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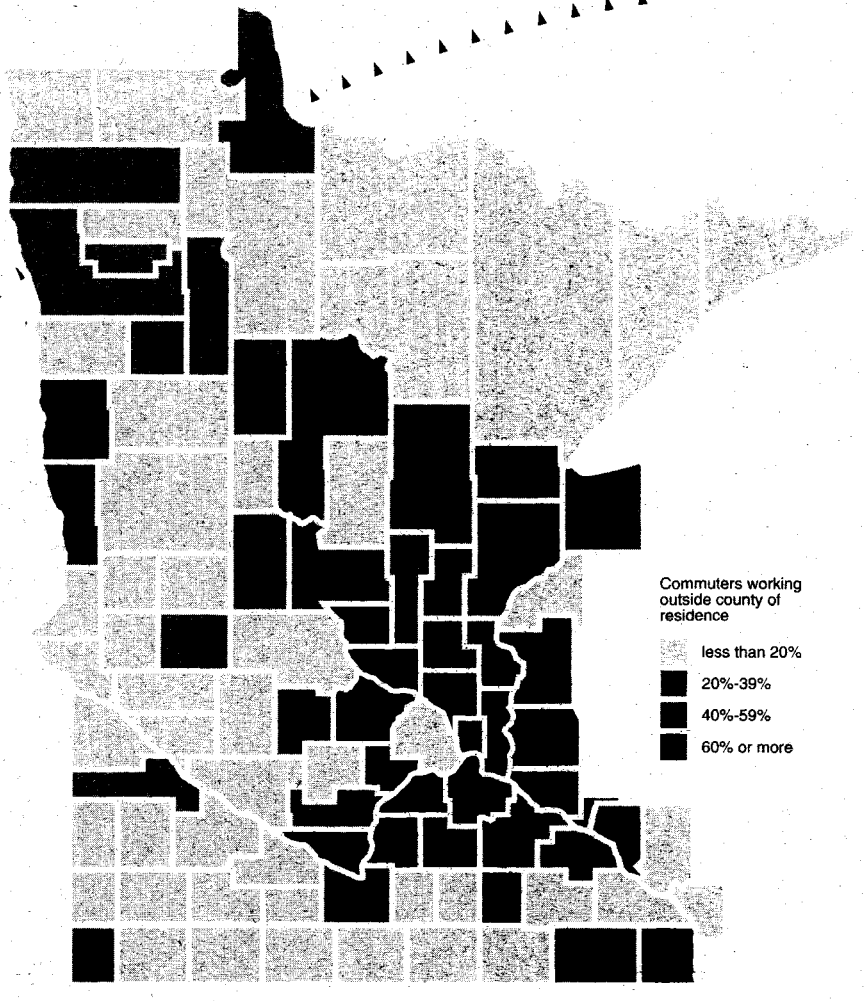

Long Distance Commuting in Minnesota

UNIVERSITY OF MINNESOTA
CENTER FOR TRANSPORTATION STUDIES

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Workers making long daily commutes in the 1950s were understood as those best able to afford amenities normally available outside the "urban core"--that is, the downtown central business district (CBD) plus adjacent transportation-industrial zones and high density residential neighborhoods within "central cities" such as Minneapolis and St. Paul. This report examines characteristics of Minnesota workers residing in Minnesota's metropolitan and non-metropolitan areas who made long duration (more than 30 minutes one way) commutes in 1990, concluding that early metropolitan-based models today lack much if not all of their former applicability.

Minnesota's average commute of 19.1 minutes fell below the national average of 19.7, but more than 450,000 Minnesota workers spent more than 30 minutes commuting each way. Long duration work journeys were not restricted to the stereotypical upper income suburban family. In all geographic categories, the largest group of long duration commuters came from two person households, whose commuting may reflect compromises between two job locations.

In a five county "exurban" (i.e., beyond continuously built-up suburban areas) study area between Minneapolis and St. Cloud, average auto commuting time was the state's highest, at nearly 26 minutes. Blue collar workers reported commuting times longer than professionals. Findings have implications for policy proposals such as highway improvements, toll roads, or new energy taxes.

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Long Distance Commuting in Minnesota

FINAL REPORT

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EXECUTIVE SUMMARY

This report examines long-distance commuting in Minnesota, and portrays selected characteristics of workers making long duration daily commutes. Economic and social changes of the past quarter century in Minnesota reorganized the state's settlement system along with the transportation systems that serve it. Sources and locations of jobs have changed, as have locations that people have selected for their homes. Sometimes people follow the new jobs in recreation, manufacturing, retailing, and services, but new jobs emerge as well where people choose to live. The daily commute connects job and residence for those who work outside the home.

In the early decades following World War II, transportation analysts generally agreed that workers making long commutes were those best able to afford amenities normally available outside the "urban core", that is, the downtown Central Business District (CBD) plus adjacent transportation-industrial zones and high density residential neighborhoods within "central cities" such as Minneapolis and St. Paul. Greater distances between home and work translated into larger time and money expenditures for transportation--making longer commutes generally unaffordable for persons below a certain income level. Lower socioeconomic status workers--laborers, domestic, and service employees--were understood to cluster around their work places more tightly than did those with higher status employment--managerial and professional workers.

These early metropolitan-based models have lost much if not all of their applicability to today's metro and non-metro commuting world. Regional labor markets have dispersed geographically, with workers from a broad range of socioeconomic backgrounds now traveling longer distances to work than in the past. Today, spouses and other household members may

hold diverse, full-time, part-time, and seasonal jobs, so the needs of more than one commuter affect the household's location decisions.

A large majority (79 percent) of Minnesota's 2.1 million commuters in 1990 traveled to work alone in private cars. The average commute duration of 19.1 minutes fell below the national average of 19.7, but more than 450,000 Minnesota workers spent 30 minutes or more traveling to work each way. Fewer than a fifth of the commuters used transit or ride sharing to and from work, but among those who did, nearly half had work journeys exceeding 30 minutes.

Long duration work journeys today are not restricted to the stereotypical upper-income suburban family. Inside metro areas, long distance solo commuting still appears concentrated within upper income classes compared with non-metro patterns, but average income disparities between metro and non-metro areas cloud income-based comparisons. A high proportion of suburban long-distance commuters come from households earning over $50,000, but the same proportion of non-metro workers commuting the same duration had aggregate household incomes under $30,000. In all geographic categories, the largest group of long duration commuters consistently come from two person households, whose travel behavior may reflect compromise between two remote job locations, and whose residential location decisions may be sensitive to fewer constraints than those faced by larger or smaller households.

Although work journeys of long duration in metropolitan areas are associated with high income, white-collar suburbanites living in relatively new and expensive housing, commutes in non-metropolitan areas are marked by a greater share of middle income, blue collar workers with larger families in modest housing. Thus, images of affluent, white-collar commuters are somewhat inaccurate for non-metro settings.

In a five county-study area lying on the fringe between the Twin Cities and St. Cloud, settlement has been expanding to encompass "exurban" communities, that is, those lying beyond the continuously built-up suburbs. Within that area, average travel time for auto

commuters is the state's highest, at nearly 26 minutes each way, while average household income exceeds $44,000. Recent movers in the area are more likely to work in the Twin Cities than their "stayer" counterparts, but they are not disproportionately white-collar managerial-professional workers.

Blue collar workers living in the study area report average commuting times longer than those of professionals, regardless of length of tenure in their housing. Blue collar workers moving in during the previous five years had the longest journey durations, just over 29 minutes. Thus, in the study area, white collar professionals are not the only group of workers who, either by choice or by necessity, commute from farther afield on a regular basis.

Although Twin City area data are consistent with the traditional relationship between socioeconomic prestige and work journey duration, socioeconomic characteristics for long-duration commuters living beyond the edges of urban areas indicate that complex processes are at work as household members decide about place of residence, job location, and journey to work.

Results from the five county exurban study area run counter to expectations that new arrivals would be affluent white-collar workers. Patterns turned out to be substantially more diverse than existing theories of commuting would lead us to believe. Findings have implications for those seeking to understand effects of public policy initiatives such as highway improvements, toll road construction, or the incidence on different user groups of energy tax proposals. For example, to accommodate steadily increasing numbers of long distance commuters with origins and/or destinations in Minnesota and Wisconsin counties adjacent to the Twin Cities Metropolitan Council seven-county planning area, by expanding and improving highways without charging a substantial share of the incremental infrastructure cost and operating expense to the users, will inevitably multiply aggregate costs of supplying urban services to scattered, newly developing exurban areas that currently lie beyond the reach of metropolitan planning and development management controls. Such an outcome would

perpetuate a half-century of costly post-World War II sprawl brought about by steady public subsidization of suburban development, with much of those costs imposed unfairly and disproportionately upon aging central cities.

INTRODUCTION

Three major forces have operated in recent decades to modify American patterns of commuting to jobs: the economy has changed in structure and in its patterns of locational distribution; households have changed in their composition and patterns of participation in the paid work force; and improved cars, cheap gasoline, and convenient highway transportation systems have loosened the geographical bonds tying home and work place. The results of these changes show up in part in census data on the journey to work.

This report examines long distance commuting in metropolitan and non-metropolitan Minnesota as reported by the 1990 U.S. Census of Population and Housing. The U. S. Bureau of the Census has published one percent and five percent Public Use Microdata Samples (PUMS) of long-form census returns since 1950. The PUMS contain detailed information from each sampled household, including place of residence (metro, non-metro, central city, suburb), occupations of household members, duration of commutes for household members working outside the home, mode of travel to work, value of housing (for owned housing), monthly contract rent paid (for rental housing), and date when the household moved to its present residence. Since the PUMS provide individual household records, with detailed locational identifiers removed to preserve confidentiality, cross tabulations of each variable with every other variable in the sample can be constructed. Selected cross tabulations for commuters residing in the State of Minnesota, and in a five county "exurban" study area lying between the Twin Cities and St. Cloud, form the basis for this report.

The report begins with a general overview of how the settlement patterns and the economic geography of the state have changed since World War II. Next, the report considers how theories of central city-focused job markets and commuting patterns of the 1940s and 1950s have become increasingly nonrepresentative of the broad commuting fields that have emerged

across the state in recent decades as metro area jobs disperse from the core, and as non-resource based employment opportunities have engaged workers across non-metro Minnesota.

With a focus on long duration (over 30 minutes) commutes, and the sample of commuter households divided between metro and non-metro residence, the report presents statistical profiles of commuters with respect to their household incomes, their occupations, their mode of travel to work, value of housing, and year moved into present housing. The report first examines long duration commuting throughout Minnesota, then takes a closer look at patterns within a five-county study area located between St. Cloud and the Twin Cities. Special attention is focused on solo commuters, who comprise the bulk of all commuters in the state.

The concluding section summarizes findings that Twin Cities metro area commuting data appear generally consistent with traditional theory, while findings from the exurban study area and from non-metro parts of the state suggest a need to revise traditional generalizations about long distance commuting, who engages in it, what is meant for the state, and how it may affect policy initiatives such as highway improvements and energy taxes.

I. LONG-DISTANCE COMMUTING IN MINNESOTA

This report examines long-distance commuting in metropolitan and nonmetropolitan Minnesota, and the characteristics of workers with long daily commute durations. Long work journey travel time is increasingly common in Minnesota and elsewhere in the Upper Midwest as economic and social changes reorganize life in America. The steady improvement of the state's highway system has made commuting patterns feasible that would have been judged impossible a generation ago. Moreover, gasoline is as cheap or cheaper in real terms as it was in recent decades, while cars are highly fuel efficient, reliable and comfortable. Under these circumstances it is understandable why we observe commuters going 40, 50, 60 miles or more one way daily to their jobs. This report examines data from the 1990 U.S. Census of Population and Housing to construct a profile of long-distance commuting in Minnesota, and to suggest some policy implications of the phenomenon.

II. AN OVERVIEW

Economic and social changes in Minnesota in the past twenty-five years have been reorganizing our settlement map, and the transportation and communications systems that connect and serve it. (Anding *et al.* 1990; Borchert 1987; Lukermann *et al.* 1991) Agriculture continues to mechanize as farm sizes increase, the number of farms continues to decline, and national and international competitive pressures on Minnesota farming intensify. Recreation and retirement activities along Minnesota's lakes and streams introduce fresh wealth and disposable incomes into areas of northern and central Minnesota that years ago watched their mineral resource-based industries languish, although certain segments of the timber, wood products, and paper manufacturing industries continue to prosper due to product innovation and sustained-yield forest management practices. (Hart 1991a, 1991b, 1992)

The state's manufacturers have diversified and modernized, spinning off to subcontractors much of the work formerly pursued in integrated operations under one roof. Small cities and towns across central and southern Minnesota that formerly earned their living mainly as collection points for agricultural output, and as central places distributing goods and services to tributary market areas, are now the sites of important manufacturing operations, some of considerable size, and of back-office clerical activities spun off from metropolitan areas.

General retailing has moved up the urban hierarchy to superstores in regional malls and shopping centers. Meanwhile, specialty retailing has percolated down the urban hierarchy to the store fronts on small town main streets. Wholesale distribution centers serving the entire region have emerged in the countryside along superhighways linking them to their customers and employees.

In business and professional services, when a county's population falls short of the size needed to support a medical specialist, a full service financial institution, or a fully qualified public administrator or planner, there are two solutions: move the nonresident service providers to the clients and customers, or move the customers longer distances to the services. For example, "circuit-riding" professionals may work a day or two per week in each of several small urban centers to provide what is needed, such as when a professional county administrator works for two or three counties. Or residents visit one town for one occasionally needed service such as legal assistance, but then visit another town for hospital and medical care. Daily and weekly activity orbits for today's households are substantially broader geographically than they were just a generation ago.

Job location requirements are changing in other ways as well. While itinerant professionals may serve a wide geographic area, telecommunications and other technological improvements allow additional commuting flexibility among many occupations. At-home assembly work is made feasible by lower shipping costs. Computer technology allows some

workers to commute via the information highway, thereby reducing the frequency of traditional commutes. California studies suggest that more than half of home telecommuters need only pencil and paper, and perhaps a telephone to carry on their work at home. (Telecommuting in the Twin Cities 1994)

Residential location needs of new and different types develop with the increasing complexity of household employment distribution. A family that once decided where to live on the basis of just one commuter's connection with a single employment location now faces constraints from several family members. Likewise, the rise in part-time employment and multiple job holding means an increase in the number of work locations affecting each household's location decision.

As Minnesota settlement reorganizes, some jobs follow the population and its purchasing power, while in other cases workers follow the jobs. Workers following jobs may mean relocating one's household from the Iron Range to St. Paul, or from Minneapolis to New Prague, or from Marshall to the Rochester area. But it may also mean long-distance commuting from a fixed residence to jobs on an ever changing employment landscape.

III. THE APPROACH

An understanding of how social and economic characteristics vary among different commuter groups is important for the effective design and implementation of transportation policy. Each of these attributes is well-documented individually. We know the average household income in a county, educational level in a census tract, or number of motor vehicles per household within a municipality. But traditional analysis is usually restricted to reporting how statistical averages vary from place to place without much attention to specific attribute combinations at the individual or household level.

Our purpose in this report is to extend understanding of socioeconomic and commuting patterns beyond the geographic limits of metropolitan areas and the analytical constraints of single-variable analysis. In doing so we challenge the application to nonmetropolitan areas of the traditional metropolitan area model describing positive correlations among occupation, income, and work journey length.

To this end, we use two approaches. First, we examine the socioeconomic characteristics of all workers in Minnesota who spend 30 minutes or more in the work journey, thus obtaining a rough surrogate for long-distance commuters across the state. Second, we explore in greater detail the same characteristics of workers in a study area on the fringe of the Twin Cities of Minneapolis and St. Paul.

IV. BACKGROUND

Past approaches to the study of commuter attributes revealed important characteristics of urban systems. For example, we can determine which areas in a city house workers with the greatest average work journey duration, the lowest average income, or the highest percentage holding college degrees. Over time, relocation of these concentrations can be traced across the metropolitan areas. Because of the large number of employment concentrations in metropolitan areas today and the mosaic of residential zones of different types within those areas, generalizations about work places and home places, along with actual and expected commuting flows among them, are frequently made in order to facilitate transportation planning.

Examining the statistical links between socioeconomic status (i.e., household type) and commute duration (i.e., journey to work activity) in metropolitan areas is not new. Common sense leads us to believe that persons with longer commutes are able to afford amenities that normally can be found only outside the urban core itself. Greater distances from the workplace

translate into larger time and monetary expenditures for transportation--making longer commutes generally unaffordable for persons below a certain income level. On the other hand, if households are prepared to relocate well beyond suburbia to small towns and rural areas of "exurbia", where housing is often substantially cheaper than either urban or suburban options, savings in housing costs can compensate for higher commuting costs.

Studies of the spatial structure of commuting patterns inside urban areas validate the positive relationship between various measures of socioeconomic status and length of daily commutes. A well known study from the 1960s illustrated a simple, typical relationship between average lengths of work journeys and average occupational status of urban workers when the large majority of workers resided within a few miles of their workplace, which was the typical case at that time (Figure 1). The residences of lower-status employees--categorized here as laborers, domestic, and service workers--clustered somewhat more tightly around their workplaces than did those of higher-status employees--classified as managerial and professional workers. When places of employment were concentrated in the urban core, which was largely the case in the early 1960s, a patterning of the metropolis emerged in which socioeconomic well-being increased with distance from the city center. As metro areas developed a multi-centered character in the decades following 1950, these post-war generalizations steadily broke down.

V. WEAKNESS OF THE TRADITIONAL MODEL

This abstract model relating average length of commute with socioeconomic status relies on certain restrictive assumptions that certainly were valid before World War II and for a decade or so following. But these assumptions fail to reflect changes in and near North American metropolitan regions during the past four decades. Recent studies in metropolitan areas have indeed failed to demonstrate persistence of those traditional relationships. Yet

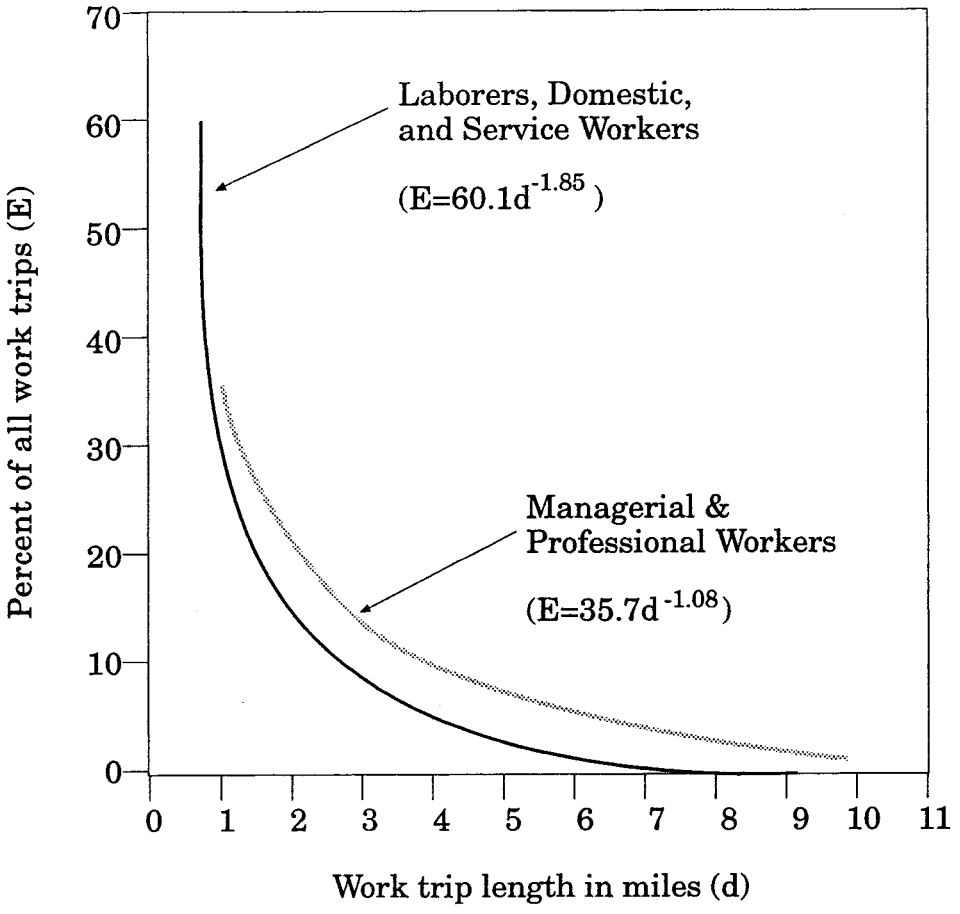


Figure 1. Distribution of Work Trips by Distance to Workplace.
Source: Adapted from Lowry (1964). ***A Model of Metropolis.*** Santa Monica, CA: Rand Corporation.

much contemporary thinking and research still incorporate this model of urban spatial behavior, and in some cases it is applied to areas well beyond the built-up portions of metropolitan areas.

