

The Urban Transportation Planning Package*

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ABSTRACT

The Urban Transportation Planning Package is a series of special tabulations from the 1980 Census of Population and Housing that provides data by standard format and user-specified geography on variables of particular interest to transportation planners. The tabulations contain work-trip data and socioeconomic information by place of residence and place of work and by trip between residence and workplace for user-specified geography. This valuable information resource for transportation planning is described.

Standard products from the decennial census have two major limitations for transportation planners. First, many useful tabulations of transportation-related questions are not provided for small units of geography such as census tracts, and no data are provided for user-defined traffic analysis zones of similar size but different boundaries. Second, none of the worker characteristics are tabulated for small geographical units at the place of work or for commuters between a given pair of origins and destinations. These missing tabulations are important to transportation planners, who make substantial use of origin-destination (OD) tables and characteristics of areas that attract trips (i.e., workplaces). Although the requisite data have traditionally been obtained through local surveys, the cost of local data collection continues to rise, whereas the available funds remain constant or decline. The decennial census provides a more cost-effective source of desired data and needs only the appropriate tabulations.

The Urban Transportation Planning Package (UTPP) is a set of special tabulations of data from the decennial census. The UTPP has been designed to meet the data needs of local, regional, and other transportation planners by providing 1980 census data by place of work, by OD pair, and by user-specified geography. The UTPP tabulations are produced by the Bureau of the Census using software developed by the bureau under contract to the U.S. Department of Transportation (DOT). Purchasers of the UTPP reimburse the bureau for processing costs, which are kept to a minimum by the use of the UTPP's standard format.

SOURCE OF THE UTPP

The UTPP journey-to-work information was collected from responses to the long-form census questionnaire intended to be completed by one in every six households and returned on census day, Tuesday, April 1, 1980. However, because of budget constraints, only half of these were coded for place of work, result-

ing in a sampling of 1 household in 12, or about 8.3 percent of all households.

Geographic coding was made as complete and accurate as feasible, including use of improved coding guides. Also, information was requested as a substitute for valid work addresses whenever a street address could not be specified. If the street address was not known, the respondent was asked to enter the building name, shopping center, or other physical location description. Three Census Bureau offices were established to do the geographic coding of workplaces. As a result of this decentralization, personnel in these offices could more efficiently contact local agencies for help in coding addresses that could not be coded from available information.

For the UTPP only, workers whose place of work was not reported or whose workplace could not be coded to the finest geographic detail for which it was eligible were allocated to a tract or block based on the best available information. The allocation procedure is explained in detail elsewhere in this Record.

CONTENTS OF THE UTPP

The UTPP is divided into six parts that include 82 summaries and 13,391 data items. The six parts are summarized in Table 1 and are listed in detail in Appendix F.

Because geographic coding was done at the block level, the UTPP can be ordered coded either to census tracts or to a zone system defined to the bureau by the requesting agency. The UTPP also gives subtotals for such geographic units as the central business district (CBD), central city, and so forth.

Part I provides 29 tabulations of data by tract or zone of residence. Subtotals are provided for

TABLE 1 Urban Transportation Planning Package from the 1980 Census

Part	Description	Tabulations	Data Items
I	Tabulations by census tract or block group (or zone-special order) of residence	29	773
II	Tabulations by large geographic areas of residence	19	11,642
III ^a	Tabulations by census tract (or zone-special order) of work	14	517
IV ^a	Tabulations by census tract of residence to census tract of work (or zone of residence to zone of work-special order)	3	30
V ^a	Tabulations by block group of work (subtotals to census tract of work or zone of work-special order)	7	107
VI	Tabulations by county of residence to county of work (includes up to 20 external counties or New England towns with a large number of journey-to-work trips)	10	322
Total		82	13,391

^aIn the modified UTPP for areas outside SMSAs in 1980, these parts will change as follows:

- III Tabulations by central city(s), place(s) 2,500 + population, county, SMSA of work,
- IV Tabulations by place/county of residence to place/county of work,
- V Not applicable to those areas not involved in the census GBF/DIME program.

