

Studies in Population

3000 Years of Urban Growth

Tertius Chandler and Gerald Fox

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3000 YEARS OF URBAN GROWTH

STUDIES IN POPULATION

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Tertius Chandler and Gerald Fox. 3000 Years of Urban Growth.

3000 YEARS OF URBAN GROWTH

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With a Foreword by Lewis Mumford



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FOREWORD

For reasons difficult to fathom, the study of cities was never seriously cultivated until the nineteenth century; and so-called histories of cities are too often only accounts of politics, war, trade, within the bounds of a particular urban area—while the city itself remains a shadow. Even the deluge of urban studies that has descended during the last quarter century has, with a few outstanding exceptions, done little to illuminate the forces that have given the city its specific form and character. One of the most serious defects of historical urban studies is the lack of specific statistical information about the area, the density, and the population of cities. This lack points to the belated development of statistics itself: a discipline that hardly dates back in the West before the seventeenth century. Small wonder, then, that Adna Ferrin Weber's pioneer work, "The Growth of Cities in the Nineteenth Century" has, for all its inevitable limitations, remained a classic for more than seventy years.

There are, of course, good reasons for this lack of population studies of even a single city, and still more for a comparative estimate of many cities: namely, the scarcity of accurate data, and in many cases the absence of anything worthy to be called a quantitative datum, whether accurate or not. Even to make a first survey of this no-man's land required a special kind of hardihood: for it not merely demanded a lifetime's dedication, but gave no assurance in advance that the effort would bring a sufficient reward. Anyone looking for a prosperous academic career would hesitate before giving himself to such a dubious exploration; yet until someone ventured into this area no one could be sure if there were any pay-dirt—though even a negative result, if arrived at after due effort, would at least relieve other sociologists of a guilty sense of possibly having overlooked a mine of important information.

Happily in Tertius Chandler the indispensable qualifications for this tedious, difficult, and doubtfully rewarding job were united in a single person. A passion for figures, a dogged persistence in exploring sources, an almost fanatic faith that something would come of his effort enabled him to devote himself to this task for more than thirty years. As far back as 1940—or was it earlier?—he began sending me his mimeographed tabulations of the populations of cities, covering the urbanization of the planet, so far as any figures on city populations could be discovered or deduced. Since until I wrote "The City in History" I had no special need for this kind of information, I duly filed these reports; moreover, I confess, I was a little chary of using Chandler's figures, for at no point until now did he explain his methods, list his sources, or critically review his results. Knowing, as Chandler did, the paucity and slipperiness of population figures, one can only marvel at his hardihood in working so long without even the encouragement of partial publication. Happily, on Chandler's return to Berkeley, where he had studied geography under Carl Sauer, he received substantial encouragement from Professor Fox and from Professor Kingsley Davis, a leading authority on social statistics; and with the critical assistance of Fox he was finally ready to publish the present volume.

To assess these tables properly, one must remember that it is the first work of its kind in existence; and even if its results were far more questionable than they are, they would still be valuable, as leading to more exhaustive studies by native scholars whose documents are not accessible to outsiders or to those unfamiliar with their language. Though Chandler first began with tables for the largest cities of the world going back only to A.D. 1400, he progressively pushed his dates back to 1360 B.C. In presenting these results he has put a quietus on the parochial notion that urbanization, urban overgrowth, and therewith urban congestion and disorganization, are distinctly novel phenomena, confined to recent industrial civilization in the West. This in itself is a salutary correction of current urban thinking, and it complements the work done by Max Weber, Werner Sombart, Patrick Geddes, Gideon Sjoberg, and a few others in putting modern urban development in historical perspective. Thus Chandler's bare figures tell us something of qualitative significance about the city.

As the base figure for his statistical definition of the city Chandler, up to 1800, takes 40,000 for

Asia, 20,000 for other continents: and after 1850, 40,000 for the whole planet. What he shows is a remarkably wide range of urban populations, not entirely accounted for by the fact that his definition of the city takes in areas lying outside strict municipal boundaries. I have not had the opportunity to analyze these accumulated figures, and relate them to their historic periods and cultures, or to the transformations effected by political conquest, war, colonization, food resources, and diseases: but I am sure that a careful study would reveal important new facts, again of a qualitative nature. Even where the statistical data may be vague and meager, the relative population figures may be reasonably trustworthy: and they would be even more interesting if the size and number of cities could be related to the total population of the area from which the urban inhabitants were drawn. This would indicate with even greater clarity the overall differences in urban population patterns, as disclosed by the number, size, and distribution of cities, grading down from the biggest to the smallest.

