

## Problems in the Statistics of Urban Agglomeration

The growth of urban areas has made necessary new concepts and reformulations in social statistics.

Stuart A. Rice

Objects and other conceptual entities are classified according to criteria that command notice or seem important. These criteria tend to differ from group to group, to change with time, and to be supplanted when their significance disappears. Sometimes an evolving entity has changed so much that it seems useful to place it in another class, though this may be a matter of opinion. Henri Pirenne, in his 1922 lectures in America, raised this question respecting the city. Referring to Western Europe in the ninth century, he asked whether cities existed at all "in the midst of that essentially agricultural civilization." The answer depended "on the meaning given to the term 'city.' . . . The cities which were then to be found were without two of the fundamental attributes of the cities of the Middle Ages and of modern times—a middle-class population and a communal organization. . . . The period which opened with the Carolingian era knew cities neither in the social sense, nor in the economic sense, nor in the legal sense of that word" (1).

Ivar Oman, director of the Stockholm Office of Statistics, describes the Western European town of a thousand years ago as an enclosed and compact settle-

ment with a detailed network of streets (2). Its criterion was "that it formed its own market, administered justice in its own courts . . . and was free to determine its affairs in important matters. By and large, he believes, "these criteria still hold good," despite an astonishing growth in city size. Oman notes that "great cities in the modern sense did not exist in the Middle Ages nor at the beginning of modern times." The German scholar Konrad Olbricht placed in the class of "great cities" 17th-century towns with 15,000 inhabitants and 18th-century towns with 20,000 inhabitants.

### Cities and Towns

In America the incorporated municipalities of a century ago were substantially identical with urban areas. The identification and demarcation of cities and towns thus offered no difficulties to census takers, statisticians, or city dwellers themselves. By contrast, to illustrate present needs for new criteria of classification, let us compare Falls Church, Virginia, with the "largest city in the world."

Falls Church is known to many residents of nearby Washington, D.C., as a vaguely defined section that interposes a traffic bottleneck on the way to the Virginia Skyline Drive. The incorporated city of about 2 square miles and some

10,000 inhabitants is rarely distinguished from East Falls Church, a section of Arlington County; from West Falls Church, within its own boundaries; from the Falls Church District of Fairfax County, with some 20,000 or 30,000 population; or from the area served by the Falls Church post office, an area containing, perhaps, 60,000 people, all of whom use Falls Church as their postal address. To add further confusion, the city's own high school is outside its boundaries, in Fairfax County, a wholly separate jurisdiction in the Virginia setting, while "Falls Church High School," located within the city, is a property of Fairfax County and subject to that county's jurisdiction.

If the identity of Falls Church is obscure, even to many residents, the "largest city in the world" is virtually unknown in this country. In area it is 12 times as large as Los Angeles and 2729 times as large as Falls Church, but has only about three times the population of Falls Church. This "city" is Kiruna, Sweden. It includes within its municipal boundaries iron mines, the highest mountain in Sweden, and much of the northern territory of that country. By legal definition Falls Church and Kiruna are both "cities," with taxing and administrative authorities. In other respects they have little comparability. If attention is shifted from public administration to the demographic, social, and economic realities with which urban life is increasingly concerned, it seems clear that legal status as a municipality is no longer adequate as a statistical criterion for the classification of spatial groupings of people. New criteria are developing new conceptual units, and the end is not yet visible.

In the Western world, particularly in the United States, life has become adjusted to motor transportation. The automobile sometimes seems as important to individual and family life as the home. Yet the first indications of basic changes in the conceptual units needed for statistical descriptions of urban areas preceded the age of Henry Ford. Leon Schnore points out that "at the turn of the twentieth century most urban cen-

The author is president of the Surveys and Research Corporation, Washington, D.C. This article is based on his vice-presidential address to Section K, AAAS, on 27 December 1957 in Indianapolis, Ind.

ters were still rather compact and self-contained entities." However, "... railways—powered by steam or electricity—spread out from the largest cities in radial strings, and along their lines began to appear clusters of dwellings," the occupants of which were in various ways related functionally to the city (3).