There are several reasons to question the applicability of 1960s era metropolitan area-based explanations to 1990s conditions in rural or exurban communities, both on the basis of intuition as well as on a small but growing body of literature derived from a variety of geographical settings. (Clemente and Summer 1975; Brooker-Gross and Maraffa 1985) First of all, the general dispersal and lower overall densities of contemporary rural and exurban labor markets would seem to imply that workers from the broad range of the socioeconomic ladder would journey longer distances to work than in earlier decades. To be sure, some major office employers relocated to suburban locations, such as General Mills, Prudential, and Cargill, who moved from the Minneapolis CBD to expansive sites in the western suburbs to be closer to the residences of key employees. Others such as Gamble-Skogmo relocated from downtown Minneapolis to larger sites convenient to highway transportation. Meanwhile, new employment centers such as Southdale and Rosedale emerged in the post-war suburbs to tap suburban, auto oriented purchasing power. (Adams and VanDrasek 1993)

Second, the responsibility of supporting a household with work outside the home is often shared among two or more workers today. Spouses and other household members may hold diverse full-time, part-time and seasonal jobs at scattered locations. Thus, the needs of more than one commuter affect the household's location decision.

Third, the spatial distribution of available and satisfactory residential opportunities outside urban areas often sharply limits the tradeoffs that workers might otherwise make between commuting and moving. Workers may own or rent housing in weak real estate markets where rentals are low or perhaps falling, and where the value of owner-occupied

housing is stable or even dropping. Renters may be unable to find substitute housing at better locations at prices they can afford.

If owners decide to sell their house, it might mean incurring a capital loss, with little prospect that equivalent alternative housing could be found at another more convenient location. So they decide to maintain their present housing and take employment where they can find it, even though this choice often means substantial commutes. Thus, even low-wage or low-skill workers may devote considerable time and expense to the work journey, especially in the case of declining Minnesota rural counties, where workers increasingly search far afield for jobs.

VI. MINNESOTA'S LONG-DISTANCE COMMUTERS

What is the socioeconomic profile of commuters in Minnesota, a state with its share of both rural counties losing population, as well as growing communities on metropolitan fringes? When Minnesota is compared with the United States on a series of work journey indicators, most measures are approximately in line with the national profile (Table 1). The lower statewide proportion of workers using public transit is certainly due in part to the low population density of Minnesota's urban and rural areas relative to the rest of the nation, and possibly from competition from the use of van pools, bicycles, and walking as means of transportation to work.

Relative affluence of the Minnesota population contributes to the lower percentage using transit, as well as to the slightly lower than average auto occupancy nationwide. The large majority (79 percent) of Minnesota's 2.1 million commuters travel to work alone in private automobiles according to the 1990 U.S. Census, further accounting for the lower-than-average auto occupancy figure for the state.

Table 1. Work Journey Indicators for Minnesota and the U.S., 1990

	Minnesota (as percent of all commuters)	**United States** (as percent of all work trips)
Mode of travel to work (percent):		
By Automobile (Car, Truck, or Van)	90.9	91.4
By Public Transit	3.8	5.5
By Other Means	5.3	3.1
Average Auto Occupancy (persons/trip)	1.07	1.10
Average Commute Travel Time (minutes)	19.1	19.7

Note: Work journey data from the census are based on the percentage of individuals with particular work journey characteristics. Nationwide Personal Transportation Survey data are based on work trips within a week. *Source*: U.S. Bureau of the Census, 1990 Census of Population and Housing; 1990 Nationwide Personal Transportation Survey.

Access to a private car for a solo work journey is a clear measure of economic well-being in most cases. Also of note is Minnesota's relatively short commute average duration of 19.1 minutes compared with 19.7 minutes nationwide. The difference is probably attributable to the low density of settlement in and around the major employment centers like the Twin Cities area as well as the high level of private auto access. In general, low density metropolitan areas across the U.S. offer better mobility for their residents than do high density areas, which tend to have a higher proportion of their built up central city and inner suburban areas inherited from an earlier era. (Adams 1987; Abler et al. 1976)

These general measures inform us, but fail to portray directly and sufficiently the population's well-being. Socioeconomic disparities exist between commuters traveling alone by car compared with those in carpools or public transit, a finding consistent with the urban transportation literature (Figures 2 and 3). While just 23 percent of Minnesota's solo commuters come from households earning under $30,000 annually, the corresponding figure for those using other transportation means (transit, van pool, bicycle, taxi, etc.) is 31 percent across the state.

As mentioned above, the average Minnesota work journey length of 19.1 minutes falls just under the national indicator. This aggregate figure, however, conceals substantial variation among different types of commuters in different parts of the state. In fact, more than 450,000 Minnesota workers representing nearly a quarter of all commuters, spend 30 minutes or more traveling to work each way. Our overview completed, we turn next to analysis characterizing in greater detail the statewide population of long-distance commuters.

VII. METHODOLOGY

Our approaches use data from the Public Use Microdata Sample (PUMS) file, of the 1990 Census of Population and Housing. These data provide stratified, one or five percent samples of

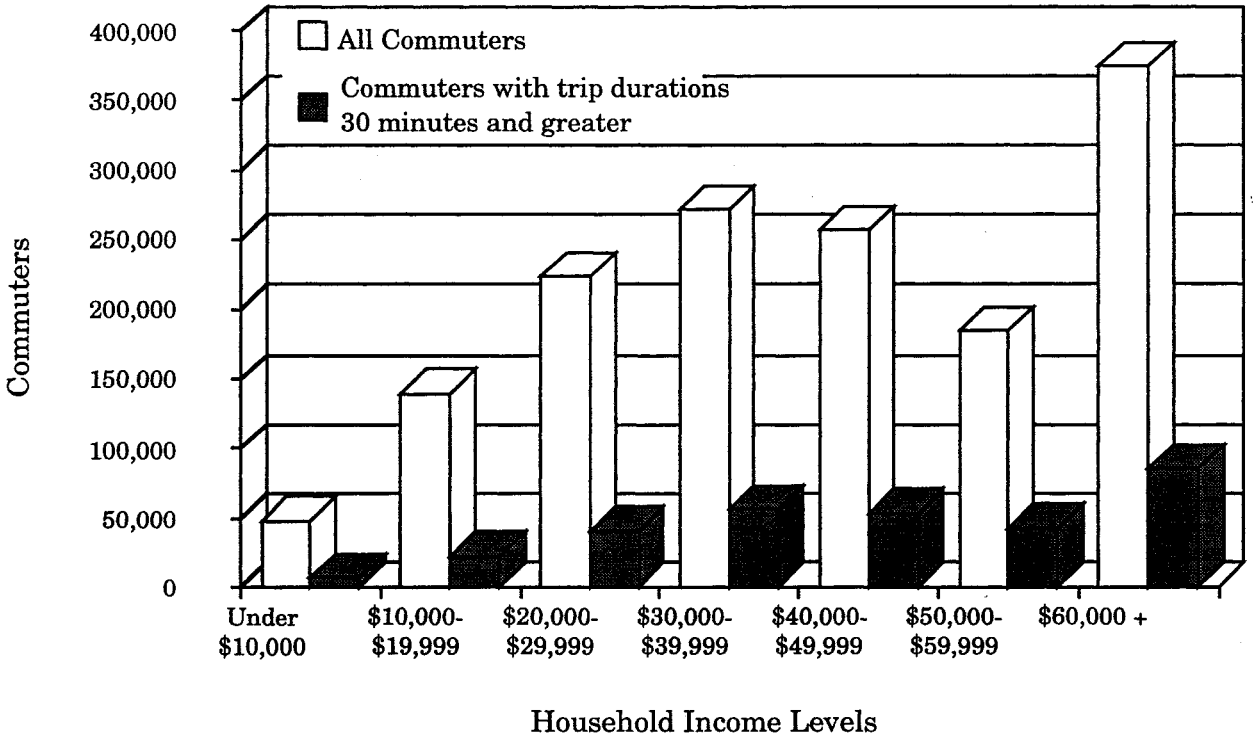


Figure 2. Household Income Levels of Minnesota Commuters Driving to Work Alone

Source: U.S. Bureau of the Census, special tabulations of the Public Use Microdata Sample (1 percent sample), 1990. Calculations by the authors.

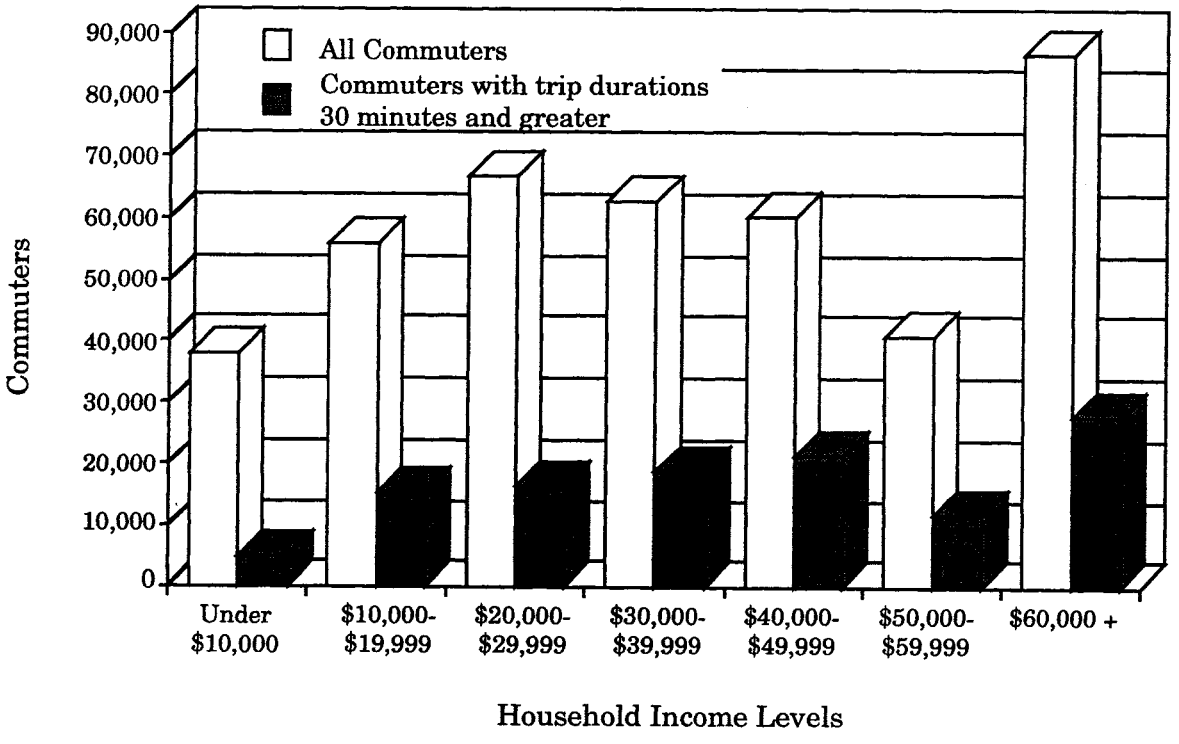


Figure 3. Household Income Levels of Minnesota Commuters Who Travel to Work by Other Means

Source: U.S. Bureau of the Census, Special Tabulations of the Public Use Microdata Sample (one percent sample), 1990. Calculations by the authors.

all responses to the long-form census questionnaire and thereby allow detailed analysis of household and individual data not available from any other source. (See Appendix C) To avoid inappropriate disclosure of personal information, however, the Census Bureau removes all but the most crude locational identifiers. This practice sacrifices geographic detail in order to preserve household and individual detail.

For the first portion of our analysis, we extracted records from the Minnesota PUMS file for all employed persons making one-way work journeys with durations exceeding 30 minutes. The census questionnaire asked : "How many minutes did it usually take this person to get from home to work LAST WEEK?" The question made no mention of linked work trips such as a stop at a day care center or coffee shop on the way to work. No attention is paid to trips home from work, or to stops made along the way, as was done in the 1990 Twin City area Transportation Behavior Inventory.

The next step sorted the records by metropolitan and non-metropolitan areas. Metro counties included the ten Minnesota counties in the 1990 Minneapolis-St. Paul MSA, St. Louis (Duluth MSA), Clay (Fargo-Moorhead MSA), Benton, Sherburne, and Stearns (St. Cloud), and Olmsted (Rochester MSA). Comparisons between census years are based on 1990 MSA definitions. (See appendices.) For the Minneapolis-St. Paul area, which includes over half of the state's population, geographic differentiation into central city and suburban categories is also determined.

PUMS file records provide no geographic specificity beyond these general levels. As an alternative, the data tabulation and presentation formats make use of a subdivision of the state into groups of contiguous counties with aggregate population thresholds of approximately 100,000 persons. At this population size, the Census Bureau is able to sample populations large enough to ensure anonymity and statistical confidence. The area subdivisions are referred to

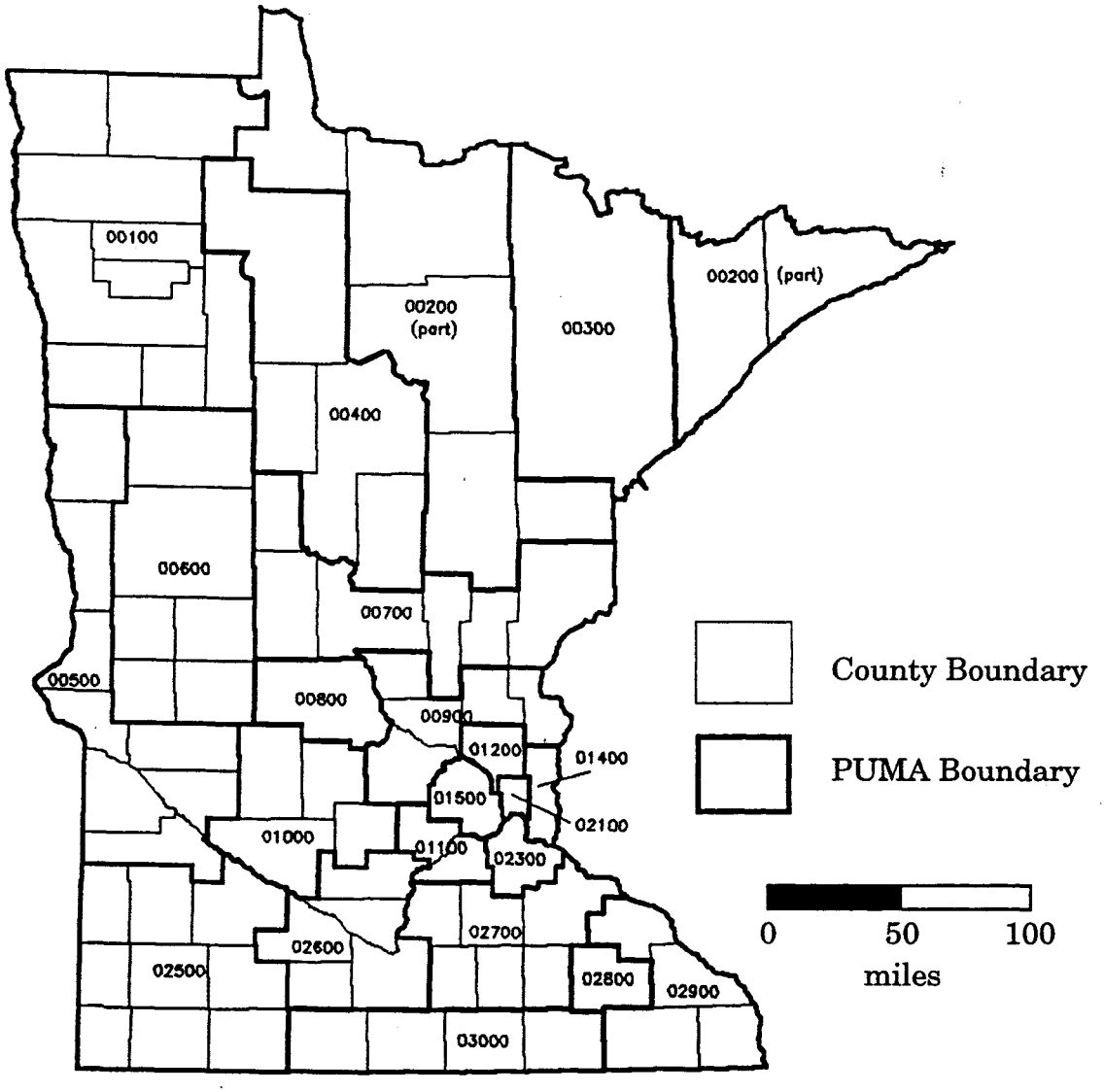
as Public Use Microdata Areas (PUMAs) (Figure 4). The state is completely subdivided into non-overlapping PUMAs. For the one and five percent samples, PUMA boundaries differ.

The second phase of the analysis focuses on a study area identified by the Census Bureau as PUMA 00900 from the 5 percent sample, designated to encompass parts of five counties straddling the increasingly blurred boundary between Minneapolis-St. Paul and St. Cloud (Figure 5). This particular PUMA is an especially appropriate one for both examining suburban and exurban commuting based on the distribution of commute destinations within the state, and demonstrating how PUMS data can be used to study long-distance commuting at the substate level.

In the 1980s, the study area experienced nearly a 25 percent population growth to its 1990 total of nearly 200,000. It is located between two overlapping urban systems--Minneapolis-St. Paul, and St. Cloud. A number of counties in this part of the state send commuters to more than one urban center, reflecting considerable intermixing of local labor markets. One of the counties studied, Sherburne County, splits its work journeys evenly between the Twin Cities area and the St. Cloud area, prompting the Census Bureau to classify part of the city of St. Cloud within the Minneapolis-St. Paul MSA.

To sketch a basic profile of commuters in the study area, we used the five percent PUMS file for Minnesota and identified all employed persons living in PUMA 00900 who traveled to work alone by car. These criteria provided a sample size of just under 5,000 persons, or 2.5 percent of all persons living in PUMA 00900.

Variables combined in cross-tabulations for analysis include occupation, household income, journey to work length, mode of commute, tenure at current residence, and household size. Selection is based on relevance to exhibiting socioeconomic status. The most significant results for both approaches are outlined below.



Not shown: PUMA boundaries within Anoka, Dakota, Hennepin, and Ramsey counties

Figure 4. Minnesota 5 Percent Sample Public Use Microdata Areas (PUMAs), 1990

Source: 1990 U.S. Bureau of the Census. Public Use Microdata Sample Technical Documentation.