At this point however one must issue a *caveat*. Chandler for excellent reasons confined his survey to cities of a definite minimal size. But we must remember that for the larger part of history, as the geographer Max Sorre observed, small cities, country towns, and villages hugely outnumbered in total population the few large centers; that the city which took form in Mesopotamia or Greece had fewer than 5000 inhabitants; and that in Western Europe through the Middle Ages, the small city predominated, and that before 1700 only a few commercial and industrial cities like Milan, Venice, and Paris, had populations of over 100,000. London had only 45,000 inhabitants in the fifteenth century, and in spite of its royal and commercial concentration had not yet reached a million at the beginning of the nineteenth century.

The tendency even among urban sociologists to overemphasize the bigger units and to concentrate on the forces making for urban growth unfortunately gives a false picture of the natural history of urbanization, and in turn, gives an equally false image of the city itself, as if size and density of population alone sufficed to define a city and establish its rank by numerical measure alone. Biologically speaking, this would be like counting only adults as human, and disregarding infants, children, adolescents, and old people. Anyone who confined himself to Chandler's statistics alone would have an inadequate conception of the factors that make for stability, continuity, arrest, and disintegration. The failure to study the anatomy and physiology of the city in its successive stages of growth is one of the major oversights of contemporary urban sociology. It leads to the mischievous conception that only big overgrown cities are real cities—which is like saying that only giants are men.

Let me clinch this point. Anyone who confined himself to these statistics would never guess that the Roman New Towns like Piacenza, originally planned for 50,000 inhabitants still exhibit their original outlines and street patterns. Despite radical economic, political and technological changes over two millennia, Piacenza had but 43,048 in 1936; even now it has only 87,930 inhabitants. Yet in current discussions of New Towns, the very notion of setting any upper limit to population is often dismissed out of hand as impossible, even were it desirable. Since the dominant forces in urban life today favor constant quantitative growth as the key to pecuniary aggrandizement and power, it has become important to take into account the stabilizing and growth-limiting factors that have operated in the past. This may offer a clue to developing the "steady state economy" that many other thinkers besides Ezra Mishan now regard as essential, if we are to overcome the hyperdynamic forces of disintegration.

In short, there is still a lot of unsurveyed ground to be covered before we have an adequate statistical picture of characteristic urban population patterns. This is not a reflection on Tertius Chandler's path-breaking presentation: it shows rather how he has opened up for urgent further investigation the relation of population growth to changing geographic, economic, and political conditions. In current terms of megalopolitan expansion, size is often treated as an index of urban efficiency, and unlimited size is regarded as both a necessary feature of the urban megamachine, or

even more, as its ideal terminus. This erroneous conception reaches a theoretical limit of absurdity in C. A. Doxiadis's projection of a planetary non-city to which he has affixed the name of *Ecumenopolis*.

Not the least valuable result of Chandler's study is that he has demonstrated how much valuable information of a statistical nature can be fathered, not from a direct count of population, but from a careful analysis of quite different material: the number of public baths or the area opened by the extension of walls, the number of soldiers who could be mustered, or the number of doctors available. Apart from this, his figures show reason to doubt the popular notion of urban "progress"; that cities have constantly grown bigger, and that there are no limits to this growth; for their decline and fall, their shrinkage or disappearance is statistically visible, not only in the fate of a few great centers like Rome but in many minor urban areas.

William Cobbett showed the way to this more realistic kind of interpretation when, passing through a deserted English countryside, he noted the number of well-built churches, and asked what had happened to the prosperous population that once built them and attended them. Though I have not myself any professional qualifications in statistics, I cannot examine a page of Chandler's figures without finding suggestions of interesting problems or possible answers. He himself would be the first to admit that, despite his thirty years of assiduous application, he has only made a beginning. But what a beginning it is! Any scholar who would criticize this work should first earn the right by familiarizing himself with the baffling territory it explores.

Lewis Mumford

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PURPOSE AND SCOPE OF THE STUDY

Until recently, most population figures for cities have been markedly inexact. Censuses were rare. Such figures as there were have been mainly random estimates by a miscellany of casual observers, mostly travelers. Such makeshift data are scarcely adequate for the understanding of the past. Any study of important events or trends demands more accurate information, to appreciate how many people were involved.

