

Preface

At the Crossroads of Demography and Archaeology

What can we know of the demographics of early populations for which we have none of the standard sources of historical demography, such as parish records, nominal rolls and censuses? One idea that naturally comes to mind is to analyse the human remains excavated by archaeologists. But these bones must be made to talk and the results interpreted carefully. And that is precisely the purpose of this book which, while quite unusual for demographers, is also familiar. It is unusual in its description of the techniques for estimating age at death from the gradual closure of the cranial bones, the wear and tear on certain joints and the number of cementum rings deposited on tooth roots, all of which are far removed from the world of demography, and yet familiar, because the book establishes an operational framework for these estimations by making full use of the demographer's basic toolkit, starting with life tables. This is why palaeodemography – the demography of early populations – is such a vigorous hybrid discipline. While it boasts some fine discoveries, it is also punctuated by lively controversies that called for a proper treatise to describe recent progress and to outline future developments. That task has now been accomplished in this handbook produced by Isabelle Séguy and Luc Buchet, with help from many colleagues, not least Daniel Courgeau and Henri Caussinus.

Based on a meeting of minds between a demographer and an archaeologist, the book is also the fruit of long-standing cooperation between INED and CEPAM. This joint research unit of the CNRS and the University of Nice Sophia Antipolis is one of France's largest archaeological laboratories, with an unequalled collection of plant, animal and human remains, recorded in digital databases. More than 10 years ago, CEPAM, then headed by Frank Braemer, approached INED with the audacious idea of providing a permanent position for a demographer at CEPAM while seconding one of its own researchers to INED's "History and Populations" unit. With many joint publications to their name, the two scholars have more than fulfilled their contract. The archaeology-struck demographer found herself working alongside the demography-struck archaeologist,

to the great benefit of both disciplines. This *Handbook of Palaeodemography* is the culmination of their innovative cooperation.

Outside the narrow circle of specialists, the idea of combining archaeology and demography was not an obvious one. I recall one meeting of INED's Scientific Council at which some members expressed doubts about supporting a major joint palaeodemography project between INED and CEPAM. Were we not moving rather too far from the central concerns of the institute? Fortunately I had attended the 8th *Journées Anthropologiques de Valbonne* at CEPAM headquarters (June 2003) and so could easily give practical examples of the synergies between the two disciplines. The Scientific Council was convinced and gave long-term backing to the joint project.

And yet, is it any wonder that demography and archaeology should work together, given the degree of openness of both disciplines? Archaeologists have a long tradition of calling upon a whole range of specialists, once called "auxiliaries", specialised in epigraphy, numismatics, geological stratigraphy, physical and chemical materials analysis, numerous techniques for dating material objects and animal and plant remains, and, most recently, geographic information systems. Demographers, for their part, focus on their core competence, that of demographic analysis, known as "formal demography" outside France. But they nonetheless engage in mutual exchange with a wide range of disciplines, including sociology, economics, geography, history, politics, philosophy and epidemiology. All of these fields are represented at INED, faithful to an interdisciplinary approach that is making its way in equivalent research centres elsewhere. Palaeodemography (which might just as well have been called "archaeodemography") is no more than demographic analysis for population historians who wish to use the resources of archaeology. Specifically, palaeodemography enables historians interested in population dynamics to exploit archaeological data in cases where no written archives exist. This is what defines palaeodemography, more than any specific time period: it covers all periods from prehistory to the twentieth century, including antiquity, the Middle Ages and the early modern period.

Palaeodemographers examine buried skeletons; so they naturally use some of the techniques of the forensic scientist. Our authors did consult the specialised literature of the forensic sciences, but make a clear distinction in terms of objectives: the forensic scientist seeks to identify the age of an individual, whereas the demographer is more interested in the age-sex structure of a population, in order to describe its general dynamics and specifically the probabilities of survival at given ages. There is a basic reason for this: repeated attempts to find a reliable biological indicator for age at death have failed. Individual variations severely limit any correlation between age estimated in this manner and actual age (these ages can be compared in the few cases where we have both human remains and their names). Coefficients are often below 0.5, even for the closure of the cranial sutures, one of the most frequently used indicators at present.

As a result, the authors opt for a collective, probabilistic strategy for estimating the distribution of ages at death. The question discussed at length in this handbook is a subject of much debate: How can we reconstruct a plausible distribution of ages at

death for a buried population? A “buried” population is never directly representative of the “burying” population, i.e. the individuals normally destined to be interred in the burial ground or cemetery under study, who, in turn, are quite likely to differ significantly from the surrounding society, because of demographic biases (caused by migration) or social ones (such as the aristocratic membership of certain religious communities of pre-Revolutionary France or selective burial practices). This handbook alerts readers to the biases in representativeness that may arise at every stage, but does not fall into the converse trap of standardising the buried population at all costs: its specific features must not be averaged out, but recognised and properly accounted for when choosing and specifying the best-fitting model.

The authors thus advance by stages.

