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ACCESSIBILITY FOR RESIDENTS
IN THE METROPOLITAN ENVIRONMENT

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Metropolitan areas have become the dominant community form in the United States and in other countries with high levels of economic development primarily because they facilitate accessibility among the highly divergent and specialized activities characterizing an industrial (now tending, we are told, toward a post-industrial) society. The locational advantage is most apparent with respect to business firms, professional offices, administrative headquarters, medical centers, universities and other nonresidential activities. Location in a metropolitan area is also apparently a net advantage to people, for otherwise it would be difficult to explain the persistent trend of people to migrate in force to metropolitan areas. Whether metropolitan residents are actually better off for having made that locational choice is less clear. Nevertheless, our population is now preponderantly metropolitan.

As metropolitan areas proliferate, grow, and undergo significant change, it becomes an intricate and difficult task to monitor and to interpret changes in their structure. We may suggest two changes, not unrelated, which, in turn, pose further questions as to how accessibility within metropolitan areas may be changing.

First, we judge that metropolitan areas have been shifting towards a looser, more dispersed, lower-density structure. The dominant center anchored by the fixed radial transportation lines of an earlier period has given way to a plurality of centers, often no longer compact or sharply delineated, largely held together by the amazingly un-fixed point-to-point capabilities of the auto or other motor vehicle.

Second, we suspect that, for a great variety of reasons, metropolitan residents are less likely to share patterns of work trips, facility use, and socializing than may have been the case in the past. Greater choices are potentially open to individual residents than ever before. And the metropolitan environment attracts and caters to persons with vastly different orientations toward living. Different households -- and even different members of the same household -- may be characterized by distinctively different configurations of needs, interests, resources and physical capabilities. Thus, each metropolitan resident tends to have his own distinctive set of the channels and destinations that make up his "movement space" (to be discussed further, below) and his own subjective image of his working "community."

In addition, the very nature of accessibility in the metropolitan setting has certainly been undergoing significant changes in recent decades. This involves the distinct rise in dependence upon the auto, reliance upon the ubiquitous telephone, the pervasive impact of television, and, for many, the capabilities of air travel. It also involves unprecedented increases in income and the diffusion of expectations and consumption patterns that had previously been restricted to a much smaller number of residents -- the elite. And it involves the rise of a new generation or two unfettered by the traditional encumbrances of earlier patterns and images of community. We are reaping the changes that mark a highly mobile, generally well educated, and increasingly well heeled people.

This, we hasten to note, is the larger, broad-brush view. It is certainly a facet of the American dilemma that our aspirations so far outrun our capacity to deliver with equity to all. In this paper we shall stress the deprivation and nonaccess suffered by selected categories

of residents in the midst of the larger trend toward affluence and access. Indeed, we shall particularly argue that the very widespread availability of the auto has both led us to think most Americans are thereby well served and has also permitted our urban land-use patterns and transportation systems to cater primarily to auto-users to the specific and serious deprivation of those who lack access to the auto. While we touch upon various aspects of accessibility -- and nonaccessibility -- we look most pointedly at differential access to the auto.

Various Facets of the Concept, "Accessibility"

We start by recognizing the idea of physical accessibility: the capability for getting directly into contact with persons or activities. This usually involves travel through space. Supplementary or alternative access may also be provided by other communication modes, particularly by telephone. The most ready and flexible short-distance travel mode is walking. Additionally, one may take "trips" (making use of a wheeled vehicle -- or an air- or water-borne vehicle). Most metropolitan residents have essential physical access available to them, but a significant proportion, as we shall point out below, suffer physical disabilities that make walking or driving one's own vehicle difficult or impossible.

Differentials in available income are particularly significant. Income means purchasing power and hence power to choose. It bears on where one lives, what one can afford to do, what travel mode is at one's disposal, and how self reliant one can be. It has been argued that the metropolis provides exceptional opportunities for the resident with higher income, but that it is likely merely to frustrate the resident who lacks the income to partake of the goodies latently available. (Thompson, 1972)

Access also has subjective and social psychological aspects. Expectations on the part of the individual actor loom as overwhelmingly important. As Wildavsky has suggested, a sure formula for revolt is to raise the level of expectations while failing to deliver the means for their fulfillment. (Wildavsky, 1968; esp. p. 3) Built into the social psychological aspects of access are considerations of knowledge, self-confidence, capacity for initiative, and other requisites to the effective searching out and use of possible opportunities. The metropolitan arena has become an extremely complex setting within which a myriad of subsystems operate. Finding one's way through this maze may prove to be a forbidding challenge; we need to understand and to seek to alleviate the plight of the many metropolitan residents who are ill equipped to cope with this complexity. (E.g., March, 1968)

Up to this point our discussion of access has assumed market-place circumstances by focusing on purchasing power and suggesting that metropolitan areas provide a very wide range of specialized goods and services. Another related aspect of access relates to political participation and, generally, to one's capability to have access to political power or influence. A considerable research literature has reported on differential access to community power. (Greer, 1972, Chap. 9) Thus, we must consider accessibility not only as the bridging of physical distance, but also as the bridging of social and political distance.

In specific cases, accessibility may involve a mix of all of these aspects we have separately identified. It is, in fact, reasonable to presume that these different aspects tend to blur into each other and to be part of a larger syndrome. Thus greater accessibility in any one sphere may well be associated with greater accessibility in other spheres.

Greater income, for example, pervasively ramifies to an association with better health, with better chances for physical accessibility, with greater purchasing power, and with better opportunities for political influence. Conversely, lack of access in some spheres may reinforce the very lack of knowledge and lack of self-confidence that may make accessibility in other spheres less probable or more difficult.

The Individual and Subjective Aspects of Accessibility

It is undoubtedly a matter of cultural context whether or to what degree residents of a "community" share common interpretations and expectations as to a shared "turf." Even to ask the ordinary interview-type questions poses serious possibilities of contaminating replies by the interviewer's expectation that the respondent will be able to identify a "neighborhood." (Lee, 1968, pp. 352-361) Our purpose here is not to provide any comprehensive review of research of this particular sort. At the risk of some selectivity or even personal bias, we merely stress that each urban resident inevitably has his own personal image of that portion of his urban environment of which he makes active working use. This reflects, to be sure, a land-use pattern in the vicinity of the resident's home and a broader pattern of transportation channels and activity centers more distant from his home. Only a selected number of stores, other facilities, friends, and possible points of contact are nearby. Others are more distant and require transportation or communication beyond the range of walking. Hence, physical-spatial constraints are imposed.

But each resident has a personalized interpretation of needs, a configuration of tastes, a sense of his financial resources, and his own physical condition (reflecting, in particular his age) and role

(reflecting sex, status within the household, whether employed outside the home, etc.). And his conception of his own familiar turf interrelates with his habitual configuration of actual trips to various destinations -- whether near his home or more distant.

We recognize the distinction between a resident's effective environment and his potential environment. The effective environment is "that version of the potential environment that is manifestly or latently adopted by users." (Gans, 1968, p. 6) Thus, the effective environment incorporates the user's subjective conception of his physical environment as this ties to the user's larger view of his world.

A related concept has also been suggested: movement space. This is

...a perceived part of the environment within which movement occurs.... This concept of movement space is similar to Lewin's 'life space.' This is a universe of space and time in which the person conceives that he can or might move about, and is only a limited portion of the environment....

Movement space could be further refined. It might be possible to identify three types of movement space:

1. A core, which is the frequently travelled space, with which the tripmaker is most familiar. This is the space within which regular journeys are made, frequent visits to friends, and shopping trips.
2. A median area, the occasionally travelled space, within which journeys to visit relatives, and holidays would be made by many people.
3. An extensive movement space, which is the conceived, concept-learned, or cosmological space.

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The limits of the movement space, unique to a particular tripmaker, are set by his finite abilities to perceive, and by his learning experiences. Movement space will vary from the limited realm of the young child to the extensive realm of say an international movie-star....

(Hurst, 1969, pp. 75-76)

It would be misleading, however, to presume any tidy regularity of nested spaces. Even the core may reflect the traditional patterns of the individual in question and the urban topography (e.g., the particular configuration of land use and streets in the surrounding area). Characteristically, the resident may know and use certain routes or corridors, to the metropolitan center (if he goes there) or to specific other activity centers, without knowing or using many other sectors of the metropolitan area. The actual spatial pattern of his movement space may appear to be irregular -- a distinctive set of destinations linked by a distinctive web of routes. We may speak of these routes as the resident's "Indian paths" through the city. We may expect that each urban resident has a unique configuration of Indian paths -- making up his effective environment or his movement space.

We may also cite Lee's findings, in the same vein, reflecting his 1954 study in Cambridge, England:

It was found that people perceive, organize and react to their physical and social environment differently from their neighbours. Each person's constellation of experience and action is apparently unique, although there is some evidence of norm-formation. Repeated transaction with people and places in the urban environment leads, by a process of differentiation, to the separation of an organized socio-spatial whole. The process is probably bi-directional -- expanding outwards from the home and contracting inwards from the total city. We locate shops, cinemas, churches, parks and phone boxes; we learn the whereabouts of people who will cater to our specific needs -- grocers, taxi-drivers, policemen and plumbers; and those who will give us the more general satisfactions of acquaintance and friendship. The roads and pathways which link them serve as a framework....

(Lee, 1968, p. 354)

Changing Metropolitan Structure

We are undoubtedly trapped by very serious conceptual lags in our attempts to understand the functional-spatial organization of the contemporary large American metropolitan area. We persist in thinking of a traditional center serving both the main central city and the larger metropolitan area. We think of major transportation routes focusing on this center. And we think of suburbs as being adjuncts to the main central city. Even our data collecting efforts are, in part, caught by a certain inertia such that we continue to collect the same types of data that reflected earlier circumstances.

We are, in fact, still influenced by the outpourings of the Chicago school of urban sociology that, during the 1920s and 1930s, produced an impressive and reinforcing set of empirical studies. We appear to lack an equally influential cutting edge that constantly brings us up to date on the incredibly powerful changes that have, if anything, basically changed the structure of metropolitan areas during the past few decades.

These changes appear to reflect in particular the interlocking impact of at least four major developments: (1) generally rising household incomes that have made it possible for households to have and use autos and that have encouraged moves to lower density suburban locations; (2) the very significant and pervasive rise in the availability of autos (the full import masked by the long period of time over which the change has been underway); (3) the great rise, both in absolute and relative terms, of the suburban portions of metropolitan areas at the inevitable expense of the central cities; and (4) the persistent drop in residential densities (and, more precisely, in the mix within any given metropolitan area as between low-density and higher-density sectors, with the low-density

suburban sectors becoming ever more dominant). Home ownership is also positively associated with lower density.

Over the past five or so decades the trend toward low-density dispersal and the increasingly heavy reliance on the private motor vehicle have had a cumulative and highly circular character, to the point where it becomes difficult and perhaps not very helpful to try to unravel the relative significance of the separate factors. As the suburbs have grown, new shopping centers and other service facilities have followed. A preponderance of employed persons residing in the suburbs of large metropolitan areas find employment in the suburbs. But to move around the suburbs means to have "wheels." The land-use pattern makes it virtually imperative to have at least one car, and characteristically more than one auto, per household. In turn, the prevalence of autos has dictated the character of the shopping centers and the broader pattern of centers. The overall pattern has a looseness to it that is only understandable in terms of travel predominantly by auto. Given the auto, one merely extends in scale (as if stepped up by a giant pantograph) the freedom and flexibility of walking travel. Metropolitan residents "walk" in their cars.

The auto has already had profound impacts on both the overall land-use pattern of the metropolis and on the individual lives of its residents. Further, the base for future development has vastly changed, and this foreshadows potential further changes that will cumulatively exert even greater long-range impact. While this is perhaps most evident in, say, Orange County, it is geographically pervasive; one could be dropped blindfolded by plane or helicopter into almost any suburban sector of a large American metropolitan area and be hard put to identify immediately which precise metropolitan area he is observing.

While there are many threads to the overall trend, we single out the shifting residential densities as one broadly significant feature. We must recognize the difficulties in measuring densities. The main measure we employ, gross density, is exceedingly crude. And yet it permits a rough grasp of changes underway. Table 1 provides an initial overview for those urbanized areas of the U. S. with population of 100,000 or more. This shows that in the 60 years from 1920 to 1980 residential density on average drops to 58 per cent of the 1920 level. For that same 60-year period, population in these urbanized areas increased by 4.3 times while the land area included increased by 7.2 times. This includes the inclusion of additional urbanized areas, but reflects the average metropolitan environment for Americans.