Accurate population for all cities is simply not to be had. For nearly all cities however, some data, scant and incomplete as they may be, exist. But these data, even when weighed and posted, reveal only broken population histories. To fill in the gaps as far as possible, we have sought first to gather whatever plausible population figures and demographically related data are available for the major cities of the world, and second, to develop methods for estimating populations from scanty data.

This project began when Chandler presented to Fox tables compiled for the largest cities of the world back to 1400 A.D. Professor Kingsley Davis of I.P.U.R. arranged financing, and Chandler entered the stacks of the University of California for more data. This book can be accurately described as "compiled by Tertius Chandler, and inspected by Gerald Fox." Except for late insertions, every figure has been worked over and discussed by both authors and has been agreed to by both, often after considerable discussion and sometimes further library research by both Chandler and Fox. The period to be covered was first set at 1200-1800 and then expanded to 800-1850. The cities included are those which at anytime from 800 to 1800 reached a population of 40,000 for Asia, or 20,000 for the other continents. At 1850 the mark is set at 40,000 for all continents. Within this frame we have attempted to provide estimated century end population figures for the cities. These are accompanied by maps. A further expansion, done by Chandler alone, carries the coverage back to 1360 B.C., the time of Moses. Next come lists of the 75 largest cities of the world at the same dates, and also at some intermediate dates. After that comes a listing of the six largest on each continent.

The word "city," it should be understood, is used here in the sense of urban area, to include suburbs lying outside the municipal area. It amounts to a house-to-house unity. Only in the 1968 list, prepared by Forstall, is a somewhat wider definition applied, to take in more scattered, commuting suburbs, appropriate to the automobile era.

Finally, a short chapter traces the rivalry for largest city in the world from early antiquity down to the present.

SOURCES

We have collected population data from as wide a selection of sources as were readily available. No special attempt has been made to inspect the census documents for early nineteenth century Europe, and some small errors may have occurred in consequence. Materials that were used ranged the gamut from authoritative scholarly reports to travelers' diaries. Encyclopedias have been used as a first line of reference.

Much of our additional information came from exchanges with urban scholars and individual city librarians and archivists. These instances are so extensive that to thank individuals is impossible, but these scholars have been most generous in replies to questions and have made each his or her essential contribution to the volume. The materials from city libraries are virtually unobtainable elsewhere. While cooperation varied greatly, ranging down to refusal to supply any information at all in a couple of rare instances, in general the librarians from over the world were most helpful and resourceful in obtaining data.

Sundry other sources were used. Among the secondary ones, gazatteers and travel guides frequently contain references to the size of cities. Religious histories of cities or dioceses have been helpful, by giving the foundation date of the various churches, especially parish churches.

The figures at 1968 and 1970 are taken with permission from the very accurate Richard Forstall of Rand McNally and Company.

Our study does not—cannot—claim to completeness, and specialists may well know of additional material for individual cities, for which, incidentally the authors would be most grateful.

METHODS

Population-size estimating is actually an exercise in puzzle construction and solution. To determine an urban unit's population it is necessary to know two significant figures: a relevant figure for a demographic factor such as individuals, houses, parishes, etc., and a relevant multiplier. The ideal is a complete census of individuals, with, therefore, a demographic multiplier of one. This formula, a demographic factor with an accompanying appropriate multiplier, has been the methodological foundation of the estimates prepared for this study.

Occasionally, it is possible to improve accuracy by cross checking with several different demographic factors. A quick example will explain this procedure. Amsterdam in 1514 had 2,507 houses, 2,907 hearths or family units, and 9,000 Christian communicants. All these factors point to a population around 14,000, so we use that as our deduced figure. Another example is Bagdad in 932. At that date, data exist for the number of doctors, the number of public baths, the area, and even the number of houses. All these figures are compatible with each other, and from them a reasonable figure of the population can be derived.

Two special problems which emerged are the disparity between different sorts of data, and the preparation of estimates from what can be considered a data void.

As an example of conflicting data from different demographic factors, the problem of the relative size of Bangkok and Hanoi can serve. Round about 1830 Bangkok was said to be only half Saigon's size, yet its population was given as 77,000, whereas, the earliest figure for Saigon is only 50,000. The resolution of this particular problem has proved, so far, impossible.

Other examples show this problem in terms of one city. The factual information for Cordova shows evidence of an internal consistency of growth and eventual decline, yet contemporary estimates by the chroniclers always overstate the population of the city.

An example in contrast to Cordova is Hyderabad, whose population just before the first census was estimated by outsiders to be greatly lower than it actually was; the error in this case was a surprising 200,000.