After determining the scope and limitations of the various bone-based estimation methods, they describe the range of models that can be used to reconstruct the demographic dynamics underlying the available data, for all their flaws and biases. One instrument well known to demographers working with poorly recorded societies is the set of model life tables published by Sully Ledermann from 1956 on: these tables are constructed from logistic relationships that empirically link the observed probabilities of dying at various ages. At a higher level, we have the “logit system” devised by William Brass in 1969, which consists of taking the life table of a known population as a reference standard in order to adjust the unknown table of the study population, using the variations in median age at birth and the relationship between child and adult mortality. Brass first established a standard for the mortality regime of Western Europe and then an “African Standard”. Since then, bodies such as the OECD, United Nations and the INDEPTH network of demographic surveillance sites have produced a large number of regional standards. The authors of this handbook prefer to use as references the life tables they have constructed themselves, based on data from pre-industrial countries that have not completed their demographic transition. This enables them to extrapolate mortality in the earliest years of life, seldom accessible from the archaeological data because of the poor conservation of child skeletons. In short, the standardising or modelling method involves applying to ancient societies where data are lacking the mortality distribution of societies for which reliable records are available.

This method, in turn, must be based on estimates of the age distribution at death. The handbook moves on to address this point. The authors opt for the “probability vector” method proposed by Claude Masset in 1973. Although originally designed to estimate the age distribution of populations recorded in historical demography, the method is extended here to buried populations: the authors closely follow the path traced by Jean-Pierre Bocquet-Appel while introducing various corrections and variants.

This part of the handbook actually raises a disturbing question: How can we fill the gaps in our knowledge without unduly substituting our model for reality? Faced with obscure or incomprehensible evidence, we are tempted to force the unknown into the mould of the known, which is the very mechanism of bias itself, unless we exercise considerable caution – as our authors certainly do – to ensure that the model remains no more than a set of hypotheses that are both perfectible and

refutable. In the social sciences as in the others, any model is reductionist in the sense that it simplifies and arranges reality, but this reductionism is productive if the truths that emerge from it exceed in both quantity and quality the details that have to be sacrificed. Rather than just filling in gaps by means of isolated estimates, the demographic models in this handbook use a coherent network of assumptions, a structure in the strictest sense of the word, to plausibly and verifiably link together the various parameters that define the dynamics of a population. Therein lies their strength.

But the transfer still calls for considerable caution and a constant awareness of the nature of these assumptions and their mode of construction. The aim is not to replace poorly supported archaeology or an inadequate timeline with a preconceived pattern. The authors are careful to specify that the demographic modelling will be all the more satisfactory where the osteological remains are properly dated and soundly supported by archaeological evidence. A further precaution is mentioned recurrently throughout the handbook: a model must never be applied mechanically but must take account, as far as possible, of the social and historical context, which may be influenced by migration, the presence of a garrison or religious institution, the selective use of cremation, the effects of epidemics, wars and so on; the chapter on archaeological examples provides a very judicious reminder of this point.

There is thus a tension in the handbook between two necessities: to construct a demographic model enabling the archaeologist-demographer to capture demographic dynamics despite highly fragmentary evidence and yet to contain that model within the bounds of probability. For example, there are thresholds of life expectancy or mean length of life below which no population is viable, just as the model may produce disparities between mortality risks at different ages that lie outside the range of possible values. As always in demography, the work of indirect estimation is both modest and risky, both tentative and daring; it must be bold while keeping within certain bounds to avoid missing the target of the “plausible” and “demographically possible” – keywords in this handbook. One might say that estimates of age at death must remain “demo-compatible”, to coin a word. Modelling has thus a double effect: it releases researchers from their impotence by giving them access to unseen structures and it places reasonable limits on their ambitions. This handbook steers a course between the two necessities. In scientific terms, what could be healthier than this intellectual tug-of-war?

In the last part of this handbook, Isabelle Séguy and Luc Buchet hand over to two eminent statisticians, Daniel Courgeau and Henri Caussinus, who have generously contributed their skills to this endeavour. They both return to the “probability vector” method of age estimation illustrated by Masset and Bocquet-Appel. They place this method within the wider set of statistical proportional fitting procedures, which start from the margins of a table (row and column totals) to reconstruct each of its cells (for our purposes, the number of deceased individuals in each age group and at each historical period or “stage”).

The aim here, once again, is to start from the known and fill in the unknown, except that Courgeau and Caussinus adopt a truly Bayesian approach to do so: the

gaps are not filled in arbitrarily by a prior model but rather the posterior estimation of probabilities is improved by making the best use of pre-existing elements of certainty or likelihood, so that the reconstructed table of data differs as little as possible from the initial table. This discussion is necessarily a technical one, but it has already produced tangible results: the demographic estimations applied to certain illustrative populations throughout the handbook are substantially revised as a consequence.

These methodological innovations by Daniel Courgeau and Henri Caussinus will fulfil their promise once they have been converted into reference tools accessible to researchers with less exceptional statistical skills. Whatever the future application of these ideas, this final section has the great advantage of opening up new lines of inquiry. For Isabelle Séguy and Luc Buchet, their *Handbook of Palaeodemography* is not some definitive treatise designed to hand down canonical truths that are cast in stone. The subject is by its nature a complex and evolving one. The handbook is, as it were, a guide to a site in an advanced stage of excavation, where the first structures have been unearthed by such talented forerunners as Claude Masset and Jean-Pierre Bocquet-Appel, while the authors, with their sound knowledge of the literature and their own rich experience, have dug down further and classified the discoveries made so far. As for every excavation, it is clear that more exploration is needed. The authors and their collaborators may be justly proud of their work.

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Handbook of Palaeodemography

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2013, XXII, 329 p. 78 illus., Hardcover

ISBN: 978-3-319-01552-1