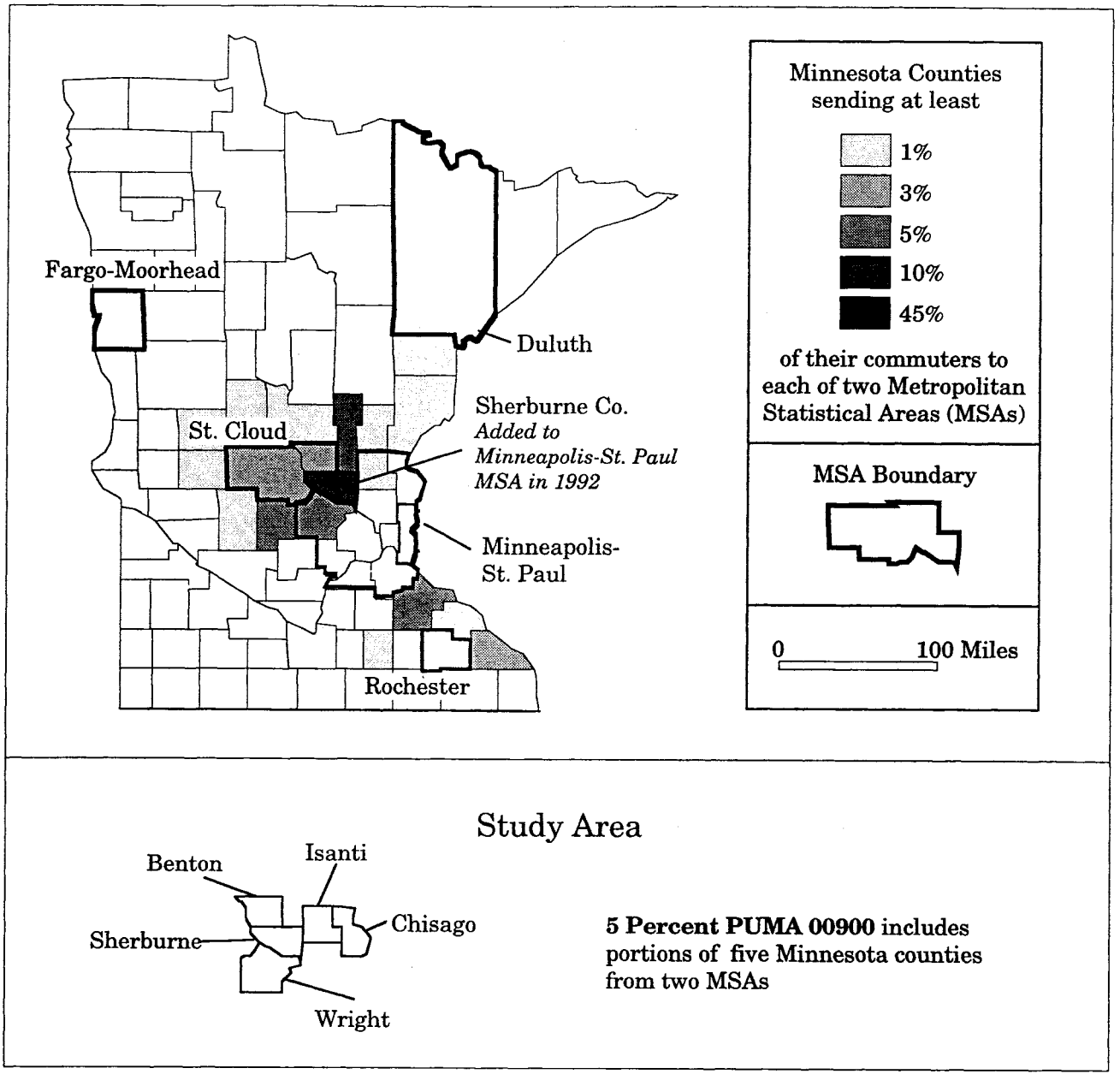


Figure 5. Study Area Bridging the St. Cloud-Twin Cities Metropolitan Areas

Source: Special tabulations of decennial U.S. Census journey-to-work frequency tables and Bureau of Economic Analysis data.

Note: MSA boundaries shown are as of June 30, 1990--U.S. Bureau of the Census.

VIII. RESULTS: PART 1 -- STATEWIDE ANALYSIS FROM PUMS DATA

A. SOLO COMMUTERS IN 1990

Initial findings disclose income differences among solo and shared-journey commuters across the state by work trip duration. Overall, more than three-quarters of Minnesota's 2.1 million workers are "solo commuters," making their work trip alone in a private automobile. More than a quarter of these individuals spend 30 minutes or more each way in the work journey. Commutes of at least 30 minutes duration are characterized as long-distance commutes in this analysis.

Commutes of long duration are less common among workers from lower-income households (< $30,000) than for those from upper income households (Table 2). Over 40 percent of workers with commuting time at or exceeding 30 minutes actually have household incomes of $50,000 or more. The median household income of long-distance commuters is approximately 5 percent higher than for all solo commuters, further differentiating them among workers. At the state level, sample sizes are large enough that statistics derived from them generally are highly significant statistically.

B. LONG-DURATION COMMUTERS USING OTHER MEANS OF TRANSPORTATION IN 1990

Similar patterns emerged when the same income breakdown is applied to commuters using means other than solo commuting in private cars (i.e., carpools, transit, bicycles, walking, taxis, etc.) for their work journeys (Table 3). Consistent with national trends, less than one-fifth of the working population use transit or ride sharing as their usual means of transportation to and from the workplace during the week. Among these, nearly one-half had work journey times greater than 30 minutes. This finding seems logical given the additional time required for shared or mass transit routing.

Table 2. Minnesota Commuters Who Drive to Work Alone, by Household Income Level

Income Category	All Commuters		Workers Commuting more than 30 Minutes	
Under $10,000	47,587	*3.2%*	6,785	*2.2%*
$10,000-$19,999	139,472	*9.3%*	22,517	*7.3%*
$20,000-$29,999	223,652	*14.9%*	41,170	*13.4%*
$30,000-$39,999	271,147	*18.1%*	56,396	*18.3%*
$40,000-$49,999	256,381	*17.1%*	53,337	*17.3%*
$50,000-$59,999	184,644	*12.3%*	42,481	*13.8%*
$60,000 and above	374,233	*25.0%*	85,491	*27.7%*
TOTAL	**1,497,116**	**100.0%**	**308,177**	**100.0%**
MEDIAN*	**$42,601**		**$45,103**	

*Medians interpolated assuming continuous distribution within each class.

Source: U.S. Bureau of the Census, Special tabulations of the Public Use Microdata Sample (1 percent sample), Minnesota, 1990. Calculations by the authors.

Table 3. Minnesota Commuters Who Travel to Work by Other Means, by Household Income Level

Income Category	All Commuters		Workers Commuting More than 30 Minutes	
Under $10,000	37,973	*9.2%*	4,899	*4.2%*
$10,000-$19,999	56,120	*13.6%*	15,226	*13.1%*
$20,000-$29,999	66,792	*16.2%*	16,330	*14.0%*
$30,000-$39,999	62,928	*15.3%*	18,791	*16.2%*
$40,000-$49,999	60,214	*14.6%*	21,505	*18.5%*
$50,000-$59,999	40,756	*9.9%*	11,661	*10.0%*
$60,000 and above	86,480	*21.0%*	27,830	*23.9%*
TOTAL	**411,263**	**100.0%**	**116,242**	**100.0%**
MEDIAN*	**$37,110**		**$41,337**	

*Medians interpolated assuming continuous distribution within each class.

Source: U.S. Bureau of the Census, Special tabulations of the Public Use Microdata Sample (1 percent sample), Minnesota, 1990. Calculations by the authors.

As in the case of long-duration solo commuters, a significant proportion of those commuting long durations by other means lived in households with annual incomes above $50,000. That is, nearly 34 percent of long-duration commuters using alternative means came from households with $50,000 or higher incomes, while nearly 40 percent of all long-distance commuters came from such households. At low end of the income distribution, almost one in four commuters statewide who drive to work alone more than 30 minutes lived in households earning under $30,000 annually (Table 2). About 17 percent of Minnesota commuters with household incomes under $20,000 used means other than solo commuting for their long duration journeys to work, a rate almost double the percentage of solo long duration commuters in the same income bracket (Tables 2 and 3).

C. LONG-DURATION SOLO COMMUTING BY TYPE OF AREA

Disaggregating long-distance commuter groups further on the basis of residential location, the relationships between income, journey length, and mode are less straightforward (Tables 4 and 5). Inside metro areas, long-distance solo commuting generally concentrates among the upper income classes to a greater degree than the non-metro workers with commuting times exceeding 30 minutes. But then, overall metro area median income is nearly 50 percent higher than the state's non-metro median; the difference between median incomes of metro and non-metro long-distance commuters is 40 percent. In fact, almost a third of the long-distance solo commuters living in metro areas come from households with incomes exceeding $60,000, while in non-metro areas, the share is less than 11 percent.

In addition to prompting speculation whether these households might be likely candidates for telecommuting, this disparity prompts us to question whether differences between the metro and non-metro areas' income proportions with respect to long-distance solo commuting mainly reflect lower cost-of-living in non-metro areas, or possibly better

Table 4. Minnesota Long-Distance Commuters Who Drive to Work Alone, by Household Income Level and Geographic Area

Income Category	Outside Metro Area		Within Metro Areas						Total	
			Central City		Rest of Metro Areas					
Under $10,000	3,105	*5.0%*	1,610	*5.3%*	2,070	*1.0%*	3,680	*1.5%*	**6,785**	*2.2%*
$10,000-$19,999	8,832	*14.3%*	4,554	*14.9%*	9,131	*4.2%*	13,685	*5.6%*	**22,517**	*7.3%*
$20,000-$29,999	12,581	*20.4%*	5,681	*18.6%*	22,908	*10.6%*	28,589	*11.6%*	**41,170**	*13.4%*
$30,000-$39,999	13,938	*22.6%*	5,888	*19.2%*	36,570	*16.9%*	42,458	*17.2%*	**56,396**	*18.3%*
$40,000-$49,999	11,270	*18.3%*	3,473	*11.4%*	38,594	*17.9%*	42,067	*17.1%*	**53,337**	*17.3%*
$50,000-$59,999	5,359	*8.7%*	2,875	*9.4%*	34,247	*15.9%*	37,122	*15.1%*	**42,481**	*13.8%*
$60,000 and above	6,624	*10.7%*	6,509	*21.3%*	72,358	*33.5%*	78,867	*32.0%*	**85,491**	*27.7%*
TOTAL	**61,709**	**100.0%**	**30,590**	**100.0%**	**215,878**	**100.0%**	**246,468**	**100.0%**	**308,177**	**100.0%**
MEDIAN*	**$34,546**		**$35,859**		**$49,653**		**$48,277**		**$45,103**	

*Medians interpolated assuming continuous distribution within each class.

Source: U.S. Bureau of the Census, Special tabulations of the Public Use Microdata Sample (1 percent sample), Minnesota, 1990. Calculations by the authors.

Table 5. Minnesota Long-Distance Commuters Who Travel to Work by Other Means, by Household Income Level and Geographic Area

Income Category	Outside Metro Area		Within Metro Areas						Total	
			Central City		Rest of Metro Areas					
Under $10,000	1,288	*5.5%*	2,691	*9.1%*	920	*1.5%*	3,611	*3.9%*	**4,899**	*4.2%*
$10,000-$19,999	3,657	*15.7%*	7,636	*25.7%*	3,933	*6.2%*	11,569	*12.5%*	**15,226**	*13.1%*
$20,000-$29,999	4,830	*20.7%*	4,738	*16.0%*	6,762	*10.7%*	11,500	*12.4%*	**16,330**	*14.0%*
$30,000-$39,999	6,210	*26.6%*	3,289	*11.1%*	9,292	*14.7%*	12,581	*13.5%*	**18,791**	*16.2%*
$40,000-$49,999	3,243	*13.9%*	3,289	*11.1%*	14,973	*23.7%*	18,262	*19.7%*	**21,505**	*18.5%*
$50,000-$59,999	1,587	*6.8%*	2,944	*9.9%*	7,130	*11.3%*	10,074	*10.8%*	**11,661**	*10.0%*
$60,000 and above	2,530	*10.8%*	5,106	*17.2%*	20,194	*32.0%*	25,300	*27.2%*	**27,830**	*23.9%*
TOTAL	**23,345**	**100.0%**	**29,693**	**100.0%**	**63,204**	**100.0%**	**92,897**	**100.0%**	**116,242**	**100.0%**
MEDIAN*	**$33,055**		**$29,538**		**$47,142**		**$43,935**		**$41,337**	

*Medians interpolated assuming continuous distribution within each class.

Source: U.S. Bureau of the Census, Special tabulations of the Public Use Microdata Sample (1 percent sample), Minnesota, 1990. Calculations by the authors.

opportunities for two worker households to earn a high income in metro areas compared with non-metro areas, or other determining factors.

Significant variations in long-distance solo commuting appear between central city and suburban areas of the Twin Cities area as well. Although a high proportion of suburban (i.e., "Rest of MSA") long-distance commuters come from households earning over $50,000, nearly the same proportion of non-metro workers commuting the same duration live in homes with aggregate incomes below $30,000. Median household income is, unsurprisingly, higher in the suburban ring than in the central cities of the Twin Cities at $49,653 (vs. $35,859) for solo long-distance commuters, and $47,142 (vs. $29,538) among long-distance carpool and transit users.

The corresponding median incomes for long-distance solo commuters from non-metropolitan areas are almost $14,000 lower than their urban counterparts. The only other group of long-distance solo commuters with a higher proportion of households earning below $30,000 is central city households in which the employed utilize transit or carpools for work journeys greater than 30 minutes (median household income $29,538).

D. LONG-DURATION SOLO COMMUTING AND OTHER CHARACTERISTICS

Results thus far suggest that long work journeys are not solely a mark of the stereotypical upper-income suburban family. Further support for this conclusion comes from data on household size, housing characteristics, and occupation of long-distance solo commuters in non-metropolitan communities. Nearly one in five of this group live in households of five or more members, compared with about one in seven from inside metro areas (Table 6).

Likewise, about two in five long duration commuters living in metro areas reside in households with fewer than three persons, while only about one in three of those in non-metro

Table 6. Minnesota's Long-Distance Commuters, by Household Size and Geographic Area

Household Size	Outside Metro Area		Within Metro Areas						Total	
			Central City		Rest of Metro Areas					
1	5,244	*6.2%*	14,007	*23.2%*	20,102	*7.2%*	34,109	*10.1%*	**39,353**	*9.3%*
2	22,241	*26.1%*	19,044	*31.6%*	82,018	*29.4%*	101,062	*29.8%*	**123,303**	*29.1%*
3	20,263	*23.8%*	11,500	*19.1%*	67,160	*24.1%*	78,660	*23.2%*	**98,923**	*23.3%*
4	21,229	*25.0%*	7,843	*13.0%*	71,852	*25.7%*	79,695	*23.5%*	**100,924**	*23.8%*
5 or more	16,077	*18.9%*	7,889	*13.1%*	37,950	*13.6%*	45,839	*13.5%*	**61,916**	*14.6%*
TOTAL	**85,054**	**100.0%**	**60,283**	**100.0%**	**279,082**	**100.0%**	**339,365**	**100.0%**	**424,419**	**100.0%**

Source: U.S. Bureau of the Census, Special tabulations of the Public Use Microdata Sample (1 percent sample), Minnesota, 1990. Calculations by the authors.

areas come from households of fewer than three persons. In all geographic categories, however, the largest group of long-distance commuters consistently comes from two person households. Residential location decisions seem to be sensitive to fewer constraints within this group. The dual income, two-person household's travel behavior, for example, may reflect a compromise between two remote employment locations.

Among those non-metro long-distance commuters who are homeowners, 55 percent have lived in the same house for longer than five years as of 1990, compared with only 46 percent in metro areas. This contrast reflects the expected higher mobility rates among metro residents. Housing value inconsistencies between non-metro and metro places are also exhibited from the PUMS data. The median home value of metro area long-distance commuters surpasses its non-metro counterpart by almost $40,000 (Tables 7 and 8). Cost-of-living differences among metro and non-metro places are reflected again in the housing value data.

Perhaps most striking, however, is the variation within occupation breakdowns of long-distance solo commuters within the state. Employment appears to be divided more evenly among occupational types in non-metropolitan areas than in metro areas (Figures 6 and 7). While the proportion of operators, fabricators, and laborers is twice as high outside metropolitan areas as inside, it is not much larger than metro areas' proportion of managerial and professional specialty employees. These figures are based on responses to the occupation question in the census long form which could be classified--approximately 75 percent of all individuals surveyed.

In short, Part 1 of our analysis demonstrates that while work journeys of long duration within metropolitan areas are associated with high income, white-collar suburbanites living in relatively new and expensive housing, those in non-metropolitan areas are marked by a greater

Table 7. Minnesota's Long-Distance Solo Commuters, by Year Moved to Current Residence and Geographic Area

Year Moved	Outside Metro Area		Within Metro Areas						Total	
			Central City		Rest of Metro Areas					
Before 1960	4,094	*6.6%*	483	*1.6%*	7,314	*3.4%*	7,797	*3.2%*	**11,891**	*3.9%*
1960-1969	5,037	*8.2%*	2,369	*7.7%*	16,192	*7.5%*	18,561	*7.5%*	**23,598**	*7.7%*
1970-1979	13,685	*22.2%*	3,611	*11.8%*	45,885	*21.3%*	49,496	*20.1%*	**63,181**	*20.5%*
1980-1984	10,925	*17.7%*	4,715	*15.4%*	32,637	*15.1%*	37,352	*15.2%*	**48,277**	*15.7%*
1985-1988	17,733	*28.7%*	11,477	*37.5%*	73,991	*34.3%*	85,468	*34.7%*	**103,201**	*33.5%*
1989-1990	10,120	*16.4%*	7,774	*25.4%*	39,698	*18.4%*	47,472	*19.3%*	**57,592**	*18.7%*
Not Specified	115	*0.2%*	161	*0.5%*	161	*0.0%*	322	*0.1%*	**437**	*0.1%*
TOTAL	**61,709**	**100.0%**	**30,590**	**100.0%**	**215,878**	**100.0%**	**246,468**	**100.0%**	**308,177**	**100.0%**

Source: U.S. Bureau of the Census, Special tabulations of the Public Use Microdata Sample (1 percent sample), Minnesota, 1990. Calculations by the authors.

Table 8. Minnesota's Long-Distance Solo Commuters, by Housing Value and Geographic Area

Income Category	Outside Metro Area		Within Metro Areas						Total	
			Central City		Rest of Metro Areas					
Less than $25,000	8,257	*16.0%*	0	*0.0%*	5,589	*3.0%*	5,589	*2.7%*	**13,846**	*5.4%*
$25,000-$49,999	16,468	*32.0%*	1,587	*8.7%*	4,324	*2.3%*	5,911	*2.9%*	**22,379**	*8.8%*
$50,000-$74,999	14,398	*28.0%*	6,854	*37.8%*	39,422	*21.2%*	46,276	*22.7%*	**60,674**	*23.7%*
$75,000-$99,999	7,015	*13.6%*	6,141	*33.8%*	63,503	*34.2%*	69,644	*34.1%*	**76,659**	*30.0%*
$100,000-$149,999	4,232	*8.2%*	2,438	*13.4%*	48,990	*26.3%*	51,428	*25.2%*	**55,660**	*21.8%*
$150,000 and greater	1,081	*2.1%*	1,127	*6.2%*	24,104	*13.0%*	25,231	*12.4%*	**26,312**	*10.3%*
TOTAL	**51,451**	**100.0%**	**18,147**	**100.0%**	**185,932**	**100.0%**	**204,079**	**100.0%**	**255,530**	**100.0%**
MEDIAN*	**$51,737**		**$77,575**		**$92,176**		**$90,889**		**$85,066**	
Not Specified**	10,258		12,443		29,946		42,389		**52,647**	

*Medians interpolated assuming continuous distribution within each class.
**No housing value recorded. Housing units are not owner-occupied.

Source: U.S. Bureau of the Census, Special tabulations of the Public Use Microdata Sample (1 percent sample), Minnesota, 1990. Calculations by the authors.

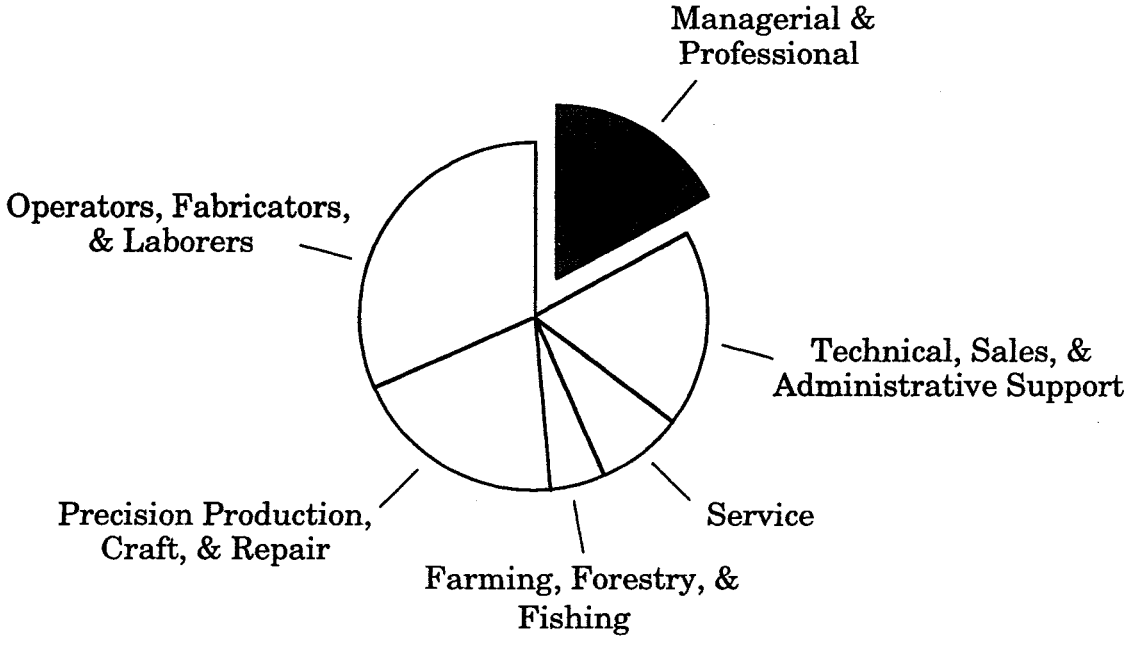


Figure 6. Occupations of Minnesota's Long-Distance Solo Commuters in Nonmetropolitan Areas

Source: U.S. Bureau of the Census, Special tabulations of the Public Use Microdata Sample (1 percent sample), 1990. Calculations by the authors.