*From Transportation Planners' Guide to Using the 1980 Census, FHWA, U.S. Department of Transportation, January 1983.

the CBD, central city, entire area, county, and Standard Metropolitan Statistical Area (SMSA).

Part II provides 19 tables of residence data for larger areas (CBD, central city, entire area, county, and SMSA) and is most useful for examining cross-classification relationships. For example, households are classified by vehicles available, income, and household size, and the number of workers are classified by household income, size of household, and means of transportation and carpooling to work.

Part III provides 14 tabulations of data similar to Part I except that they are summarized by tract or zone for place of work instead of residence. Subtotals on all tabulations are provided by CBD, central city, entire area, county, and SMSA.

Part IV provides 3 tabulations of information on journeys between residence and place of work. Residence and place of work can each be identified by either census tract or planning zone. In addition to the trip tables by means of transportation for the journey to work distributed by tract or zone, summary trip tables are provided for the CBD, central city, entire area, county, SMSA, within commutershed, and outside commutershed.

Part V provides 7 tabulations of place-of-work data at the block-group level. Subtotals are provided by census tract or by a locally defined zone system on request. The information includes the number of workers by occupation and sex and by major industry and sex, the number of private vehicles used, persons per vehicle, and persons per carpool. Such numerical information is useful in proportioning other data available only by tract or zone to the smaller geography of block groups.

Part VI provides 10 tables of journey-to-work information on travel between counties. This summarized information, when compared with 1970 census data, for example, is useful in the study of transportation and land use trends. For each county within an SMSA, data are given for up to 20 counties that account for a large number of journey-to-work trips.

DEFINITIONS

Most of the tabulations of the UTPP focus on workers and their travel. The balance is about households, vehicles, and persons. Vehicles include automobiles, trucks, and vans available to a household. Mode is synonymous with means of transportation and usually consists of the following: car--drive alone, car--carpool, truck or van--drive alone, truck or van--carpool, bus or streetcar, railroad, subway or elevated, taxicab, motorcycle, bicycle, walked only, and other means.

In some tables (I-20, III-10, IV-3, V-5, and VI-8) the number of vehicles used in travel to work has been calculated from the number of workers who drive alone and the number who travel in carpools, which ranges from two-person pools to those of seven or more persons. In this latter category, 0.1428 was the factor used to convert the number of workers to the number of vehicles used. Persons per carpool is calculated by dividing the number of workers who share driving, drive others only, or ride as a passenger only by the number of carpool vehicles used in travel to work (total vehicles minus vehicles of workers who drive alone).

Journey-to-work questions asked in the census differ in some respects from those usually asked by planners in travel surveys. The questions related to work trips and vehicle ownership as asked in 1980 and for purposes of comparison in 1970 are given in Figure 1. (Appendix A gives detailed definitions

and explanations relevant to journey-to-work questions.) Several points should be kept in mind when census data about work trips are used:

1. The address where the individual worked most often was recorded in the census questionnaire. When a worker held two jobs, the second job location normally was not entered.

2. Some workers go to different work locations on a given day. If such workers reported to a central location, this location was to be entered as the workplace. If there was no central location and the worker went to various work locations, the smallest geographic area common to the starting places (for example, Westchester County, New York) was entered.

3. The questions assumed direct trips from residence to workplace and did not request information about indirect work trips.

4. The census asked about work "at any time last week." Thus, typical (usual) workday information was received rather than average workday information. The difference between an average day and a typical day is significant in transportation planning because on an average day some 10 to 20 percent of all workers may not commute from home to work for one reason or another.

5. Time-of-day travel information was not obtained in the census. An understanding of local work schedules is important in estimating peak-hour traffic volumes.

6. The difference between the 1970 and 1980 censuses in the wording of questions about mode of travel should also be noted. The 1980 census asked how the person "usually" got to work the previous week. This probably results in mode estimates that are low for transit and high for the automobile as compared with results obtained by questions customarily asked in transportation studies.