It was in the census of 1900 that the Bureau of the Census, with remarkable prescience in its adaptation to change, for the first time defined a new demographic unit, the "metropolitan district" (4). As cities increasingly emptied or attracted inhabitants into surrounding areas, the use of this new concept as a statistical unit for all manner of social and economic analyses gained momentum. It is not improbable that "standard metropolitan areas," successors to "metropolitan districts," now outrank "cities" in statistical importance. Indeed, the Bureau of the Census is considering for the 1960 decennial enumeration a primary dichotomy between metropolitan areas and nonmetropolitan areas for classification of the nation's population.

If evolutionary processes could be halted, it is probable that the principal areal and demographic units now employed in statistics of urban areas would suffice for most administrative and analytical purposes. But urbanizing trends are dynamic. There is unlikely to be a pause in the social and economic metamorphoses to which they are leading. Oman describes the "modern great city" as having "broken through the boundaries of the traditional type of town. . . . [Its] very structure has come to differ radically from the formation of towns in the past. . . . The great city has become the focal point of what might be called an urbanized area, a mixture of country and town, a diffuse mass with neither beginning nor end."

Another aspect of this evolution is "the town attached to the road." This has been described in vivid language by Dan Jacobson, a South African newly arrived in the United States. He writes:

"The town seems to be the no man's land, not the road. Except for a house to live in, that road along its length is able to provide you with any material thing you might ever need. There are banks, travel agencies, money lenders; real estate agents . . . and furniture stores . . . bookstores and shops selling . . . records . . . little establishments that offer you fish in bowls . . . at least three or four hospitals for dogs. But the curious, the frightening thing is that no one lives on the road; all these shops and

facilities belong only to the road and to no city. Nowhere along its length does the road contract, confine itself, center itself for a community around it. . . . It is as if some kind of vital tendon has been severed, so that it can grasp nothing to itself, can enclose nothing in itself, can make no order of itself, but can only lie sprawling, incoherent, centerless, viewless, shapeless, faceless—offering all the products a community can need and yet making the establishment of a community impossible" (5).

Neither Oman nor Jacobson is describing the "urban agglomeration" of the future but only its present, imperfectly developed embryo. The matured phenomenon of which they see the beginnings may be more than urban, more than metropolitan, more than a great city or metropolitan area. Even under the definition of metropolitan districts employed in the 1930 census, which rested mainly upon the presence of central cities of 100,000 or more population and the population density of minor civil divisions adjacent to them, it would have been "possible to proceed from the state line of Maryland to the state line of New Hampshire leaving the area of a metropolitan district only twice for a total distance of less than 16 miles" (6).

Jean Gottman, director of the Study of Metropolitan Areas by the Twentieth Century Fund, refers to the superagglomeration that is forming along the North Atlantic seaboard of the United States as "megapolis" (7). He defines it as "a cluster of metropolitan areas with several downtown nuclei corresponding to the conventional meaning of the word city." He thus adds some precision to a recent newspaper editorial entitled "A Virginia-to-Maine Strip City" (8).

### Mixture of Country and Town

It is uncertain that even this vast conception will fully satisfy the need for a statistical term to describe the agglomerations of the future. Gottmann states that "... today there are no longer any clear-cut limits which separate 'town' from 'country.'" This fact is implicit in the employment by newspapers or broadcasting stations, to describe their areas of coverage, of such vague terms as "Chicago-land," with the rather indefinite inclusion of major portions of whole states within them. The use of such terms is supported by the disappearance of many of the differentiated aspects of urban and rural living which distin-

guished "city slickers" from "hayseeds" for our great-grandparents. City workers may enjoy many of the pleasures of country living during portions of the year, or even in their daily living, while farm dwellers, whose economic life increasingly resembles that of manufacturing or extractive industry, possess many of the cultural attributes of urban society, such as communication over wide areas, ready transportation, and recreational facilities.

