

# Estimating the Daytime Population with the Urban Transportation Planning Package

PHILIP N. FULTON

ABSTRACT

A procedure for estimating daytime population with data from the Urban Transportation Planning Package is described. In an illustrative application, a census tract in Atlanta, Georgia, containing 715 residents is estimated to have a daytime population of 26,067.

The Urban Transportation Planning Package (UTPP) is a special tabulation of 1980 census data for individual Standard Metropolitan Statistical Areas (SMSAs) tailored to geographic areas that are used in transportation planning. Local transportation planning organizations submit specifications to the Census Bureau for the geographic detail required for their area (e.g., traffic zones or census tracts), and the bureau then produces a standard set of tabulations for those planning areas on a cost-reimbursable basis. Specifications for the content of the UTPP were prepared and submitted to the bureau by an ad hoc committee representing the TRB Committee on Transportation Information Systems and Data Requirements.

Although the UTPP was conceived as a transportation planning tool, the place-of-work information it contains makes the package a unique product for other applications as well. For example, data from the UTPP that provide the number and characteristics of persons by place of residence and place of work can be used to make estimates of the daytime population of small areas such as census tracts or traffic zones. In this paper a brief description is presented of how to use the UTPP to produce such estimates.

BASIC CONCEPTS

Before going into the actual methodology of making daytime population estimates, it is important to understand the definitions of several underlying concepts. These are resident population, working resident population, nonworking resident population, at-work population, and daytime population.

1. Resident population: All persons living within a tabulation area (e.g., census tract) at the time of the census (as of April 1, 1980).
2. Working resident population: All persons 16 years old and older living within the tabulation area who had a job and were at work during the week before the census (commonly referred to as the reference week).
3. Nonworking resident population: All persons living within the tabulation area at the time of the census who were not at work during the week before the census. This group includes persons under 16 years of age, persons 16 and older with no job, and persons 16 and older with a job but not at work dur-

ing the reference week due to illness, vacation, layoff, or some other reason.

4. At-work population: For a given tabulation area, the estimated number of workers 16 years old and older, including members of the armed forces, who carried out their occupational activities within that area during the week before the census. The at-work population is not a count of total employment because it excludes workers who usually work in the area but were not at work during the reference week.

5. Daytime population: For a given tabulation area, the estimated maximum population within the area on a typical weekday. Because the number of persons in any one location is dynamic, varying with the time of day, the estimate is of the number of persons over the course of the whole day. The daytime population is composed of three components: the at-work population, the nonworking resident population, and nonresidents who are in the area for some purpose other than work. Such persons include users of business establishments, theaters, amusement and recreation facilities, hotels, shopping centers, and transportation terminals; patients in hospitals; students in elementary and secondary schools, colleges, and universities; pedestrians; and persons in vehicles. Adjustments for this third component of the daytime population must be made independently of the UTPP.

PROCEDURE

An estimate of the daytime population of a census tract or traffic zone can be made by determining the nonworking resident population of the area and then adding that to its at-work population (Figure 1).

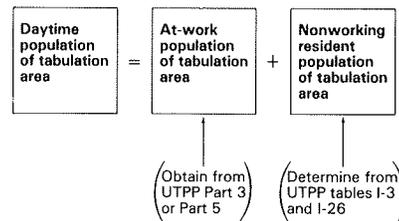


FIGURE 1 Estimating the daytime population using the UTPP.

The at-work population is readily obtainable from any of several tables in Part III or V of the UTPP, but the nonworking resident population must be derived by subtracting the working resident population found in UTPP Part I, Table I-26, from total resident population found in Part I, Table I-3 (Figure 2).

Because the UTPP age categories for the resident population are more detailed than those provided for the working resident population, some of the resi-

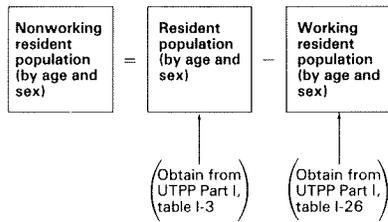


FIGURE 2 Determining the nonworking resident population for a tabulation area.

dent population age categories must be combined for comparability with those of the workers (Figure 3). Once the appropriate adjustments have been made, the procedure is simply to subtract the number of working residents from the total number of residents within each age and sex category to arrive at a breakdown of the nonworking resident workers by age and sex. These are the only characteristics of this group that are available from the UTPP.

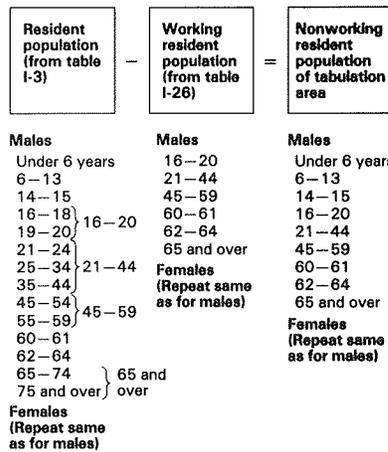


FIGURE 3 Adjusting age categories in determining the nonworking resident population by age and sex.

APPLICATION: ATLANTA, GEORGIA

This example demonstrates the application of the procedure to a census tract within Atlanta, Georgia. The tract chosen for analysis is tract 0019, one of three tracts that make up the Atlanta central business district.

Figure 4 shows data for the at-work population that are contained in the Atlanta UTPP, Part III, Table III-1. The data provide the number of workers who work in tract 0019 by sex and occupation. The at-work population of the tract consists of 13,903 men and 11,930 women for a total of 25,833 workers.

Figure 5 shows the calculation of the number of nonworking residents of the tract, using appropriate data from the Atlanta UTPP, Part I, Tables I-3 and I-26. The nonworking resident population of tract 0019 is 234: 106 men and 128 women.