7. Similarly, questioning about "usual" carpool size probably results in overestimation of carpool size. Carpools are usually formed of a given number of passengers. However, on any given day a carpool member might not work, might be out of town, and so on, resulting in a number of passengers lower than that reported for the usual case.

8. The census asked where the respondent was employed "last week." It did not ask, as travel surveys do, whether a trip to work was made "yesterday."

9. Journey-to-work questions were asked of both full- and part-time workers indiscriminately and only the combined responses are reported by the Bureau of the Census.

In the following section the importance of these points and how they may be managed practically will be discussed.

Journey-to-Work Adjustments (1)

The Washington Metropolitan Area Council of Governments compared census journey-to-work data with those of the metropolitan planning organization. The census source in this case was the 1977 Annual Housing Survey and a supplementary journey-to-work survey conducted by the Bureau of the Census for the U.S. Department of Housing and Urban Development. The journey-to-work supplement was similar in form to the 1980 census.

The census asked where the respondent was employed "last week." It did not ask, as travel surveys usually do, whether a trip to work was made "yesterday." In Washington, D.C., it was found that a factor of 0.85 was required to adjust the census "usual-day" data to travel demands on a specific day as sought by transportation planners.

1970

Did this person work at any time *last week*?
 How many hours did he work *last week* (all jobs)?
 Where did he work *last week*? (If he worked in
 more than one place, print where he worked most.)

- a) address (number and street name)
 - b) name of city, town, village, etc.
 - c) inside the limits of this city, town, village, etc.
 - d) county
 - e) state
 - f) zip code
- How did he get to work *last week*? (Chief means used on
 the last day worked at the address given)

Driver, Private Auto
 Passenger, Private Auto
 Bus or Streetcar
 Subway or Elevated
 Railroad
 Taxicab
 Walked Only
 Worked at Home
 Other Means

How many passenger automobiles are owned or regularly
 used by members of your household?

- None
- 1 Automobile
- 2 Automobiles
- 3 Or More Automobiles
- Not Included

Not Included

Not Included

Not Included

FIGURE 1 Journey-to-work questions.

Public transit trips tended to be underreported in the census data because only the usual mode was requested. A Washington, D.C., survey of transit riders showed that only 89 percent of bus riders and 76 percent of rail riders used public transit four or more days per week. For both forms of transit combined, 85 percent were regular users.

Comparisons were also made of person work trips and transit work trips. For the Washington region, census data were a little more than 6 percent low for total trips and a little more than 5 percent low for transit trips.

Overall employment data were also compared. The census does not count second jobs and, except in areas where commutershed information is available, the failure to count work trips into the region from counties outside the SMSA results in underreporting the volume of travel demands. Such underreporting results even if commutershed reporting is provided, because not all areas external to an SMSA are considered. In Washington, D.C., the census reported 1.2 million jobs as compared with local agency estimates of 1.5 million jobs, a census underreporting of about 20 percent.

Commutersheds

An option available in the UTPP is inclusion of spe-

1980

Did this person work at any time *last week*?
 How many hours did this person work *last week* (at all jobs)?
 At what location did this person work *last week*?

- (If this person worked at more than one location, print where he or she worked most last week?)
- a) address (number and street) If street address is not known enter the building name, shopping center, or other physical location description.
- b) name of city, town, village, borough, etc.
- c) Is the place of work inside the incorporated (legal) limits of that city, town, village, borough, etc.?
- d) county
- e) state
- f) zip code

How did this person usually get to work *last week*? (If this person used more than one method, give the one usually used for most of the distance.)

Car
 Truck
 Van
 Bus or Streetcar
 Railroad
 Subway or Elevated
 Taxicab
 Motorcycle*
 Bicycle*
 Walked Only
 Worked at Home
 Other -Specify

How many automobiles are kept at home for use by members
 of your household?

- None
- 1 Automobile
- 2 Automobiles
- 3 Or More Automobiles

How many vans or trucks of one-ton capacity or less are kept
 at home for use by members of your household?

