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THE DEMOGRAPHIC STUDY OF PASTORAL PEOPLES

by Eric Abella Roth

The past twenty years witnessed major anthropological works on nomadic peoples, both hunter-gatherers (Lee and DeVore 1968, 1976) and pastoralists (Salzman 1980; Galaty and Salzman 1981; Galaty et al. 1981). While the latter included research on demography (cf. Howell 1976, 1979; Harpending 1976) this topic was absent in studies of pastoral peoples. The following article attempts to summarize current knowledge concerning pastoral peoples while pointing to the need and potential for future research.

Current Status

Spooner (1982:111) notes it is now de rigueur to include people as an integral part of any ecosystem. However, the implications of this tenet are not yet fully recognized. As an example, flow diagrams outlining the research design of UNESCO's Integrated program for Arid Lands in northern Kenya (Lusigi and Glaser 1984:22) emphasize biological, botanical, and climatic variables, while concerning itself only with cultural acceptance, and hence "improved human welfare arising from intervention and manipulation of the former factors". This neglect of human demography is in spite of the program's primary concern with the growing human population. There is no mention of the rate of population growth, nor implication of demographic mechanisms underlying such growth, e.g. increased fertility, and/or declining mortality. The object is not to single out this particular project for criticism. Rather, this example points to the lack of demographic knowledge about pastoral populations. Indeed, it appears we now know more about livestock population dynamics (cf. Dahl and Hjort 1976; Clark 1984) than the human populations who tend and depend upon them.

One reason for this is adoption of a particular ecological viewpoint in which humans are viewed as merely the ultimate trophic level in an environmental pyramid. This implies human numbers are dependent upon and regulated by climatic (drought) and biological (disease) factors which influence herd size and composition. While true on one level, this view slights the rich social, economic and symbolic systems of pastoral human populations. It is the contention of this paper that demographic studies of pastoral peoples can delineate the human position in pastoral systems, demonstrating instances in which humans are dependent upon natural factors, as well as cases where cultural features allow pastoralists to regulate these factors. As such, demographic studies can potentially provide a more balanced view of nomadic populations.

Previous demographic studies compared pastoralists to their sedentary counterparts and neighbors, with only one study to date conducted on solely non-sedentary pastoralists (cf. Ganon 1975). Recognizing that nomadic is not a pure synonym for pastoralists (Salzman 1982) Table 1 presents data on

nomadic groups, including hunter-gatherers, pastoralists and horticulturalists. Diachronic (Cree, Nunamiut, Kutchin) and synchronic studies are included. With few exceptions, the studies compare the same ethnic group. Exceptions are Tuareg and Fulani populations derived from national censuses compared with sedentary agrarian populations of the same nationality. Fertility and mortality parameters for nomadic relative to sedentary populations are denoted as decreasing (-), increasing (+) or remaining stable (0). Overall the table points to increasing fertility combined with decreasing mortality pressures, resulting in rapid population growth for sedentary populations. Ware (1977:85), with particular reference to francophone Africa, states:

> Those who advocate the sedentarization of the nomads should bear in mind that one unintentional consequence of such a policy would be a rise in population growth among the ex-nomads.

Almost certainly, but not totally certain. Pastoral Fulani of Mali (Gallais 1967) feature higher growth rates than their sedentary neighbors. Nor does fertility always increase with sedentism, as noted by the .Kung and Turkana. Other exceptions are stable or increased mortality for the Juang, Somali, and Fulani populations. These data represent "anthropological populations" (Howell 1973), that is non-age-conscious groups lacking written vital registration systems. Thus age determination for the delineation of age-specific fertility, mortality and migration is difficult. The result often is the formulation of only crude rates (births and deaths per 1000 population) which are influenced by the age structure of the population. Dependency upon crude rates may introduce errors that are carried over to the rates of natural increase shown (Natural Increase = Crude Birth Rate - Crude Death Rate). Couple the above with cultural traits such as the Sub-Saharan hesitancy to mention dead offspring (Brass and Coale 1968) and the problems of simply enumerating pastoral peoples become evident.

Fortunately new demographic techniques for age assessment and analysis exist. Notable are the age ranking approach used by Howell (1979), the historical event calendar technique employed by Brainard (1981) in her analysis of the Turkana, and the long awaited United Nations Manual on Indirect Estimation Techniques (1983). Similarly, the successful application of water-hole techniques, whereby enumerators interview nomadic families as they water their animals (Somalia, Central Statistical department 1981) bodes well for future studies on nomadic peoples.

However, at present all we know about the demography of nomadic peoples is, as a rule, they feature lower fertility, higher mortality, and hence lower growth rates than do their sedentary counterparts. Yet the exceptions remain just as important, if not more so, than the rule. Furthermore, we know little of the underlying mechanisms, biological, physical and/or cultural which determine demographic parameters. In the following sections potential avenues of research into these areas, based on current demographic and anthropological models, are suggested.

