

STATISTICAL SIGNIFICANCE

With profound effects on communities, safety, public health, and the economy, transportation policy in the public and private sectors relies on statistical science—from the collection of data to their analysis and understanding to the evaluation of options to the eventual decisionmaking. Gaining an understanding of where, when, and how people travel and how, when, and where commodities are transported is challenging given the diversity of our society and economy, and this is only the first step in planning transportation infrastructure and services. Statistical science is also instrumental in formulating effective safety protocols, determining cost-benefit tradeoffs, and allocating resources while reducing pollution and congestion.

Statistics Plays Important Role in Transportation

DESIGNING COST-EFFECTIVE PUBLIC TRANSPORTATION SYSTEMS

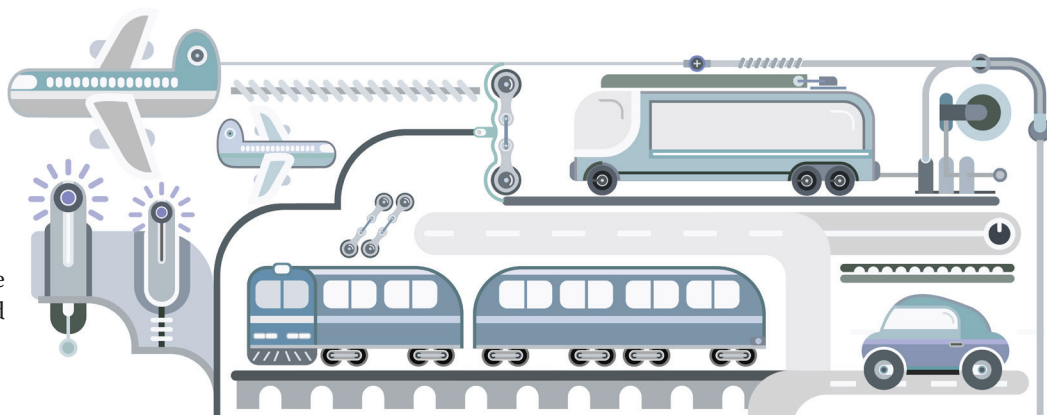
Before a city, county, or region invests in a mass transit system, it must be sure the system will serve the needs and budgets of the community for decades. Statistical science informs transportation planners through the entire process, beginning with well-designed travel surveys to capture specific information about preferred travel mode, travel purposes, and options. It then relates these to demographic and lifestyle variables. The analyzed and aggregated data are used in ridership forecasts, travel demand models, and infrastructure investment tools to generate route choices for different travel modes and enhance urban living by reducing costs.

IMPROVING AUTOMOBILE SAFETY

Highway driving is the most dangerous daily activity most people encounter. Making driving safer requires sorting out hundreds of variables to distinguish driver behavior from vehicle capability from driving environment. Before policies/changes such as seatbelts and child car seats were implemented, it was necessary to have confidence in their effectiveness. Statistical science plays an integral role during all steps, from the design of studies to the evaluation of programs.

ADDRESSING PUBLIC HEALTH EFFECTS

Public health is an important consideration for transportation planners because of the potential effects of automobile exhaust, noise pollution, and commute times. Urban transportation planners collaborate with statistical scientists and epidemiologists



to evaluate a community's health risk. The results may then inform the use and placement of new roads, bicycle trails, parks, and connected communities.

MAINTAINING ECONOMIC VITALITY

Economic prosperity and employment growth occur when there is a robust flow of goods on a reliable transportation infrastructure. Freight data illustrate the health of roads, waterways, railways, airways, ports, and pipelines to ensure a strong transportation network. Federal data and freight data at the state, metropolitan, county, and city levels enable government and private sector actors to optimize commercial transport. Decisionmakers use freight statistics as an objective baseline to make sound decisions about how to allocate funds, plan for the future, and develop transportation policies. High quality, timely, and local transportation data thereby helps keep our economy competitive in the global market.

IMPROVING TRAFFIC FLOW

Major urban areas struggle with traffic flow, particularly during rush hours. To address

the issue, one must take into account factors such as roadway design, traffic light timing, merging traffic, high-occupancy vehicle lanes, mass transit, and signage. Statistical science provides a critical foundation for data-driven improvements to our transportation system. Statistical methods enable planners to construct and validate microsimulations of traffic congestion and explore alternative designs. These models are also useful in planning for emergencies, such as managing the evacuation of a major city threatened by a hurricane.

"Statistical Science Improving Transportation" is part of Statistical Significance, a series from the American Statistical Association documenting the contributions of statistics to our country and society. For more in this series, visit www.amstat.org/outreach/statsig.cfm. The American Statistical Association is the foremost professional society of statisticians, representing 19,000 scientists in industry, government, and academia: www.amstat.org. This Statistical Significance was produced under the supervision of the ASA Transportation Statistics Interest Group.