CONFERENCE PROCEEDINGS 4

Decennial Census Data for Transportation Planning

TRANSPORTATION RESEARCH BOARD

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Conclusions

The 2000 census design program has been conducted with the aim of addressing the two major problems of continuing differential undercount and rising costs in past decennial censuses. To attain both goals, the design program has looked at fundamentally different ways of conducting the census, recognizing that past methods will not be able to overcome these problems. The two most important method changes are integrated coverage measurement and sampling for nonresponse follow-up. The former is designed to reduce differential undercoverage—the latter to reduce or contain cost.

Fundamental change includes not only new methods of improving housing unit and person coverage and reducing costs, but also different ways to collect content. In addition to the use of 1990-like options for the 2000 census, this paper discussed two other approaches—multiple sample forms and continuous measurement. The results from the 1995 census test will provide data important in making the final design decisions at the end of calendar year 1995.

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Implications of the Census Bureau's 2000 Census Plans for the Continued Availability of Transportation Data from the Decennial Census

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Data from the decennial census are the backbone of the statistical system that supports the transportation planning process of our nation. The U.S. Department of Transportation (DOT), as well as state and local transportation planning organizations, have relied on the consistent data collection provided by the decennial census since 1960, when transportation questions were first added to the census questionnaire. Today, these organizations are increasingly reliant on census data to implement the requirements of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and the Clean Air Act Amendments of 1990 (CAAA).

Although the next census is still more than 5 years in the future, planning for the 2000 census is well under way at the Census Bureau. The Office of Management and Budget (OMB) is already reviewing federal agency requirements for decennial census data to set priorities among competing data needs. The decisions that OMB and the Census Bureau make will determine what transportation data will be collected in the decennial census to meet the nation's data needs at the turn of the 21st century.

At this stage of the 2000 census planning cycle, the continued availability of data needed by transportation planners and policy makers and historically collected in the decennial census is by no means assured. In response to congressional criticism, the Census Bureau has taken a zero-based approach to what the 2000 census will look like. One major thrust of the bureau's approach is to consider alternative "designs" for the census (i.e., the fundamental details of how the census is conducted). A second is to question the justification for collecting any data in the decennial census beyond the minimal information required for congressional reapportionment and legislative redistricting. Both are meant to move the decennial census in the direction of achieving the Census Bureau's stated 2000 census objectives: to reduce the undercount of the population and the cost of conducting the census.

The objective of this paper is to place current and future needs for transportation data from the decennial census within the context of the Census Bureau's plans for the 2000 census as well as within the political context of the 2000 census planning process. I recount the rich history of transportation data in the decennial census and describe the critical need for and uses of the data to meet the requirements of federal legislation. I provide an overview of the political context of the 2000 census planning process and how it has influenced the Census Bureau's plans. Finally, I summarize the Census Bureau's 2000 census plans and present what in my view are the implications of those plans for the continued availability of transportation data from the decennial census.

History of Transportation Data From the Decennial Census

The 1960 Census: First Transportation Data from the Decennial Census

DOT and the Bureau of the Census have a long tradition of working together to meet the nation's needs for transportation data. Transportation data were first collected in the 1960 census, when questions on city and county of work, means of transportation to work, and the number of automobiles available to each household were added to the census questionnaire. The pioneering regional transportation studies undertaken in many large cities in the latter half of the 1950s and provisions of the Federal-Aid Highway Act of 1956 to provide alternative interstate service into, through, and around urban areas gave impetus to the demand for comprehensive statistics on the amount and character of commuting within metropolitan communities.

The Federal-Aid Highway Act of 1962 required that approval of any federal-aid highway project in an urbanized area of 50,000 or more population be based on a continuing, comprehensive urban transportation planning process. By 1965, all then-existing urbanized areas had an urban transportation planning process under way. This planning process created the need for more geographically detailed commuting data for urban areas to monitor local travel patterns.

The 1970 Census: First Transportation Data from the Decennial Census for Traffic Analysis Zones

The development by the Census Bureau of computerized address coding guides made it operationally feasible for the bureau to collect the actual street address of workplaces in the 1970 census and code them to the city block level. Local transportation planning agencies, supported by state highway planning and research funds, assisted the Census Bureau at its request in the development of these coding tools.

After the 1970 census, DOT contracted with the Bureau of the Census to produce compilations of block-level socioeconomic and travel-to-work data aggregated to traffic analysis zones. The standardized tabulations contained in this "transportation planning package" were designed to provide a common data base for transportation studies and reduce processing costs. Metropolitan planning organizations submitted census block-to-traffic analysis zone equivalency files for their metropolitan areas, and the Census Bureau produced the traffic zone data packages on a cost-reimbursable basis.

In 1973, the Transportation Research Board of the National Academy of Sciences held the first national conference on Census Data and Urban Transportation Planning in Albuquerque, New Mexico. The conference was attended by DOT and Census Bureau officials, as well as professionals throughout the nation working in census and transportation planning activities. They reviewed their experiences in using the data from the 1970 census in the transportation planning process and formulated recommendations for improvements in transportation data from the 1980 census.