A demographic void seemed at first the case for Anhilvada. Back of 1197, it did not have any figures whatever, except one for distance around and another for the number of marketplaces. Reluctantly we concluded we did not have a good ratio for marketplaces. That left the area and the spotty data at 1197, when 15,000 were slain and 20,000 were captured. Those slain would be presumably militia, and the captured, women. So $15,000 \times$ the usual 6 for militia = 90,000. That does for 1197, but Anhilvada's height of glory was earlier. What of then? To then we could assign her area. This in turn could be compared to the area covered by Ahmedabad, a nearby city, when at its peak in the 1600s. And Anhilvada's peak was known to have been in the reign which went from 1094

to 1143. So we were able to assign a population of 125,000 in 1100 and, as the country was near its full size by 996, a further figure of 100,000 in 1000.

In situations where we wished to interpolate populations for a century-end figure, we have occasionally used estimated probable growth or decline rates based on consistency through a long period of years. Such a case is early Kyoto. Interpolations or estimates of this type are always indicated, with historical notes to back them up. These estimates over long periods are infrequent however and are used only in cases where prolonged stability or a steady rate of growth was very likely.

TOTAL SIZE ESTIMATES

Census figures, clearly the most desirable data for city populations, are available in only limited instances for the period covered in this study. If these censuses are accurate they are an ideal form of data, yet their accuracy, even in modern times, is frequently questionable. The most general error is simply one of undercounting the population. This error exists for two principle reasons: (1) the census was usually conducted by the local officials, whose efficiency varied, and (2) the purposes behind conducting a census were frequently ones which raised the populace's suspicions and therefore uncooperativeness—namely to prepare lists for drafting into military service, and to locate all taxpayers.

Nevertheless, in most cases the early censuses were quite accurate. Yet, persons living outside the city limits were seldom included, even though they were part of the greater city or urban area.

Another serious type of error in total population counts is the exclusion of one or more groups within the population from the count. No consistent pattern was used to select or include specific groups, and not all censuses indicate those groups excluded from the total figures. Even the assiduous Beloch, while giving very accurate counts for the major cities of Italy, sometimes fails to mention that certain groups are excluded. In many other cases censuses indicate that certain groups were in fact excluded from the count, but no information is available to even approximate the number of people excluded. Madrid (1757) excluded clergy and the garrison; Toulouse (1695 to 1790) excluded orphans and students; Troyes (1433) excluded the poor, certainly a substantial number; and Pernambuco (1845) excluded slaves. Ouro Preto (1735) astoundingly omitted non-slaves! The commonest omission was the Jews.

Contrasting with this exclusion is the contrary situation where rural populations are included in census figures, being within the municipal limits. This is habitually the case in southern Italy and Sicily, Messina being a classic example with census figures 1/3 too high for the truly urban population. The early censuses offer no information on what percentage of the people were rural; that has to be determined by a look at more recent censuses, which do have such a breakdown of the population, and sometimes by a look at maps.

Other instances of inflated figures are caused by the timing of the count. Travelers' estimates were apt to be made during large festivals. The Papal habit of holding a jubilee year at the end of each century from 1600 onward gave a special lift to figures for century's end at Rome. The Roman figures have been retained intact for this study however, as the city remained booming for much of the year, and the whole purpose of century-end dating is to compare actual present populations at one precise date. Rome just happens to get a statistical advantage from the popular penchant for using rounded dates for tables.

Another consideration is over the Chinese units called *hsien* and *fu*. *Fu* is used in two meanings, as a rather large administrative district, and as the capital city of such a district.

In the case of a national capital, the *fu* coincides with the city, surrounded by a wall. Some provincial capitals are the same way, and are even known as *fu*, as in the case of Tali-*fu*. A *hsien* is a smaller administrative district, but even so usually much more than a city. On the other hand a number of cities have expanded to the point where the city coincides with the *hsien*, or even with several *hsiens*. When that point was reached in any given case is extremely hard to know. Chinese city and provincial histories may tell, for they are very large; however, they have no index.

A difficulty in travelers' estimates is the lack of facilities for making an accurate guess; even contemporary policemen and trained demographic experts have difficulty in estimating large crowds. What frequently appears to be an enormous number of people is in fact likely to be only a few thousand, not several hundred thousand as often quoted. Even so, casual travelers are most frequently reliable, as they have no specific purpose other than curiosity in estimating the population, and they often asked for their information from well-informed townspeople or even local officials.