The drop in residential densities has affected both the central and the suburban portions of these urbanized areas. The trend for the most recent 20 years is shown in Table 2. We see that the drop in density was even more pronounced for the central cities than for the suburban portions, and that the densities of the central cities and the suburbs were more nearly equal in 1970 than they were in 1950. The suburban portions were, of course, growing more rapidly than the central cities. And whereas the central cities and the suburban portions were about equal in area in 1950, by 1970 the suburban portions had come to represent nearly 21,000 square miles, well over the 14,000 in central cities.

Table 3 shows more precisely the changing densities in four large urbanized areas, around New York, Chicago, Los Angeles and San Francisco. The trends, when viewed in this detail, show some variations. Densities have generally been rising somewhat in the Los Angeles area, and Los Angeles as a central city is gradually moving a bit closer to the

Table 1

Gross Residential Densities, Population, and Geographic Area:
Large U. S. Urbanized Areas, 1920 to 2000

	<u>1920</u>	<u>1940</u>	<u>1960</u>	<u>Projected 1980</u>	<u>Projected 2000</u>
Persons per square mile	6,580	5,870	4,230	3,840	3,732
Population (in mills.)	34.6	52.4	91.0	148.0	220.5
Square miles (in thous.)	5.3	8.9	21.6	38.4	60.6

Note: Includes only those urbanized areas with populations of 100,000 and over. In 1960 such areas represented about 95 per cent of the population of all urbanized areas.

Source: Adapted from Clawson, 1971, Table 39, p. 336 (in turn, from Pickard, 1967).

Table 2

Gross Residential Densities, Population, and Area:
All U. S. Urbanized Areas, 1950-1970

	<u>1950</u>	<u>1960</u>	<u>1970</u>
Population per Square Mile			
Total urbanized areas	<u>5,408</u>	<u>3,837</u>	<u>3,376</u>
Inside central cities	7,786	5,502	4,463
Outside central cities	3,167	2,622	2,627
Total Population (in 000s)			
Total urbanized areas	<u>69,252</u>	<u>95,834</u>	<u>118,447</u>
Inside central cities	48,377	57,966	63,922
Outside central cities	20,875	37,868	54,525
Percentage Distribution of Population			
Total urbanized areas	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Inside central cities	69.9	60.5	54.0
Outside central cities	30.1	39.5	46.0
Land Area in Square Miles (000s)			
Total urbanized areas	<u>12.8</u>	<u>25.0</u>	<u>35.1</u>
Inside central cities	6.2	10.5	14.3
Outside central cities	6.6	14.4	20.8

Source: U. S. Censuses of Population, 1960 and 1970.

Table 3

Gross Residential Densities: The New York, Chicago,
Los Angeles and San Francisco Urbanized Areas, 1950-1970

	<u>1950</u>	<u>1960</u>	<u>1970</u>
New York-Northeastern New Jersey urbanized area			
Total urbanized area	<u>9,810</u>	<u>7,512</u>	<u>6,683</u>
Inside central cities (New York City)	24,537 (25,046)	24,132 (25,966)	24,382 (26,343)
Outside central cities	4,066	3,541	3,580
Chicago-Northwestern Indiana urbanized area			
Total urbanized area	<u>6,954</u>	<u>6,238</u>	<u>5,257</u>
Inside central cities (Chicago)	17,450 (17,450)	13,138 (16,014)	12,283 (15,126)
Outside central cities	2,599	3,131	3,091
Los Angeles-Long Beach urbanized area			
Total urbanized area	<u>4,587</u>	<u>4,633</u>	<u>5,313</u>
Inside central cities (Los Angeles)	4,370 (4,370)	5,475 (5,447)	6,135 (7,364)
Outside central cities	4,821	4,134	4,818
San Francisco-Oakland urbanized area			
Total urbanized area	<u>7,038</u>	<u>4,213</u>	<u>4,387</u>
Inside central cities (San Francisco)	11,885 (17,385)	11,351 (16,307)	10,035 (15,764)
Outside central cities	4,545	2,734	3,252

Source: U. S. Censuses of Population, 1960 and 1970.

prevalent notion of higher densities for the central city than for the suburbs. Densities have generally fallen in the New York and Chicago urbanized areas and in the Bay Area.

These broad averages mask finer variations both within the central cities and within the suburban portions. Table 4 shows, for example, the combined Baltimore-Washington, D. C. region, as of the late 1950s, the variations in densities by geographic sector and the more refined alternative density measures that can be employed (in addition to gross density per square mile, the figure in the last column that we also employed in Tables 1, 2 and 3). This table shows that quite beyond the simplifying dichotomy of inside and outside central cities used in Tables 2 and 3, there may well be much greater differences as between the innermost part and the outer suburbs. We must bear in mind these very great differences and avoid undue generalization. Even so, we cannot avoid the important conclusion that very large numbers and proportions of persons are now living in relative low-density portions of metropolitan environs.

Metropolitan development at low density brings certain inevitable correlaries. It brings vast increases in the land area within recognized urbanized areas. It brings an inability to provide effective public transportation; over half of our metropolitan residents report no available public transportation service. (Marans and Rodgers, 1972, p. 38) It also brings to an end the traditional notion that local shops, schools, churches, and other community facilities will be within ready walking distance of homes; densities have become so low that most residents are now beyond normal walking distance of these facilities, except for some elementary schools. (Blumenfeld, 1967, Chaps. 10 and 16) These low-density

Table 4

Residential Density Groups; Baltimore-Washington Region,
Late 1950s

<u>Density group</u>	Neighborhood density: ^a persons per acre		Net residential density ^b Persons Housing units per acre per acre		Gross density ^c Persons Persons per acre per sq mi.	
	<u>Range</u>	<u>Average</u>	<u>per acre</u>	<u>per acre</u>	<u>per acre</u>	<u>per sq mi.</u>
Inner city	50-120	100 (Balt.) 75 (Wash.)	120+	40+	20+	13,000+
Outer city	21-50	30	55-65	16-18	18	11,000
Inner suburban	12-21	15	20-25	6-7	8	5,000
Outer suburban	4-12	7	9-12	2-3	4	2,500
Rural	under 4	3	4-5	1-2	2	1,200

^aPersons on land devoted or to be devoted to residential use per acre of residential land, including residential streets and local neighborhood facilities.

^bSame, per acre of strictly residential land, exclusive of streets, neighborhood facilities, etc.

^cResidential population per acre of all land developed or to be developed.

Source: Adapted from Clawson, 1971, Table 36, p. 305 (in turn, from Baltimore Regional Planning Council and National Capital Regional Planning Council, 1960).

residential areas have become auto-land. Even as of 1960 (and autos have become even more prevalent since that date), the most recently developed areas in metropolitan California were characterized by the following distribution (Foley et al., 1965, pp. 202-203):

<u>Households with --</u>	<u>Per Cent</u>
No auto available	3-5
1 auto available	50-55
2 or more autos available	40-45

Autos have now become so prevalent and have been in the ascendancy as a mode of personal transportation for so long in these lower density portions of our metropolitan areas that it has become the common presumption that residents will have and rely upon autos. This, in turn, has affected the very design of these residential environments, including community facilities and their accessibility, and, of course, the transportation channels as such. A perfect case in point is the large suburban shopping center locationally related to a comprehensive freeway system. It is virtually taken for granted that one gets to such a shopping center by auto.

We are not about to assert that low-density development and dependence upon the auto are in any simplistic way interlocked all by themselves. As Kain has carefully stated, "...it appears that income has been the most important factor underlying both higher post-war levels of automobile ownership and declines in residential density." (Kain, 1966, p. 21) And he develops in greater detail the very real complexities of unravelling out of a larger web those factors that may be considered the most conclusively determinative. He also points to family size and to the pattern of labor force participation as affecting residential density.

But when we talk about cities and about metropolitan areas in today's America, we are in fact dealing with a very different environmental setting than that which confronted the classic Chicago sociologists some fifty years ago.

Access to the Auto
As a Pivotal Key to the Broader Question of Access

In very broad terms, then, we have been moving into metropolitan environments in which it has been assumed that the modal form of personal transportation was the auto. It has increasingly been assumed that, with the exception of certain high density inner-city settings, most households would have an auto available. Further, and without our quite realizing the degree to which this has come about -- since the evolution has been so gradual and we have been so immediately caught up in the process -- we have in recent years been moving even beyond the point of the auto as available to a household, a logical earlier concept, to the point now where increasingly the auto is personally available to each member of the household. As we shall show below, this has now reached much more significant dimensions than many of us may have realized.

The thrust of our analysis from this point on will be to provide a summary of two trends over time and two types of differentials at any given time: (1) the availability of the auto to a household and (2) the availability of an auto to a specific household member. These two are, in turn, interrelated. Quite obviously, as the number or proportion of households with one or more autos available rises, so, too, do the chances that individual members of that household have access to an auto. The further focus on individual members demonstrates certain persistent and significant differentials even within a given household. Thus,

personal access to an auto reflects both the general level of auto availability to the household and each household member's own characteristics.

Concern about transportation -- and a focus now on the availability of autos -- inevitably raises difficult considerations about the ends at stake. Clearly, we do not want transportation only for transportation's sake. Fresh recognition that the primary goals are to improve urban livability and to provide access to opportunities has come into recent analyses of the transportation problem. Webber has effectively stated:

A governmental strategy, aimed at improving human welfare by expanding individuals' accessibilities, must employ a spectrum of programmatic approaches in concert. Any modern strategy would be directed to improving educational opportunities, fostering positive mental and physical health, expanding the national and regional economies, improving the quality of the communications media, expanding the transportation networks and extending transport services to those presently excluded, raising family-income levels, expanding the range of housing choices, fostering diversity in the ranges of consumer goods offered for distribution, and more. Transport is clearly but one of many important inputs into such a strategy.

(Webber, 1971, p. 139)

Further, an exclusive focus on autos is of course incomplete. We ought to have a very full grasp of the effectiveness with which alternative modes of transport serve metropolitan residents. And, as we move toward an uncertain future, we should bear in mind that the auto, despite its fascinatingly relentless appeal, may well be superseded in coming decades by new versions of personal transport yet to be invented and translated to reality. But the auto has provided a personalized mode of transport so advantageous and so appealing to most present or would-be users that its acceptance and impact must be recognized.

There has been much written about the functional and social features underlying the auto's acceptance, and we shall not attempt to inventory these many features. We merely repeat that it permits residents to "walk" their metropolitan environs, but on the larger scale that more nearly matches the way in which metropolitan facilities and activity centers have come to be organized. It provides comfort and privacy; permits spontaneous starts, stops or changes in trip plan; encourages sociability or intimacy; serves to carry or to store many sizes of "things"; and lends itself to symbolic extension of self or home.

To have access to an auto is thus to provide potential "wheels" by which to do many things one needs to or desires to do. Transportation to work is overwhelmingly by auto. Other purposes are admirably served; formal traffic counts and our own personal experiences of living in cities attest to the increasing importance of week-end and evening travel.

In contrast, the urban resident lacking access to an auto is confronted with several forms of deprivation. First, he lacks the direct use of the auto. Second, he lacks choice of mode. Third, and increasingly serious, he lacks effective public transport. We have catered to those with autos, and, in error, have come to act as though "everyone" had an auto. But various categories of persons comprising a sizeable minority in fact lack autos. And yet, increasingly, metropolitan residents find themselves in total environs (including the land use patterns and the available transportation channels) which are designed solely for auto users. The evolving land-use changes reflecting auto predominance combine with the direct lack of auto and the absence of good public transportation in increasing the relative deprivation of those who must continue to face life without autos in today's metropolitan environs.

This suggests that attacks on the problem include a fresh recognition of land use plans and controls, with an eye to lessening the need for transportation and, in particular, for reliance on the auto. (Abley stressed in Owen, 1972) We shall return to this implication at the end of this paper.

Auto Availability: A Quick National Summary

We have not sought to break out the overall background picture for the U. S. for earlier years on a household basis. The fifty-year trend is shown here, on the gross autos-per-1,000 population basis customarily employed:

<u>Dates</u>	<u>Privately Owned, Registered Cars per 1,000 Population</u>	<u>Percentage Increase in Ratio over Previous Ratio</u>
1920	76.9	--
1930	187.1	+143.3
1940	207.9	+ 11.1
1950	266.7	+ 28.3
1960	342.6	+ 28.5
1970	439.9	+ 28.4

Sources: Adapted from Automobile Manufacturers Association, 1972, p. 18, and U. S. Census of Population, 1970.