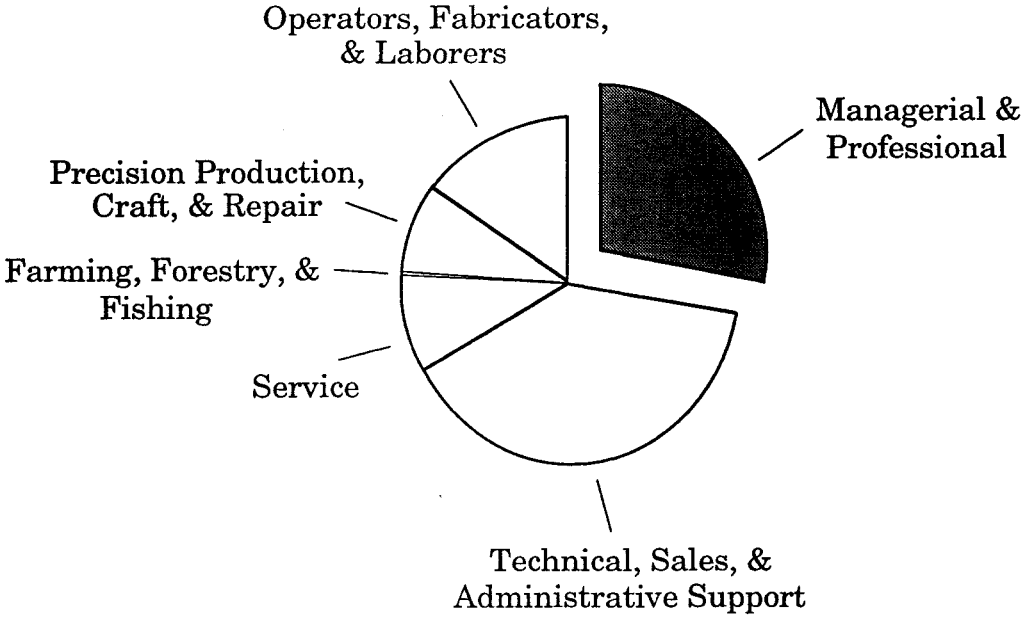


Figure 7. Occupations of Minnesota's Long-Distance Solo Commuters in Metropolitan Areas

Source: U.S. Bureau of the Census, Special Tabulations of the Public Use Microdata Sample (1 percent sample), 1990. Calculations by the authors.

share of middle-income, blue-collar workers with larger families in modest housing. Apparently non-metro blue collar workers find fewer job opportunities close to home and thus must travel farther to find satisfactory work.

We cannot, however, draw any further inferences from these results, other than to conclude that images of affluent, white-collar commuters are somewhat inaccurate in non-metropolitan settings. Indeed, these findings are unsurprising, given the concentration of professional jobs and higher-priced housing in the metropolitan economy. What about areas on the fringe, where the metropolitan area is expanding to encompass communities in the "exurbs" beyond the suburbs? The expansion of an urban system carries metropolitan commuting patterns outward, and often brings with it an influx of affluent, white-collar commuters. The system also eventually engulfs old established independent communities like Forest Lake, Stillwater, Hastings, and Shakopee and incorporates them into the metro system, partly as transportation nodes and employment centers, but also as outlying residential suburbs with distinctive personalities and significant histories in their own right.

IX. RESULTS: PART 2 - METRO AREA ANALYSIS FOR STUDY AREA "PUMA 00900"

As mentioned above, we approach these questions through analysis of the five percent sample PUMS file for the five county study area lying between the Twin Cities and St. Cloud areas (Figure 5). All employed persons traveling to work alone by car are the basis for our study. In line with expectations, the average travel time of workers in the study area is the state's highest among the PUMAs compared, at nearly 26 minutes each way, and average household income exceeds $44,000.

Yet desegregating the sample by housing tenure and worker occupation yields interesting results. Movers, defined as residents living in their present homes less than five

years, are more likely to work in the Twin Cities than their "stayer" counterparts (Table 9). These findings suggest a certain number of workers move into exurbia while maintaining their job ties to the metropolitan economy. These workers are not, however, disproportionately white-collar, defined in terms of managerial and professional occupations. Slightly fewer of the white-collar workers travel to the Twin Cities for jobs than do their operator, fabricator, and laborer counterparts.

While a cumulative plot of travel time does show a slight divergence on the basis of housing tenure, the difference is not statistically significant (Figure 8). In contrast, household income is significantly lower among newly arrived exurban residents, while stayers report an average of nearly $47,000 (Table 10). This latter figure appears to reflect a larger share of non-wage earnings for established exurban residents, while the income of new arrivals more closely reflects earned wages.

A simple dichotomy of occupational prestige--between 1) managerial and professional specialty occupations, and 2) operators, fabricators, and laborers--reveals other interesting findings. Blue-collar workers report average travel times higher than those of professionals, regardless of tenure. Blue-collar workers who moved in the last five years report the longest average work journey, just over 29 minutes. Thus, white-collar professionals are clearly not the only group of workers who, either by choice or by necessity, commute from farther afield on a regular basis.

X. CONCLUSIONS AND POLICY ISSUES

Part 1 illustrates some major qualifications for the positive relationship between socioeconomic prestige and work journey length in metropolitan areas. While data for the Twin Cities MSA support the traditional pattern, analysis of socioeconomic characteristics for

Table 9. Place of Work, by Mobility Status and Occupation

Place of Work	*Movers*		*Stayers*	
	All	Managerial and Professional	All	Managerial and Professional
Sample Size	2,192	532	2,723	604
Within Study Area	44.4%	45.9%	53.3%	49.1%
Stearns County	11.5%	13.9%	10.4%	12.9%
Twin Cities				
(Suburbs)	31.3%	26.1%	24.6%	24.5%
(Central Cities)	8.5%	8.3%	8%	8.9%
Elsewhere	4.2%	5.7%	3.7%	4.4%

Source: U.S. Bureau of the Census, 1990 Census of Population and Housing (Minnesota). Special tabulations of the Public Use Microdata Sample (5 percent sample).

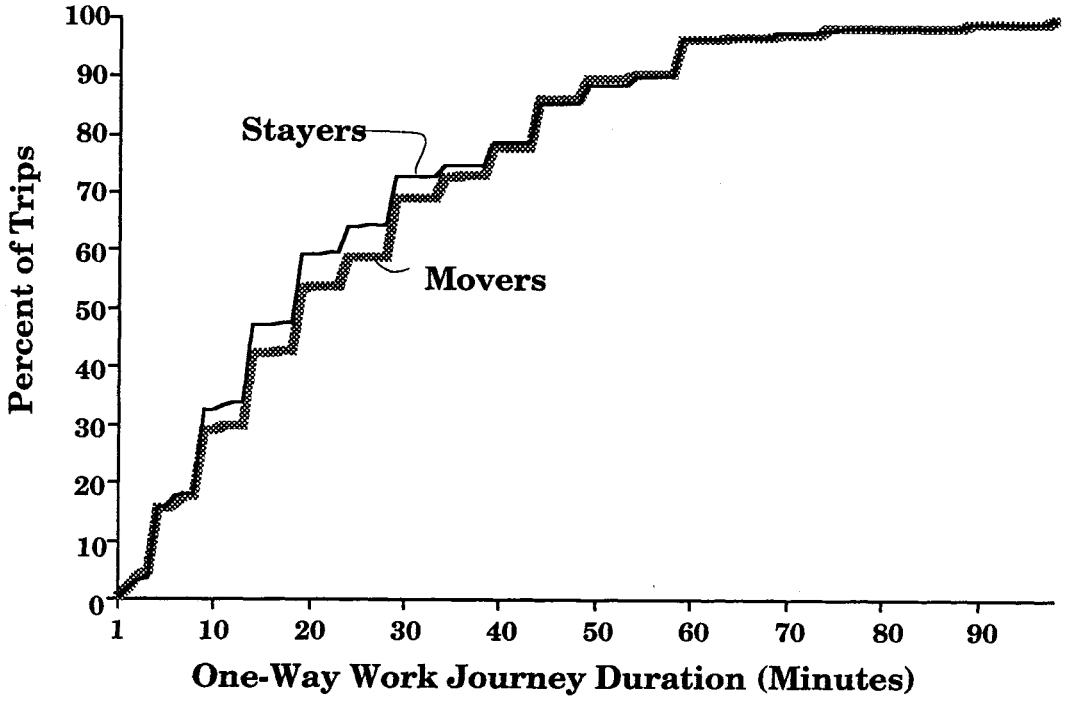


Figure 8. Cumulative Distribution of Work Trips by Travel Time

Source: U.S. Bureau of the Census, 1990 Census of Population and Housing (Minnesota). Special tabulations of the Public-Use Microdata Sample (1 percent sample).

Table 10. Travel Time and Income, by Tenure, by Occupation

	Entire Sample	*Movers*			*Stayers*		
		All	Managerial and Professional	Operators, Fabricators, Laborers	All	Managerial and Professional	Operators, Fabricators, Laborers
N	4,915	2,192	532	398	2,723	604	552
Travel Time (min.)	25.7	26.3	26	29.3	25.2	24.9	28.8
Household Income	$44,200	$40,900	$46,900	$36,100	$46,800	$54,600	$44,200
Individual Wages	$19,100	$19,200	$23,600	$19,200	$19,000	$26,300	$18,500

Source: U.S. Bureau of the Census, 1990 Census of Population and Housing (Minnesota). Special tabulations of the Public Use Microdata Sample (1 percent sample).

long-duration commuters living beyond the edges of urban areas indicates more complex processes at work.

Results of Part 2 run counter to the expectation that new arrivals in exurbia are predominantly affluent, white-collar workers. Instead, the PUMS data seem to show that exurban commuting patterns are considerably more diverse than that. Together, both parts of this study indicate that standard theories of travel behavior derived from the metropolitan context paint an inaccurate picture when applied to non-metropolitan and exurban communities.

The Minneapolis-St. Paul metro area continues to grow within the generally stagnant midwestern Manufacturing Belt. Since the Twin Cities area did not have a heavy specialization in manufacturing, the decline of the Rust Belt had relatively little impact on the Twin Cities area. Nevertheless, along with metropolitan growth has come decentralization of population and employment. Some jobs have relocated to suburban and exurban areas, leading workers outward in their daily commutes. The dispersal of housing and disposable incomes has attracted retailing, and personal and professional services following households and their purchasing power.

As this decentralization occurs, and travel patterns become more complex, old ideas of how the metro highway systems will or ought to be used will have to change. The urban world of the 1990s is significantly different from the world for which we built the interstate highways and the other major routes serving the greater Twin Cities area.

The metropolitan freeway and arterial system was designed and built in the 1950s and 1960s and subsequently expanded to capacities that planners expected would handle morning and afternoon work-journey peak loads. But in the 1990s, commute trips between home and work accounted for just 38 percent of trips during the increasingly congested morning rush

hour, and only 20 percent in the afternoon rush. If those trips are combined with other work-linked trips, the rush hour percentages rise to 62 and 44 respectively.

We cannot conclude from these findings that exurban and non-metropolitan commuting fields are simply the result of some uniquely non-metropolitan--but still economically rational--tradeoff of distance for space. The location of the residence appears to be more permanent than conventional theories assume, and the choices available to many households are correspondingly limited in the short- to medium-term. Even more important, the link between home and work is a reflection of choices and constraints within the household. Here, we examined household size only. Further analysis might consider the distinction between socioeconomic status and social role as demonstrated by more complex factors such as gender, marital status, and life cycle stage.

These considerations should inform any detailed study of the journey to work in the contemporary North American context. Non-metropolitan and exurban commuting patterns, even when viewed in terms of simple measures of socioeconomic status, are considerably more diverse than many theories would lead us to believe. Findings have far-reaching implications for those seeking to understand effects of public policy initiatives such as highway improvements, toll road construction, or energy tax implementation.

It would be useful to know the share of household income that is currently devoted to commuting, and the trends up to the present for households of different composition and different wealth and income resources. It seems that if fuel costs and fuel taxes were to rise substantially, the increased commuting costs would place considerable pressures on households of modest means who moved to exurban areas in order to take advantage of cheaper housing. These people might respond to the additional costs as policymakers would expect--searching for jobs closer by in order to reduce their total travel budgets--but in the long run they might also try to reduce housing costs even further, to compensate for higher fuel prices.

Meanwhile, upper income households might move to distant suburbs in search of more expensive housing, incur longer commutes, yet feel relatively unaffected by higher fuel prices. Household budget impacts may differ significantly, but the public costs to the transportation system might be similar.

But costs of building and operating increments to the transportation system are only one element in the aggregate cost to the public of metropolitan expansion. Accommodating steadily increasing numbers of long distance commuters with origins and/or destinations in Minnesota and Wisconsin counties adjacent to the Twin Cities Metropolitan Council seven county planning area by expanding and improving highways serving outer suburban and exurban districts, but without charging a substantial share of the incremental infrastructure cost and operating expense to the users and to the property owners who benefit directly from the improvements to the transportation system, will inevitably multiply aggregate metropolitan-wide costs of supplying urban services to scattered, newly developing exurban areas that currently lie beyond the reach of metropolitan planning and development management controls. Such an outcome would perpetuate a half-century of costly post-World War II sprawl that has been brought about by continued public subsidization of suburban development, with much of those costs imposed unfairly and disproportionately upon the households, businesses, and property owners within aging central cities.

We need to know how long jobs last, now that long-term stable employment with a single employer is less common than it was in the previous generation, and as multiple job-holding by individuals and households appears to be increasing. People change jobs regularly, and they also change their housing frequently. Since job locations and housing locational choice are both adjustable, what is the significance of the journey to work as the highway system develops towards an all-points grid similar to telephone and electrical service, and as part- or full-time telecommuting becomes increasingly common for people in information-intensive occupations.

It seems that people increasingly expect a transportation network that is usable like the telephone, with a perception of flat rate pricing regardless of length of trip, time of day, or day of the week. This expectation is probably unrealistic for an expanding metropolitan area because of the skyrocketing costs of providing expanded channel capacity. But there are solutions. We use congestion pricing for hotel rates, telephone calls, airline tickets, and bus fares. For highways in the U.S. to date we have avoided congestion pricing, except by metering access to some metro area freeways during peak loads, making drivers spend extra time waiting, which is the same procedure used when waiting for an overseas telephone circuit.

Some travel is made necessary as a consequence of urban zoning restrictions that separate activities such as schools, day care, shopping centers, offices, parking, transit hubs, and residences. This separation of land uses means that the commuting worker with child care and daily shopping responsibilities must make several trips among dispersed nodes to accomplish the day's chores. Public policy adjustments permitting or favoring "mixed use developments" in both newly developing areas as well as in redeveloping zones within our central cities would reduce travel demands while simplifying life for harried household members, especially single parents with dependent children.

Recent census and Travel Behavior Inventory data document average increases in commuting times in recent decades. At present, we do not know if the trend toward longer duration will continue, increase, or level off; nor do we know whether trends developing in one part of Minnesota are occurring in other regions. Depending on the nature of the trend and emerging practice regarding the pricing of road usage, highway improvement plans may turn out to be too ambitious, just right, or too little and possibly too late.

We do know that the journey to work will increasingly be a smaller share of total demand placed on the transportation system. The journey to work is about 25 percent of all travel now. There is much "trip chaining", especially in the afternoon hours. Movement on the system

today is more complex than in earlier decades. Interstate highways were planned and built to handle "peak loads", which occurred in the morning and afternoon with workers going to and from work. Now, a greater volume of travel is spread more evenly throughout the day. So congestion pricing makes more sense today, as much of the travel behavior today is discretionary. When the journey to work comprised a high percentage of total travel, then congestion pricing was difficult to consider without substantial attention to complicated equity considerations.

If all trips, whether for work, shopping, school, or recreation are becoming longer in distance and duration on the average, this trend implies that a greater share of state product will be devoted to transportation, thereby creating a greater incentive to substitute communications for movement. Such trends mean a greater degree of interdependence of each subarea of the state on other areas, which stimulates an urgent call for long range regional planning so that physical infrastructure improvements and extensions will be planned intelligently, priced properly, and resources used wisely.

The promotion of independent living for the elderly, the handicapped, and those who cannot or should not drive cars, triggers a need for regular transit service in the non-metro regions of the state.

Sharing rides for the journey to work is steadily promoted by public and private interests, but the share of commuters sharing rides has been falling. Despite substantial net public benefits for ride sharing in many instances, the private cost-benefit calculus by each commuter usually leads to a decision to drive alone if possible. On the other hand, if ride sharing unduly extends trips or leads to empty "back hauling", ride sharing could be less efficient than solo commuting. Transit solutions to the commuting problem are efficient only if they shorten aggregate time of vehicle operation.

This observation prompts further questions about the goals of transportation policy makers. Should we try to ensure (1) that all people can move conveniently among all places all the time? Or (2) that our infrastructure is designed for efficiency and environmental sensitivity, assuming that they are not mutually exclusive? Or (3) that work journeys be as quick as possible? Or (4) all three, with statewide transportation/transit systems that are at once efficient and fair?

What about new forms of transportation demand and supply management policy options? Travel demand management was important in the 1980s. It was work place centered, and began as a private sector initiative. Later it spread to state departments of transportation. Flexible work schedules and expanded opportunities for telecommuting suggest new opportunities for demand management.

On the supply side, better knowledge on the part of motorists of alternate routes could alleviate congestion on heavily traveled channels. Road information available to motorists and used by them seems highly specific so that when road way incidents occur or construction or maintenance slow traffic, many of them feel that have no alternative but to wait rather than to move to an alternate route. Truckers and delivery personnel make heavy use of MnDOT route information, but the average motorists seems not to know of sources and uses of up-to-date road information.

We should examine more carefully why long distance solo commuters are thought to be a concern. Obviously from the point of view of the commuters themselves, their daily trips make sense. What are the public issues involved, and how do they differ between (1) commuter travel on lightly used nonmetro highways, and (2) on congested exurban and metro roads?

Commuting duration may be related to affordable housing alternatives at diverse locations, or at least to household awareness of alternatives. The number of workers who live

alone and commute more than 30 minutes may indicate limits on housing options. It would seem that they, unlike dual income families with children do not need to think about a spouse's place of employment, quality of schooling, or any other preferences besides their own needs, tastes and resources. If it is true that this group has greater residential flexibility than many others, then their commuting patterns are particularly important to consider.

The census questionnaire asked respondents to report the major mode of transportation used in the journey to work in the previous week. This question does not permit reporting alternative modes used part of the time, occasionally and seasonally, such as bicycles in the summer, nor does it recognize telecommuting one or more days per week. Thus, census data probably overstate the use of automobiles in commuting, understate the use of alternative modes, and ignore communication substitutes for movement.

Census questions on journey to work differ from questions asked in a conventional Transportation Behavior Inventory (TBI), which inquires about each type of trip made among the nodes visited in a day's travel. Census questions reflect conceptualizations about the dominant urban vehicular travel in the immediate post war decades of urban highway construction, while contemporary TBI surveys reflect today's trip making activity in a more comprehensive fashion. The advantage of the journey to work data from the decennial census is that they may be linked with other data collected at the same time and with reference to a uniform census geography that generally changes little from census to census. TBI data can be collected in inter-census years, but lacks the comprehensive household and housing data provided by the decennial census.