Several notorious examples exist, however, which illustrate population estimates with a specific purpose. In 1300 the city officials of Ghent were asked to estimate the population to aid the pope in determining the number of clergy to be assigned to the city. The burghers' estimate was specifically designed to allow the city more clergy, and was so totally out of proportion with the existing population that the estimate was laughable.

There is too the question of contemporary versus historical perspective in population estimating. Thus, Laborde, writing in 1798, was accurate on Spanish cities in his own time, using the recent census of 1797, but he was far too high in his reports of the traditionally stated size of Cordova back in 1236 or of Toledo back around 1000. Again, França's data for Lisbon from 1639 onward are excellent, but for earlier periods he found only estimates which as he himself admits are unreliable.

An instance of a reliable contemporary figure way back at 1326 is "over 30,000" claimed by the officials of Metz. That figure checks with the area at that time, and with the loss from the plague reported later on in the century.

Yaqut's figure 444,000 for Herat in 1217, though often repeated for the city, must be a district figure. Comparison with other cities in that area, cities of greater distinction, makes this certain. Elimination of figures like this from serious consideration is one of the aims of this book.

Acceptable however is Manrique's 660,000 plus foreigners for Agra around 1630. Agra's importance as the capital of the Mogul empire and its huge area make such a population reasonable. The main reason for accepting it, however, is the accuracy of Manrique's figures for other cities, especially Arakan, where a count of surviving stone houses proved him a reliable reporter.

A particularly useful traveler for our purposes was Leo Africanus. Leo wandered across most of Moslem Africa, notably south of the Sahara to and beyond Timbuktu. High-born and well-educated, he furnishes trustworthy population figures for many places for which no other demographic data of any kind are available for centuries before and after his time. Thanks to him, Africa at 1500 stands as one of the best-prepared lists in this book.

AREA

Area is a very useful tool for determining population. Sometimes a city's area is stated in the sources; much more often it has to be calculated from the circumference or

perimeter, which is usually that of the city walls. Occasionally suburbs outside the walls are included, but generally not. Fortunately for the statistician, the large growth of suburbs had not begun before 1850 except in the newly rising industrial conurbations of Britain. The circuit of city walls varied in shape. For a wall that is square, the area is easily found by squaring the length of one side. For a circle, the area comes out 1/4 larger. For a rectangle with proportions of 4 to 1, the area comes out 1/3 less than the same length of city wall in a square. Once the area has been determined, the population can be estimated by using the population density of other cities in the same region, even at a much later date. This is possible, because the way of life remained unchanged for centuries. There is an abundance of evidence to prove that this constancy of life-style was real. The inventions that have transformed modern life were only just beginning to take effect in 1850. Except in Britain and America, cities then were generally surrounded by a wall, with all or nearly all the urban population living within it.

There is a problem, however, in that city walls cannot be readily moved to accommodate a growing population. Occasionally a small expansion was built to jut out beyond part of one side of a wall. More often however, the wall stayed as it had first been erected, while the population inside it grew somewhat crowded. Finally, a new wall would be constructed, beyond the limits of the old one. Hence, the density ratio for an old wall should be substantially higher than for a new one. This observation has been termed by Chandler as Fox's Law: that new walls should represent a lower density than usual, and that older walls should have the norm for the district, and a wall just before the building of a new wall must have a considerably higher density within it than the regional average. In a number of instances perimeter figures, from which areas can be calculated, are available for the old and the new wall, thus providing a ratio of the amount of expansion. We have become accustomed to standard ratios of 100 people per hectare (1/100 sq. km. or 1/259 of a sq. mile) in the Orient and much of Europe, of around 75 per ha. for new walls, of up to 200 per ha. just before a new wall is built, and of even higher densities in special geographic circumstances. Thus, Genoa in the later Middle Ages was the densest in Europe, with over 600 per ha. Edinburgh was nearly as dense by 1750. Both these cities are boxed in by mountains, which accounts for their unusually high density, resulting in old buildings up to 14 stories high.

INSTITUTIONAL FACTORS

The units of institutional life most serviceable for population estimates are: families, households and homes (these three vary very slightly, as a household may contain servants, and a home occasionally contains several families), and militia. In many cases in Europe very accurate figures are accessible for one or several of these units. Just as the consistent pattern of urban life made for the use of the same densities over our whole thousand-year period, so it makes too for steady multiplying factors for families, homes, etc. down the centuries. So the multiplier for families or housing is found by taking the ratio at some date when one of these, and also the population, are known. In a few cases such full information is on hand for a given city at several dates in our period, showing the extent to which the ratio has changed. The change turns out to be very little indeed, but of course we use the differences when we find them.