Finally, Figure 6 gives the final daytime population estimate for tract 0019. More than 26,000 persons are present in the tract on a typical day, 25,833 workers and 234 residents of the area who do not work. Figure 6 also shows the stark contrast between the daytime and resident populations of the tract. Only 715 persons reside in the tract, but

Occupations	Males	Females
All workers	13,903	11,930
Executive, administrative, and managerial occupations	2,996	1,741
Professional specialty occupations	2,259	1,416
Technicians and related support occupations	459	367
Sales occupations	1,391	925
Administrative support occupations, including clerical	1,400	5,036
Service occupations	1,607	1,808
Farming, forestry, and fishing occupations	23	37
Precision products, craft, and repair occupations	1,494	102
Operators, fabricators, and laborers	2,251	498
Armed Forces	23	-

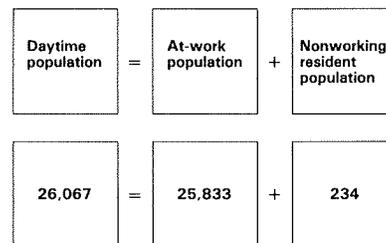
FIGURE 4 Occupation and sex of the at-work population for census tract 0019 in Atlanta, Georgia, 1980.

	Resident population (from table I-3)	Working resident population (from table I-26)	Nonworking resident population
<b>Males total</b>	421	315	106
Under 6 years	24	-	24
6-13	-	-	-
14-15	7	-	7
16-20	8	8	-
21-44	247	198	49
45-59	87	69	18
60-61	20	20	-
62-64	7	7	-
65 and over	21	13	8
<b>Females total</b>	294	166	128
Under 6 years	26	-	26
6-13	-	-	-
14-15	-	-	-
16-20	36	24	12
21-44	120	87	33
45-59	39	27	12
60-61	18	18	-
62-64	4	4	-
65 and over	51	6	45

FIGURE 5 Nonworking resident population by age and sex for census tract 0019 in Atlanta, Georgia, 1980.

that number swells to more than 26,000 on a typical day.

If tract 0019 contained any facilities such as hotels, hospitals, shopping centers, schools, or colleges, counts of those using these facilities could be obtained and added to the UTPP daytime



Total resident population = 715  
Total estimated daytime population = 26,067

FIGURE 6 Estimated daytime population for census tract 0019 in 1980.

population total to arrive at a more accurate estimate. Surveys of pedestrians and vehicular traffic could also be conducted to further enhance the estimate if they were warranted.

#### CHARACTERISTICS AVAILABLE FROM THE UTPP

Because the UTPP is a special tabulation designed for transportation planning, most of the characteristics it provides are for the at-work population. As noted previously, the only characteristics available in the UTPP for nonworking residents are age and sex. However, this should not seriously limit the utility of the UTPP as a tool for analysis of the daytime population because most applications focus on the characteristics of the work force by place of work.

The characteristics of the at-work population that are available in the UTPP include the following:

- Occupation by sex,
- Industry by sex,
- Class of worker by sex,
- Means of transportation to work by earnings,
- Means of transportation to work and carpooling,
- Travel time to work by means of transportation,
- Means of transportation by race and Spanish origin,
- Carpool type and vehicle occupancy,
- Number of vehicles used to get to work,
- Persons per vehicle,
- Persons per carpool,
- Means of transportation by household income, and

- Means of transportation by number of vehicles available.

#### USES OF DAYTIME POPULATION ESTIMATES

Certainly the number and characteristics of persons who work in a given location are of critical importance for transportation planning. There are, however, many other uses for these data. Some of these are listed as follows:

- Transportation planning,
- Marketing,
- Environmental impact analysis,
- Disaster planning,
- Planning for service delivery,
- Labor market analysis,
- Economic development planning, and
- Equal Employment Opportunity studies.

#### OBTAINING DATA FROM THE UTPP

UTPPs for many SMSAs have been delivered, and packages for the majority of the remaining metropolitan areas will be produced within the next year or so. Interested data users may contact either the agency that purchased the package or the Census Bureau. A complete description of the UTPP, a list of purchasers, or information on the cost and availability of a particular UTPP may be obtained by writing to the Chief, Journey-to-Work and Migration Statistics Branch, Population Division, Bureau of the Census, Washington, D.C. 20233.

## Linking the Urban Transportation Planning Package with the Urban Transportation Planning System\*

MICHAEL B. CLARKE

#### ABSTRACT

Methods are described in detail for accessing data from the Urban Transportation Planning Package on a mainframe computer. Specific procedures are explained for using the data as part of the Urban Transportation Planning System.

The purpose of this paper is to aid the user in getting the Urban Transportation Planning Package (UTPP) into a usable format for computer-assisted

urban travel modeling. The process of using the census data in a meaningful and easy manner can be difficult, and it is hoped that the reader will gain a better understanding of the mechanics of the data and their application.

This paper is organized in several sections in order to make the process more easily comprehensible and at the same time show the differences between the applications to be covered. Presented first is a general description of what the user will be confronted with when he receives the UTPP. In this section procedures the user may find helpful in using the tape, including how to access and use the UTPP print program, are detailed. The UTPP is compared with the past data-handling methods contained in UCEN70. In the next section how and why the user should reformat the UTPP data for use with the Urban Transportation Planning System (UTPS) and for use in microcomputer software packages are discussed. In the third section the creation of UTPS 2-files

\*From Arthur B. Sosslau and Michael B. Clarke, Case Studies: Applying the Urban Transportation Planning Package (UTPP) in Transportation Modeling, FHWA, U.S. Department of Transportation, January 1984.