The 1980 Census: First Census with a Fully Developed Journey-to-Work Statistics Program

The energy crisis of the early 1970s heightened the need for transportation statistics to assess the transportation implications of energy shortages and costs. To meet the need for data, DOT sponsored a travel-to-work supplement to the Annual Housing Survey, conducted by the Bureau of the Census for the Department of Housing and Urban Development. The travel-to-work statistics collected in the Annual Housing Survey between 1975 and 1977 became the model for the transportation items collected in the 1980 census. The increasing importance

with which the Bureau of the Census viewed transportation statistics was also demonstrated in 1978 when it established a journey-to-work statistics staff.

The 1980 census was the first for which the Census Bureau had a fully developed journey-to-work statistics program. The number of transportation questions asked in the census increased significantly in 1980. In addition to the inquiries on place of work, means of transportation to work, and the number of automobiles available to each household that had been included in the census in 1960 and 1970, the 1980 census asked new questions on carpooling arrangements, the number of persons in the carpool, travel time from home to work, the number of persons with disabilities that limited their use of or prevented them from using public transportation, and the number of trucks and vans available.

The geographic reference materials used to code responses to the place-of-work question for the 1980 census were improved, resulting in an improvement in the accuracy and completeness of the coded data. Major employer files and reference lists of buildings, colleges and universities, military installations, shopping centers, and other employment sites were developed to code workplace responses.

The development of computerized Geographic Base File/Dual Independent Map Encoding (GBF/DIME) files by the Census Bureau to code addresses for the 1980 census also contributed greatly to the improved accuracy of block-level place-of-work data. Regional transportation planning organizations in the nation's metropolitan areas assisted the Census Bureau in the development of the GBF/DIME files by creating and updating the files on the basis of local maps and expertise. DOT provided funding to support this cooperative effort.

Once again, for the 1980 census, DOT contracted with the Census Bureau to create a series of special tabulations in a transportation planning package. Metropolitan planning organizations obtained the data tabulated for their traffic analysis zones on a cost-reimbursable basis. To increase the utility of the census data for local transportation planning, the Census Bureau developed an innovative procedure to assign incomplete place-of-work responses to census blocks so that they too could be tabulated at the traffic analysis zone level.

After the 1980 census, the Transportation Research Board conducted the second National Conference on Decennial Census Data for Transportation Planning. Held in Orlando, Florida, in 1984, the conference was structured to review data user experience with the 1980 census and recommend improvements in the program for the 1990 census. Officials from DOT and the Bureau of the Census participated in the conference along with state and metropolitan transportation planners.

The 1990 Census: Refinement of Transportation Questions and Innovations in Place-of-Work Coding and Transportation Data Dissemination

The 1990 census transportation statistics program marked the continued refinement of transportation data available from the census, technical improvement in the geographic coding of place-of-work responses to small areas within metropolitan regions, and the creation and dissemination of innovative transportation data products. The 1990 census again included questions on place of work, means of transportation to work, carpooling, carpool occupancy, and travel time to work. An important new question on time of departure from home to work was added to the census questionnaire to allow tabulation of commuting patterns and characteristics by peak hours of travel. The questions on the number of automobiles available to each household and the number of trucks or vans available to each household were combined into one question on the total number of vehicles (cars, trucks, and vans) available. The question on public transportation disability was replaced with a more general question that identified persons whose disabilities limited their ability to get around outside the home.

Two innovative technical advances in place-of-work coding were made for 1990. The first was the joint development of the Census/Metropolitan Planning Organization Cooperative Assistance Program by the Census Bureau and DOT. This program gave local metropolitan planning organizations the opportunity to assist the Census Bureau in improving the accuracy of place-of-work data for their region. Planning organizations took part in three activities:

providing files of employers and their locations to the Census Bureau, working with major employers to ensure that their employees reported accurate workplace addresses, and assisting the Census Bureau in coding place-of-work responses that census clerks could not code. More than 300 metropolitan planning organizations took part in these cooperative activities. The Federal Highway Administration (FHWA) made the costs incurred by the metropolitan planning organizations for this work an eligible activity for use of federal-aid highway planning funds.

The second advance in place-of-work coding was the implementation by the Census Bureau of an automated place-of-work coding system. Place-of-work addresses were keyed to create machine-readable files that were then matched to address coding and major employer files to assign geographic codes to the place-of-work responses. Cases that could not be coded on the computer were sorted and clustered and referred to clerks for research and computer-assisted coding. The automation of place-of-work coding allowed the Census Bureau to accomplish the coding operation efficiently and cost-effectively.