This is exceedingly crude. All of these autos were not necessarily in active use. The population figure includes children and does not take into account household size or composition. But it does suggest a highly significant relative increase in the ratio of autos to people during the 1920s; some slow-down during the 1930s, reflecting mainly depression conditions; and quite remarkably, substantial increases of slightly over 28 per cent in the ratio for each of the past three decades. It is particularly significant that the percentage increase in the ratio held up during the 1960s, despite the already very high base of auto

availability by 1960 and despite the common presumption that we were nearing the saturation point. It seems further to support the degree to which the auto was becoming "indispensable," encouraged by a greatly augmented freeway and highway system and by the shifting land-use pattern to which we have already alluded.

We offer two further time series, both for the U. S. as a whole.

The first is on a family basis:

<u>Dates</u>	<u>Per Cent of Families Owning Autos</u>
1955	71
1960	77
1965	79
1969	82

Source: Automobile Manufacturers Association, 1972, p. 48.

The second is on a household basis, and introduces two measures:

<u>Dates</u>	<u>Per Cent of Households Owning:</u>				<u>Ratio of Autos to Households^a</u>
	<u>No Auto</u>	<u>One Auto</u>	<u>Two Autos</u>	<u>Three+ Autos</u>	
1960	25.0	58.6	16.4		.91
1970	20.4	50.3	24.6	4.7	1.09

^aCalculated on the basis of a trichotomous classification -- no auto, one auto, or two or more autos -- with the latter class being treated only as though there were two autos. Thus, the ratio somewhat understates the precise number of autos in relation to households.

Source: Adapted from U.S. Bureau of the Census, October 16, 1970, Table 1.

By either of these measures, it is quite clear that the 1960s saw our nation move much farther along the road toward the ubiquity of the auto. Over four-fifths of all households or families have an auto. And even with a conservative estimate for multi-auto households we find that the

average ratio of autos to households has risen from .91 to 1.09. We now have, on average, more than an auto per household.

Table 5 summarizes the past decade's changes in this ratio of autos to households for separate regions of the U. S. and for selected large SMSAs. This shows that both the levels of auto ownership and the increases in auto ownership from 1960 to 1970 were generally high in all but the Boston, New York and Pittsburgh SMSAs. The increases were notable in many of the SMSAs and in most of the regions of the U. S. While in 1960 the Los Angeles-Long Beach SMSA in particular and the Pacific and Mountain regions in general led the rest of the nation by a considerable margin, by 1970 many other SMSAs and regions had reduced the gap.

Tables 6 and 7 show that both income of the household and age of the household head influence the ratio of auto ownership. In interpreting Table 6 we must bear in mind that an inflationary decade altered the relative purchasing power of the income classes shown. Two conclusions, however, stand out: the only gains, class by class, are for the two income classes over \$10,000; and, by inference, the bulk of the upward shift of .18 points in the overall ratios is due to redistribution of households into higher income groups -- i.e., more in the upper income groups and fewer in the lower income groups in 1970 than in 1960.

Table 7, breaking down by age of the head of the household, shows that by 1970 there were roughly three levels of auto availability: the highest for households with heads 35 to 54, the next highest for households with heads on either side in age (i.e., 25 to 34 and 55 to 64), and the lowest for households with heads under 25 or 65 and over. The table also shows that those age classes already associated with the highest levels of auto availability in 1960 had the greatest point gains, further reinforcing previous differentials.

Table 5

Changes in the Ratio of Autos Owned to Households, U. S. Geographic
Regions and Selected Large SMSAs: 1960-61 and 1969-70 Averages

<u>Regions</u>	Ratio, Autos to Households ^a			<u>SMSAs</u>	Ratio, Autos to Households ^a		
	<u>1960-61</u>	<u>1969-70</u>	<u>Change in Ratio</u>		<u>1960-61</u>	<u>1969-70</u>	<u>Change in Ratio</u>
Total U.S.	.93	1.09	+.16				
New England	.95	1.12	+.17	Boston	.84	.85	+.01
Middle Atlantic	.81	.94	+.13	New York	.72	.77	+.05
				Philadelphia	.86	1.01	+.15
				Pittsburgh	.90	.90	0
East N. Central	.98	1.13	+.15	Chicago	.77	.93	+.16
				Detroit	1.05	1.21	+.16
				Cleveland	1.06	1.14	+.08
West N. Central	.98	1.15	+.17	St. Louis	.85	1.03	+.18
				Minneapolis- St. Paul	n.a.	1.28	n.a.
South Atlantic	.86	1.04	+.18	Washington	.88	1.06	+.18
East S. Central	.83	1.08	+.25				
West S. Central	.95	1.11	+.16				
Mountain	1.07	1.24	+.17				
Pacific	1.07	1.19	+.12	Los Angeles- Long Beach	1.13	1.21	+.08
				San Francisco- Oakland	.96	1.13	+.17

^a Method of calculation understates precise number of autos in relation to households. See footnote a, table at bottom, p. 16.

Source: Adapted from U. S. Bureau of the Census, October 16, 1970, Table 3.

Table 6

Ratio of Autos Owned to Households, by Income of Primary
Family or Primary Individual, U. S., 1960-1970^a

<u>Income</u>	<u>1960</u>	<u>1970</u>	<u>Change, 1960-70</u>
Total - All Incomes	<u>.91</u>	<u>1.09</u>	<u>+.18</u>
Under \$3,000	.48	.47	-.01
\$3,000 - 4,999	.90	.83	-.07
5,000 - 7,499	1.11	1.09	-.02
7,500 - 9,999	1.27	1.26	-.01
10,000 - 14,999	1.38	1.44	+.06
15,000 and over	1.53	1.59	+.06

^aSee footnote a, Table 5.

Source: Adapted from U. S. Bureau of the Census,
October 16, 1970, Table 1.

Table 7

Ratio of Autos Owned to Households, by Age of Household
Head, U. S., 1960-1970^a

<u>Age of Household Head</u>	<u>1960</u>	<u>1970</u>	<u>Change, 1960-70</u>
Total - All Ages	<u>.91</u>	<u>1.09</u>	<u>+.18</u>
Under 25	.85	.87	+.02
25 - 34	.98	1.17	+.19
35 - 44	1.06	1.30	+.24
45 - 54	1.04	1.29	+.25
55 - 64	.89	1.04	+.19
65 and over	.57	.64	+.07

^aSee footnote a, Table 5.

Source: Same as for Table 6.

Table 8 presents further breakdowns in national figures. We see that both the highest level of auto ownership and the greatest increase in the ratios from 1960 to 1970 were to be found outside of the central cities in the metropolitan areas. This had the effect of pulling up the metropolitan-total ratios to the point where, by 1970, they were virtually the same as the ratios for nonmetropolitan areas. The final differences -- marginal totals only (since they do not include any further cross tabulations) -- merely reinforce the type of difference we have between central cities and suburban areas, since both the owner category and the white category are so directly associated with suburban residence.

From another source we are given, for 1965, the comparable ratios of autos owned to households, for a national sample (but excluding the New York metropolitan area from the sample). Table 9 shows the two-way impact of type of metropolitan setting and of income. The four metropolitan types give us an indirect sense of residential density, ranging from the highest density for the old, large central cities to the lowest for the suburban areas. Low-income households in the former had a ratio of only 0.15 autos per household; high-income households in the latter had on average 1.60 autos per household. These are indeed very substantial differences. We may conclude that the differences between metropolitan settings account for more variation than differences in income. Even low-income households are shown to have autos in suburban areas.

Table 10, from the same survey and source, uses the identical breakdown by type of metropolitan setting and shows, for each setting, the distribution by mode of travel for regular trips (presumably excluding trips to work). In the old, large central cities, about half of the trips are taken by auto (always or sometimes), while for suburban areas

Table 8

Ratio of Autos Owned to Households, by Metropolitan-
Nonmetropolitan Status and by Selected Other Categories,
U. S., 1960-1970^a

<u>Selected Characteristics</u>	<u>1960</u>	<u>1970</u>	<u>Change, 1960-70</u>
U. S. - All Households	<u>.91</u>	<u>1.09</u>	<u>+.18</u>
Metropolitan Areas - Total	<u>.83</u>	<u>1.08</u>	<u>+.25</u>
Central Cities	.72	.88	+.16
Outside Central Cities	1.03	1.26	+.23
Nonmetropolitan Areas - Total	<u>.99</u>	<u>1.10</u>	<u>+.11</u>
Nonfarm	1.00	1.10	+.10
Farm	.93	1.14	+.21
U. S. - Owner Occupied	1.04	1.25	+.21
- Renter Occupied	.70	.81	+.11
U. S. - Black Households	.62	.64	+.02
- White Households	1.11	1.14	+.02

^aSee footnote a, Table 5.

Source: Adapted from U. S. Bureau of the Census, October 16, 1970,
Table 7.

Table 9

Ratio of Autos Owned to Households, by Type of Metropolitan
 Environs and by Family Income: Metropolitan Areas in the
 U. S. excluding the New York Area, 1965

<u>Family Income</u>	<u>Total U. S. Metropolitan (excluding New York)</u>	<u>Old, Large Central Cities^a</u>	<u>New, Large Central Cities^a</u>	<u>Small Central Cities</u>	<u>Sub- urban Areas</u>
(Sample Ns)	(1,474)	(117)	(111)	(474)	(772)
Total - All Incomes	<u>1.23</u>	<u>0.54</u>	<u>1.06</u>	<u>1.12</u>	<u>1.43</u>
Under \$4,000	(308) <u>0.64</u>	0.15	0.58	0.55	1.04
\$4,000 - 7,499	(530) <u>1.21</u>	0.62	0.86	1.14	1.35
\$7,500 and over	(636) <u>1.55</u>	1.05	1.43	1.56	1.60

^aThe 11 largest SMSAs exclusive of the New York area were divided as follows: "Old central cities" were Baltimore, Boston, Chicago, St. Louis and Philadelphia. "New central cities" were Cleveland, Detroit, Los Angeles, Pittsburgh, San Francisco, and Washington, D.C.

Source: Lansing and Hendricks, 1967, adapted from Table 5, p. 16.

Table 10

Percentage Distribution of Regular Trips, by Type of Metropolitan Environs:
Metropolitan Areas in the U. S. excluding the New York Area, 1965

<u>Mode of Travel</u>	<u>Total U.S. Metropolitan (excluding New York)</u>	<u>Old, Large Central Cities^a</u>	<u>New, Large Central Cities^a</u>	<u>Small Central Cities</u>	<u>Sub- urban Areas</u>
(Sample Ns)	(1,534)	(89)	(129)	(454)	(862)
Total Trips - All Modes	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
Walk or taxi	5	8	2	5	6
Always common carrier	8	37	15	7	4
Sometimes auto, sometimes common carrier	7	20	18	10	3
Always auto	80	35	65	78	87

^aSee footnote a, Table 9.

Source: Same as Table 9, Appendix Table 7, p. 171.

this percentage rises to 90. Trips always taken by common carrier drop very low in the suburbs. These are not surprises, but hopefully these sample findings -- for the broad, average basis they are intended to report -- help us to understand the levels of auto ownership and use that characterize contemporary metropolitan situations.

Motor Vehicle Availability: A More Detailed Look
at the San Francisco Bay Area

Bay Area Survey No. 1 was conducted during the summer of 1971 by the staff of the Survey Research Center, University of California, Berkeley. The major client for the Survey was the BART Impact Study Group, Institute of Urban and Regional Development, University of California, Berkeley. The survey involved a rigorous random sample of household heads or their spouses in the five-county San Francisco-Oakland SMSA. Interviews were completed with 1,018 actual respondents, but final weighted results were adjusted so that the final results could be treated as a 1-in-a-1,000 sample of the Bay Area. Thus, a final 2,209 reported persons aged 16 and over represented 2,209,000 household members 16 and over in the five-county SMSA. We draw upon this survey in considerable detail because it provides data in detail within a conceptual and classificatory system providing relatively fresh approaches to the phenomenon of personal access to autos. Despite the location in California, the Bay Area as a metropolitan area and San Francisco as the main central city are fairly typical for much of the United States (note Table 5), so that we may regard the findings for the Bay Area as deserving of considerable generalization.

In the analysis of survey findings, household "motor vehicle" was used as the basic unit rather than household "auto." Of the total of all

motor vehicles, 88.6 per cent were autos, 6.7 per cent were pick-up trucks, 2.8 per cent were motorcycles, and 1.9 were other trucks for personal use. A first measure was the number of motor vehicles per household, with the following percentage distribution:

	<u>Households</u>	<u>Persons 16 Years of Age and Older</u>
(Weighted-Sample Ns)	(1,087)	(2,209)
All Households	<u>100</u>	<u>100</u>
No motor vehicles	17	12
One motor vehicle	41	37
Two motor vehicles	31	34
Three motor vehicles	8	12
Four or more motor vehicles	3	5

This showed that only 1 out of every 8 persons 16 and over in the Bay Area lived in households lacking an auto, and 4 out of every 8 lived in households with two or more autos.

