benchmarks, a top-down disaggregation was applied. This ensured that granular estimates conformed to controlled totals at higher geographies. National and state-level controls from the Census and ACS were used as anchors. PUMS data served as the basis for imputation where data gaps existed.

Data Quality Assurance and Audits

Data integrity was prioritized through a multi-stage audit framework. Audits were embedded at key junctures to detect anomalies and enforce accuracy:

- **Input Validation**: Pre-processing checks verified source data completeness and consistency.
- **Interim Consistency and Plausibility Audits**: After each major step, variance analyses compared projected values to benchmarks, flagging deviations for manual review.
- **Post-Production Review**: Aggregate totals were review and benchmarked against independent sources.

This methodology yields a robust demographic dataset suitable for applications in real estate planning, marketing and research, with traceability to authoritative sources and a commitment to statistical rigor.