Oman cites as problems posed to community planners and statisticians, first, the coordination of statistics on the various parts of the urban agglomeration; and second, the delimitation of the sphere of influence around a great city. With respect to the first, American sociologists and demographers have taken the lead in studies of the structure of agglomerations and the relations among their parts. New concepts, subordinate or ancillary to the concept of the metropolitan area, such as "urbanized area," "central city," "central business district," "suburb," and "suburban fringe," are being defined with increasing precision.

Oman's second problem leads to others related to the "mixture of country and town." Do we perhaps need to delimit a series of zones, extending *beyond* the metropolitan area, the urban agglomeration, or "megapolis," within which urban influences directly affect the social and economic structure? Such zones might reflect either the kind of influence or its degree. In 1933 I suggested that the "metropolitanism" or "urbanity" of a population "might be regarded as variable." "Urban" and "rural" might cease to be discrete concepts and "become relative terms—calling in each case for a specification of the degree of urbanity or rurality" (9).

Notable among pioneer studies pointing in this direction were those about the beginning of the 1930's by Horace Secrist, director of the Bureau of Business Research of Northwestern University. Trading areas of different types were differentiated. They were centered all the way from neighborhood markets for the purchase of groceries and school pencils to the metropolitan marts with far-flung clientele for such commodities at retail as expensive clothing and (it could have been added) stocks and bonds. Secrist's conceptions, borne out by his findings, were undoubtedly influenced by the conception of gradients in urban phenomena, developed by McKenzie, Burgess, and others at the department of sociology of the University of Chicago.

## Statistical Issues

I remain somewhat overwhelmed by the immense variety and complexity of the statistical issues to be faced in a changing society, even in a single country—the United States. The subjects upon which data will be needed will not differ greatly from those now elaborated in many familiar statistical sources. We will still need information on such economic phenomena as employment, wages, income, agricultural and industrial production, distribution, prices, and finance, as well as on demographic and vital phenomena, health, education, and other indicators of social structure and welfare—all, as at present, in great detail. The predictable statistical changes will be less in subject matter than in the demographic units of statistical classification and in the over-all structure of organization.

A greater volume and specificity of local data will be needed as urban agglomerations continue to expand. These data will be directed toward the solution of types of issues that have already appeared in our larger metropolitan areas, especially in those which embrace two or more state jurisdictions. Such issues are under study by the Joint House-Senate Committee on the Washington Metropolitan Area. The committee has tabulated the problems most often mentioned “by area public agencies as the most important facing the group.” In order of frequency of mention, these are mass transportation, highways, recreation and park acquisition, sewage disposal, water supply, land-use zoning, silt and industrial water pollution, lack of authoritative planning, school shortages, hospital problems, taxes, public housing, special problems of the District of Columbia, parking, and taxicab regulation. Although not mentioned by that name, urban renewal clearly belongs in the list.

Most of these issues will be found in other metropolitan areas. They will continue to exist, in even more exaggerated form, if, as allegedly predicted by Jerome Pickard of the Washington Board of Trade, the Washington and Baltimore areas are ultimately consolidated in a single gigantic city of 8 million people (10).

Greater emphasis upon local data will have to be reconciled with pressures for information of national scope. These pressures will continue to increase as national economic and social organization, both in the public and private sectors of the economy, continues to expand. With

local and national statistics both gaining in relative importance, a relative shrinkage can occur only in the availability of data related to the traditional administrative jurisdictions of our political system below the Federal Government—states, counties, and incorporated municipalities.

Demands for information pertaining to cross-cutting areas under special and *ad hoc* jurisdictions—port authorities, transit commissions, sewer districts, and official planning bodies, for example—and for information for unofficial bodies such as regional planning councils, will lead to a proliferation of statisticians and statistical activities. “Municipal” statistics have never received in the United States the extensive specialized development and recognition given them in Europe. Bypassing their development, here we may anticipate the emergence of “urban statistics” as a major subdivision of the statistical field. Uniform national patterns for obtaining much of the data needed by special and *ad hoc* agencies will be absent. These agencies will depend increasingly upon their own statistical personnel and facilities rather than upon those of the Federal Government. A tendency toward the decentralization of statistical responsibilities from Washington, along with a needed clarification of the respective responsibilities of national and local statistical agencies, may result.

