The costs for collecting the 1970 journey-to-work data are roughly estimated as follows:

Item	Millions of Dollars
Additional questions	5.0
Coding of census journey-to-work data	5.0
Processing to produce package	1.0
Coding guides for 80 nonmail areas	3.0
Produce information from journey-to-work data in usable format (252 areas at $5,000)	1.25

Obviously the dollars spent on the census journey-to-work data result in information useful in nonurban areas as well as in urban areas where home interview surveys are taken. However, it would appear that a critical evaluation should be made of the usefulness of the census data relative to that obtained from home interview surveys or perhaps some new collection process. We expect our work in Rhode Island to indicate the relative benefits and cost effectiveness of using census journey-to-work data versus collecting data in home interview surveys.

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The Albuquerque Project

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In the fall of 1972, the Federal Highway Administration initiated an evaluation of the 1970 standard package of census data for urban transportation planning studies. This evaluation study was conducted by the staff of the Middle Rio Grande Council of Governments with assistance from the Special Studies Group of the New Mexico State Highway Department. The objectives of this study were to verify the reliability of the data from the Urban Transportation Planning Package (UTPP) and to test and evaluate their practical usefulness in an actual transportation planning program. The study was conducted prior to the official release of the UTPP to other metropolitan areas in the anticipation that results of the Albuquerque study would be of general benefit to all transportation planning staffs attempting to use the census data.

The UTPP data developed for the Albuquerque SMSA consisted of socioeconomic and travel characteristics for about 450 small geographical areas called data analysis subzones. The total population for these areas in 1970 was about 315,000 persons. These people live in an oasis-like community; very little urban development exists beyond the boundaries of the Albuquerque SMSA. Low-density housing is along both sides of the Rio Grande River, and trade, business, and employment centers are dispersed; the CBD is small. A large military base and the Sandia Mountains block development to the east and south. The community is almost totally dependent on the automobile for transportation. The present street and highway system provides an excellent level of service. Extensive use is made of the 2 north-south and east-west freeways, which cross near the center of Albuquerque and provide easy access to the CBD.

A considerable amount of locally developed data was available for comparison with the census data. The Albuquerque continuing transportation planning study was initiated in 1966. Socioeconomic data for comparison are available from a number of sources including the Albuquerque public school system, the third-count summary tape of the 1970 census, New Mexico State Employment Security Commission, and the business activity module of the city of Albuquerque. Unfortunately, these data do not contain recent trip data of known accuracy. Nor was employment-by-category data available at the zone of residence.

Phase 1 of the study was a test of the validity of the UTPP data and of the techniques used in assigning them to traffic subzones. This phase was specifically an evaluation of the data contained in the zone-of-residence table. A comparison was made between selected data sets and similar information obtained from local and census sources. This comparison validated the technique used in expanding the 15- and 20-percent-sample data to the 100 percent universe. The census expansion factors were checked by using the published standard error tables for census tracts.

In addition, an evaluation was made of the practical usefulness of the UTPP format computer program that reads the magnetic tape and prints its contents in tabular form by traffic subzone.

Phase 2 incorporated the UTPP data into the transportation planning process. In this phase, the zone-of-work data and the home-to-work trip table were evaluated. Since both tables are incomplete, considerable effort was devoted to devising ways for completing them. The usefulness of these data was then determined by developing a new work-trip generation equation and comparing it with the one obtained by using the 1962 origin-destination data. A more comprehensive test was undertaken by attempting to develop a peak-period traffic model by using the completed home-to-work trip table. The results were inconclusive, but considerable insight was gained on how the UTPP and a minimum of locally developed data can be used to develop a transportation planning program. This investigation is being continued, and preliminary results look promising.

CONCLUSIONS

1. The zone-of-residence table is an excellent source of surveillance information about the socioeconomic characteristics of the traffic subzones. The data meet the accuracy standard set by the Bureau of the Census, and they are comparable to the locally developed data currently being used in the Albuquerque transportation planning process. The data contained in this table may be used as input to trip generation equations and home-to-work equations. Care should be exercised in substituting the UTPP data for local data because of possible differences in definitions and methods of data collection.

2. The home-to-work trip table by mode of transportation is incomplete and could not be used in Albuquerque because of the large number of missing trips. Some 36 percent of the trips could not be assigned to a specific work location. Instead, most were assigned to a larger areal identifier such as a zip code or the Universal Area Code (UAC). However, 6 percent could not be assigned to any area location. Techniques were developed for assigning the missing trips, and the completed trip table was

then used in the transportation planning process. A sample of UTPP data for other areas indicates that any trip table will likely not be sufficiently complete to be used without modification.

3. The zone-of-work table is also incomplete because of the large number of missing trip ends. The table must be completed before it can be used as input to trip attraction equations or a home-to-work attraction equation. Total employment by traffic zone may be obtained by the same technique used to complete the trip table. However, a different technique using local data is required to determine employment by job category. No technique was tested for completing the employment-by-job category because a large amount of locally developed data is required, and these data were not available.