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Appendix A

Summary Population, Socioeconomic, and Commuting Data for Minnesota, 1970-1990

Appendix A. Summary Population, Socioeconomic, and Commuting Data for Minnesota, 1970-1990

	State	Metro	Non Metro	Central Cities
Total Population				
1990	4,375,099	2,959,899	1,415,200	964,298
1980	4,075,970	2,631,930	1,444,040	864,446
1970	3,804,971	2,165,029	1,639,942	928,352
% Change 80-90	*7.34%*	*12.46%*	*-2.00%*	*11.55%*
% Change 70-80	*7.12%*	*21.57%*	*-11.95%*	*-6.88%*
% Change 70-90	*14.98%*	*36.71%*	*-13.70%*	*3.87%*
Total Workers Over Age 16				
1990	2,138,733	1,538,102	620,631	485,642
1980	1,837,689	1,264,968	572,721	413,033
1970	1,442,851	869,077	573,774	387,683
% Change 80-90	*16.38%*	*21.59%*	*8.37%*	*17.58%*
% Change 70-80	*27.37%*	*45.55%*	*-0.18%*	*6.54%*
% Change 70-90	*48.23%*	*76.98%*	*8.17%*	*25.27%*
Work-at-Home Workers Over Age 16				
1990	115,737	55,136	60,601	13,948
1980	99,985	34,408	65,577	7,024
1970	123,164	21,984	101,180	8,232
% Change 80-90	*15.75%*	*60.24%*	*-7.59%*	*98.58%*
% Change 70-80	*-18.82%*	*56.51%*	*-35.19%*	*-14.67%*
% Change 70-90	*-6.03%*	*150.80%*	*-40.11%*	*69.44%*
As a Percent of All Workers Over Age 16				
1990	5.41%	3.58%	9.76%	2.87%
1980	5.44%	2.72%	11.45%	1.70%
1970	8.54%	2.53%	17.63%	2.12%
% Change 80-90	*-0.54%*	*31.79%*	*-14.72%*	*68.89%*
% Change 70-80	*-36.26%*	*7.53%*	*-35.07%*	*-19.91%*
% Change 70-90	*-36.61%*	*41.71%*	*-44.63%*	*35.26%*
Total 16+ Workers who Work Outside the Home (Commuters)				
1990	2,022,996	1,482,966	560,030	471,694
1980	1,737,704	1,230,560	507,144	406,009
1970	1,319,687	847,093	472,594	379,451
% Change 80-90	*16.42%*	*20.51%*	*10.43%*	*16.18%*
% Change 70-80	*31.68%*	*45.27%*	*7.31%*	*7.00%*
% Change 70-90	*53.29%*	*75.07%*	*18.50%*	*24.31%*
As a Percent of all 16+ Workers				
1990	94.59%	96.42%	90.24%	97.13%
1980	94.56%	97.28%	88.55%	98.30%
1970	91.46%	97.47%	82.37%	97.88%
% Change 80-90	*0.03%*	*-0.89%*	*1.90%*	*-1.19%*
% Change 70-80	*3.38%*	*-0.20%*	*7.51%*	*0.43%*
% Change 70-90	*3.42%*	*-1.08%*	*9.55%*	*-0.76%*

Appendix A (continued)

	State	Metro	Non Metro	Central Cities
Workers Commuting by Car, Truck, or Van				
As a Percent of All Commuters				
1990	90.93%	90.13%	89.81%	80.63%
1980	84.23%	84.64%	83.25%	72.66%
1970	81.07%	81.87%	79.64%	71.87%
% Change 80-90	*7.95%*	*6.49%*	*7.88%*	*10.97%*
% Change 70-80	*3.90%*	*3.38%*	*4.53%*	*1.10%*
% Change 70-90	*12.16%*	*10.09%*	*12.77%*	*12.19%*
Workers Driving Alone to Work (SOVs)				
1990	1,593,019	1,161,969	431,050	327,236
1980	1,114,504	790,185	324,319	223,408
% Change 80-90	*42.94%*	*47.05%*	*32.91%*	*46.47%*
As a Percent of All Commuters				
1990	78.75%	78.35%	76.97%	69.37%
1980	64.14%	64.21%	63.95%	55.03%
% Change 80-90	*22.78%*	*22.02%*	*20.36%*	*26.08%*
Workers Commuting in Carpools				
1990	246,546	174,620	71,926	53,092
As a Percent of All Commuters	12.19%	11.78%	12.84%	11.26%
Average Vehicle Occupancy 1990	1.08	1.08	1.08	1.09
Workers Commuting by Public Transit				
1990	77,722	74,319	3,403	50,138
1980	101,749	99,151	2,598	66,336
1970	73,564	71,139	2,425	57,584
% Change 80-90	*-23.61%*	*-25.04%*	*30.99%*	*-24.42%*
% Change 70-80	*38.31%*	*39.38%*	*7.13%*	*15.20%*
% Change 70-90	*5.65%*	*4.47%*	*40.33%*	*-12.93%*
As a Percent of All Commuters				
1990	3.84%	5.01%	0.61%	10.63%
1980	5.86%	8.06%	0.51%	16.34%
1970	5.57%	8.40%	0.51%	15.18%
% Change 80-90	*-34.39%*	*-37.80%*	*18.62%*	*-34.94%*
% Change 70-80	*5.04%*	*-4.06%*	*-0.16%*	*7.66%*
% Change 70-90	*-31.08%*	*-40.33%*	*18.42%*	*-29.96%*
Long Distance Commuters				
1990	457,867	368,263	89,584	30,201
As a Percent of All Commuters	22.63%	24.83%	16.00%	6.40%
Mean Travel Time to Work 1990	19.1	20.4	15.6	18.0
Number of Households 1990	1,648,825	1,119,156	529,669	397,009
Median Household Income 1990	$30,909	$35,043	$23,638	$27,230
Mean Household Income 1990	$37,718	$42,095	$28,470	$34,733
Persons per Household 1990	2.58	2.58	2.58	2.32

NOTE: Delineations of metropolitan and nonmetropolitan areas are not consistent from year to year. These figures reflect the specified census year.

Source: U.S. Bureau of the Census, Census of Population and Housing, 1970, 1980, 1990.

Appendix B

Summary Population, Socioeconomic, and Commuting Data for Exurban Study Area Counties

Appendix B. Summary Population, Socioeconomic, and Commuting Data for Exurban Study Area Counties: Benton, Chisago, Isanti, Sherburne, and Wright, 1970-1990

5 Percent PUMA 00900	Benton	Chisago	Isanti	Sherburne	Wright
Total Population					
1990	30,185	30,521	25,921	41,945	68,710
1980	25,187	25,717	23,600	29,908	58,681
1970	20,841	17,492	16,560	18,344	38,933
% Change 80-90	*20%*	*19%*	*10%*	*40%*	*17%*
% Change 70-80	*21%*	*47%*	*43%*	*63%*	*51%*
% Change 70-90	*45%*	*74%*	*57%*	*129%*	*76%*
Total Workers Over Age 16					
1990	14,774	13,765	11,799	20,178	33,514
1980	10,778	10,633	9,432	12,157	24,228
% Change 80-90	*37%*	*29%*	*25%*	*66%*	*38%*
Work-at-Home Workers Over Age 16					
1990	912	734	659	937	1,956
1980	1,007	695	499	547	1,676
% Change 80-90	*-9%*	*6%*	*32%*	*71%*	*17%*
As a Percent of all Workers over Age 16					
1990	6%	5%	6%	5%	6%
1980	9%	7%	5%	4%	7%
% Change 80-90	*-34%*	*-18%*	*6%*	*3%*	*-16%*
Total 16+ Workers who Work Outside the Home (Commuters)					
1990	13,862	13,031	11,140	19,241	31,558
1980	9,771	9,938	8,933	11,610	22,552
% Change 80-90	*42%*	*31%*	*25%*	*66%*	*40%*
As a Percent of all 16+ Workers					
1990	94%	95%	94%	95%	94%
1980	91%	93%	95%	96%	93%
% Change 80-90	*3%*	*1%*	*0%*	*0%*	*1%*
Workers Commuting by Car, Truck, or Van					
1990	12,986	12,442	10,662	18,434	30,364
1980	8,764	9,147	8,160	10,880	20,746
% Change 80-90	*48%*	*36%*	*31%*	*69%*	*46%*
As a Percent of all Commuters					
1990	94%	95%	96%	96%	96%
1980	90%	92%	91%	94%	92%
% Change 80-90	*4%*	*4%*	*5%*	*2%*	*5%*

Appendix B (continued)

5 Percent PUMA 00900	Benton	Chisago	Isanti	Sherburne	Wright
Workers Driving Alone to Work (SOVs)					
1990	11,181	10,062	8,768	15,559	24,926
1980	6,581	6,354	5,682	7,559	14,114
% Change 80-90	*70%*	*58%*	*54%*	*106%*	*77%*
As a Percent of all Commuters					
1990	81%	77%	79%	81%	79%
1980	67%	64%	64%	65%	63%
% Change 80-90	*20%*	*21%*	*24%*	*24%*	*26%*
Workers Commuting in Carpools					
1990	1,805	2,380	1,874	2,875	5,438
As a Percent of all Commuters	13%	18%	17%	15%	17%
Average Vehicle Occupancy 1990	1.08	1.12	1.11	1.10	1.11
Workers Commuting by Public Transit					
1990	163	29	23	161	75
1980	153	26	22	149	65
% Change 80-90	*7%*	*12%*	*5%*	*8%*	*15%*
As a Percent of all Commuters					
1990	1%	0%	0%	1%	0%
1980	2%	0%	0%	1%	0%
% Change 80-90	*-25%*	*-15%*	*-16%*	*-35%*	*-18%*
Long Distance Commuters					
1990	1,452	5,864	5,081	7,977	13,771
As a Percent of all Commuters	10%	45%	46%	41%	44%
Mean Travel Time to Work 1990	18.2	27.9	30.0	26.7	26.4
Number of Households 1990	10,915	10,526	8,833	13,672	22,945
Median Household Income 1990	$26,619	$31,281	$31,308	$35,585	$33,456
Mean Household Income 1990	$30,197	$35,229	$34,733	$39,628	$37,645
Persons per Household 1990	2.71	2.84	2.85	2.93	2.96

NOTE: Delineations of metropolitan and nonmetropolitan areas are not consistent from year to year. These figures reflect boundaries during the specified census year.
Source: U.S. Bureau of the Census, Census of Population and Housing, 1970, 1980, 1990.

Appendix C

Facsimile of 1990 U.S. Census Long-Form Respondent Questionnaire

Appendix C. Facsimile of 1990 U.S. Census Long-Form Respondent Questionnaire

CENSUS '90

OFFICIAL 1990 U.S. CENSUS FORM

Thank you for taking time to complete and return this census questionnaire. It's important to you, your community, and the Nation.

The law requires answers but guarantees privacy.

By law (Title 13, U.S. Code), you're required to answer the census questions to the best of your knowledge. However, the same law guarantees that your census form remains confidential. For 72 years–or until the year 2062–only Census Bureau employees can see your form. No one else–no other government body, no police department, no court system or welfare agency–is permitted to see this confidential information under any circumstances.

How to get started–and get help.

Start by listing on the next page the names of all the people who live in your home. Please answer all questions with a black lead pencil. You'll find detailed instructions for answering the census in the enclosed guide. If you need additional help, call the toll-free telephone number to the left, near your address.

Please answer and return your form promptly.

Complete your form and return it by April 1, 1990 in the postage-paid envelope provided. Avoid the inconvenience of having a census taker visit your home.

Again, thank you for answering the 1990 Census.
Remember: Return the completed form by April 1, 1990.

Para personas de habla hispana –
(For Spanish-speaking persons)

Si usted desea un cuestionario del censo en español, llame sin cargo alguno al siguiente número: 1-800-CUENTAN
(o sea 1-800-283-6826)

U.S. Department of Commerce
BUREAU OF THE CENSUS
FORM D-2

OMB No. 0607-0628
Approval Expires 07/31/91

Appendix C (continued)

Page 1

The 1990 census must count every person at his or her "usual residence." This means the place where the person lives and sleeps most of the time.

1a. List on the numbered lines below the name of each person living here on Sunday, April 1, including all persons staying here who have no other home. If EVERYONE at this address is staying here temporarily and usually lives somewhere else, follow the instructions given in question 1b below.

Include	Do NOT include
• Everyone who usually lives here such as family members, housemates and roommates, foster children, roomers, boarders, and live-in employees	• Persons who usually live somewhere else
• Persons who are temporarily away on a business trip, on vacation, or in a general hospital	• Persons who are away in an institution such as a prison, mental hospital, or a nursing home
• College students who stay here while attending college	• College students who live somewhere else while attending college
• Persons in the Armed Forces who live here	• Persons in the Armed Forces who live somewhere else
• Newborn babies still in the hospital	
• Children in boarding schools below the college level	
• Persons who stay here most of the week while working even if they have a home somewhere else	• Persons who stay somewhere else most of the week while working
• Persons with no other home who are staying here on April 1	

Print last name, first name, and middle initial for each person. Begin on line 1 with the household member (or one of the household members) in whose name this house or apartment is owned, being bought, or rented. If there is no such person, start on line 1 with any adult household member.

	LAST	FIRST	INITIAL		LAST	FIRST	INITIAL
1				7			
2				8			
3				9			
4				10			
5				11			
6				12			

1b. If EVERYONE is staying here only temporarily and usually lives somewhere else, list the name of each person on the numbered lines above, fill this circle ⟶ ○ and print their usual address below. DO NOT PRINT THE ADDRESS LISTED ON THE FRONT COVER.

House number | Street or road/Rural route and box number | Apartment number

City | State | ZIP Code

County or foreign country | Names of nearest intersecting streets or roads

NOW PLEASE OPEN THE FLAP TO PAGE 2 AND ANSWER ALL QUESTIONS FOR THE FIRST 7 PEOPLE LISTED. USE A BLACK LEAD PENCIL ONLY.

Appendix C (continued)

Page 2 — *PLEASE ALSO ANSWER HOUSING QUESTIONS ON PAGE 3* →

Please fill one column → for each person listed in Question 1a on page 1.	PERSON 1 Last name First name / Middle initial	PERSON 2 Last name First name / Middle initial
2. How is this person related to PERSON 1? Fill ONE circle for each person. If Other relative of person in column 1, fill circle and print exact relationship, such as mother-in-law, grandparent, son-in-law, niece, cousin, and so on.	START in this column with the household member (or one of the members) in whose name the home is owned, being bought, or rented. If there is no such person, start in this column with any adult household member.	If a RELATIVE of Person 1: ○ Husband/wife ○ Brother/sister ○ Natural-born or adopted son/daughter ○ Father/mother ○ Grandchild ○ Other relative ○ Stepson/stepdaughter If NOT RELATED to Person 1: ○ Roomer, boarder, or foster child ○ Unmarried partner ○ Housemate, roommate ○ Other nonrelative
3. Sex Fill ONE circle for each person.	○ Male ○ Female	○ Male ○ Female
4. Race Fill ONE circle for the race that the person considers himself/herself to be. If Indian (Amer.), print the name of the enrolled or principal tribe. If Other Asian or Pacific Islander (API), print one group, for example: Hmong, Fijian, Laotian, Thai, Tongan, Pakistani, Cambodian, and so on. If Other race, print race.	○ White ○ Black or Negro ○ Indian (Amer.) (Print the name of the enrolled or principal tribe.) ○ Eskimo ○ Aleut Asian or Pacific Islander (API) ○ Chinese ○ Japanese ○ Filipino ○ Asian Indian ○ Hawaiian ○ Samoan ○ Korean ○ Guamanian ○ Vietnamese ○ Other API ○ Other race (Print race)	○ White ○ Black or Negro ○ Indian (Amer.) (Print the name of the enrolled or principal tribe.) ○ Eskimo ○ Aleut Asian or Pacific Islander (API) ○ Chinese ○ Japanese ○ Filipino ○ Asian Indian ○ Hawaiian ○ Samoan ○ Korean ○ Guamanian ○ Vietnamese ○ Other API ○ Other race (Print race)
5. Age and year of birth a. Print each person's age at last birthday. Fill in the matching circle below each box. b. Print each person's year of birth and fill the matching circle below each box.	a. Age: 0 0 0 ○ 0 ○ 1 ○ 1 ○ 1 ○ 2 ○ 2 ○ 3 ○ 3 ○ 4 ○ 4 ○ 5 ○ 5 ○ 6 ○ 6 ○ 7 ○ 7 ○ 8 ○ 8 ○ 9 ○ 9 ○ b. Year of birth: 1 ● 8 ○ 0 ○ 0 ○ 9 ○ 1 ○ 1 ○ 2 ○ 2 ○ 3 ○ 3 ○ 4 ○ 4 ○ 5 ○ 5 ○ 6 ○ 6 ○ 7 ○ 7 ○ 8 ○ 8 ○ 9 ○ 9 ○	a. Age: 0 0 0 ○ 0 ○ 1 ○ 1 ○ 1 ○ 2 ○ 2 ○ 3 ○ 3 ○ 4 ○ 4 ○ 5 ○ 5 ○ 6 ○ 6 ○ 7 ○ 7 ○ 8 ○ 8 ○ 9 ○ 9 ○ b. Year of birth: 1 ● 8 ○ 0 ○ 0 ○ 9 ○ 1 ○ 1 ○ 2 ○ 2 ○ 3 ○ 3 ○ 4 ○ 4 ○ 5 ○ 5 ○ 6 ○ 6 ○ 7 ○ 7 ○ 8 ○ 8 ○ 9 ○ 9 ○
6. Marital status Fill ONE circle for each person.	○ Now married ○ Separated ○ Widowed ○ Never married ○ Divorced	○ Now married ○ Separated ○ Widowed ○ Never married ○ Divorced
7. Is this person of Spanish/Hispanic origin? Fill ONE circle for each person. If Yes, other Spanish/Hispanic, print one group.	○ No (not Spanish/Hispanic) ○ Yes, Mexican, Mexican-Am., Chicano ○ Yes, Puerto Rican ○ Yes, Cuban ○ Yes, other Spanish/Hispanic (Print one group, for example: Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on.)	○ No (not Spanish/Hispanic) ○ Yes, Mexican, Mexican-Am., Chicano ○ Yes, Puerto Rican ○ Yes, Cuban ○ Yes, other Spanish/Hispanic (Print one group, for example: Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on.)
FOR CENSUS USE →	○ ○	○ ○

Appendix C (continued)

PERSON 7

Last name

First name — Middle initial

If a RELATIVE of Person 1:

- O Husband/wife
- O Natural-born or adopted son/daughter
- O Stepson/stepdaughter
- O Brother/sister
- O Father/mother
- O Grandchild
- O Other relative — 7

If NOT RELATED to Person 1:

- O Roomer, boarder, or foster child
- O Housemate, roommate
- O Unmarried partner
- O Other nonrelative

- O Male
- O Female

- O White
- O Black or Negro
- O Indian (Amer.) (Print the name of the enrolled or principal tribe.) 7
- O Eskimo
- O Aleut

Asian or Pacific Islander (API)

- O Chinese
- O Filipino
- O Hawaiian
- O Korean
- O Vietnamese
- O Japanese
- O Asian Indian
- O Samoan
- O Guamanian
- O Other API 7

- O Other race (Print race.) 7

a. Age — b. Year of birth 1

a. Age	b. Year of birth
0 0 0 C 0 0	1 ● 8 0 0 0 0 C
1 0 1 C 1 0	9 C 1 0 1 0
2 0 2 0	2 0 2 0
3 0 3 0	3 C 3 C
4 0 4 0	4 0 4 0
5 0 5 0	5 0 5 0
6 0 6 0	6 0 6 0
7 0 7 0	7 0 7 0
8 0 8 0	8 C 8 0
9 0 9 0	9 0 9 0

- O Now married
- O Widowed
- O Divorced
- O Separated
- O Never married

- O No (not Spanish/Hispanic)
- O Yes, Mexican, Mexican-Am., Chicano
- O Yes, Puerto Rican
- O Yes, Cuban
- O Yes, other Spanish/Hispanic (Print one group, for example: Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on.) 7

O

O

NOW PLEASE ANSWER QUESTIONS H1a—H26 FOR THIS HOUSEHOLD

H1a. Did you leave anyone out of your list of persons for Question 1a on page 1 because you were not sure if the person should be listed — for example, someone temporarily away on a business trip or vacation, a newborn baby still in the hospital, or a person who stays here once in a while and has no other home?

- O Yes, please print the name(s) and reason(s). 7
- O No

b. Did you include anyone in your list of persons for Question 1a on page 1 even though you were not sure that the person should be listed — for example, a visitor who is staying here temporarily or a person who usually lives somewhere else?

- O Yes, please print the name(s) and reason(s). 7
- O No

H2. Which best describes this building? Include all apartments, flats, etc., even if vacant.

- O A mobile home or trailer
- O A one-family house detached from any other house
- O A one-family house attached to one or more houses
- O A building with 2 apartments
- O A building with 3 or 4 apartments
- O A building with 5 to 9 apartments
- O A building with 10 to 19 apartments
- O A building with 20 to 49 apartments
- O A building with 50 or more apartments
- O Other

H3. How many rooms do you have in this house or apartment? Do NOT count bathrooms, porches, balconies, foyers, halls, or half-rooms.