The following chart gives ratios of persons per institutional unit in specific cases:

Institutional Factors

		per household	per family	per house	per taxpayer		per household	per house
Florence	1401	4				Cork	1800	8
Genoa	1460			15		Prague	1605	30
Milan	1492	5				Warsaw	1609	12
Córdoba	1000			4.5		Astrakhan	1767	8
Madrid	1597			11	10	Kiev	1766	8
"	1787			11		Moscow	1725	8
Oporto	1810			4.6		Santiago	1657	10
Coimbra	1732	3.7						
Dijon	1700	8						
Rouen	1250		6.25					
"	1700	5						
Tours	1598			15				
"	1698	5						
Antwerp	1645			5				
Brussels	1783			7				
Liège	1650			6-7				
Haarlem	1632			6.1				
Hague	1732			5.5				
Leiden	1659			5				

It should be obvious that some of the above figures given in the sources as for "houses" should be actually for families or households. The figures ranging from 10 to 30 should be for whole buildings.

The count of militia or arms-bearing males is frequently given and makes a very good basis for estimating population. The militia usually took 1 in 5 of the population in a crisis, or 1 in 6 otherwise. These high ratios hold good despite the fact that such elements as the clergy and usually Jews and aliens were excluded from military service. When a city was wholly unexposed to danger, its militia ratio might be too low to use in estimating the population, but such safety was all too rare. On the other hand, a garrison imposed on a city from outside merely reflected strategic importance and thus for another reason is usually valueless for the urban demographer. The militia, however, chosen by the citizenry from their own ranks, is a sound basis, available wherever cities had their freedom. The following are examples:

		militia	population	ratio
Cremona	1160		20000	
"	1259	5000	(30,000)	6
"	1304	6400		
"	1502		40000	
Lyon	1546	18000		6.7
"	1549		120000	
Paris	1313	50000		5.5
"	1328		c. 274000	
Cologne	1359	1500		26
"	1400		40000	
Hamburg	1600	6600	40000	6
"	1680	10260	60000	6
Novgorod	1471	10000	60000	6
Hangchow	1273		432000	
"	1350	72000		6

So a demographic multiplier of 6 for militia is just about right, on the basis of the above data.

Probably for military purposes, otherwise for taxation, all the adult males in a city were often enumerated. Thus, Venice (1336) listed males 20-60 years old, York (1377) those over 14, and Pisa (1228) those of citizen status aged 15-70. Breslau (1403) likewise listed the male citizens, and Vienna, Frankfurt, and London enumerated voters—who were presumably the same as the male citizens.

The Catholic Church kept track of communicants of both sexes. At Tours (1672) it listed all over 7 years. At Lisbon (1758) the age was also set at 7.

The number of Christian clergy varies too much to be a satisfactory factor.

Such groups as merchants and skilled craftsmen provide little more than cross-checking possibilities. There might be an exception for bakers, as nearly everyone in most parts of Europe ate bread, but as it happened, where there were good data on the number of bakers, there were also superior demographic data of other sorts.

Religious institutions such as parishes, churches, mosques, and monasteries are also, somewhat surprisingly, usable as demographic factors. The ratio of 3000 persons per parish fits much of Christendom, while 9,000 per “main” or “Friday” mosque has proven passably acceptable for much of Islam. Northeast France has a much lower parish ratio, as at Reims and Metz, where 1250 fits the other data. Total churches or mosques are less reliable as factors, because of the tendency of rich men to build each his own family place of worship. We were able, however, to derive a multiplying ratio of 1250 for churches and 800 for mosques, and we have accepted Gen. Cunningham’s 5 persons per Buddhist monk for early medieval India. The latter checks well with area in the case of Kanauj.

City quarters seem to have been derived from parishes, at least in France, where the same ratio of 3,000 fits well for such cities as Orléans. 5,000 however, lived in one of Caen’s quarters as early as 1060.

For Ahmedabad we were fortunate enough to get a ratio for city wards at 1866, which made it possible to derive figures for the city at the time of its heyday around 1700.

Market-places proved a disappointment. There are data for several cities (Ahmednagar, Anhilvada, Adrianople, etc.), but some of them were not consistent with others, and we failed to derive a usable multiplier. We sincerely hope our successors, with fuller information, will be able to crack this problem, at least for some areas. Three thousand per market-place may be applicable for western India.