The second, and more sophisticated, measure was the ratio of household motor vehicles to persons 16 and over in that household. Here are the percentage distributions on this basis:

<u>Type of Household</u>	<u>Ratio of Motor Vehicles to Persons 16 and Older</u>	<u>Households</u>	<u>Persons 16 Years of Age and Older</u>
(Weighted-Sample Ns)		(1,087)	(2,209)
All Households		<u>100</u>	<u>100</u>
With no motor vehicle	0	<u>17</u>	<u>12</u>
Unsaturated with motor vehicles		<u>35</u>	<u>45</u>
	.01 - .49	6	10
	.50	22	23
	.51 - .99	7	13
Saturated with motor vehicles		<u>49</u>	<u>43</u>
	1.00	43	37
	1.01 or more	6	6

This shows that nearly half of the Bay Area households were, and over two-fifths of household members 16 and over lived in, motor-vehicle saturated households (i.e., in households in which there were at least as many personal motor vehicles as household members 16 and over). About 35 per cent of all households were, and 45 per cent of household members 16 and over lived in, unsaturated households but households in which there was at least one auto. For persons 16 and over this is, by a slight margin, the most frequent class.

A third, and more personalized, measure was to determine more exactly the type and level of direct personal access to an auto characterizing each household member 16 and over. This distribution follows:

<u>Auto-Access Status of Each Household Member</u>	<u>Persons 16 Years of Age and Older</u>
(Weighted-Sample N)	(2,209)
All Household Members 16+	<u>100</u>
Subtotal - Member does not use motor vehicle	<u>25</u>
Member does not drive	22
Member drives, but is without household vehicle	3
Subtotal - Member has secondary or shared use of a motor vehicle	<u>12</u>
Member has secondary use of a motor vehicle	12
Member shares motor vehicle equally with another household member	1
Subtotal - Member is primary user of a motor vehicle	<u>63</u>

Thus, we see that over three-fifths of all household members 16 and over are primary users, which is to say that they have either exclusive use of a household motor vehicle or have greater use of the motor vehicle than any other household member. This is, of course, a very high proportion to have such personalized access to a motor vehicle and shows, for the

Bay Area at least, how far we have moved toward direct personal access, in contrast to merely having an auto or a motor vehicle for the household.

As a further simplifying device we added together two percentages: all of the percentage of primary use and half of the combined secondary and shared users. Thus for the total Bay Area this represented:

Percentage primary users (all)	63
Percentage secondary or shared users (half of 12.4)	<u>6</u>
Percentage grouped as having direct access	69

Conversely, the remaining 31 per cent of household members 16 and over were grouped as lacking direct personal access to a household motor vehicle. We employ this simplifying dichotomy from this point on, and use the percentage lacking direct personal access to a household motor vehicle as our "thermometer" of nonaccess to motor vehicles. Overall, for the Bay Area, this 31 per cent converts to an estimate of nearly 700,000 persons 16 and over who lack direct personal access to a household motor vehicle. As might be expected, a large block of persons lacking access, numbering more than 250,000, is to be found in households having no motor vehicle. But an even larger number, estimated at about 375,000 and representing 55 percent of those persons lacking access, are from "unsaturated" households -- where there is at least one motor vehicle, but not enough vehicles to match the number of adults.

We now examine the two-way breakdown of household members, by the number of motor vehicles in the household and by the ratio of motor vehicles to household members 16 and over. This is shown as Table 11. This shows, as one would expect, that both the number and ratio of motor vehicles is directly associated with the per cent of adults lacking access

Table 11

Per Cent of Household Members 16 and Over Lacking Direct
Personal Access to Motor Vehicles, by the Ratio of Motor
Vehicles to Persons 16 and Over and by the Number of Motor
Vehicles per Household: San Francisco-Oakland SMSA, Summer 1971^a

Motor Vehicles per Household	All Households	Households by Ratio of Vehicles to Persons 16+		
		<u>0 - .49</u>	<u>.50 - .99</u>	<u>1.00 and over</u>
(Weighted- Sample Ns)	(2,209)	(479)	(790)	(940)
All Households	<u>31</u>	<u>81</u>	<u>33</u>	<u>5</u>
No vehicles	(266) <u>100</u>	100	--	--
One Vehicle	(810) <u>35</u>	58	36	1
Two or more vehicles	(1,133) <u>13</u>	**	28	6

^aThese figures are at best estimates, and carry possible sampling errors. These errors may be the largest for some of the internal cells of the table where the samples upon which they are based are the smallest. We report weighted-sample Ns, and these may vary somewhat from the original unweighted sample Ns; in general, the original Ns tend to be slightly smaller. This caution extends to Tables 12 through 20, all based on Bay Area Survey No. 1.

Each percentage shown in this table represents the household members 16 and over in that "cell" lacking access to motor vehicles as a per cent of all household members 16 and over in that "cell" of the table.

Legend: -- 0, by definition.

** base too small to percentagize; under 20 weighted cases.

Source: Derived from Bay Area Survey No. 1.

to a motor vehicle. We may particularly note the intermediate situations where, with unsaturated households, a full third or so of adults lack direct access to a vehicle. And even in so-termed saturated households, a small per cent of adults may lack immediate access (apparently because at any one time some vehicles may be inoperative or unavailable, or because a household member may be unable to drive).

The impact of household income on nonaccess to motor vehicles is very direct, as is shown in Table 12. The rates of nonaccess to motor vehicles, shown in the first column of the table, show a progressive drop from the high rate of 54 per cent for members in households with income \$20,000 and over. As one would thus expect, we have a disproportionately heavy clustering of household members lacking access in the two lower income classes. Those lacking access in these two lower income classes represent 65 per cent of all lacking access, whereas only 45 per cent of all household members are in these income classes.

There are also differentials between majority-white households and the various ethnic or racial minority households, as summarized for the entire Bay Area in Table 13. Overall, nearly 2 out of every 4 members 16 and over of minority households lack access to a motor vehicle, while for majority-white households only about 1 out of every 4 members 16 and over lacks access. The more than a quarter million minority household members 16 and over lacking access to motor vehicles represent about three-eighths of all household members 16 and over lacking access to motor vehicles, whereas minority household members 16 and over in total represent only a quarter of all household members 16 and over. In Oriental households nearly 3 out of 4 members 16 and over lacked access, reflecting in part the heavy concentration of households in the high-density Chinatown area of San Francisco.

Table 12

Household Members 16 and Over Lacking Direct Personal
Access to Motor Vehicles, by Household Income:
San Francisco-Oakland SMSA, Summer 1971^a

<u>Household Income</u>	<u>As Per Cent of All Household Members 16+ in That Income Class</u>	<u>Estimated Number</u>
(Weighted-Sample Ns)	(2,209)	
All Households	<u>31</u>	<u>689,000^b</u>
Under \$5,000	54 (403)	217,000
\$5,000 - 9,999	36 (521)	186,000
10,000 - 14,999	23 (581)	136,000
15,000 - 19,999	18 (280)	50,000
20,000 and over	12 (260)	31,000

^aSee also footnote a, Table 11.

^bHouseholds not reporting income numbered an estimated 69,000 and are not included. Therefore, the figures below add to only 620,000.

Table 13

Household Members 16 and Over Lacking Direct Personal Access
to Motor Vehicles, by Ethnic Status: San Francisco-Oakland
SMSA, Summer 1971^a

<u>Ethnic Status</u>	<u>As Per Cent of All House- hold Members 16+ in that Ethnic Status</u>	<u>Estimated Number</u>
(Weighted-Sample Ns)	(2,209)	
All Households	<u>31</u>	<u>689,000</u>
Majority-white households	26 (1,659)	435,000
All minority households	47 (550)	256,000
Negro households	43 (252) ^b	107,000 ^b
Spanish households	36 (142) ^b	51,000 ^b
Oriental households	73 (97) ^b	71,000 ^b
Other minority households	47 (59)	27,000

^aSee also footnote a, Table 11.

^bThe Bay Area Survey appears to have undersampled household members of Spanish surname, to have somewhat oversampled Negro households, and slightly oversampled Oriental households and other minority households. We may presume that the percentages in the first column are more reliable than the figures in the second column.

Table 14 provides a more detailed cross tabulation by geographic sector, by ethnic status and by income. It shows the simultaneous impact of ethnic status and income as well as the differentials for San Francisco as the main central city, the main part of the East Bay, and the remaining more clearly suburban portions of the SMSA. In broad terms, it would appear that income is a more significant factor than ethnic status, but that the differentials between San Francisco and the other parts of the SMSA are also very marked and certainly persist even when we separately view particular "cells" in the ethnic-income cross classification. For San Franciscans 16 and over with household incomes under \$10,000, 3 out of every 5 lack personal access to a motor vehicle, and this rises to 2 out of every 3 for San Franciscans of minority ethnic status with household incomes under \$10,000. At the opposite extreme, for household members 16 and over with household incomes \$10,000 or more in the more suburbanized portions of the SMSA, only 18 per cent lacked direct personal access to a motor vehicle. This percentage did not appear to vary appreciably, whether majority-white or minority household.

Up to this point we have been examining the impact of household characteristics and have considered only the average situation for all household members 16 and over in these categories of households. We now turn to differences within households, examining the impact of several characteristics that vary person by person: specifically, age, sex, and activity status (i.e., whether employed, in school, etc.).

Table 15 shows the very important breakdown by age and sex. This shows that women are strikingly deficient in their access to motor vehicles, with 43 per cent of all women lacking access to motor vehicles in contrast to only 19 per cent of men lacking access to vehicles. Nearly a

Table 14

Per Cent of Household Members 16 and Over Lacking Direct Personal Access to Motor Vehicle, by Geographic Sector, by Ethnic Status and by Household Income: San Francisco-Oakland SMSA, Summer 1971^a

<u>Household Income</u>	<u>Total</u>	<u>Majority- White</u>	<u>Combined Minorities</u>
Total - Five-County SMSA			
Total - All Incomes	<u>31</u>	<u>26</u>	<u>47</u>
Less than \$10,000	<u>44</u>	37	56
\$10,000 and over	<u>19</u>	17	29
San Francisco			
Total - All Incomes	<u>50</u>	<u>43</u>	<u>59</u>
Less than \$10,000	<u>60</u>	53	66
\$10,000 and over	<u>28</u>	25	36
Main Urbanized East Bay ^b			
Total - All Incomes	<u>26</u>	<u>22</u>	<u>38</u>
Less than \$10,000	<u>37</u>	32	45
\$10,000 and over	<u>17</u>	14	27
Remainder of SMSA ^c			
Total - All Incomes	<u>23</u>	<u>22</u>	<u>32</u>
Less than \$10,000	<u>29</u>	27	**
\$10,000 and over	<u>18</u>	18	[19]

^aSee also footnote a, Table 11.

^bGenerally western and central Contra Costa County and western Alameda County.

^cThe remainder of Alameda and Contra Costa counties and all of Marin and San Mateo counties.

Legend: ** - basetoo small to percentagize; under 20 weighted cases.
 [] - percentage based on N of only 20-49 weighted cases.

Table 15

Household Members 16 and Over Lacking Direct Personal Access
to Motor Vehicles, by Age and by Sex:
San Francisco-Oakland SMSA, Summer 1971^a

<u>Sex</u>	<u>Total - All 16+</u>	<u>Age 16-24</u>	<u>Age 25-44</u>	<u>Age 45-64</u>	<u>Age 65 and Over</u>
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Percentage of All Household Members 16+ in Age-Sex Category
Lacking Personal Access to Motor Vehicles

(Weighted-Sample Ns)	(2,209)	(530)	(764)	(671)	(244)
Total	<u>31</u>	<u>38</u>	<u>22</u>	<u>27</u>	<u>58</u>
Male (1,043)	<u>19</u>	25	12	16	36
Female (1,166)	<u>43</u>	49	31	38	71

Estimated Number Lacking Personal Access to Motor Vehicles

Total	<u>689,000</u>	<u>200,000</u>	<u>168,000</u>	<u>181,000</u>	<u>140,000</u>
Male	<u>194,000</u>	61,000	49,000	51,000	34,000
Female	<u>495,000</u>	139,000	119,000	130,000	106,000

^aSee also footnote a, Table 11.

half million of the 689,000 persons 16 and over lacking access are women. Both old (65 and over) and young (16-24) women have high nonaccess rates. The largest single block of household members 16 and over, according to the breakdown employed in the lower part of the table, is women aged 16-24. Looking at the percentages of persons lacking access to motor vehicles, cell by cell, in the upper part of the table, we find great spread -- from a high of 71 per cent of women 65 and over lacking access to a low of only 12 per cent of men in the active age class, 25-44. The general pattern is an important one, showing the combined impact of both age and sex; while we do not carry the age-sex breakdown through many further tables in combination with other variables, the differences do in fact generally persist.