- O 1 room
- O 2 rooms
- O 3 rooms
- O 4 rooms
- O 5 rooms
- O 6 rooms
- O 7 rooms
- O 8 rooms
- O 9 or more rooms

H4. Is this house or apartment —

- O Owned by you or someone in this household with a mortgage or loan?
- O Owned by you or someone in this household free and clear (without a mortgage)?
- O Rented for cash rent?
- O Occupied without payment of cash rent?

If this is a ONE-FAMILY HOUSE —

H5a. Is this house on ten or more acres?

- O Yes
- O No

b. Is there a business (such as a store or barber shop) or a medical office on this property?

- O Yes
- O No

Answer only if you or someone in this household OWNS OR IS BUYING this house or apartment —

H6. What is the value of this property; that is, how much do you think this house and lot or condominium unit would sell for if it were for sale?

- O Less than $10,000
- O $10,000 to $14,999
- O $15,000 to $19,999
- O $20,000 to $24,999
- O $25,000 to $29,999
- O $30,000 to $34,999
- O $35,000 to $39,999
- O $40,000 to $44,999
- O $45,000 to $49,999
- O $50,000 to $54,999
- O $55,000 to $59,999
- O $60,000 to $64,999
- O $65,000 to $69,999
- O $70,000 to $74,999
- O $75,000 to $79,999
- O $80,000 to $89,999
- O $90,000 to $99,999
- O $100,000 to $124,999
- O $125,000 to $149,999
- O $150,000 to $174,999
- O $175,000 to $199,999
- O $200,000 to $249,999
- O $250,000 to $299,999
- O $300,000 to $399,999
- O $400,000 to $499,999
- O $500,000 or more

Answer only if you PAY RENT for this house or apartment —

H7a. What is the monthly rent?

- O Less than $80
- O $80 to $99
- O $100 to $124
- O $125 to $149
- O $150 to $174
- O $175 to $199
- O $200 to $224
- O $225 to $249
- O $250 to $274
- O $275 to $299
- O $300 to $324
- O $325 to $349
- O $350 to $374
- O $375 to $399
- O $400 to $424
- O $425 to $449
- O $450 to $474
- O $475 to $499
- O $500 to $524
- O $525 to $549
- O $550 to $599
- O $600 to $649
- O $650 to $699
- O $700 to $749
- O $750 to $999
- O $1,000 or more

b. Does the monthly rent include any meals?

- O Yes
- O No

FOR CENSUS USE

A. Total persons

B. Type of unit

Occupied: O First form, O Cont'n

Vacant: O Regular, O Usual home elsewhere

C1. Vacancy status

- O For rent
- O For sale only
- O Rented or sold, not occupied
- O For seas./rec/occ
- O For migrant workers
- O Other vacant

C2. Is this unit boarded up?

- O Yes
- O No

D. Months vacant

- O Less than 1
- O 1 up to 2
- O 2 up to 6
- O 6 up to 12
- O 12 up to 24
- O 24 or more

E. Complete after

O LR O TC O QA JIC 1 O

O P/F O RE O I/T O

O MV O ED O EN

O P0 O P3 O P6

O P1 O P4 O IA JIC 2 O

O P2 O P5 O SM O

F. Cov.

O 1b O 1a O 7 O H1

G. DO — ID

Appendix C (continued)

PLEASE ALSO ANSWER THESE

H8. When did the person listed in column 1 on page 2 move into this house or apartment?

- O 1989 or 1990
- O 1985 to 1988
- O 1980 to 1984
- O 1970 to 1979
- O 1960 to 1969
- O 1959 or earlier

H9. How many bedrooms do you have; that is, how many bedrooms would you list if this house or apartment were on the market for sale or rent?

- O No bedroom
- O 1 bedroom
- O 2 bedrooms
- O 3 bedrooms
- O 4 bedrooms
- O 5 or more bedrooms

H10. Do you have COMPLETE plumbing facilities in this house or apartment; that is, 1) hot and cold piped water, 2) a flush toilet, and 3) a bathtub or shower?

- O Yes, have all three facilities
- O No

H11. Do you have COMPLETE kitchen facilities; that is, 1) a sink with piped water, 2) a range or cookstove, and 3) a refrigerator?

- O Yes
- O No

H12. Do you have a telephone in this house or apartment?

- O Yes
- O No

H13. How many automobiles, vans, and trucks of one-ton capacity or less are kept at home for use by members of your household?

- O None
- O 1
- O 2
- O 3
- O 4
- O 5
- O 6
- O 7 or more

H14. Which FUEL is used MOST for heating this house or apartment?

- O Gas: from underground pipes serving the neighborhood
- O Gas: bottled, tank, or LP
- O Electricity
- O Fuel oil, kerosene, etc.
- O Coal or coke
- O Wood
- O Solar energy
- O No fuel used

H15. Do you get water from —

- O A public system such as a city water department, or private company?
- O An individual drilled well?
- O An individual dug well?
- O Some other source such as a spring, creek, river, cistern, etc.?

H16. Is this building connected to a public sewer?

- O Yes, connected to public sewer
- O No, connected to septic tank or cesspool
- O No, use other means

H17. About when was this building first built?

- O 1989 or 1990
- O 1985 to 1988
- O 1980 to 1984
- O 1970 to 1979
- O 1960 to 1969
- O 1950 to 1959
- O 1940 to 1949
- O 1939 or earlier
- O Don't know

H18. Is this house or apartment part of a condominium?

- O Yes
- O No

If you live in an apartment building, skip to H20.

H19a. Is this house on less than 1 acre?

- O Yes — *Skip to H20*
- O No

b. In 1989, what were the actual sales of all agricultural products from this property?

- O None
- O $1 to $999
- O $1,000 to $2,499
- O $2,500 to $4,999
- O $5,000 to $9,999
- O $10,000 or more

H20. What are the yearly costs of utilities and fuels for this house or apartment? If you have lived here less than 1 year, estimate the yearly cost.

a. Electricity

$ .00
Yearly cost — Dollars

OR

- O Included in rent or in condominium fee
- O No charge or electricity not used

b. Gas

$ .00
Yearly cost — Dollars

OR

- O Included in rent or in condominium fee
- O No charge or gas not used

c. Water

$ .00
Yearly cost — Dollars

OR

- O Included in rent or in condominium fee
- O No charge

d. Oil, coal, kerosene, wood, etc.

$ .00
Yearly cost — Dollars

OR

- O Included in rent or in condominium fee
- O No charge or these fuels not used

Appendix C (continued)

QUESTIONS FOR YOUR HOUSEHOLD

INSTRUCTION:

Answer questions H21 TO H26, if this is a one-family house, a condominium, or a mobile home that someone in this household OWNS OR IS BUYING; otherwise, go to page 6.

H21. What were the real estate taxes on THIS property last year?

$ .00
Yearly amount — Dollars

OR

○ None

H22. What was the annual payment for fire, hazard, and flood insurance on THIS property?

$ .00
Yearly amount — Dollars

OR

○ None

H23a. Do you have a mortgage, deed of trust, contract to purchase, or similar debt on THIS property?

○ Yes, mortgage, deed of trust, or similar debt } *Go to H23b*
○ Yes, contract to purchase
○ No — *Skip to H24a*

b. How much is your regular monthly mortgage payment on THIS property? Include payment only on first mortgage or contract to purchase.

$ .00
Monthly amount — Dollars

OR

○ No regular payment required — *Skip to H24a*

c. Does your regular monthly mortgage payment include payments for real estate taxes on THIS property?

○ Yes, taxes included in payment
○ No, taxes paid separately or taxes not required

d. Does your regular monthly mortgage payment include payments for fire, hazard, or flood insurance on THIS property?

○ Yes, insurance included in payment
○ No, insurance paid separately or no insurance

H24a. Do you have a second or junior mortgage or a home equity loan on THIS property?

○ Yes
○ No — *Skip to H25*

b. How much is your regular monthly payment on all second or junior mortgages and all home equity loans?

$ .00
Monthly amount — Dollars

OR

○ No regular payment required

Answer ONLY if this is a CONDOMINIUM —

H25. What is the monthly condominium fee?

$ .00
Monthly amount — Dollars

Answer ONLY if this is a MOBILE HOME —

H26. What was the total cost for personal property taxes, site rent, registration fees, and license fees on this mobile home and its site last year? Exclude real estate taxes.

$ .00
Yearly amount — Dollars

Please turn to page 6.

Appendix C (continued)

Page 6

PLEASE ANSWER THESE QUESTIONS

PERSON 1

Last name | First name | Middle initial

8. In what U.S. State or foreign country was this person born?

(Name of State or foreign country; or Puerto Rico, Guam, etc.)

9. Is this person a CITIZEN of the United States?

- O Yes, born in the United States — *Skip to 11*
- O Yes, born in Puerto Rico, Guam, the U.S. Virgin Islands, or Northern Marianas
- O Yes, born abroad of American parent or parents
- O Yes, U.S. citizen by naturalization
- O No, not a citizen of the United States

10. When did this person come to the United States to stay?

- O 1987 to 1990
- O 1985 or 1986
- O 1982 to 1984
- O 1980 or 1981
- O 1975 to 1979
- O 1970 to 1974
- O 1965 to 1969
- O 1960 to 1964
- O 1950 to 1959
- O Before 1950

11. At any time since February 1, 1990, has this person attended regular school or college? Include only nursery school, kindergarten, elementary school, and schooling which leads to a high school diploma or a college degree.

- O No, has not attended since February 1
- O Yes, public school, public college
- O Yes, private school, private college

12. How much school has this person COMPLETED? Fill ONE circle for the highest level COMPLETED or degree RECEIVED. If currently enrolled, mark the level of previous grade attended or highest degree received.

- O No school completed
- O Nursery school
- O Kindergarten
- O 1st, 2nd, 3rd, or 4th grade
- O 5th, 6th, 7th, or 8th grade
- O 9th grade
- O 10th grade
- O 11th grade
- O 12th grade, NO DIPLOMA
- O HIGH SCHOOL GRADUATE - high school DIPLOMA or the equivalent (For example: GED)
- O Some college but no degree
- O Associate degree in college - Occupational program
- O Associate degree in college - Academic program
- O Bachelor's degree (For example: BA, AB, BS)
- O Master's degree (For example: MA, MS, MEng, MEd, MSW, MBA)
- O Professional school degree (For example: MD, DDS, DVM, LLB, JD)
- O Doctorate degree (For example: PhD, EdD)

13. What is this person's ancestry or ethnic origin? (See instruction guide for further information.)

(For example: German, Italian, Afro-Amer., Croatian, Cape Verdean, Dominican, Ecuadoran, Haitian, Cajun, French Canadian, Jamaican, Korean, Lebanese, Mexican, Nigerian, Irish, Polish, Slovak, Taiwanese, Thai, Ukrainian, etc.)

14a. Did this person live in this house or apartment 5 years ago (on April 1, 1985)?

- O Born after April 1, 1985 — *Go to questions for the next person*
- O Yes — *Skip to 15a*
- O No

b. Where did this person live 5 years ago (on April 1, 1985)?

(1) Name of U.S. State or foreign country

(If outside U.S., print answer above and skip to 15a.)

(2) Name of county in the U.S.

(3) Name of city or town in the U.S.

(4) Did this person live inside the city or town limits?

- O Yes
- O No, lived outside the city/town limits

15a. Does this person speak a language other than English at home?

- O Yes
- O No — *Skip to 16*

b. What is this language?

(For example: Chinese, Italian, Spanish, Vietnamese)

c. How well does this person speak English?

- O Very well
- O Well
- O Not well
- O Not at all

16. When was this person born?

- O Born before April 1, 1975 — *Go to 17a*
- O Born April 1, 1975 or later — *Go to questions for the next person*

17a. Has this person ever been on active-duty military service in the Armed Forces of the United States or ever been in the United States military Reserves or the National Guard? If service was in Reserves or National Guard only, see instruction guide.

- O Yes, now on active duty
- O Yes, on active duty in past, but not now
- O Yes, service in Reserves or National Guard only — *Skip to 18*
- O No — *Skip to 18*

b. Was active-duty military service during — Fill a circle for each period in which this person served.

- O September 1980 or later
- O May 1975 to August 1980
- O Vietnam era (August 1964—April 1975)
- O February 1955—July 1964
- O Korean conflict (June 1950—January 1955)
- O World War II (September 1940—July 1947)
- O World War I (April 1917—November 1918)
- O Any other time

c. In total, how many years of active-duty military service has this person had?

Years

18. Does this person have a physical, mental, or other health condition that has lasted for 6 or more months and which —

a. Limits the kind or amount of work this person can do at a job?

- O Yes
- O No

b. Prevents this person from working at a job?

- O Yes
- O No

19. Because of a health condition that has lasted for 6 or more months, does this person have any difficulty —

a. Going outside the home alone, for example, to shop or visit a doctor's office?

- O Yes
- O No

b. Taking care of his or her own personal needs, such as bathing, dressing, or getting around inside the home?

- O Yes
- O No

If this person is a female —

20. How many babies has she ever had, not counting stillbirths? Do not count her stepchildren or children she has adopted.

None 1 2 3 4 5 6 7 8 9 10 11 12 or more

O O O O O O O O O O O O O

21a. Did this person work at any time LAST WEEK?

- O Yes — Fill this circle if this person worked full time or part time. (Count part-time work such as delivering papers, or helping without pay in a family business or farm. Also count active duty in the Armed Forces.)
- O No — Fill this circle if this person did not work, or did only own housework, school work, or volunteer work. — *Skip to 25*

b. How many hours did this person work LAST WEEK (at all jobs)? Subtract any time off; add overtime or extra hours worked.

Hours

22. 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 the exact address is not known, give a description of the location such as the building name or the nearest street or intersection.)

b. Name of city, town, or post office

c. Is the work location inside the limits of that city or town?

- O Yes
- O No, outside the city/town limits

d. County

e. State

f. ZIP Code

Appendix C (continued)

FOR PERSON 1 ON PAGE 2

23a. How did this person usually get to work LAST WEEK? If this person usually used more than one method of transportation during the trip, fill the circle of the one used for most of the distance.

- ○ Car, truck, or van
- ○ Bus or trolley bus
- ○ Streetcar or trolley car
- ○ Subway or elevated
- ○ Railroad
- ○ Ferryboat
- ○ Taxicab
- ○ Motorcycle
- ○ Bicycle
- ○ Walked
- ○ Worked at home — *Skip to 28*
- ○ Other method

If "car, truck, or van" is marked in 23a, go to 23b. Otherwise, skip to 24a.

b. How many people, including this person, usually rode to work in the car, truck, or van LAST WEEK?

- ○ Drove alone
- ○ 2 people
- ○ 3 people
- ○ 4 people
- ○ 5 people
- ○ 6 people
- ○ 7 to 9 people
- ○ 10 or more people

24a. What time did this person usually leave home to go to work LAST WEEK?

[ ] ○ a.m. ○ p.m.

b. How many minutes did it usually take this person to get from home to work LAST WEEK?

[ ] Minutes — *Skip to 28*

25. Was this person TEMPORARILY absent or on layoff from a job or business LAST WEEK?

- ○ Yes, on layoff
- ○ Yes, on vacation, temporary illness, labor dispute, etc.
- ○ No

26a. Has this person been looking for work during the last 4 weeks?

- ○ Yes
- ○ No — *Skip to 27*

b. Could this person have taken a job LAST WEEK if one had been offered?

- ○ No, already has a job
- ○ No, temporarily ill
- ○ No, other reasons (in school, etc.)
- ○ Yes, could have taken a job

27. When did this person last work, even for a few days?

- ○ 1990
- ○ 1989
- ○ 1988
- ○ 1985 to 1987

Go to 28

- ○ 1980 to 1984
- ○ 1979 or earlier
- ○ Never worked

Skip to 32

28-30. CURRENT OR MOST RECENT JOB ACTIVITY. Describe clearly this person's chief job activity or business last week. If this person had more than one job, describe the one at which this person worked the most hours. If this person had no job or business last week, give information for his/her last job or business since 1985.

28. Industry or Employer

a. For whom did this person work? If now on active duty in the Armed Forces, fill this circle ——→ ○ and print the branch of the Armed Forces.

[ ]
(Name of company, business, or other employer)

b. What kind of business or industry was this? Describe the activity at location where employed.

[ ]
(For example: hospital, newspaper publishing, mail order house, auto engine manufacturing, retail bakery)

c. Is this mainly — Fill ONE circle

- ○ Manufacturing
- ○ Wholesale trade
- ○ Retail trade
- ○ Other (agriculture, construction, service, government, etc.)

29. Occupation

a. What kind of work was this person doing?

[ ]
(For example: registered nurse, personnel manager, supervisor of order department, gasoline engine assembler, cake icer)

b. What were this person's most important activities or duties?

[ ]
(For example: patient care, directing hiring policies, supervising order clerks, assembling engines, icing cakes)

30. Was this person — Fill ONE circle

- ○ Employee of a PRIVATE FOR PROFIT company or business or of an individual, for wages, salary, or commissions
- ○ Employee of a PRIVATE NOT-FOR-PROFIT, tax-exempt, or charitable organization
- ○ Local GOVERNMENT employee (city, county, etc.)
- ○ State GOVERNMENT employee
- ○ Federal GOVERNMENT employee
- ○ SELF-EMPLOYED in own NOT INCORPORATED business, professional practice, or farm
- ○ SELF-EMPLOYED in own INCORPORATED business, professional practice, or farm
- ○ Working WITHOUT PAY in family business or farm

31a. Last year (1989), did this person work, even for a few days, at a paid job or in a business or farm?

- ○ Yes
- ○ No — *Skip to 32*

b. How many weeks did this person work in 1989? Count paid vacation, paid sick leave, and military service.

[ ] Weeks

c. During the weeks WORKED in 1989, how many hours did this person usually work each week?

[ ] Hours

32. INCOME IN 1989 —

Fill the "Yes" circle below for each income source received during 1989. Otherwise, fill the "No" circle. If "Yes," enter the total amount received during 1989.

For income received jointly, see instruction guide. If exact amount is not known, please give best estimate.

If net income was a loss, write "Loss" above the dollar amount.

a. Wages, salary, commissions, bonuses, or tips from all jobs — Report amount before deductions for taxes, bonds, dues, or other items.

○ Yes ——→ [$ .00] Annual amount — Dollars
○ No

b. Self-employment income from own nonfarm business, including proprietorship and partnership — Report NET income after business expenses.

○ Yes ——→ [$ .00] Annual amount — Dollars
○ No

c. Farm self-employment income — Report NET income after operating expenses. Include earnings as a tenant farmer or sharecropper.

○ Yes ——→ [$ .00] Annual amount — Dollars
○ No

d. Interest, dividends, net rental income or royalty income, or income from estates and trusts — Report even small amounts credited to an account.

○ Yes ——→ [$ .00] Annual amount — Dollars
○ No

e. Social Security or Railroad Retirement

○ Yes ——→ [$ .00] Annual amount — Dollars
○ No

f. Supplemental Security Income (SSI), Aid to Families with Dependent Children (AFDC), or other public assistance or public welfare payments.

○ Yes ——→ [$ .00] Annual amount — Dollars
○ No

g. Retirement, survivor, or disability pensions — Do NOT include Social Security.

○ Yes ——→ [$ .00] Annual amount — Dollars
○ No

h. Any other sources of income received regularly such as Veterans' (VA) payments, unemployment compensation, child support, or alimony — Do NOT include lump-sum payments such as money from an inheritance or the sale of a home.

○ Yes ——→ [$ .00] Annual amount — Dollars
○ No

33. What was this person's total income in 1989? Add entries in questions 32a through 32h; subtract any losses. If total amount was a loss, write "Loss" above amount.

○ None OR [$ .00] Annual amount — Dollars

Please turn the page and answer questions for Person 2 listed on page 1. If this is the last person listed in question 1a on page 1, go to the back of the form.