To Washington, however, the public must continue to look for basic data pertaining to the population, its distribution and its use of the earth's surface. Most statistical information is directly or indirectly based upon the population census. The decennial population and housing census may well become quinquennial, as statisticians and sociologists have urged for upward of a quarter of a century. It will be supplemented by expansions of the monthly “current population survey,” an invention of depression years, to give more information on more subjects on a sample basis.

The demand for information on population and housing by small and stabilized area units, already great, will continue to grow as urban agglomerations are widened. Aggregates for many varied combinations of small areas will be compiled for the numerous special studies undertaken by official jurisdictions and unofficial planning bodies that cut across traditional administrative boundaries. The statistical “building blocks” needed for this purpose have already been created and put to use in most of the larger

cities and throughout some of the metropolitan areas of the United States. “Census tracts” consist of small areas, coinciding where practicable with the boundaries of administrative jurisdictions or electoral districts but relatively independent of changes in these. They are intended to remain constant from year to year and from survey to survey. As primary units for statistical summation they make possible comparability among diverse data and the measurement of changes in demographic, social, and economic structures over a period of time. Most cities of 50,000 or more population and all metropolitan areas with central cities of 100,000 or more population have now been divided into tracts by local initiative with federal review and approval. The total of 12,500 tracts in 1950 has already been raised to some 22,000. When the process of division into tracts has been completed, to include all of the territory which is urbanized, or is likely to become urbanized, or is affected by the proximity of agglomeration, then a statistical portrayal in census terms of the growth of a “Virginia-to-Maine strip city” will become a simple problem of arithmetic. Statistical studies of problems of the types that concern the House-Senate Committee on the Washington Metropolitan Area will be facilitated. A more precise definition of the extent and character of the influences exerted by urban agglomerations upon surrounding territory, including delimitations of those influences, will become possible.

A second type of statistical “building block” now in use and subject to greater development in the future is the city block itself. The practical utility of use of city blocks is found in urban areas of high population density where sharper delineations than census tracts are needed for urban renewal and slum clearance programs and for correlations among housing conditions, health, delinquency, and other social phenomena. City blocks are also useful for certain marketing studies and for use in the stratification of samples. Block statistics have lesser utility in loosely built residential areas.

Population mobility, as compared with place of residence or abode, will receive greater emphasis in the future. Functional differentiations are magnified in an expanding urban agglomeration, and related problems of transportation and communication will give greater importance to the movements of people within it. Daily movement of population, or its absence, is not always a function of com-

munity size. Nevertheless, the prevailing pattern of urban living for an increasing number of adults involves a principal division of time between place of abode and place of work, with growing distance between the two and between either of them and places of marketing and recreation. The character, direction, and extent of the incidental transportation are ancillary data of crucial importance to planners and analysts of urban problems.

Each of two statistical approaches to the relatively new phenomenon of separation between residence and work may serve a different group of needs. For some purposes, notably for planning measures of civil defense, it seems important to know the physical location of people at various times of the day and week. The conception of "residence" is applicable to a part only—possibly a minor part—of the 24 hours in a working day. In terms of some unit of economic activity, presumably hours of employment, residence is clearly of secondary importance. Hence, it is conceivable that we may some time wish, following British census precedent, to make the place of work rather than place of abode the primary basis of classification of the adult population.