- None
- 1 Van or Truck
- 2 Vans or Trucks
- 3 Or More Vans or Trucks

When going to work *last week*, did this person usually:

- Drive alone
- Share driving
- Drive others only
- Ride as passenger only

How many people, including this person, usually rode to work
 in the car, truck, or van *last week*?

Last week, how long did it usually take
 this person to get from home to work (one way) in minutes?

cial commutershed data for contiguous SMSAs that make up a larger planning region. The commutershed of an SMSA includes all territory in which its workers reside and from which they travel to work. In a given pair of SMSAs, the SMSA from which a significant number of commuters travel is considered part of the commutershed of the receiving SMSA. In regions where significant rates of commuting occur in both directions, each SMSA is considered within the commutershed of the other. Similarly, if an SMSA sends a significant number of commuters to more than one other SMSA, it is considered part of the commutershed of each receiving area.

In coding responses to the 1980 census question on place of work, the usual procedure was to code intermetropolitan commuters only to place or county of work. However, residents of SMSAs designated as within the commutershed of an adjoining SMSA were coded to the census tract and block level if they commuted into that adjacent SMSA. This now allows the option of including these intermetropolitan commuters in tabulations by census tract of work (Part II) and in tabulations of census tract of residence by census tract of work (Part IV).

Analysis of 1970 data on commutation between contiguous SMSAs, between all areas within multi-SMSAs, and between all areas within multi-SMSA transportation planning regions led to development of criteria for commutershed designation, which are discussed in

more detail in Appendix C. Inclusion of commuted data in the UTPP is by special request only and at additional cost.

they can be used in comprehensive planning as well as for traffic analysis.

ZONE VERSUS TRACT DATA

The UTPP can be ordered either with the census tract as the basic reporting unit or with some other aggregate unit of block geography such as a traffic zone. Requests for zone representation must be accompanied by a census-geography-to-zone conversion table. If the UTPP is requested by zone, the Bureau of the Census will supply a list of census geographic codes and maps if needed. A zone number must then be assigned to each census geographic unit and the list returned to the Census Bureau. If both tract and zone UTPPs are desired, they may be ordered. If zone and tract boundaries coincide, there will be little, if any, additional cost for obtaining both. If they do not coincide, additional costs will be incurred.

The advantage in obtaining the UTPP by traffic analysis zones is that the information will be available for zone-based transportation planning without further manipulation. It should be noted, however, that the data will not be geographically compatible with census data available from standard Census Bureau releases (reports, STFs, etc.), in which the basic reporting unit is the census tract.

A cost differential also exists: Reporting by tract will cost about \$10 per 1,000 population; by zone, between \$12 and \$13 per 1,000. As an example, for an area with 750,000 population the cost difference will be about \$1,900. However, should zone data be needed, the cost increment is small compared with the costs of converting purchased tract data to zones. If both tract and zone data are purchased,

AVAILABILITY AND COST

The special UTPP is available for 277 SMSAs coded to place of work. The package must be ordered by special request to the Bureau of the Census. Requests generally will be filled in the order received from those areas for which data are available. The reporting unit requested can be the census tract or any other combination of blocks. The cost of the UTPP to any given SMSA will be supplied by the Bureau of the Census on request. Table 2 gives cost estimates for 10 SMSA population sizes based on the following bureau guidelines:

1. \$10 per 1,000 population on tract basis and
2. \$12 to \$13 per 1,000 population on basis of traffic analysis zone (or other geographic combination of blocks).

Agencies of urbanized areas outside SMSAs or inside new 1980 SMSAs will not be able to obtain the complete UTPP for their jurisdictions but will be able to obtain a modified version of the package. The modifications are briefly noted in Table 1, and the areas affected are listed in Appendix B. This modified package, like the complete UTPP, will contain data not available from summary tape files or census publications.