4. The summary table is correct because it is based on the residence data, which were judged to be accurate and complete.

5. The information contained in the UTPP is not sufficient by itself for developing a peak traffic model that would relate work trips to peak-hour traffic. However, the UTPP data plus locally developed data and an ongoing transportation planning study should provide sufficient information for constructing such a model.

6. The FHWA format program that tabulates the data requires a computer that can process COBOL level U language. The city of Albuquerque's computer does not have this capability. In addition, there are problems associated with the reading of selected pieces of data because of the way the tape file is constructed.

7. A major deficiency in the UTPP is that it does not contain external-to-internal work trips for those trips originating outside the SMSA. For large metropolitan areas, this could mean that 20 percent or more of the total work trips will not be included in the trip table.

These conclusions indicate that the UTPP augments local data, but, at the present time, is not equivalent to a limited origin-destination survey and cannot be used as a sole basis for a transportation planning program. However, it can be improved and eventually used in this capacity. Obviously, the trip table and zone-of-work table must be completed either by improving the census data or by developing adequate techniques for expanding the tables. The external-to-internal work trips must also be provided and a peak-traffic model developed that uses a minimum of local data. If these major improvements can be developed, then the UTPP would represent a significant contribution to transportation planning.

RECOMMENDATIONS

The quality of the Urban Transportation Planning Package can be improved considerably by initiating a number of relatively minor changes.

1. School enrollment provided by the UTPP is classified by grade level only, but should be classified as private, public, or other. This would facilitate the updating of local data, for the only reliable school enrollment data may be public school data.

2. Automobile-availability data should include the total number of passenger vehicles owned, including pickup trucks. In 1971, about 33,000 pickup trucks were used in the Albuquerque area as passenger vehicles.

3. To simplify the development of algorithms for the completion of the trip table, trips that could not be coded to a specific location should be divided into 2 categories: those that cannot be coded to a work address and those that are given UACs that were not designated work areas. These 2 categories should be kept separate because they should be treated differently in the algorithm that completes the trip table by assigning those trips to work locations.

4. The UTPP equivalency table, which indicates the correspondence among zip codes, data analysis subzones, or centroids, should be subjected to an edit check.

5. Control totals should be provided for all items listed in the tables; otherwise, the totals must be obtained by combining census tract data from the Tract Book.

6. The UTPP format often uses the column heading "Totals," but what is being totaled is not always clear. A more appropriate heading should be devised that is consistent with the individual tables.

7. A user's handbook should be included with the Urban Transportation Planning Package for each SMSA. It should include pertinent information from this report plus recommendations from FHWA and the Bureau of the Census on using the data. A summary of the accuracy, data collection techniques, and data definitions would be helpful.

8. The organization of the tape file should be restructured so that selected pieces of data can be easily read off the tape by using FORTRAN IV.

9. The time of work-trip origins is a key parameter that is needed in the development of a peak-period model. This information should be obtained in the census; otherwise, it must be collected by an independent survey.

10. So that the external work trips originating outside the SMSA and terminating inside can be determined, the census should record a person's work address in all cases. At the present no specific address is asked for the workplace outside of the worker's home county.

11. A significant weakness in the UTPP data is that employment at major employment centers is often underestimated. This may result from persons' not knowing the specific addresses of their places of work and using references such as "GE Plant" or "Coronado Center." If the local agency prepared a correspondence table between major employment centers and census blocks for use in coding the sample data, the Bureau of the Census might be able to retrieve much of the lost employment information.

The really difficult problem is how to improve the collection of data so that the work trips can be assigned to a specific work subzone. It is certainly not clear from the evaluation of the UTPP where the difficulty is. A comprehensive study of the whole data collection and processing techniques may be required to identify what is required to reduce the number of unassigned trip ends to an acceptable level. This effort would certainly be worthwhile in view of the tremendous potential of the package.

Effort should also be continued on developing and evaluating techniques for assigning the missing trips. The main need is to do a quantitative check of the various alternatives so as to determine the accuracy of each technique. This would probably require that an origin-destination survey be taken at the same time the census data are collected.

To develop the necessary attraction generation equation requires that the zone-of-work table be completed. Considerable effort is still required to develop an acceptable technique and to evaluate its accuracy. It appears that a considerable amount of local data will be required to complete the table. Hence, an investigation should be initiated on how to accomplish the needed completion with a minimum of local data.

If the full potential of the UTPP concept is to be realized, effort should be continued on the development of the peak-traffic model concept. This approach looks favorable if all the information of a complete origin-destination study is available. However, it is certainly not clear how this problem can best be handled with a minimum of data.

The Wilmington Project

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The Wilmington SMSA is located in the northern part of Delaware and includes New Castle County, Delaware; Cecil County, Maryland; and Salem County, New Jersey. The SMSA had a 1970 population of 500,000 (according to the Bureau of the Census); 386,000