If funds were available and administrative difficulties could be resolved, a double enumeration and classification is conceivable: one enumeration at the place of residence and one at the place of work, without attempt to identify the individuals counted at the one place with those counted at the other. This would have the advantage (since information concerning workers is usually provided to census enumerators by some other member of the family) of providing much more accurate information than at present concerning the occupation, industry, and work status of the population. For any area, comparison between the resident population and the working population would indicate the net, rather than gross, diurnal movement

between the two areas. In its usual laudable endeavor to adapt its schedules to the changing times, the Bureau of the Census is even now contemplating an attempt in the 1960 census to gain a gross measure of diurnal movement by interrelating residence with place of work as identified with one or another of a few broad zones into which metropolitan areas may be divided.

The second statistical approach to diurnal population mobility is to measure movements while they are in process. This approach has become familiar in the form of traffic surveys which enumerate drivers or passengers by origin and destination of trip. The utility of this type of inquiry is more limited and perhaps more ephemeral than that of a census at place of work would be. Traffic surveys have specialized value for those who must plan the extensions and interrelations of highway networks and other transit facilities.

A parallel problem of population mobility is involved in seasonal movements. The Bureau of the Census is confronted with a new puzzle in its application of even the conventional identification of place of residence: Many families now have *two* residences. Which of them is to be considered the family base for the tabulation of population totals? The direction of its thinking is indicated by the bureau's decision to record college students as residing at the place of their study.

More extensive are the annual migrations of millions of persons between seasons to take advantage of climatic differences. *Time* magazine (11) reports that "8,500,000 to 9,000,000 outstaters are planning to flock to Florida in the next twelve months—about 1,000,000 more than in the past year." Surely this is an important social phenomenon, collaterally related to urbanism, of which statistical records must be made in a more systematic manner in the future.

The statistical response to this phenomenon seems to require a still further expansion of the monthly sample current

population survey of the Bureau of the Census. Just as many time series of economic data are conceived as reflecting a variety of movements—secular, cyclical, and seasonal, in particular—the location of people may in the future be similarly conceived and measured. The official "population" of a community or area may some time require notation of the season, and even of the day and hour, and not merely of the date of the decennial or quinquennial enumeration.

A final conclusion concerns the need for statistical studies of the attitudes and plans of the people whose continued presence in close proximity creates the urban agglomeration. If we knew more about the interests, desires, and motivations which prompt people to seek residence in a particular suburb, to return from a fringe area to a downtown apartment, to drive through traffic instead of riding on the Long Island Railroad or the Illinois Central, we would obtain a better view of the forces and trends to which urban growth and planning must be adapted.

#### References and Notes

1. H. Pirenne, *Medieval Cities*, F. D. Halsey, trans. (Doubleday, Garden City, N.Y., 1956), pp. 39, 53.
2. I. Oman, "Great Cities and their surroundings: a statistical delimitation problem," paper presented at the 30th biennial session of the International Statistical Institute, Stockholm, Sweden, 1957.
3. L. F. Schnore, *Am. J. Sociol.* 63, 173 (1957).
4. H. S. Shryock, Jr., *ibid.* 63, 163 (1957).
5. D. Jacobson, *Reporter* (21 Feb. 1957), p. 18.
6. S. A. Rice, *Next Steps in the Development of Social Statistics* (Edwards, Ann Arbor, Mich., 1933), p. 21. The density criterion for the definition of metropolitan districts applied in the 1930 census has been replaced in considerable part by evidences of functional relationships (volume of commuter travel, telephone traffic, and so forth) for the definition of "metropolitan areas." These embrace whole counties contiguous to central cities of 50,000 or more population. In consequence, the non-urbanized territory included in "metropolitan areas" is greater in extent than that included in the "metropolitan districts" of 1930.
7. J. Gottmann, *Challenge, the Mag. of Econ. Affairs* (N.Y. Univ.), Aug.-Sept., 1957, p. 54.
8. *Northern Virginia Sun* (14 Oct. 1957).
9. S. A. Rice, *Next Steps in the Development of Social Statistics* (Edwards, Ann Arbor, Mich., 1933), p. 25.
10. There is an interesting survival in this idea of the conventional conceptions of the "city" and the "metropolitan area."
11. *Time* (9 Dec. 1957).