Appendix D

Minnesota Long-Distance Commuters, by Household Size, Commute Means, and Residential Location, 1990

Appendix D. Minnesota Long-Distance Commuters, by Household Size, Commute Means, and Residential Location, 1990

Persons in Households	Drove Alone					Commuted by Other Means					TOTAL
	Outside Metro Areas	Within Metro Areas				Outside Metro Areas	Within Metro Areas				
		Central City	Rest of MSA				Central City	Rest of MSA			
Row%	11%	17%	38%	56%	66%	3%	18%	13%	31%	34%	100%
1	4,209	6,854	14,996	21,850	26,059	1,035	7,153	5,106	12,259	13,294	**39,353**
Column%	7%	22%	7%	9%	8%	4%	24%	8%	13%	11%	9%
Row%	13%	7%	49%	57%	70%	5%	8%	17%	25%	30%	100%
2	16,399	9,131	60,881	70,012	86,411	5,842	9,913	21,137	31,050	36,892	**123,303**
Column%	27%	30%	28%	28%	28%	25%	33%	33%	33%	32%	29%
Row%	14%	7%	53%	60%	74%	6%	4%	15%	20%	26%	100%
3	14,122	7,107	51,934	59,041	73,163	6,141	4,393	15,226	19,619	25,760	**98,923**
Column%	23%	23%	24%	24%	24%	26%	15%	24%	21%	22%	23%
Row%	15%	4%	58%	62%	77%	6%	4%	13%	17%	23%	100%
4	15,456	4,002	58,443	62,445	77,901	5,773	3,841	13,409	17,250	23,023	**100,924**
Column%	25%	13%	27%	25%	25%	25%	13%	21%	19%	20%	24%
Row%	19%	6%	48%	53%	72%	7%	7%	13%	21%	28%	100%
5 or more	11,523	3,496	29,624	33,120	44,643	4,554	4,393	8,326	12,719	17,273	**61,916**
Column%	19%	11%	14%	13%	14%	20%	15%	13%	14%	15%	15%
Row%	15%	7%	51%	58%	73%	6%	7%	15%	22%	27%	100%
Total	**61,709**	**30,590**	**215,878**	**246,468**	**308,177**	**23,345**	**29,693**	**63,204**	**92,897**	**116,242**	**424,419**
Column%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: U.S. Bureau of the Census, 1990 Census of Population and Housing (Minnesota), special tabulations of the Public Use Microdata Sample (1 percent sample).

Appendix E

Minnesota Long-Distance Commuters, by Housing Value, Commute Means, and Residential Location, 1990

Appendix E. Minnesota Long-Distance Commuters, by Housing Value, Commute Means, and Residential Location, 1990

Housing Value	Drove Alone					Commuted by Other Means					TOTAL
	Outside Metro Areas	Within Metro Areas				Outside Metro Areas	Within Metro Areas				
		Central City	Rest of MSA				Central City	Rest of MSA			
Row%	41%	0%	28%	28%	68%	19%	4%	9%	12%	32%	100%
Less than $25,000	8,257	0	5,589	5,589	13,846	3,956	713	1,794	2,507	6,463	**20,309**
Column%	13%	0%	3%	2%	4.49%	17%	2%	3%	3%	6%	5%
Row%	50%	5%	13%	18%	68%	20.61%	5.38%	6%	11%	32%	100%
$25,000-$49,999	16,468	1,587	4,324	5,911	22,379	6,785	1,771	1,978	3,749	10,534	**32,913**
Column%	27%	5%	2%	2%	7%	29%	6%	3%	4%	9%	8%
Row%	17%	8%	47%	55%	72%	5%	10%	12%	22%	28%	100%
$50,000-$74,999	14,398	6,854	39,422	46,276	60,674	4,600	8,717	10,143	18,860	23,460	**84,134**
Column%	23%	22%	18%	19%	20%	20%	29%	16%	20%	20%	20%
Row%	7%	6%	65%	71%	78%	2%	4%	16%	20%	22%	100%
$75,000-$99,999	7,015	6,141	63,503	69,644	76,659	2,047	3,519	16,008	19,527	21,574	**98,233**
Column%	11%	20%	29%	28%	25%	9%	12%	25%	21%	19%	23%
Row%	6%	4%	71%	75%	81%	2%	1%	17%	18%	19%	100%
$100,000-$149,999	4,232	2,438	48,990	51,428	55,660	1,173	667	11,385	12,052	13,225	**68,885**
Column%	7%	8%	23%	21%	18%	5%	2%	18%	13%	11%	16%
Row%	3%	3%	68%	71%	74%	2%	1%	23%	24%	26%	100%
$150,000 and greater	1,081	1,127	24,104	25,231	26,312	598	253	8,188	8,441	9,039	**35,351**
Column%	2%	4%	11%	10%	9%	3%	1%	13%	9%	8%	8%
Row%	12%	15%	35%	50%	62%	5%	17%	16%	33%	38%	100%
Not Specified/ Rental	10,258	12,443	29,946	42,389	52,647	4,186	14,053	13,708	27,761	31,947	**84,594**
Column%	17%	41%	14%	17%	17%	18%	47%	22%	30%	27%	20%
Row%	15%	7%	51%	58%	73%	6%	7%	15%	22%	27%	100%
Total	**61,709**	**30,590**	**215,878**	**246,468**	**308,177**	**23,345**	**29,693**	**63,204**	**92,897**	**116,242**	**424,419**
Column%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: U.S. Bureau of the Census, 1990 Census of Population and Housing (Minnesota), special tabulations of the Public Use Microdata Sample.

Appendix F

Long-Distance Commuters in Minnesota, by Year Moved In, by Residential Location, 1990

Appendix F. Long-Distance Commuters in Minnesota, by Year Moved In, by Residential Location, 1990

Year Moved In	Residential Location		Total
	Outside Metro Areas	Within Metro Areas	
Before 1960	5,704	10,925	16,629
1960-1969	6,486	25,415	31,901
1970-1979	18,216	66,033	84,249
1980-1984	14,306	48,231	62,537
1985-1988	25,507	121,601	147,108
1989-1990	14,536	66,723	81,259
Not Specified	299	437	736
Total	**85,054**	**339,365**	**424,419**

Source: U.S. Bureau of the Census, 1990 Census of Population and Housing (Minnesota), special tabulations of the Public Use Microdata Sample (1 percent) sample.

Appendix G

Long-Distance Commuters in Minnesota, by Household Income, by Residential Location, by Means of Commuting, 1990

Appendix G. Long-Distance Commuters in Minnesota, by Household Income, by Residential Location, by Means of Commuting, 1990

Income Level	Drove Alone					Commuted by Other Means					TOTAL
	Outside Metro Areas	Within Metro Areas				Outside Metro Areas	Within Metro Areas				
		Central City	Rest of MSA				Central City	Rest of MSA			
Row%	27%	14%	18%	31%	58%	11%	23%	8%	31%	42%	100%
Under $10,000	3,105	1,610	2,070	3,680	6,785	1,288	2,691	920	3,611	4,899	**11,684**
Column%	5%	5%	1%	1%	2%	6%	9%	1%	4%		3%
Row%	23%	12%	24%	36%	60%	10%	20%	10%	31%	40%	100%
$10,000-$19,999	8,832	4,554	9,131	13,685	22,517	3,657	7,636	3,933	11,569	15,226	**37,743**
Column%	14%	15%	4%	6%	7%	16%	26%	6%	12%		9%
Row%	22%	10%	40%	50%	72%	8%	8%	12%	20%	28%	100%
$20,000-$29,999	12,581	5,681	22,908	28,589	41,170	4,830	4,738	6,762	11,500	16,330	**57,500**
Column%	20%	19%	11%	12%	13%	21%	16%	11%	12%	14%	14%
Row%	19%	8%	49%	56%	75%	8%	4%	12%	17%	25%	100%
$30,000-$39,999	13,938	5,888	36,570	42,458	56,396	6,210	3,289	9,292	12,581	18,791	**75,187**
Column%	23%	19%	17%	17%	18%	27%	11%	15%	14%	16%	18%
Row%	15%	5%	52%	56%	71%	4%	4%	20%	24%	29%	100%
$40,000-$49,999	11,270	3,473	38,594	42,067	53,337	3,243	3,289	14,973	18,262	21,505	**74,842**
Column%	18%	11%	18%	17%	17%	14%	11%	24%	20%	19%	18%
Row%	10%	5%	63%	69%	78%	3%	5%	13%	19%	22%	100%
$50,000-$59,999	5,359	2,875	34,247	37,122	42,481	1,587	2,944	7,130	10,074	11,661	**54,142**
Column%	9%	9%	16%	15%	14%	7%	10%	11%	11%	10%	13%
Row%	6%	6%	64%	70%	75%	2%	5%	18%	22%	25%	100%
$60,000 and greater	6,624	6,509	72,358	78,867	85,491	2,530	5,106	20,194	25,300	27,830	**113,321**
Column%	11%	21%	34%	32%	28%	11%	17%	32%	27%	24%	27%
Row%	15%	7%	51%	58%	73%	6%	7%	15%	22%	27%	100%
Total	**61,709**	**30,590**	**215,878**	**246,468**	**308,177**	**23,345**	**29,693**	**63,204**	**92,897**	**116,242**	**424,419**
Column%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: U.S. Bureau of the Census, 1990 Census of Population and Housing (Minnesota), special tabulations of the Public Use Microdata Sample (1 percent sample).

Appendix H

Long-Distance Commuters in Minnesota, by Occupation, by Commute Means, by Residential Location, 1990

Appendix H. Long-Distance Commuters in Minnesota, by Occupation, by Commute Means, by Residential Location, 1990

Occupation Type	Drove Alone					Commuted by Other Means					TOTAL
	Outside Metro Areas	Within Metro Areas				Outside Metro Areas	Within Metro Areas				
		Central City	Rest of MSA				Central City	Rest of MSA			
Row%	11%	10%	54%	64%	75%	3%	7%	15%	22%	25%	100%
Managerial & Professional Specialty	12,673	12,351	63,917	76,268	88,941	3,956	8,142	18,032	26,174	30,130	**119,071**
Column%	21%	31%	31%	31%	29%	17%	26%	30%	28%	26%	28%
Row%	11%	9%	52%	61%	72%	3%	8%	17%	25%	28%	100%
Technical, Sales, & Administrative Support	15,410	13,294	74,221	87,515	102,925	4,324	11,224	24,610	35,834	40,158	**143,083**
Column%	25%	33%	36%	36%	33%	19%	35%	40%	39%	35%	34%
Row%	18%	11%	38%	49%	67%	5%	16%	11%	27%	33%	100%
Service	6,095	3,611	12,949	16,560	22,655	1,840	5,382	3,818	9,200	11,040	**33,695**
Column%	10%	9%	6%	7%	7%	8%	17%	6%	10%	10%	8%
Row%	41%	14%	16%	29%	70%	25%	0%	5%	5%	30%	100%
Farming, Forestry, & Fishing	2,001	667	782	1,449	3,450	1,219	0	253	253	1,472	**4,922**
Column%	3%	2%	0%	1%	1%	5%	0%	0%	0%	1%	1%
Row%	20%	9%	49%	58%	78%	8%	3%	11%	14%	22%	100%
Precision Production, Craft, & Repair	10,833	5,152	26,818	31,970	42,803	4,623	1,426	6,164	7,590	12,213	**55,016**
Column%	18%	13%	13%	13%	14%	20%	4%	10%	8%	11%	13%
Row%	21%	8%	40%	48%	69%	11%	8%	12%	20%	31%	100%
Operators, Fabricators, & Laborers	14,651	5,336	27,186	32,522	47,173	7,383	5,589	8,257	13,846	21,229	**68,402**
Column%	24%	13%	13%	13%	15%	32%	18%	14%	15%	18%	16%
Row%	20%	0%	80%	80%	100%	0%	0%	0%	0%	0%	100%
Military	46	0	184	184	230	0	0	0	0	0	**230**
Column%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Row%	15%	10%	49%	58%	73%	6%	7%	14%	22%	27%	100%
Total	**61,709**	**40,411**	**206,057**	**246,468**	**308,177**	**23,345**	**31,763**	**61,134**	**92,897**	**116,242**	**424,419**
Column%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: U.S. Bureau of the Census, 1990 Census of Population and Housing (Minnesota), special tabulations of the Public Use Microdata Sample (1 percent sample).

Appendix I

Long-Distance Commuters in Minnesota, by Year Moved Into Residence, by Commuting Means, by Place of Residence, 1990

Appendix I. Long-Distance Commuters in Minnesota, by Year Moved Into Residence, by Commuting Means, by Place of Residence, 1990

Year Moved	Drove Alone					Commuted by Other Means					TOTAL
	Outside Metro Area	Within Metro Areas				Outside Metro Area	Within Metro Areas				
		Central City	Rest of MSA				Central City	Rest of MSA			
Row%	25%	3%	44%	47%	72%	10%	9%	10%	19%	28%	100%
Before 1960	4,094	483	7,314	7,797	11,891	1,610	1,541	1,587	3,128	4,738	16,629
Column%	7%	2%	3%	3%	4%	7%	5%	3%	3%	4%	4%
Row%	16%	7%	51%	58%	74%	5%	9%	12%	21%	26%	100%
1960-1969	5,037	2,369	16,192	18,561	23,598	1,449	2,875	3,979	6,854	8,303	31,901
Column%	8%	8%	8%	8%	8%	6%	10%	6%	7%	7%	8%
Row%	16%	4%	54%	59%	75%	5%	4%	15%	20%	25%	100%
1970-1979	13,685	3,611	45,885	49,496	63,181	4,531	3,703	12,834	16,537	21,068	84,249
Column%	22%	12%	21%	20%	21%	19%	12%	20%	18%	18%	20%
Row%	17%	8%	52%	60%	77%	5%	4%	13%	17%	23%	100%
1980-1984	10,925	4,715	32,637	37,352	48,277	3,381	2,576	8,303	10,879	14,260	62,537
Column%	18%	15%	15%	15%	16%	14%	9%	13%	12%	12%	15%
Row%	12%	8%	50%	58%	70%	5%	7%	17%	25%	30%	100%
1985-1988	17,733	11,477	73,991	85,468	103,201	7,774	10,626	25,507	36,133	43,907	147,108
Column%	29%	38%	34%	35%	33%	33%	36%	40%	39%	38%	35%
Row%	12%	10%	49%	58%	71%	5%	10%	14%	24%	29%	100%
1989-1990	10,120	7,774	39,698	47,472	57,592	4,416	8,257	10,994	19,251	23,667	81,259
Column%	16%	25%	18%	19%	19%	19%	28%	17%	21%	20%	19%
Row%	16%	22%	22%	44%	59%	25%	16%	0%	16%	41%	100%
Not Specified	115	161	161	322	437	184	115	0	115	299	736
Column%	0%	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%
Row%	15%	7%	51%	58%	73%	6%	7%	15%	22%	27%	100%
Total	**61,709**	**30,590**	**215,878**	**246,468**	**308,177**	**23,345**	**29,693**	**63,204**	**92,897**	**116,242**	**424,419**
Column%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: U.S. Bureau of the Census, 1990 Census of Population and Housing (Minnesota), special tabulations of the Public Use Microdata Sample (1 percent sample).

Appendix J

Public Use Microdata Sample Structure and Usage

Appendix J. Public Use Microdata Sample Structure and Usage

I. File Structure

Each PUMS file is composed of "household" and "person" records. Altogether, each record contains 231 variables in a hierarchical structure. These range from characteristics of the physical housing unit itself to personal information such as family size, income, and education. All households and individuals in the United States make up the universe sampled. Group quarters and vacant housing receive special consideration.

Three samples are available. The 5 percent sample is based on whole counties, groups of counties, and places within a state's borders wherever possible, and form Public Use Microdata Areas (PUMAs) with minimum populations of 100,000 persons in each. Where these entities exceed a population threshold of 200,000, portions will be used in separate PUMAs. Thus, an entire state can be addressed with this sample.

Alternatively, the 1 percent sample is based on metropolitan areas. Although county and state boundaries are considered, a single PUMA is likely to include parts of several geographic entities. The PUMA boundaries designated for this sample do not fall exclusively within state borders; thus, one cannot use the 1 percent sample to characterize the entire population of a single state exclusively.

The 3 percent sample uses the same geographic boundaries as those designated for the 5 percent sample, but draws from the elderly population only. These samples are not yet available for all states for 1990.

II. Error Considerations

Nearly all figures released by the Census Bureau are samples of one kind or another. 100-percent counts are available for only a few variables, and even these cannot include every individual in the nation. Because of the sampling involved, all census figures are estimates only.

The integrity of estimates varies depending on data sampling, collection, and processing methodology. Each PUMS record includes a person-weight--an estimate of how many people within the entire population can be expected to share the record's basic characteristics. Person-weights can be applied to each record to expand the sample to produce an estimate for the entire population.

Three considerations help to explain discrepancies between summary tape file (STF) data and PUMS variable totals. First, the PUMS data are subject to both sampling and non-sampling error while the 100-percent counts found in summary data are subject only to non-sampling error. Sampling error is the deviation of a sample estimate from the average of all possible samples. It arises from the composition of the sample, and how closely the chosen sample represents the entire population. Non-sampling error such as non-reporting of

information or mis-reporting by census respondents is generated in data collection and processing.

Second, the PUMS is based on households, with individuals treated as members of households. Summary data, on the other hand, are based on individuals themselves. Third, the accuracy of the weights generated for expanding the sample to reflect the entire population introduce another potential error source. The PUMS data provide unique variable combination totals, but these estimates are vulnerable to many types of error during calculation.

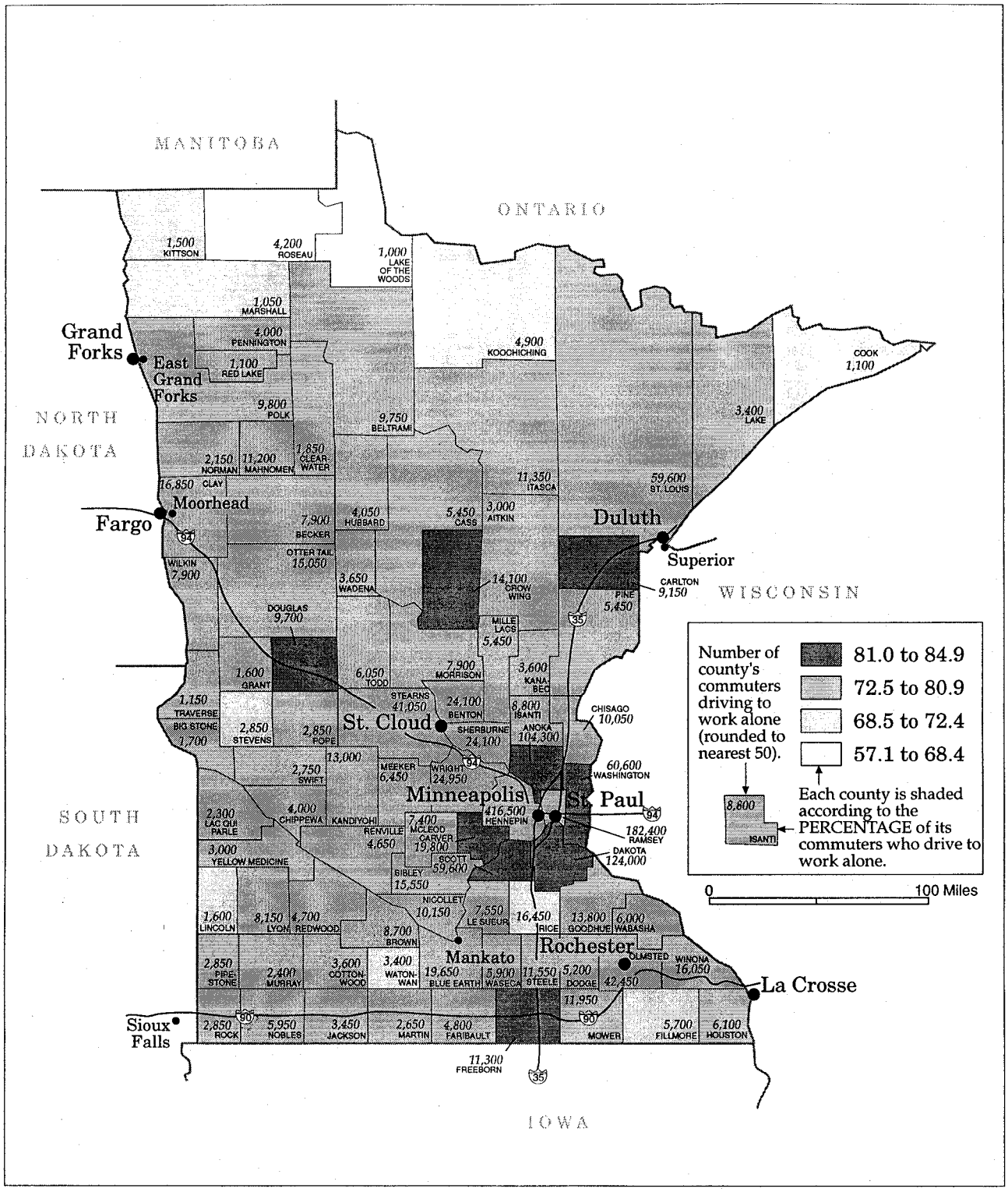
III. Census Bureau Definitions

Within this study, comparisons are made between metropolitan and nonmetropolitan areas. The Census Bureau describes both metro/non-metro and urban/rural areas with separate classification schemes. The two breakdowns are *not* mutually exclusive. In fact, metropolitan areas can include rural areas, just as nonmetropolitan areas can include urban places. While metropolitan areas are defined based on commuting fields, population, and employment concentrations, and "urban" place is simply a nucleated settlement with resident population of 2,500 or more. Within a metropolitan area, the "urbanized area" portions are delimited in terms of housing and population density criteria. Thus, nonmetropolitan areas are not direct surrogates for rural areas.