Table 16 combines the effects of age and sex with the additional effect of household income. The table shows a consistent pattern, with the impacts of income being very strong but being overlaid by the persistent impacts of age and sex. The highest percentage for any "cell," not surprisingly, is 80 per cent nonaccess for women aged 65 and over in households with incomes less than \$5,000. We would expect that the lowest percentages would be for men in their active ages with high incomes. This is very nearly the case, for we find only 9 per cent and 5 per cent in the age 25-44 and 45-64 categories with household income \$15,000 and over. Surprisingly, there is one female "cell," for age 25-44, with income \$15,000 and over, where the percentage drops to 5. This may, in part, reflect sampling error, but it appears to suggest that females in this active age group and in households with high income, may have percentages of nonaccess at approximately the same level as males.

Table 16

Per Cent of Household Members 16 and Over Lacking Direct Personal Access to Motor Vehicle, by Age, by Sex, and by Household Income: San Francisco-Oakland SMSA, Summer 1971^a

<u>Household Income</u>	<u>Total - All 16+</u>	<u>Age 16-24</u>	<u>Age 25-44</u>	<u>Age 45-64</u>	<u>Age 65 and Over</u>
Male					
(Weighted-Sample Ns)	(1,043)	(264)	(374)	(328)	(95)
All Males	<u>19</u>	<u>25</u>	<u>12</u>	<u>16</u>	<u>36</u>
Less than \$5,000	<u>38</u>	28	[33]	[50]	[43]
\$5,000 - 9,999	<u>25</u>	30	19	19	45
10,000 - 14,999	<u>10</u>	18	6	9	**
15,000 and over	<u>9</u>	[19]	9	5	**
Female					
(Weighted-Sample Ns)	(1,166)	(284)	(390)	(343)	(149)
All Females	<u>43</u>	<u>48</u>	<u>31</u>	<u>38</u>	<u>71</u>
Less than \$5,000	<u>66</u>	58	62	62	80
\$5,000 - 9,999	<u>46</u>	51	44	37	[54]
10,000 - 14,999	<u>36</u>	46	24	36	**
15,000 and over	<u>21</u>	33	5	27	**

^aSee also footnote a, Table 11.

Legend: ** - base too small to percentagize; under 20 weighted cases.
 [] - percentage based on N of only 20-49 weighted cases.

In Table 17 we show the respective and combined impacts of ethnic status, household income and sex. We have not shown age in addition because that becomes unduly detailed and runs a bit beyond the capabilities of this particular sample. One should understand that the age differentials would reflect the patterns already shown. Table 17 shows that sex has a strong and persistent impact whatever "cell" or subcategory we examine. By far the highest percentage for any of the "cells" shown is 71 for women, of minority status, with household incomes under \$10,000. The lowest percentage, as we might expect, is for majority-white males with incomes \$10,000 and over -- only 8 per cent. Within each sex, both ethnic status and income have decided and persistent impact.

We next offer a breakdown by the major activity status of each household member 16 and over, showing the number of persons in each status, the percentage lacking direct access to motor vehicles, and the number lacking access:

<u>Major Activity Status</u>	<u>Per Cent of Persons 16+ Lacking Direct Access to Motor Vehicles</u>	<u>Estimated Number Lacking Direct Access to Motor Vehicles</u>
(Weighted-Sample Ns)	(2,209)	
All Persons 16+	<u>31</u>	<u>689,000</u>
Working	21 (1,255)	264,000
Attending school	43 (176)	76,000
Engaged in housework	43 (464)	199,000
Retired	52 (140)	72,000
Other status	45 (174)	78,000

The largest group, those employed, has the lowest percentage lacking access to motor vehicle with only slightly over a quarter million employed persons lacking access. Categories with high percentages of nonaccess were housewives (the largest group), those attending school, and those retired.

Table 17

Per Cent of Household Members 16 and Over Lacking Direct Personal
Access to Motor Vehicle, by Ethnic Status, by Income, and by Sex:
San Francisco-Oakland SMSA, Summer 1971^a

<u>Household Income</u>	<u>Total</u>	<u>Majority- White</u>	<u>Combined Minorities</u>
Male			
Total -- All Incomes	<u>19</u>	<u>15</u>	<u>31</u>
Less than \$10,000	<u>30</u>	25	39
\$10,000 and over	<u>13</u>	8	18
Female			
Total - All Incomes	<u>43</u>	<u>36</u>	<u>61</u>
Less than \$10,000	<u>55</u>	46	71
\$10,000 and over	<u>29</u>	27	40

Note: The cross tabulation for both sexes combined has already been shown as the upper part of Table 14.

^aSee also footnote a, Table 11.

Table 18 shows that the much greater lack of motor-vehicle access for household members who are not working carries persistently through even when the further breakdowns by household income and by sex are introduced. One finding does emerge, however, and that is that working women are in a much more disadvantaged position with respect to motor-vehicle access than are working men. In the three household income categories above \$5,000, for example, the percentages of working women lacking personal access to motor vehicles very nearly equals the corresponding percentages for non-working men. It seems clear that the working male has by far the highest claims on personal use of a household motor vehicle. This may either reflect a situation of saturation where virtually all adult household members have direct access to a motor vehicle or a situation where the male has first claim to such vehicles as are owned even though there are not enough vehicles to go around.

In Table 19 we present a further compound breakdown to show the respective and combined impacts of ethnic status, work or non-work status, and household income. This table, in addition to showing the impacts of all three of these factors on motor-vehicle nonaccess, in particular shows the very high rate of nonaccess on the part of minority workers. While only about 2 out of 10 majority-white workers with household income under \$10,000 lack personal access to a motor vehicle, an average of 5 out of 10 minority workers in this income class lack personal access.

In Table 20, the final reporting of Bay Area findings, we show the differences for the three main geographic sectors of the SMSA along with breakdowns by household income and by major activity status. In addition to the consistent differences between San Francisco and the other parts of the Bay Area, which we would fully expect, there is one particularly

Table 18

Per Cent of Household Members 16 and Over Lacking Direct Personal
Access to Motor Vehicles, by Activity Status, by Income and by Sex:
San Francisco-Oakland SMSA, Summer 1971^a

<u>Household Income</u>	<u>Total - All Statuses</u>	<u>Working</u>	<u>Other than Working</u>
Total			
Total - All Incomes	<u>31</u>	<u>21</u>	<u>42</u>
Less than \$5,000	<u>54</u>	46	58
\$5,000 - 9,999	<u>36</u>	26	47
10,000 - 14,999	<u>23</u>	13	35
15,000 and over	<u>15</u>	12	20
Male			
Total - All Incomes	<u>19</u>	<u>12</u>	<u>32</u>
Less than \$5,000	<u>38</u>	30	43
\$5,000 - 9,999	<u>25</u>	17	38
10,000 - 14,999	<u>10</u>	6	23
15,000 and over	<u>2</u>	7	18
Female			
Total - All Incomes	<u>43</u>	<u>35</u>	<u>45</u>
Less than \$5,000	<u>66</u>	61	68
\$5,000 - 9,999	<u>46</u>	38	51
10,000 - 14,999	<u>36</u>	29	40
15,000 and over	<u>21</u>	21	21

^aSee also footnote a, Table 11.

Table 19

Per Cent of Household Members 16 and Over Lacking Direct Personal Access to Motor Vehicles, by Ethnic Status, by Income, and by Major Activity Status: San Francisco-Oakland SMSA, Summer 1971^a

<u>Household Income</u>	<u>Total</u>	<u>Majority White</u>	<u>Combined Minorities</u>
Working as Major Activity			
Total - All Incomes	<u>21</u>	<u>15</u>	<u>38</u>
Less than \$10,000	<u>33</u>	22	51
\$10,000 and over	<u>13</u>	11	19
Other than Working as Major Activity			
Total - All Incomes	<u>42</u>	<u>36</u>	<u>56</u>
Less than \$10,000	<u>52</u>	48	62
\$10,000 and over	<u>29</u>	26	43

Note: The cross tabulation for all activities combined has already been shown as the upper part of Table 14.

^aSee also footnote a, Table 11.

Table 20

Per Cent of Household Members 16 and Over Lacking Direct Personal Access to Motor Vehicles, by Geographic Sector, by Income, and by Major Activity Status: San Francisco-Oakland SMSA, Summer 1971^a

<u>Household Income</u>	<u>Total Bay Area</u>	<u>San Francisco</u>	<u>Main East Bay^b</u>	<u>Remainder of SMSA^b</u> AA
Total - All Major Activities				
Total - All Incomes	<u>31</u>	<u>50</u>	<u>26</u>	<u>23</u>
Less than \$10,000	<u>44</u>	60	37	29
\$10,000 and over	<u>19</u>	23	17	18
Working as Major Activity				
Total - All Incomes	<u>21</u>	<u>40</u>	<u>14</u>	<u>11</u>
Less than \$10,000	<u>33</u>	54	23	7
\$10,000 and over	<u>13</u>	22	9	11
Other than Working as Major Activity				
Total - All Incomes	<u>42</u>	<u>61</u>	<u>37</u>	<u>35</u>
Less than \$10,000	<u>52</u>	68	46	45
\$10,000 and over	<u>29</u>	39	27	27

^aSee also footnote a, Table 11.

^bFor definitions, see footnotes a and b, Table 14.

interesting feature of the middle ("Working as a Major Activity") part of the table. The final column, for the remainder of the SMSA, represents a generally low-density suburban development in which there is the least available good public transportation. Note the extremely low percentage, 6.5, of workers with household incomes under \$10,000 lacking personal access to a motor vehicle. It is possible, of course, that there is some sampling error involved, but, even so, it suggests that almost all workers in this area, regardless of income, need a personal motor vehicle. This is fully consistent with the Lansing-Hendricks finding that we reported in Table 9. From this we can conclude that it might prove extremely difficult for a low- or moderate-income household moving to a suburban area lacking good public transportation to get along without a sufficient number of motor vehicles to at least match the number of workers in the household.

Let us summarize the findings from the Bay Area Survey data, so as to rise above the considerable detail just presented: (1) Overall, Bay Area residents (i.e., household members 16 years of age and over) have a very high level of direct personal access to motor vehicles, with nearly 7 out of every 10 enjoying such access. This quite obviously has permeated their living patterns and facilitated their out-of-the-home activities. (2) Conversely, despite the fact that we have moved so overwhelmingly to a situation in which personal use of motor vehicles is so high, nearly 3 out of 10 residents lack direct personal access to a motor vehicle. Some factors directly associated with this lack of access are household characteristics, and include low-income, ethnic-minority status, and residence in the higher-density central city. This suggests that certain residential districts may be unusually dependent upon modes of transportation other than auto. (3) But even within specific households it becomes very evident

that highly significant differentials in access to a motor vehicle are common. Women, in particular, have much higher rates of nonaccess; household members in the 16-to-24 and the 65-and-over age groups have consistently higher rates; and household members who are not in a gainfully employed status have much higher rates. Such persons, we have found, are widely distributed, both in households without motor vehicles and also, importantly, in households in which there are fewer vehicles than adults.

(4) The compound impacts of these various factors can be strongly reinforcing, with the result that it is not uncommon for certain subcategories of residents (specific "cells" in our detailed tables) to have very high rates of nonaccess to motor vehicles. In such cases, as many as 6, 7, or even 8 out of 10 residents may lack direct personal access to motor vehicles. (5) We need to know much more about how metropolitan residents lacking this access to motor vehicles actually cope. We should understand how much they go without trips they might take were transportation not an impediment. We should learn how well such residents are served by walking and by public transport.

Other Evidence re Out-of-the-Home Activity Patterns

Certainly these powerful forces -- rising household incomes, lower residential densities, and preponderant reliance on the auto -- have contributed to a loosening of former more traditional neighborhood and community patterns. If urban residents increasingly use autos, we may fully expect that their orbits of travel, their freedom of movement, and their corresponding shifts in facilities relied upon will change. To bring direct evidence to bear on such hypothesized shifts proves, however, to be exceedingly difficult. We have few fully satisfactory comparative

studies of shifts over time. The transportation studies tend to report only vehicular trips and not to give us the full picture of the mix of walking and vehicular trips. This makes it difficult to understand the changing relative importance of walk trips. This, in turn, has a particularly pointed relevance if we want to understand how people who lack direct access to an auto get along.