There are several items from which we failed to agree on any multiplier at all, such as the number of horses in Africa. The cities involved were Ikoso and Gbara. In the case of Troki in Europe, however, a multiplier of 5 was derived by comparisons with another city in the area for which both horse counts and other data happened to be available.

VOLUME OF LOCAL ACTIVITY

In a couple of cases (Karakorum, Vienna) there are data on the number of wagon-loads needed to provision a city daily. We didn’t happen to need them, as Karakorum fell too swiftly to make any of our lists, but eventually this function may yet yield a demographic multiplier.

Inns have proved useless in estimating population, partly because the tales of their abundance seem to have grown in the telling.

A comparison of the number of notarized papers at Genoa and Pisa was of some help in fixing the population of Pisa at 1200.

Bread consumption is a good index in lands such as Italy. The recorded fact that

Comparative Rank

Florence ate 3/7 as much bread as Milan in 1280 helped us to fix the former's population in 1300.

The number of public baths has proven useful for Moslem cities, especially Bagdad, where it confirmed other data pointing to a highly important figure: the second urban population ever to top 1,000,000.

A marked shift in local activity occurs when a city becomes or ceases to be a capital. The departure of a royal court means an assured loss of several thousand people, usually followed by a further general decline; whereas, acquiring a court means a comparable measure of prosperity.

Business trends can be helpful. The quantity of tea trade and wine trade was indispensable in deriving estimates for Canton and Xérez, respectively, at 1700.

DISASTERS

A grim but demographically helpful category of information is the statistics of loss of life reported at disasters: plague, fire, earthquake, or flood. The losses reported in these "Acts of God" often provide a check which suggests that figures held to be accurate should be reevaluated.

Total destruction of a city, whether by nature or by the warfare of man, is particularly helpful to the demographer, as the total population is frequently given. In actuality a besieged city is apt to have a population swollen by refugees and by an enlarged garrison. Even so, those telling the tale are apt to repeat merely the standard population for the city at the last count before the war began.

A special case was the 20,000 maidens taken off into captivity from Cambay. We had considerable demographic discussion on this deplorable happenstance before arriving at the conclusion—partly supported by other evidence—that the amount of the females who would be considered worth the trouble of carrying off would be about half and that the total population of the city previous to the siege would therefore be 80,000.

Information about military reverses may often help in forming the century's end estimates of population. This is true not only when a place was wholly destroyed, such as Ayutia or Angkor, but also when it is only severely shaken. A well-known instance of severe economic decline brought on by violence is Antwerp after the Spanish sack of 1576.

COMPARATIVE RANK

A risky but sometimes usable criterion is the reported comparative rank of cities. Thus our figure for Alexandria at 1500 is based on a traveler's comparison of it with Cologne. The figure for Kano at 1600 is based on the chance that it was so close to Gao in size that a special house-count had to be made to see which was ahead. Loango toward 1700 was stated to be nearly as large in area as Rouen but with much smaller houses; from this evidence, plus a comparison with other West African cities, we managed to derive a figure.

Again let us warn that the figures presented here are by no means all susceptible to accurate assessment. The need for educated estimates has predisposed both the authors to try to derive figures where possible from almost any scrap of information. Indeed we were tempted at times to go much further even than we have done, in assuming constant population for over a century for cities untouched by war. We fairly well resisted that temptation. We hope we have not yielded to too many others. We believe our conclusions

to be soundly enough based to make them viable for practical purposes of historical or sociological interpretation. This caveat does not however cover the data in the appendix, where a few special tables covering dates not included in the main text have been set; these were compiled rather hastily (comparatively speaking) and were worked on only by Chandler, without the benefit of inspection by Fox and resultant further research. They could do with some revising.

Corrections for any part of this book are welcome. Indeed we are eager to get them!