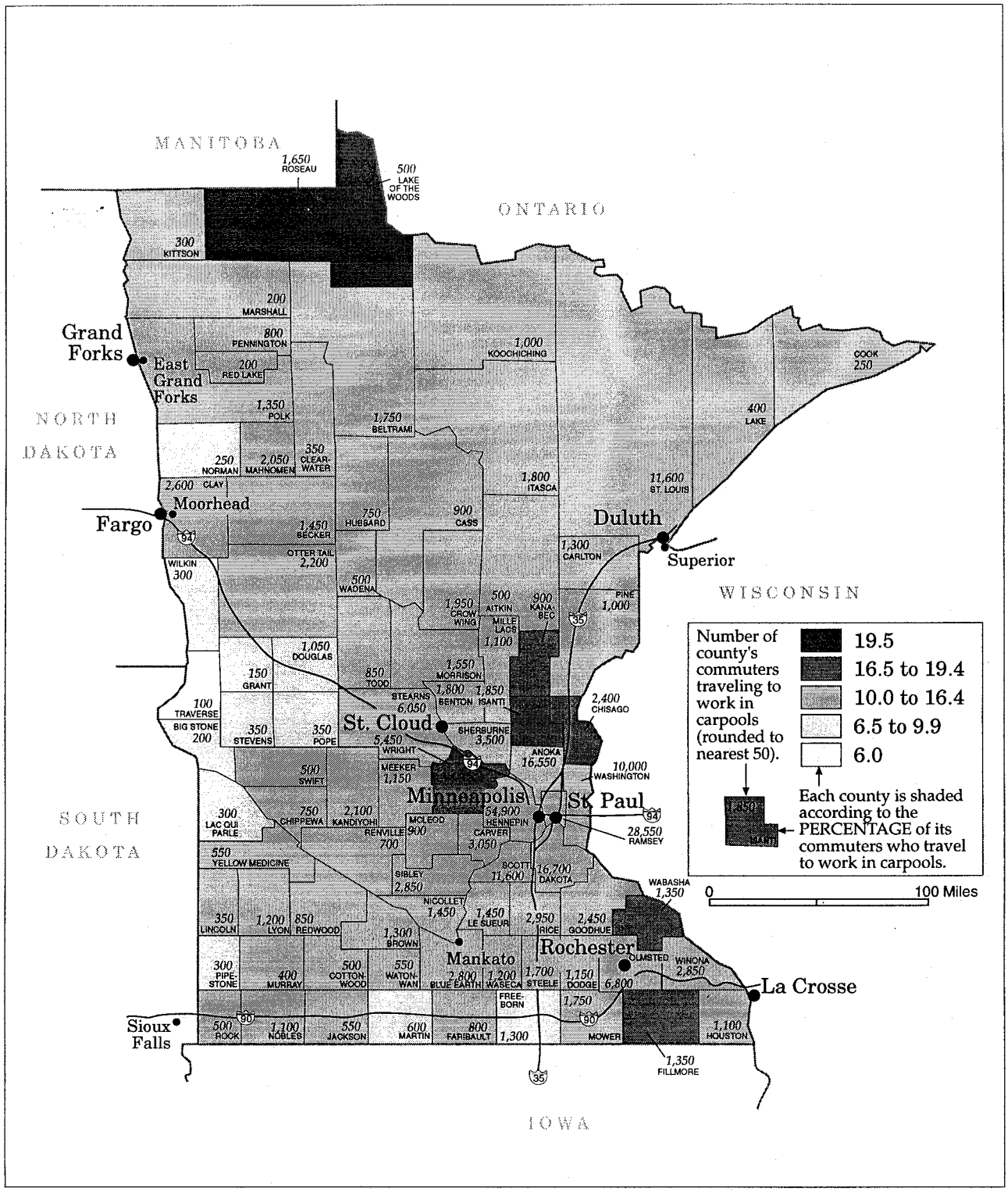
Source: U.S. Bureau of the Census, 1990 Census of Population and Housing, Public Use Microdata Samples Technical Documentation.

Appendix K

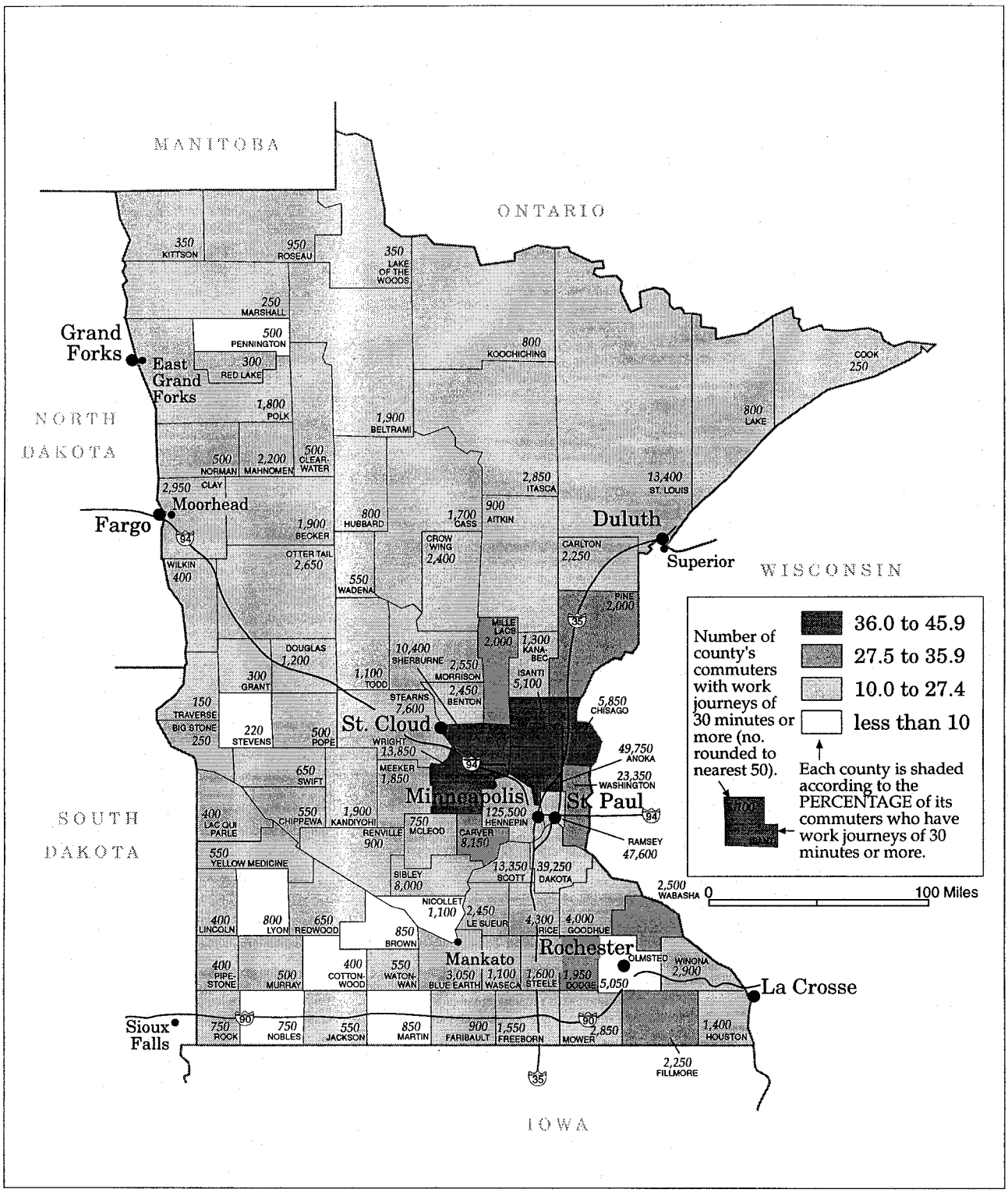
Transportation-Related Measures for Minnesota Counties, 1990: Six Reference Maps



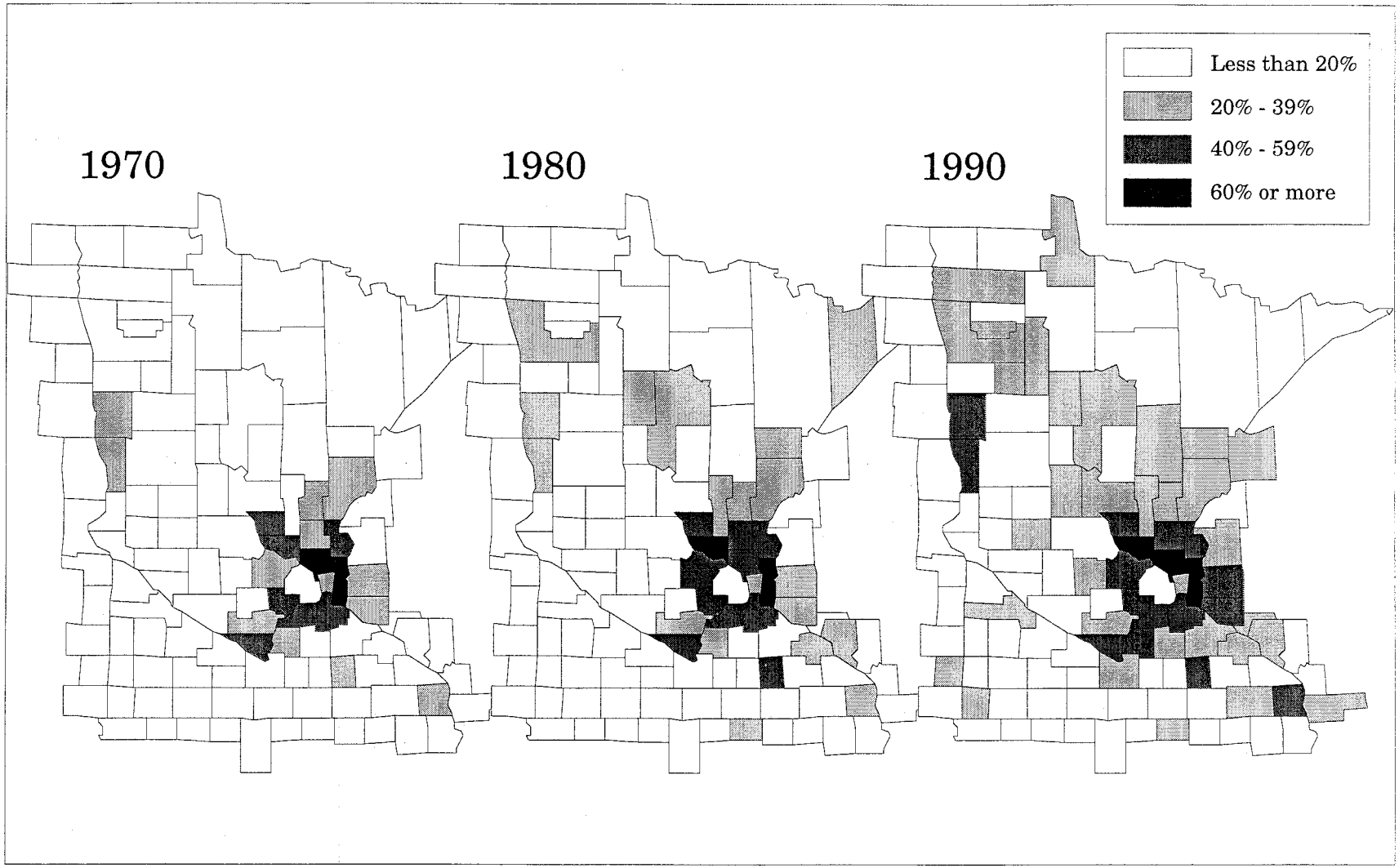
Reference map 1. Commuters Driving to Work Alone, Minnesota Counties, 1990. *(Data Source: U.S. Bureau of the Census, Summary Tape File 3.)*



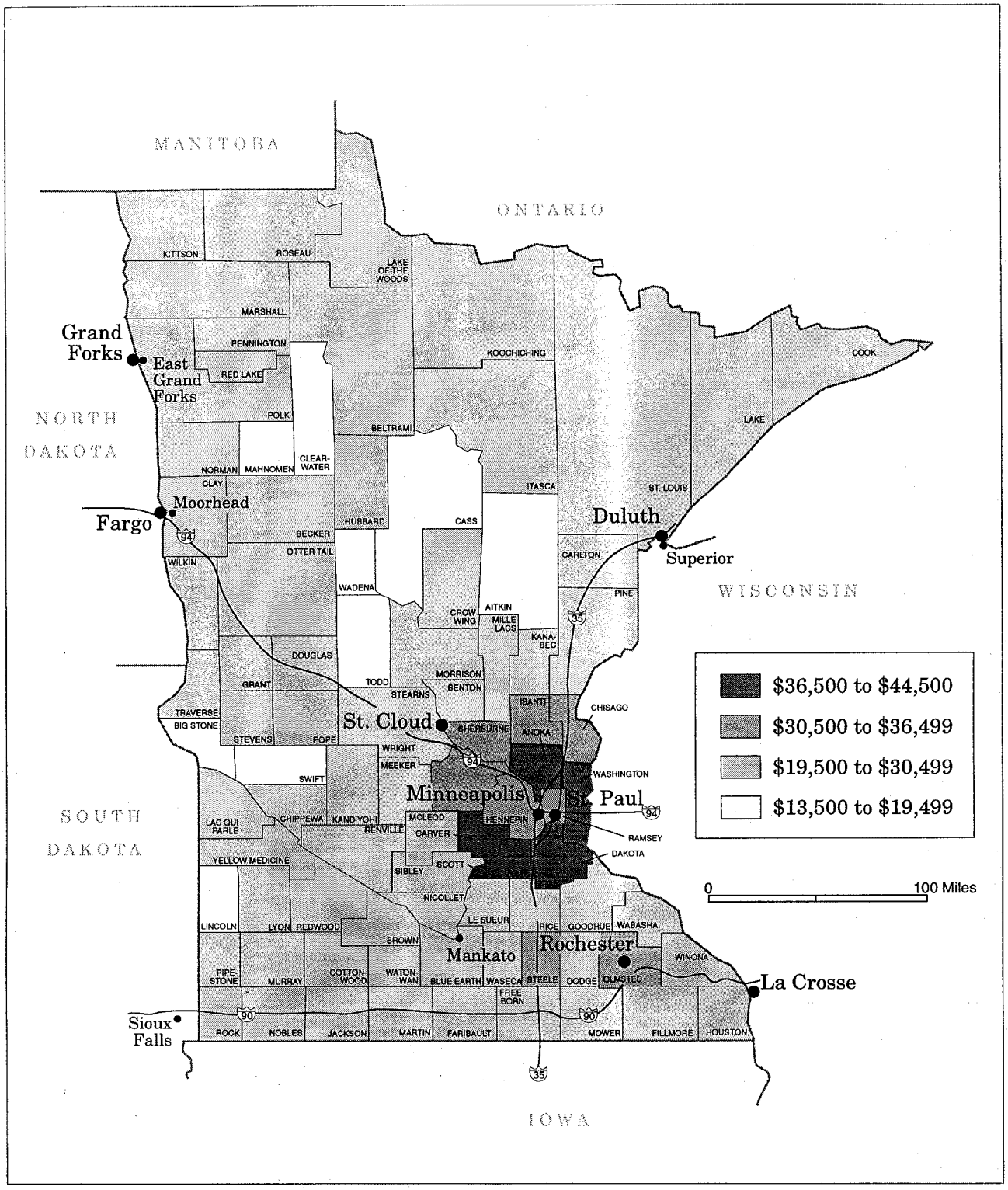
Reference map 2. Commuters Traveling to Work in Carpools, Minnesota Counties, 1990. *(Data Source: U.S. Bureau of the Census, Summary Tape File 3.)*



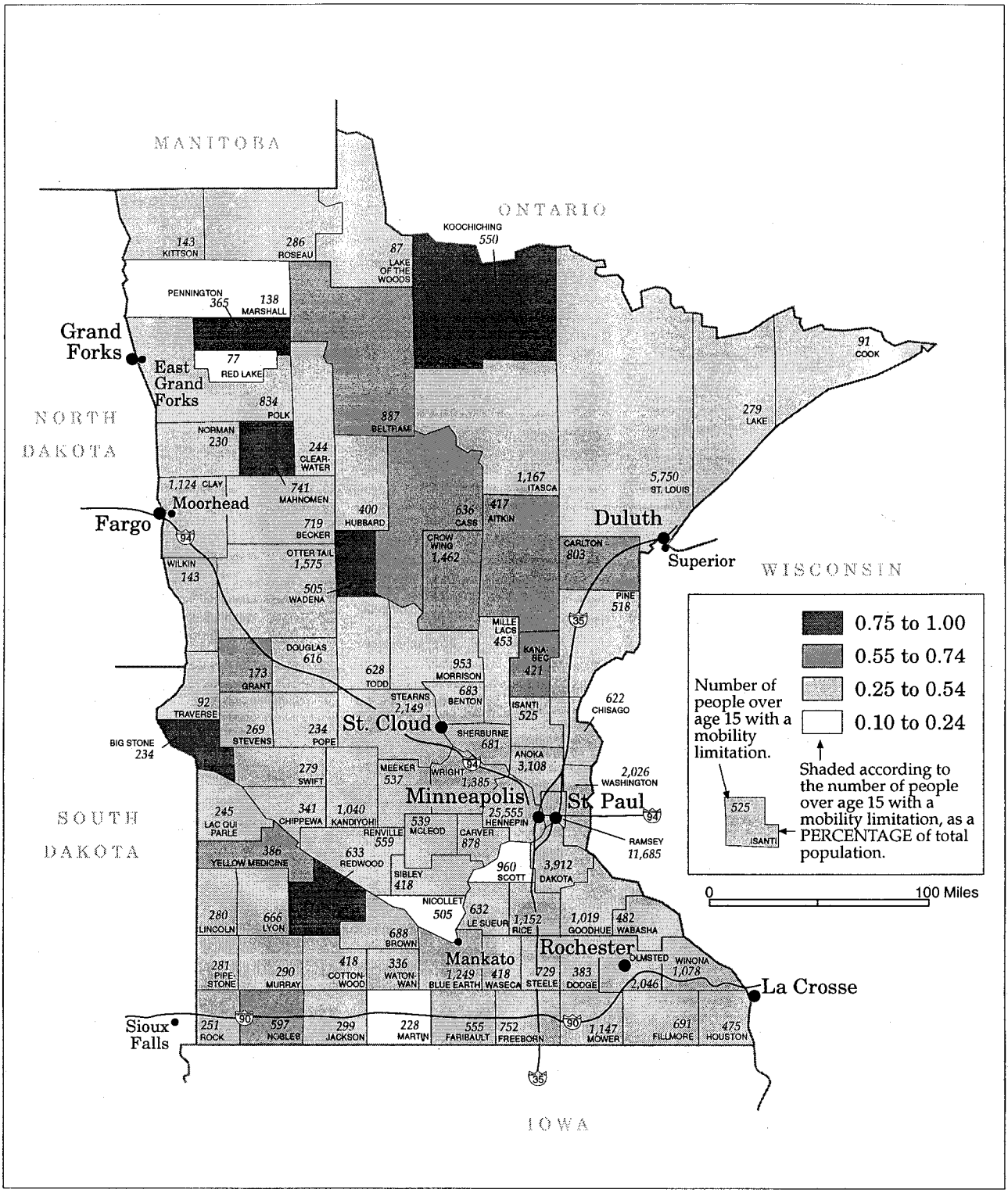
Reference map 3. Commuters with Work Journeys of 30 Minutes or More, Minnesota Counties, 1990. *(Data Source: U.S. Bureau of the Census, Summary Tape File 3.)*



Reference map 4. Percentage of Commuters Working Outside County of Residence, 1970 to 1990. *(Data Source: Special tabulations of U.S. Bureau of the Census Journey-to-Work Frequency Tables, and Bureau of Economic Analysis data.*



Reference map 5. Median Household Income, Minnesota Counties, 1990.
(Data Source: U.S. Bureau of the Census, Summary Tape File 3.)



Reference map 6. Limited Mobility Population, Minnesota Counties, 1990.
(Data Source: U.S. Bureau of the Census, Summary Tape File 3.)