A comparison for the Detroit area between 1953 and 1965 (but restricted to vehicular trips) showed, as one might expect, a considerable increase in travel by auto (number of trips in 1965/1.43, with 1953 base = 1.00) and a very great drop in travel by public transit (1965 trips = only 0.40, with 1953 = 1.00). Shopping by auto showed the greatest increase (1965 trips = 1.99). But, overall, auto trips did not show any great increase in distance (1953 average trip was 5.1 miles, 1965 was 5.5) and showed virtually no change in time (1953 average trip took 12.7 minutes, 1965 took 12.5). Transit trips, significantly, showed a marked increase in average time (up from 34.7 minutes in 1953 to 45.5 minutes in 1965), suggesting possible deterioration in headways and service as well as changes in the location of destinations. (Bellomo et al., 1970, pp. 8-19)

More complex changes were also underway in the Detroit area, which we can probably only very inadequately report in our brief summary.

In 1953, the center-city resident had the lowest work trip length and the highest housing cost.....In the suburbs the trip lengths were higher but the housing costs were lower. In 1965 the pattern with respect to the transport costs completely reversed. People in the center city had higher trip lengths whereas those in the suburbs had lower trip lengths. These dynamic changes were brought about by factors such as the transportation system, the structure of the urban area, and socio-economic conditions....

(Ibid., p. 4)

Work trips particularly increased in length and in time for low-income non-whites, with the most serious increases the case for those dependent upon public transportation. (Ibid., pp. 19-21)

Nor were increasing trip lengths restricted to large metropolitan areas like Detroit. Here are changes in average trips for two smaller urban areas:

Sioux City, Iowa	1955: 2.16 miles	1965: 2.39 miles
Reading, Penna.	1958: 2.37 miles	1964: 2.67 miles

For both cases, as with Detroit, increases in mileage were brought about with little increase in time because of improved highway systems. (Ibid., p. 9) Hawley notes earlier increases in average work trip lengths, up to the 1950s, and surmises that since then they have probably further increased. "For work places have continued to scatter over metropolitan areas, a great amount of expressway mileage has been constructed, and multiple-car ownership has become more common. The centrifugal movement of blue-collar residences, however, have tended to shorten work-trip distances for that element of the population." (Hawley, 1971, p. 191)

According to a national sample survey conducted in the summer of 1967 by Chiltern Research Services and National Analysts, respondents reported the following changes in transportation usage during the previous five years:

	<u>Auto</u>	<u>Public Transportation</u>
Total	<u>100%</u>	<u>100%</u>
Decrease in use	9	11
No change in use	40	72
Increase in use	52	17
Net increase (difference in points, increase minus decrease)	+43	+ 6

The categories of persons showing the greatest relative increase in auto use included young persons, persons of intermediate education, blue-collar and intermediate white-collar levels, and males. (McMilland and Assael, 1969, pp. 44-54)

Still another sample survey was conducted in about 1963 upon which Hawley and Zimmer have based an extensive study. It was deliberately stratified to secure six types of community settings, breaking into central city and suburbs for each of three size classes of metropolitan areas, as follows:

Large metropolitan areas (about 1,000,000): Buffalo, New York, and Milwaukee, Wisconsin.

Medium metropolitan areas (about 450,000 - 500,000): Rochester, New York, and Dayton, Ohio.

Small metropolitan areas (about 150,000): Saginaw, Michigan, and Rockford, Illinois.

Several responses relevant to our present interests were obtained and analyzed. We summarize from the study, showing first, in Table 21, selected responses. In the authors' words, "central city households place a high value on accessibility. That advantage is also important to suburban residents in large metropolitan areas. But as size of area declines accessibility yields its primacy to the spaciousness, privacy and cleanliness of suburban neighborhoods." (Hawley and Zimmer, 1970, p. 47)

Hawley and Zimmer also look at the localization of several urban activities, and construct a scope-of-activity scale. Using eight dichotomized measures, they provide an additive scale score with each localized activity contributing a point to the score. The scale ranges from 1 (= extreme localization) to 7 (= extreme nonlocalization). Average scores are shown in Table 22, so as to show the variation from one type of metropolitan setting to another and, in addition, to show the impacts of

Table 21

Percentage of Responses Identifying Selected Features as
Attractive, by Type of Metropolitan Setting, c. 1963

<u>Attractive Features</u>	Large SMSA		Medium SMSA		Small SMSA	
	<u>Central Cities</u>	<u>Sub- urbs</u>	<u>Central Cities</u>	<u>Sub- urbs</u>	<u>Central Cities</u>	<u>Sub- urbs</u>
Accessibility	52%	46%	57%	37%	52%	25%
Public transportation	22	11	28	10	14	2
Neighbors and property maintenance	24	33	26	37	30	34
Space, privacy, clean- liness	18	39	18	44	21	53

Source: Hawley and Zimmer, 1970, Table 18, p. 48.

Table 22

Mean Scope-of-Activity Scale Score by Type of Metropolitan Setting, and by Selected Other Variables, c. 1963

<u>Characteristics</u>	Large		Medium		Small	
	<u>Central Cities</u>	<u>Sub-urbs</u>	<u>Central Cities</u>	<u>Sub-urbs</u>	<u>Central Cities</u>	<u>Sub-urbs</u>
Total	<u>3.1</u>	<u>3.6</u>	<u>3.6</u>	<u>4.0</u>	<u>3.3</u>	<u>4.5</u>
Lived only same zone	3.0	3.0	3.5	3.3	3.2	4.2
Moved from oppos. zone	3.7	4.0	3.9	4.2	3.7	4.6
Age of household head						
Under 30	3.2	3.9	4.1	4.0	4.0	4.5
30-44	3.3	3.7	3.6	4.0	3.4	4.6
45-64	3.3	3.6	3.8	4.2	3.3	4.5
65 and over	2.4	3.3	2.8	3.6	2.6	3.8
Education, household head						
Elementary school	2.9	3.5	3.3	4.0	3.2	4.3
High school	3.3	3.6	3.8	4.1	3.6	4.7
College	3.7	3.9	4.2	3.9	3.7	4.8
Income, household head						
Under \$75 per week	2.7	3.3	3.0	3.8	2.9	4.0
\$75 - 149 per week	3.5	3.8	4.0	4.0	3.6	4.6
150 - 299 per week	3.4	3.7	4.5	3.9	3.7	5.0
300 or more per week	-	4.1	[3.7]	4.5	[3.4]	[4.9]

Notes: 1.0 = Extreme localization
 7.0 = Extreme nonlocalization
 [] = Based on N of less than 25.

Source: Hawley and Zimmer, 1970, Tables 24 and 25, pp. 60, 62-63.

mobility, age of household head, education of household head, and income of household head. This table shows that household members tend to go farther for activities, and hence have higher mean scores (more nonlocalized) if they are in the suburbs (rather than if in the central city), if in smaller metropolitan areas, if they have moved their residence, if they are young in age, if they have more education, and if they have higher incomes.

This study analyzes only one local facility use in any detail -- church attendance. The authors state: "Church attendance is for most people a neighborhood activity. And so it seems in the populations under study...." (Hawley and Zimmer, 1970, p. 52) They rely upon a table showing that the frequency of church attendance is considerably greater when the church is near to the home. Where the church is within a half-mile of home, from half to three quarters of respondents, depending upon the exact metropolitan setting, attend weekly. Additional raw data from the same study has been analyzed by us and included here as Table 23. This table shows that strict localness of facility use falls off in suburbs as against central cities and in smaller as against larger metropolitan settings. With the drop in residential density, the proportion of households relying on the auto to go to church rises very significantly and the proportion of households going considerable distance (e.g., even 3 miles or more) also rises significantly. Church going retains much of its traditional localness only in the central cities of large metropolitan areas. In suburban areas and even in the central cities of smaller metropolitan areas, church going typically involves trips of one-half to 3 miles and overwhelmingly relies upon the auto.

Table 23

Distance to Church and Mode of Travel to Church, by
Type of Metropolitan Setting, c. 1963

<u>Distance or Mode</u>	Large SMSA		Medium SMSA		Small SMSA	
	<u>Central Cities</u>	<u>Sub- urbs</u>	<u>Central Cities</u>	<u>Sub- urbs</u>	<u>Central Cities</u>	<u>Sub- urbs</u>
Distance in Miles from Home to Church						
(Sample N)	(432)	(462)	(398)	(415)	(428)	(415)
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Under 1/2 miles	57.9	39.0	34.5	18.6	30.1	16.8
1/2 to 3 miles	29.6	41.5	41.9	46.3	46.3	31.1
3 miles or more	18.5	19.5	23.6	35.1	23.6	52.1
Mode of Transportation from Home to Church						
(Sample N)	(434)	(464)	(396)	(418)	(429)	(415)
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Walk	35.0	18.5	22.0	6.9	16.5	3.9
Public transport. ^a	12.7	2.4	7.3	1.4	1.4	0.9
Auto	52.3	79.1	70.7	91.7	82.1	95.2

^aIn the final three columns a very small number of "other mode" included with "public transportation."

Source: Adapted from unpublished data furnished by Hawley and Zimmer.

We cite one further empirical study. This examined the hypothesis that the poor in the inner city are restricted in their shopping habits. Four inner residential districts in Rochester, New York, were studied in the late 1960s. Food trading areas were found to be as large for these inner residents as for residents living farther out. Respondents usually also reported shopping at a second store representing an even larger trading area than the first.

One possible rationale is that people use their second major stores for rather specialized purposes such as to take advantage of sales or for the purchase of some particular categories of food which are felt to be better, say meat, at the second major store; that is, the difference may result from the second major store being more like a specialty goods store than a convenience goods store...

(Haines et al., 1972, p. 100)

The study also showed that there are "fill-in" stores which do have smaller trading areas, but that these are not relied upon for the main purchases.

Summarizing from the studies reported in this section, these findings are suggested: (1) There has been indeed a switch to increased reliance upon the auto, and a corresponding decrease in public-transit use. This has increased trip distance, but more so in low-density settings (i.e., in smaller metropolitan areas and in suburban sectors). (2) Because of the great improvements in the freeway-highway systems, greater distance can be covered without any necessary increase in time. Some studies, not reported here, also show that auto trips, in contrast to transit trips, increase the distance that can be covered within a given portal-to-portal time. (Myers, 1970) (3) As the auto supplants walking as a predominant mode, the range of distance that can be covered takes a quantum jump and the geographic area that comes within reach increases vastly. The auto also permits greater selectivity; a resident's movement space becomes less bound by contiguity as such and more nearly space-jumping in

character. (4) We might have added more, too, about the combined power of the telephone and auto, with the telephone available for exploratory inquiries or for confirming whether one will make a physical trip and with the auto then available for the actual physical trip.

Physical Condition, Walking, Bicycling

In a fundamental sense, walking provides a potentially effective means of physical mobility. But it presumes (a) relatively good personal physical condition and (b) land-use arrangements such that the desired destinations are within ready walking range. Similarly, for those in very good physical condition, the bicycle offers a potentially important mode of transportation, and has, of course, been enjoying a remarkable comeback in popularity. It has been reported that more bicycles than autos have been produced and sold during the past year or two.

Walking is important both as a mode complete in itself and as a supplementary mode, by which one gets to or from his auto or to or from public transportation. By and large, we simply lack systematic and reliable information on walking. As we have already indicated, the typical transportation study restricts "trips" to vehicular trips, dropping walking through the screen of concern. Obviously, the findings from such studies greatly distort the total out-of-the-home activity picture.

In this section, we look briefly at personal physical condition and at empirical evidence regarding walking (and, in passing, bicycling) as trips.

Measures of physical disability and of mobility limitation are available nationally and for certain states or smaller geographic areas. The measures vary from study to study. Many measures are not very directly

relevant to our concern for physical accessibility or mobility. To be brief, we shall report only selected National Health Survey findings. As of the mid-1960s it has been estimated that 6.3 million Americans (or 3.3 per cent of the total population) have some limitation on mobility as well as one chronic condition or more. Table 24 shows the national breakdown by the type or seriousness of the mobility limitation cross tabulated by age group. Not surprisingly, mobility limitations are far more numerous for persons 65 and over, representing at this age nearly 1 out of every 5. For all age groups, 1.4 million persons are confined to their homes, 1.8 million need some help in getting around (either by another person or by the use of a special aid such as a wheelchair), and 3.1 million have some trouble getting around, but do not require help. The age group, 45-64, also contains a very sizeable number of persons with mobility limitations, amounting to nearly 5 per cent of the age group.

