The South African Australopithecines: A Palaeodemographic Analysis

Anthropologists, demographers and historians alike are continually seeking information about demographic profiles of prehistoric and ancient human populations. There are many different approaches relevant to the problem, yet direct evidence of the demographic structure of any archaeological population is primarily provided by analysis of human skeletal and dental remains. This offers a possibility of extending demographic inferences back to Pliocene - Early Pleistocene times, which, in turn, would enhance our understanding of the principles of human survival, adaptation, social interaction and demographic evolution of man.

Data on the age distribution of South African australopithecines has been analysed using life-table analysis, based on a stationary population model. The estimated demographic profile is then evaluated and interpreted within a framework of biological, cultural and ecological circumstances. It is concluded that palaeodemography, if carefully undertaken, can play a real and pragmatic role in understanding the demographic history of man.

Introduction

Although reconstruction of the demographic profile of past human populations is fraught with many difficulties, anthropologists, demographers and historians alike have adopted different approaches to tackle the problem. These approaches differ markedly in research strategy and the kind of data utilised. For anthropologists, palaeodemography is becoming an integral part of current skeletal biology research (e.g. Ubelaker 1974, 1978; Palkovich 1978, 1981; Buikstra and Mielke 1985; Shaaban 1988, 1989; Saunders and Katzenberg 1992). This interest stems from the potential value of palaeodemographic analysis in understanding the range of human biocultural adaptation and survival. The demographic pattern of a given population is a direct outcome of reciprocal effects of many biological, social, cultural and ecological variables upon one another (Green et al. 1974; Armelagos and Mcardle 1975; Ward and Wiess 1976; Nage 1980; Brass 1975; Van Greven et al. 1981; Handwerker 1985, Shaaban 1988).

One particularly vexed problem that besets palaeodemographic analysis is small sample-size and the fragmentary nature of the skeletal remains. This problem is, of course, made worse as we go back further in time. Therefore, the Plio-Pleistocene hominid sample represented by the South African australopithecines deserves further consideration and detailed demographic analysis. One indispensable theoretical assumption that is inevitably associated with any prehistoric population study is that of “uniformitarianism” (Howell 1976). This implies that both the basic biological process of growth and ageing, and population-structure and dynamics of past human populations are not significantly different from those observed today. Without this assumption one cannot apply modern models of ageing, sexing, or demographic analysis, etc., to prehistoric populations.
Material and methods

The present paper will use data and information on South African australopithecines to make inferences about their demographic profile. Data on the age-distribution \((Y_X)\) of the two australopithecine taxa (Mann 1968, 1975) will be considered and reanalysed in detail. Life-table analysis based on a stationary-population model (Acœadi and Nemeckéři 1970; Weiss 1973) is adopted.

Two sets of life tables have been reconstructed for the population in question. The first is based on the original observed age-distribution and the second on the smoothed one. Smoothing procedure of the age-distribution is accomplished by applying the method of running averages (Acœadi and Nemeckéři 1970; Weiss 1973). Variance \((S^2_x)\) and standard error \((S,E_x)\) of probability of dying \((q_X)\) and life-expectancy \((e_X)\) of the life table are calculated according to Chaing (1984) in order to set limits for the reliability of the estimated life-table functions (Moore et al. 1975; Shyrock and Siegel 1973).

Results and discussion

Dental and skeletal remains assigned to australopithecine’s (Plio-Pleistocene hominids) have been recovered from South and East African sites. However, data about the age-structure of this taxon are available only for the South African australopithecine.

Five fossil-bearing sites from South Africa yielded several skeletal and dental remains assigned to australopithecine. Mann (1968, 1975) was the first to attempt to analyse systematically australopithecine remains for demographic inferences. He established criteria by which he could determine the minimum number of individuals represented by the remains. He concluded that the pattern and maturation-rate of australopithecine dentition conform to those of Homo sapiens. This led him to infer that the australopithecines experienced that prolonged period of childhood-dependency, which is essential for transmission of learned behaviour across generations. This conclusion, however, has both its advocates (e.g. Mann 1988; Wolpoff et al. 1988; Mann et al. 1987, 1990, 1991) and opponents (e.g. Bromage 1987; Dean 1987; Beynon and Dean 1988; Smith 1989, 1991).

Mann (1975) provided the age distribution for \(A. \) africanus and \(A. \) robustus, and calculated mean age at death as 22.2 and 17.2 years, respectively. On the other hand, McKinley (1971) further elaborated Mann’s data as well as some more australopithecine specimens recovered from East Africa, and estimated average age at death for \(A. \) africanus and \(A. \) robustus, as well as for the two taxa combined, as 22.9, 18.0 and 19.8 years respectively. The difference in average age at death between the two taxa is statistically significant, which may reflect adaptive differences that promoted higher survival rate for \(A. \) africanus (Mann 1975:71). However, the difference may also be a reflection of bias inherent in the under-representation of very young individuals in \(A. \) africanus sample (McKinley 1971). McKinley constructed survivorship curves for both taxa and estimated a probable 4 to 5 year birth-interval for the australopithecines.

It should be pointed out that the survivorship curve depicts cumulative proportions of individuals surviving to the beginning of each age interval. Therefore, the curve is very sensitive to any misrepresentation of the age-specific mortality rate in any age interval, and hence the error will be cumulative throughout subsequent age intervals (Green et al. 1974; Moore et al. 1975; Van Gerven et al. 1981). On the other hand, probability of dying \((q_X)\) and expectation of life \((e_X)\) functions of the life tables are widely recognised as offering a most useful and relia-