Significant innovations in the dissemination of the journey-to-work data also were achieved for the 1990 census. Two transportation planning packages were produced: statewide packages for each state and the District of Columbia, and urban packages for the transportation study area defined by each metropolitan planning organization. Production of the packages by the Bureau of the Census was sponsored by the state departments of transportation under a pooled funding arrangement with the American Association of State Highway and Transportation Officials. This arrangement supported the production of data for the entire country instead of only those areas that decided to purchase the data as in previous censuses. Funding to develop the 1990 Census Transportation Planning Package Program was provided by FHWA and the Federal Transit Administration.

To make the data contained on the data tapes easily accessible and widely available, the Bureau of Transportation Statistics released the 1990 Census Transportation Planning Packages on CD-ROM and provided software to display and retrieve the data. This revolutionary advance in disseminating census data in a format compatible with widely available microcomputers democratized data accessible only on mainframe computers in previous censuses.

Now, in April 1994, the Transportation Research Board is sponsoring the third National Conference on Decennial Census Data for Transportation Planning. DOT officials, Census Bureau officials, and state and local transportation planners are meeting in Irvine, California, to review their experiences with using the 1990 census data for transportation planning and to make recommendations for the 2000 census.

Uses of Decennial Census Data for Transportation Planning

Department of Transportation Uses

Transportation data from the decennial census are used by DOT as a comprehensive data base supporting development of new policies and programs and as benchmark data with which to evaluate the impacts and overall effectiveness of previously implemented programs.

DOT works in partnership with states and local governments to assess project and corridor-level effects of implemented plans, programs, and specific projects. In supporting ISTEA and CAAA, as well as other federal legislation such as the National Environmental Protection Act, Title VI of the Civil Rights Act of 1964, the Uniform Relocation Assistance Act, and the Highway Safety Act, decennial census data facilitate a consistent level of responsible federal oversight and review of state and local plans and programs. For example, census data are an important tool in the environmental review process required under the National Environmental Protection Act to assess the potential effects of yet-to-be implemented projects. In consideration of the CAAA, journey-to-work data from the 2000 census will provide important feedback on the overall effectiveness of today's national air quality agenda. To respond to the requirements of the Americans with Disabilities Act for transportation fully accessible to all segments of the population, data on persons with mobility limitations that are traditionally provided by

the census provide an opportunity for DOT to conduct a nationwide assessment of service needs.

State and Local Uses

Decennial census data for small areas such as census tracts and traffic analysis zones are used by states and metropolitan planning organizations to meet the provisions of ISTEA, CAAA, and the Americans with Disabilities Act.

ISTEA—Comprehensive Planning

ISTEA contains specific provisions requiring comprehensive transportation planning processes on a statewide basis as well as at the metropolitan area level. States, local governments, and regional agencies must analyze the impacts of transportation plans, policies, and programs. The procedures involved are data intensive, and small-area data from the decennial census provide much of the required information. Principal among these procedures is travel forecasting.

The function of transportation models is to replicate how people travel, to model their travel to and from different locations, by time of day, purpose, and mode. Models are used to forecast how people will travel in the future. Assumptions are made about transportation infrastructure development and changes, land use changes, parking cost and availability, and changes in individual travel behavior. By building these models, planners can evaluate alternatives. For example, will adding carpool lanes along a particular highway reduce or increase congestion in the future, and how do these results compare with building general-purpose lanes or increasing transit service? For most travel models, the forecasting horizon is 20 to 30 years. Thus, data from the 1990 census are used to test the reliability of current models to predict 1990 travel behavior, and to then forecast travel in 2000, 2010, and 2020.

The decennial census provides the baseline of household and person characteristics, origins and destinations of work trips, and travel characteristics for small areas such as traffic analysis zones used in regional and local travel demand modeling efforts. These forecasts are used by state, regional, and local agencies to develop, test, and refine methods for projecting future travel needs at the regional, subarea, and corridor levels. Using these models for travel forecasting allows analysis of alternative highway, transit, and multimodal developments with various policy scenarios.

In addition to supplying data for travel forecasting, the decennial census provides important information for transportation planners to monitor trends in travel behavior. Census data permit the tracking of travel times and peak hours of travel by mode of travel and by residence and work location. The census also provides estimates and data for trend analyses of rates of carpooling and public transit use in the journey to work.

ISTEA—Transportation Improvement Program: Project Selection

ISTEA specifically requires that statewide and metropolitan transportation plans address broad issues such as land development and demographic growth, effects of transportation facilities on population segments, and regional mobility and congestion levels. These plans must consider the social, economic, and environmental effects, including air quality effects, of transportation plans and programs. Projects contained in transportation improvement programs must be found to conform to the emissions reduction schedules in a state implementation plan. Census data on commuter travel flows and travel behavior patterns provide important baseline values against which transportation improvement program projects can be evaluated and selected.

ISTEA—Traffic Congestion Management

ISTEA requires states, in cooperation with metropolitan planning organizations, to develop traffic congestion management systems. Transportation control measures and travel demand management programs often use census data on the journey to work as baseline values from