Table 25 includes only the 95 million Americans (all ages grouped together) with at least one chronic condition, ranging from disability or heart disease to more minor difficulties such as hay fever or asthma. For this large population block, the table provides a two-way classification: by mobility limitation and by activity limitation. As one would expect, there is an association between greater limitations on the activity one can carry on and the greater limitation on mobility. It is not clear from this table, however, whether overcoming mobility limitations would improve the chances for carrying on one's major activity or whether, in most instances, both types of limitations reflect personal physical condition.

Further evidence regarding the extent of personal disability is provided in Table 26. This shows that on average each person in the United States loses 22.8 days per year in disability. The table shows the

Table 24

Population, by Chronic Condition, by Mobility Limitations, by Age, United States, 1965-67 Average

Age Group	With One Chronic Condition or More ^a							
	Total Population	With No Chronic Condition	Total	With No Limitation on Mobility	With Some Limitation on Mobility			Confined to the House ^c
					Total	Trouble Getting Around ^b	Needs Help Getting Around ^b	
Number of Persons (000s)								
Total - All Ages	191,537	96,684	94,853	88,541	6,312	3,114	1,766	1,432
Under 17	66,921	51,664	15,757	15,009	248	90	82	76
17-44	67,901	31,188	36,713	35,865	848	539	163	147
45-64	38,993	11,278	27,714	25,816	1,898	1,124	407	367
65 and over	17,723	2,553	15,169	11,852	3,318	1,361	1,114	843
As Per Cent of Age Group								
Total - All Ages	100.0	50.5	49.5	46.2	3.3	1.6	0.9	0.7
Under 17	100.0	77.2	22.8	22.4	0.4	0.1	0.1	0.1
17-44	100.0	45.9	54.1	52.8	1.3	0.8	0.2	0.2
45-64	100.0	28.9	71.1	66.2	4.9	2.9	1.0	0.9
65 and over	100.0	14.4	85.6	66.9	18.7	7.7	6.3	4.8

^aChronic conditions include some two dozen conditions ranging from asthma or hay fever to heart condition to physical impairments or disability.

^bNeeds the help of another person or the use of some special aid such as a cane or a wheelchair.

^cMay or may not be confined to bed.

Source: U.S. Public Health Service, Jan. 1971, adapted from Tables A, 1, 25.

Table 25

Persons with One Chronic Condition or More, by Limitations of Activity and by Mobility
 Limitations: United States, 1965-67 Average

Type of Activity Limitation	Total with One Chronic Condition or More ^a	With No Limitation on Mobility	With Some Limitation on Mobility			
			Total	Some Trouble Getting Around	Needs Help Getting Around ^a	Confined to the House ^a
Number of Persons (000s)						
Total - All Conditions	94,853	88,541	6,312	3,114	1,766	1,432
Not limited in activity	72,869	72,585	284	157	103	24
Total - Limited in activity	21,984	15,956	6,028	2,957	1,663	1,408
Limited, but not in major activity	5,637	4,785	852	633	161	58
Limited in major activity	12,269	9,517	2,752	1,661	699	392
Unable to carry on major activity	4,078	1,654	2,424	663	803	958
As Per Cent of Activity-Limitation Group						
Total - All Conditions	100.0	93.4	6.6	3.3	1.9	1.5
Not limited in activity	100.0	99.6	0.4	0.2	0.1	*
Total - Limited in activity	100.0	72.6	27.4	13.5	7.6	6.4
Limited, but not in major activity	100.0	84.9	15.1	11.2	2.9	1.0
Limited in major activity	100.0	77.6	22.4	13.5	5.7	3.2
Unable to carry on major activity	100.0	40.6	59.4	16.3	19.7	23.5

^aFor definitions see footnotes a, b, and c, Table 24.

Source: Same as Table 24, adapted from Tables A, 1. The population figures inside the margins of the upper part of table were estimated by applying the percentage figures in the lower part of table.

Table 26

Disability Days per Person per Year, by Type of Disability
and by Age Group: United States, mid-1960s

<u>Age Group</u>	<u>Total Disability</u>	<u>Short-Term Disability</u>	<u>Long-Term Disability</u>	
			<u>Noninstitutional</u>	<u>Institutional</u>
Total -				
All Ages	<u>22.8</u>	<u>12.9</u>	<u>7.5</u>	<u>2.4</u>
Under 15	11.3	10.3	0.6	0.5
15-44	14.8	11.5	2.1	1.2
45-64	29.1	16.6	9.9	2.7
65-74	57.4	20.8	30.3	6.3
75 and over	116.2	17.0	74.7	24.5

Source: U. S. Public Health Service, July 1971, Table 3, pp. 8-9.

variation by duration, by noninstitutional-institutional status, and by age group. Persons 65 to 74 spend a sixth of their collective lives in a disabled status; persons 75 and over spend nearly a third in such status.

As of 1969 an estimated 6.2 million persons in the civilian noninstitutionalized population of the United States were reported to have one or more special orthopedic aids -- aids for providing help in getting around. This represented 3.2 per cent of the population; for males, 3.4 per cent, and for females, 3.0 per cent. A breakdown by type of special aid and by age group is provided in Table 27. The figures in the table are self-explanatory: 2.4 million persons require special shoes, 2.2 a cane or walking stick, 1.1 braces, and so on. Over 400,000 need wheel chairs and the same number need walkers.

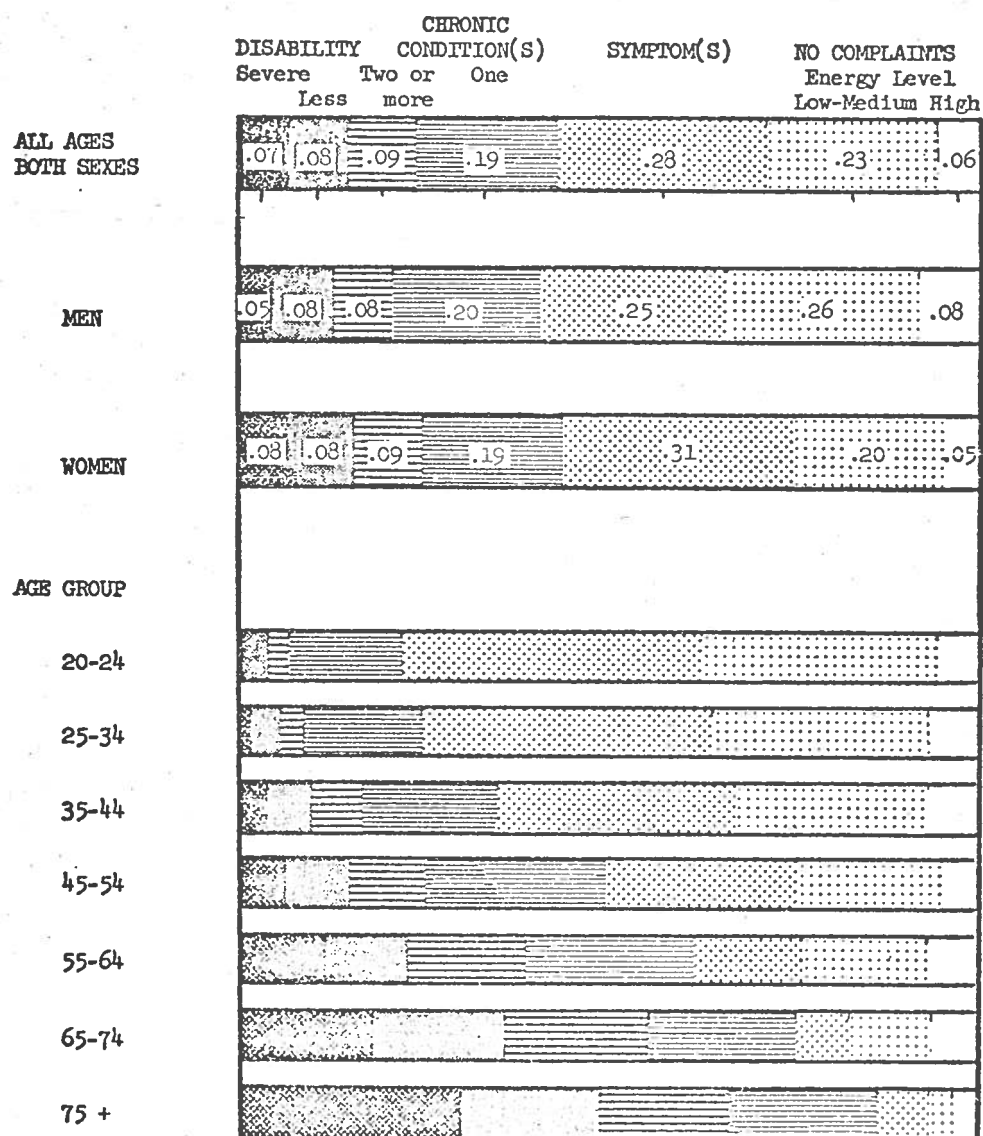
A 1965 sample survey of Alameda County, California provided a full spectrum of physical health, with the following frequency distribution of percentages for the entire population:

Total	<u>100%</u>
Severe disability	7
Lesser disability	8
Two or more chronic conditions	9
One chronic condition	19
One or more symptoms in last twelve months	28
No complaints: low-medium energy level	23
No complaints: high energy level	6

Differentials by sex and by age, for this range of health conditions, are shown in Figure 1, which provides a graphic display of the changing distribution of physical condition among persons as they age. The results of this particular survey showed men to be in slightly better physical

Figure 1

Percentage Distribution Along a Physical Health Spectrum,
by Age and by Sex: Alameda County, California, 1965



Source: Belloc et al., 1970, Figure 1

Table 27

Persons Using Special Orthopedic Aids, by Type of Aid and by Age Group:
United States, 1969

Age Group	Special Shoes	Cane or Walking Stick	Number of Persons Using Aids (in 000s)					Artificial		
			Brace	Crutches	Wheel-chair	Walker	Leg or Foot	Arm or Hand	Other	
All ages	2,377	2,156	1,102	443	409	404	126	46	140	
Under 45 45 - 64 65 and over	1,620	94	518	147	100	**	**	**	51	
	444	444	363	158	94	57	57	**	**	
	313	1,618	221	137	215	329	**	**	**	
As Per Cent of Persons in Each Age Group										
All ages	1.2	1.1	0.6	0.2	0.2	0.2	0.1	*	0.1	
Under 45 45 - 64 65 and over	1.2	0.1	0.4	0.1	0.1	**	**	**	*	
	1.1	1.1	0.9	0.4	0.2	0.1	0.1	**	**	
	1.7	8.7	1.2	0.7	1.2	1.8	**	**	**	

Notes: * - Less than 0.1 per cent. ** - Base too small to be reliable

Source: National Center for Health Statistics, May 11, 1972, Table 3.

condition, but this reflects mainly the generally younger age distribution of males.

In summary, it is clear that persons with serious limitations on mobility represent small proportions of the total population, but that persons with some ill-health symptoms or low-energy levels are far more numerous. And for older persons, even the numbers and proportions with mobility limitations are far more significant. These various statistics provide a powerful reminder that there are in fact very large numbers of persons with conditions that limit their abilities to walk or even to make fully effective use of normal modes of vehicular transportation.

We need systematically assembled data on walking: how many trips (e.g., as related to the number of vehicular trips), how far, for what purposes, and by whom. We need to study walking under different urban settings, with variations in density, land-use, and other environmental differences. We need to find out the differentials in walking ability and in the willingness to walk as associated with such personal and household variables as age, sex, physical condition, income, and personal access to other transportation modes.

We report a few extremely scattered findings, not necessarily current. In a study in a medium-density district in St. Louis, in 1948, it was estimated that something over a third of all trips from home to various facilities, including employment, were by walking. The highest proportions for walking were for elementary school attendance (97 per cent), food shopping (69 per cent), church attendance (63 per cent), and movie attendance (53 per cent). The lowest proportions were for attendance at schools other than elementary (7 per cent), outdoor recreational activities (only 8 per cent), employment (9 per cent), and major shopping

(12 per cent). The median distance for all walking trips was a third of a mile. (Foley, 1948, Tables 7 and 9)

In a 1969 sample-interview survey of household heads and spouses in ten American community settings, with emphasis on suburban and on relatively recent developments, half of which were judged to be "planned communities" (including Columbia, Reston, Radburn, Southwest Washington and Lafayette-Elmwood [Detroit]), some evidence on walking was obtained. Walking to stores or to friends was distinguished from walking or hiking for recreation. Selected findings are presented in Table 28. In planned communities, whether in-town or peripheral, something between 15 and 45 per cent of respondents (household heads or spouses) reported walking to a grocery or other store in the preceding week; in less planned or least planned peripheral communities, these percentages ranged from 0 to about 10. In the whole scatter of community types, about half of the respondents had walked to a friend's house in the preceding week. Most respondents reported hiking or walking for recreation, and this rose to about three-fourths for the planned peripheral communities. Most respondents also judged sidewalks to be important.