The UTPP is being sold under three basic options:

1. Full UTPP tabulations on tape without format with a print program and only Part II on a computer printout,
2. Full UTPP tabulations on tape without format

TABLE 2 Estimated Cost of UTPP*

Population of SMSA	Cost of UTPP (\$)	
	Tract	Zone
50,000	2,500**	3,400**
100,000	2,500**	3,400**
200,000	2,500**	3,400**
300,000	3,000	3,750
400,000	4,000	5,000
500,000	5,000	6,250
750,000	7,500	9,375
1,000,000	10,000	12,500
2,000,000	20,000	25,000
3,000,000	30,000	37,500

*Detailed estimate must be obtained from the Bureau of the Census upon request. The above is based on the most current information where:

Tract Level Cost = \$10/1,000 population

Zone Level Cost = \$12-\$13/1,000 population

The above Tract and Zone Level Costs per 1,000 population are averages and generally the cost in larger areas will be less than the average and in smaller areas the cost will be greater than the average.

**Approximate minimum charge for an order.

with a print program and all six parts on a computer printout, and

3. Full UTPP tabulations on tape without format with a print program and all six parts furnished on microfiche.

Tables on microfiche may also be purchased at additional cost. All requests for price estimates should be addressed to Philip N. Fulton, Bureau of the Census, at the address given in the front of this Record.

CONCLUSION

The UTPP is a substantial data resource for transportation planning and other applications described elsewhere in this Record. This data resource is much improved over the UTPP that was designed in conjunction with the 1970 census. The 1980 UTPP benefited in quantity from the increased number of transportation-related items on the 1980 census questionnaire and in quality from the major improve-

ments in place-of-work coding. Most significantly, the individuals responsible for the UTPP at the Census Bureau recognize that place-of-work coding errors still occur and are willing to make corrections. When purchasers of the UTPP have questioned the contents of their package, the Journey-to-Work and Migration Statistics Branch has reviewed the tabulations and corrected coding errors without additional cost when local information has indicated that there are geographic errors in the file. This responsiveness by the Census Bureau to the transportation community is exemplary of an effective relationship between users and providers of information for public decision making.

REFERENCE

1. G.V. Wickstrom. Comparisons of Census Journey-to-Work Findings with Metropolitan Planning Organization Data. Presented at 60th Annual Meeting of the Transportation Research Board, Washington, D.C., 1981.

Allocating Incomplete Place-of-Work Responses in the 1980 Census Urban Transportation Planning Package

PHILIP N. FULTON

ABSTRACT

Place-of-work data that are included in regular 1980 census data products were not allocated for incomplete responses or nonresponses because of processing limitations. However, this does not apply to special tabulations such as the Urban Transportation Planning Package (UTPP). The place-of-work allocation procedure that was developed by the Bureau of the Census for use in the 1980 UTPP project is described.

Place-of-work data collected in the 1980 census are among the few types of data that were not allocated as part of regular census processing. Allocation is the procedure whereby information is assigned in place of responses that are missing or incomplete. For most of the subject-matter items in the census, the procedure used to change these unacceptable responses was to assign an entry that was consistent with entries for other persons with similar characteristics who lived in the same general vicinity as the respondent. If, for example, a person did not report his wage and salary income, the income was assigned based on the last previous person processed who reported wage and salary income and who

matched the nonrespondent's age, race, sex, occupation, and certain other characteristics. This process ensured that the distribution of wage and salary income assigned by the computer for persons of a given set of characteristics would correspond closely to the wage and salary income distribution of persons who had reported that item in the census.

Allocation based on the responses of persons with similar characteristics has applicability for place-of-work data as well. However, it is also important to know the overall distribution of reported employment across the area into which workers are to be allocated so that the final results will reflect the workplace distribution that was originally coded. Because census data processing is sequenced on the basis of data collection areas (e.g., enumeration districts) by state of residence, the overall distribution of workers by place of work cannot be ascertained until regular census processing has been completed. Because of this limitation, allocation of place-of-work data was not undertaken for standard 1980 census products. The limitation does not apply to special tabulations such as the Urban Transportation Planning Package (UTPP), which are prepared from the final basic record files.

The UTPP is a special tabulation of census data for individual Standard Metropolitan Statistical Areas (SMSAs) tailored to geographic areas that are used in transportation planning. These areas may be census geographic areas such as census tracts or block groups or they may be locally defined traffic