top 50

FRANKS			ITALIAN STATES	
Verona	30 000		Rome	50 000
Metz	25		Naples	30
Paris	25		Benevento	
Milan	25		Amalfi	
Tours	20		DENMARK –pagan	
Reims	20		Lejre	
Pavia			SLAV STATES –pagan	
Ratisbon			Prague	
Cologne	15		Krakow	
Trier	15		KHAZARS –Jewish	
Padua			Itil	
Lyon	12		Theodosia	
Orléans			Kiev	
Arles			BULGARIA –pagan	
Toulouse			Pliska	34 000
Poitiers	10		Madara	
ENGLAND			BYZANTIUM	
London			Constantinople	300 000
SPAIN –Moslem			Thessalonica	
Cordova	160 000		Corinth	
Seville			Syracuse	
Mérida	40		Malamocco	
Toledo	25		Athens	
Cartagena			Sofia	
Elvira	15		Plovdiv	
Lisbon	15		Adrianople	10
Barcelona				
Valencia				
Almería				
Zaragoza				
Murcia				

top 100

FRENCH STATES

Laon	25 000
Paris	20
Rouen	20
Arles	
Orléans	
Reims	
Angers	15
Toulouse	
Lyon	
Rennes	
Poitiers	12
Tours	
Bourges	
Narbonne	
Soissons	
Caen	
Marseille	

ENGLAND

London	25 000
Winchester	15
York	12
Lincoln	8

DENMARK

Roskilde

FLANDERS

Bruges	12 000
Ghent	

SPAIN—Moslem indented

Cordova	450 000
Seville	90
Almería	35
Cartagena	33
Toledo	31
Elvira	22
Palma	20
Xérez	19
Murcia	19
León	

Burgos

Badajoz	16
Baeza	
Lisbon	15
Zaragoza	
Valencia	
Málaga	

Barcelona

Tortosa	
Denia	

SICILY

Palermo	75 000
Messina	
Catania	

BOHEMIA

Prague

GERMANY—ITALY

Ratisbon	40 000
Amalfi	35
Rome	35
Pavia	30
Mainz	30
Naples	30
Milan	30
Cologne	21
Verona	20
Trier	20

Worms	
Salerno	
Magdeburg	
Genoa	15
Cremona	15
Metz	14
Erfurt	
Bergamo	13
Liège	12
Ferrara	12
Mantua	12
Piacenza	

Bari

Ragusa

Bologna

Padua 10

Pisa 9

Spires

Brescia

Asti

HUNGARY

Esztergom

Székesfehérvár

POLAND

Poznan

Gnieszno

Krakow

RUSSIA AND GREAT BOLGARY

Kiev 45 000

Bolgary 25

Novgorod 18

Chernigov

Smolensk

Polotsk

BULGARIA

Ochrida

Preslav 30 000

Plovdiv 20

Corinth

Trnovo

Belgrade

BYZANTIUM

Constantinople 450 000

Venice 45

Thessalonica 40

Adrianople

Candia

top 100

FRANCE			BOHEMIA	
Paris	110 000		Prague	
Orléans	27		ENGLAND	
Ghent	25		London	40 000
Bruges	25		Rouen	40
Troyes	20		Angers	30
Provins	20		Poitiers	21
Laon			Tours	20
Ypres			Toulouse	20
Blois			Caen	20
Avignon	13		Dublin	17
Reims	12		Bordeaux	15
Arras	12		Winchester	15
PROVENCE			Bourges	
Marseille	25 000		Norway	
Arles	20		Bergen	
Béziers	20		DENMARK	
Narbonne			Roskilde	
ITALY			GERMANY	
Palermo	150 000		Cologne	50 000
Venice	70		Spires	30
Milan	60		Worms	25
Bologna	35		Mainz	25
Rome	35		Trier	25
Verona	33		Metz	23
Messina	30		Lyon	22
Genoa	30		Brunswick	21
Pisa	30		Erfurt	21
Naples	30		Liège	20
Ferrara	27		Ratisbon	
Cremona	25		Wiener-Neustadt	15
Pavia	25		Soest	15
Alessandria	20		Vienna	12
Lucca	20		HUNGARY	
Padua	20		Esztergom	18 000
Siena	15		Székesfehérvár	
Asti	15		POLAND	
Florence	15		Krakow	
Bergamo			Poznan	
Brescia			Halicz	
SPAIN—Moslem indented			RUSSIA—Moslem indented	
Seville	150 000		Kiev	40 000
Cordova	60		Smolensk	40
Granada	60		Novgorod	30
León	40		Bolgary	
Toledo	35		Vladimir	18
Palma	30		Polotsk	
Valencia	26		SERBIA	
Zaragoza	21		Prizren	
Badajoz	20		BULGARIA	
Barcelona			Trnovo	35 000
Málaga			BYZANTIUM	
Burgos	18		Constantinople	250 000
Almería			Thessalonica	30
Xérez	15		Plovdiv	20
Baeza			Adrianople	
PORTUGAL			Belgrade	
Coimbra	20 000			
Lisbon	15			