A study of retired persons living in San Antonio, Texas, in the mid-1960s, showed that for this admittedly special-age segment (although some were under 50), walking was the most commonly used mode of transportation for going to the library (67 per cent), to the senior center (45 per cent), to visit friends (42 per cent) and to church (34 per cent). It was least used to go to sports events (8 per cent), or to visit the doctor or to visit relatives (16 per cent, in each case). "Nearly half the respondents used their feet as a means of transportation several times each week, and one person in five went somewhere on foot 'every

Table 28

Percentage Walking, Having Sidewalks, and Bicycling,
Ten More or Less Planned American Communities,
1969^a

<u>Per cent Reporting</u>	<u>Highly Planned Communities</u>		<u>Less Planned</u>	<u>Least Planned</u>
	<u>Two In-town</u>	<u>Three Peripheral</u>	<u>Two Peripheral</u>	<u>Three Peripheral</u>
Walking to grocery store last week	40-44%	15-47%	0-12%	4-8%
Walking to other stores last week	26-32	13-39	0-3	2-10
Walking to a friend's house last week	46-50	50-60	57-66	30-52
Walking to two or more places last week	37-38	19-45	0-11	4-9
Hiking or walking for recreation	53-60	68-86	58-66	52-60
Sidewalks in front of or near home	98-99	62-67	0-100	38-98
Sidewalks going by home judged to be "very important"	69-75	47-60	64-88	39-71
Bicycling to at least one place last week	8-12	21-25	16-25	8-25
Bicycling for recreation	21	31-44	38-39	20-51

^aThese include only replies for household heads or spouses who reside in single-family homes or townhouses. Communities:

Highly planned, in town:	Southwest Redevelopment, Washington, D.C. Lafayette Park-Elmwood Park, Detroit
Highly planned, peripheral:	Columbia, Maryland Reston, Virginia Radburn, New Jersey
Less planned, peripheral:	Crofton, Maryland Montpelier, Maryland
Least planned, peripheral:	Norbeck area, Maryland Southfield area, Michigan Glenn Rock area, New Jersey

Source: Adapted from Lansing et al., 1970, Tables 63, 64, 67.

day'. On the other hand, nearly as many habitually walked to some destination less often than once a month, some of them at intervals of several years." (Carp, 1972a, p. 25) But "[w]alking was not well regarded as a means of transportation. Only three per cent of the walkers said walking was 'satisfactory' as a means of getting places while over half said it met their needs 'very poorly' or 'not at all'. The outstanding problem was that the places they needed and wanted to go were beyond walking range." (Ibid., pp. 25-26)

A subsequent sample survey of older persons in San Francisco -- again, a special but important group -- showed that "[w]alking was even more common among San Francisco people aged 65 and over than it was among retired people in San Antonio...Nearly 66% used their feet to take them some place every day, and over 80% made several walking trips each week." (Carp, 1972b, pp. 4-5) The most common destinations, ranked by the percentage using walking as the mode, follows:

<u>Destination</u>	<u>Percentage by Walking</u>
Food	75
Friends and acquaintances	46
Religious services	44
Park	42
Medicine	38
Out to eat	25
Other shopping	23
Other recreation	21
Doctor	15
Other relatives	14
Children	10

Source: Carp, 1972b, Table 3.

But, "walking was not popular as a means of transportation among the older residents of San Francisco. As in Texas, the more one walked, the less he liked it as a means of getting places." (Ibid., p. 5) The following problems with walking were reported:

<u>Problem</u>	<u>Percentage of respondents</u>
Destination too far	83
Depends on weather	78
Hills (steepness, slipperiness)	72
Fears (of autos, of mugging, etc.)	65
Tired, feet hurt	55
Takes too long	52
Health problem	37
Traffic confusing	36

Source: Carp, 1972b, Table 2.

On the other hand, some advantages were reported:

<u>Advantages</u>	<u>Percentage of respondents</u>
Good for health	92
Inexpensive	90
Independent	85
Convenient	82
Contact with people	81

Source: Ibid., Table 4.

We must remember that San Francisco with its high density and its developed transit system is an unusual setting; walking is undoubtedly more prevalent and more helpful in San Francisco than in most American cities.

Regarding the use and relative satisfaction in walking trips for poor persons we are not able to provide helpful information.

Little is known about the walking trips of the poor. No procedures for summarizing the large number of possible walking trip destinations, even within a neighborhood, have been prepared. Desired information on walking trips might include guidelines for transportation plans that involved walking as one phase of a trip. In particular, this information would help transportation planners to be able to estimate good bus stop space and route coverage in an area, based on people's tolerance for walking -- controlled by the walker's income, age, trip purpose, time of day and year, topography, the number and age of traveling companions, and weather.

(Gurin, 1969, p. 25)

Gurin goes on to discuss the many other elements that relate to walking and to mobility in more general terms. "Mobility, somewhat like civil rights, is taken for granted by those who have it. Until mobility is reduced or denied, a person rarely begins to appreciate how much his attitudes, hopes, aspirations, and even his faith in his own self-determination depend upon his ability to move when and where he desires." (Ibid., pp. 74-75) He goes on to show that walking involves exposure to the elements, presumes good feet and sound footgear, involves questions of physical safety.

The poor as a group and the black people as a subset of the poor have many handicaps in common that restrain travel mobility -- fear, financial deprivations, etc. The blacks, however, bear not only these burdens, but additional ones that are unique to them because of a racist social environment. Almost like aliens in an enemy land, black people in the U. S. must consider movements in this country which the 'natives' need not consider... People from whom whites normally get travel aid and directions, such as police and gas station attendants, are often the very people with whom the blacks are most reluctant to get involved. This is especially true in certain regions of the country and in exclusively white communities.

(Ibid., pp. 19-20)

Several studies have shown the impacts of suburbanization and dispersal on pulling employment opportunities away from low-income areas in inner cities. Jobs are not only spreading well beyond possible walking range; they become increasingly difficult or impossible to reach by public transit. A recent study of West Oakland, for example, showed that a majority of the jobs for which West Oakland residents might be qualified were more than 45 minutes away by bus. This suggested, according to the report, that distance and cost become very serious impediments as well as an actual lack of transportation. (Oakland City Planning Department, 1970)

A study in New York City concludes:

Ghettoized Puerto Ricans are limited in their job search to the communications network of the local area; and consequently miss out on the employment opportunities far-removed from their homes. The latter are usually opportunities in the fast-growing suburban employment centers, which appear to be better-paying, more promising positions in the long-run. If Puerto Ricans living in the central city do obtain such jobs, our data suggest that the difficulties of transportation involved in the 'reverse commuting' from their residence areas to the suburban employment centers may be too much of a burden. Thus for some Puerto Ricans tenure in a suburban job is short-lived.

(McMurry, 1972, pp. 20-21)

Conclusions

There are clearly many meanings that may be attached to the concept, "community." We have been looking at the functional-spatial aspect of facility use and of daily activity. As Hawley has suggested, "...from a spatial standpoint, the community may be defined as comprising that area the resident population of which is interrelated and integrated with reference to its daily requirements, whether contacts be direct or indirect." (Hawley, 1950, p. 257) It would appear now that those traditional notions that tie community to specific and precise geographic settings, featuring clear centers and sharp outer limits, involve a misplaced concreteness and are increasingly inappropriate as ways of viewing American metropolitan structure.

We have stressed that the structures of metropolitan areas have been undergoing tremendous change, involving the active circularity between dispersion and ever lower densities on the one hand and the extremely heavy reliance on the auto on the other. Rising income and the ready use of autos, in fact, have given most metropolitan residents access to an unprecedentedly wide range of opportunities and have provided

great scope for reaching out spatially to points where these opportunities are to be found -- but points which are well beyond the bounds that would earlier have demarcated communities. This reaching out is characteristically highly selective and permits each person to put together a relatively unique configuration of the opportunities he opts to reach or use.

Reflecting these powerful changes, we might re-interpret and supplement Hawley's approach to "community." First, we might somewhat downplay the concept of a single area and, particularly with respect to the complex structure of "sub-communities" within any given metropolitan area, stress the multiplicity of, and the irregular overlaying of, sub-communities. We might stress the lack of generally clear-cut boundaries; importantly, many of these sub-communities verge on functional, rather than literally geographic, boundaries in any event. Second, we might emphasize the degree to which individual residents come to operate with their own personalized configurations of facilities and persons to which or to whom they have customary access. And, third, we might invite increased recognition of "community" as a sharing of access to opportunities in possible contrast to "community" as a sharing of actual facility-use and personal-contact patterns. This difference is rather fundamental and suggests that with rising income, more education, and greater knowledge about one's metropolitan environs and with better transportation and communication, most metropolitan residents are able to benefit from the potential array of opportunities open to them over and beyond the actual contacts to which they customarily travel. This amounts to a greater freedom of opportunity and recognizes the significance of latent opportunities.

But in the midst of this general trend of rising accessibility to many and diverse opportunities, certain categories of residents by reason

of their household or personal characteristics find themselves seriously deprived with respect to accessibility. These persons may lack financial resources, they may have personal physical disabilities, they may lack the knowledge and the coping abilities to get along in the complex metropolis, and they may lack the most versatile and essential transportation -- the auto. Even more likely, they may suffer from combinations of these disadvantages such that the various deprivations become negatively reinforcing.

The public-policy implications of this situation particularly suggest the need for improving the accessibility on the part of those persons who have failed to share the full benefits of residence in the metropolitan environs. This leads to many challenges, but to no simple, ready solutions. Improved access to shifting job opportunities is of high priority; probably, the creation of jobs near present residence will prove even more difficult. Income maintenance would appear to be needed to provide an improved resource base. Concern for physical health and personal mobility is involved.

Several policy implications follow. Concern for latent opportunities as an active ingredient of "community" is, of course, consistent with a philosophy of pluralism that recognizes the prospects for alternative life styles within the metropolis. It respects the basic rights of urban residents to select as between nearby (local) contacts and more distant (less local) contacts; to choose their friends and to be able to maintain relations with these friends wherever they may reside in the metropolis; to have considerable choice among job opportunities, as to type of job and location of job; to be able to pursue one's particular leisure-time interests; to seek out the kind of immediate residential

environment one wants for one's household; and to pursue one's preferred religious and political beliefs. We have, if anything, been moving into an era in which choice of life style is a prominent characteristic. To a remarkable degree we have been moving beyond the point where residents' life styles can be stereotyped on the basis of ethnic background, income, or occupation. We may helpfully view a resident's home and immediate residential environment as a base from which the resident may operate rather than as a tight imposition of patterns and expectations associated with that "place."

In simple areal terms, community building must seek to provide both (a) access to an ever broadening range of metropolitan opportunities and (b) a pleasant and convenient immediate residential environment with opportunities close at hand for those who opt (or, because of physical condition or other reasons, may find it necessary) to rely on them.

If anything, we have probably placed undue emphasis in recent years on the promise of improved transportation. This has merely served to reinforce the already powerful impacts of the auto. It has suggested that it was as important to permit the resident to travel sixteen miles as a half mile. And, as we have stressed, it has gradually squeezed out many who have lacked ready access to autos. It has led to land-use patterns presuming auto-mobility.

The alternate thrust would seem to deserve fresh attention: namely the thoughtful provision of selected local opportunities. This certainly includes some basic facilities, for food shopping, other convenience shopping, and other services. This is not a simple matter, however, for the economics have been such that many strictly local

commercial ventures have not been able to hold their own against the vastly larger stores and service centers that continue to flourish.

Perhaps, too, we might seriously explore the possibilities of innovative types of service centers in local residential districts that specialize in providing information about, and contacts to, the larger web of essentially nonlocal facilities. This would respect the inappropriateness of offering anything approaching a full range of services in each district, but would seek to hook the local resident more effectively into the broader potentials. Service centers might have local personnel and seek to provide what local residents particularly expressed interest in, but might well be linked to a hierarchically organized service-center system in which various higher-level or specialized centers provided information and contacts beyond the expertise of the local center. There could be legal-advice centers or medical clinics that were fewer in number and more specialized in character.

Even here, the overriding philosophy might best be to encourage residents to get to the facilities they would prefer to use. Some may head immediately for the large law office or the major medical center; some may appreciate the availability of smaller, but more proximate facilities.

There is also much that we have made no attempt to cover. We have deliberately not dealt with the political and governmental-administrative aspects of community. We have not grappled with political participation and its ties to community identification or alienation. Nor have we dealt with the difficult fiscal situations confronted in all metropolitan areas. It stands to reason that a concern for accessibility must be melded with many other aspects of community.

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