Research Topics

The relationship of fertility, mortality and migration to demographic change is neatly summarized in the Basic Demographic Equation: (1) Δ =

(B+I) - (D+O) where:
Δ = change
B = births
I = in-migration
D = deaths
O = outmigration

By isolating the right-hand variables an examination of current findings and future research topics can be undertaken.

Fertility

By far the greatest amount of research has been in the field of fertility. The most important finding here is that non-contracepting populations often possess fertility rates far lower than previously thought (cf. Howell 1979). This finding led to the search for mechanisms responsibility for reduced fecundity. A number of factors, biological, and cultural were proposed but not proven.

What did arise was a heated debate involving proponents of Frisch's (1976) so-called "Critical Fat Hypothesis" and those stressing the role of lactation in inhibiting fecundity. Frisch analyzed cross-sectional and longitudinal growth data to predict the onset of menarche and the maintenance of ovulation. Analysis of female body composition suggested to Frisch that a "critical level" of lean body mass to body fat (approximately 3:1) must be achieved and maintained for menarche and regular ovulatory cycles. Frisch hypothesized that this relationship was based on female extra-caloric needs during pregnancy and lactation, the last necessitating on average an additional 500 calories per diem. Taking this into account Frisch suggested the hypothalamus triggers a release of lipid soluble hormones when, and only when, the crucial threshold is reached and maintained.

In contrast, others downplayed the role of nutrition in determining fecundity levels (cf. Bongaarts 1979) while stressing the contraceptive properties of the hormone necessary for lactation, prolactin. As with Frisch's hypothesis a strong dose of biological determinism is implied, with the female body prolonging post-partum non-susceptibility to ensure proper child spacing. This view does not cite breastfeeding as a totally effective contraceptive, because in many cultures the practice of post-partum abstinence, due to the belief that sexual intercourse reduces or spoils mother's milk, correlates with lactation periods (Van Ginnekan 1975).

To date both theories have been criticized (cf. Masnick 1979, Bongaarts 1979) but not convincingly disproven. Their status is perhaps best exemplified by studies of the Dobe .Kung, hunter-gatherers of the Kalahari Desert. These studies examined the same group yet produced directly opposing results. Howell (1979), making use of growth and development data for the .Kung, finds support for Frisch's hypothesis; as does Wilmsen (1979) in a study of seasonal weight fluctuations and dietary practices. Inversely, Lee (1979) presents field data indicating the importance of long (4 years) lactation periods in the reduction of .Kung fecundity, data substantiated by the analysis of Konner and Worthman on suckling frequency and intensity (1980).

Both theories have important implications for fertility studies among pastoral peoples. While Frisch's theory may be relatively unimportant for overnourished Western populations, it may be relevant for pastoral groups whose diet varies throughout an annual cycle. The low points of these cycles may produce amenorrhea due to inability to maintain stable reproductive levels of body fat. Repeated over time, these episodes could significantly alter reproductive levels. Similarly, the study of lactation practices in societies where animal milk provides a viable alternative to mother's milk holds great potential for future research, given the effect of breastfeeding on the resumption of ovulatory cycles as calculated in Bongaarts' (1978) model of "proximate fertility determinants".

The two hypotheses should not be seen as exclusive either-or alternatives, nor as precluding the important of other variables. Henin's 91968, 1969) study of Sudanese Baggara fertility levels in comparison with sedentary Kawahla, noted that contributing factors in the lower fertility of the former included a higher rate of miscarriages (presumably due to malaria), a higher level of venereal disease, a later age at marriage and a higher proportion of unmarried women. In addition the Baggara were characterized by much longer breastfeeding periods and a poorer nutritional regime.

This emphasis on biological variables is not meant to diminish the role of cultural factors. Henin's study also noted Baggara fertility was restricted by more polygynous matings ending in divorce, underlying the higher proportion of unmarried women. Questioning of nomadic women concerning the causes of marital instability suggested than they enjoyed more independence than their village based counterparts, and hence were able to marry and remarry with greater ease. In light of the present debate on the role of polygyny in elevating fertility, through early and universal marriage (Romaniuk 1980), or decreasing fertility due to increased risk of venereal disease and a post-partum abstinence period (Sembajwe 1979) consideration of female social and economic status would expand the investigation of marital pattern influence on fertility levels in pastoral groups.

An equally important research avenue is the examination of fertility differentials based on social change and stratification. Iron's (1979) examination of socio-economic variables among the Turkmen of Iran is an excellent example with relevance to any nomadic group undergoing sedentarization and/or engaged in a market economy. Another topical research area is the determination of the costs and values of children in pastoral societies. Topical because of renewed interest in this factor a prime determinant of fertility in developing countries (cf. Bulatao and Lee 1983), the subject is little studied in pastoral groups (though see Mueller 1979). Some field studies suggest that children in non-mechanized agrarian settings represent both an important source of labor from an early age as well as often constituting the sole source of parental old-age security (cf. Cain 1977; Nag et al. 1978) while other reports state that such children are net economic losses throughout the life-cycle (Vlassoff and Vlassoff 1980). There is obviously room for more studies.

Mortality

Relative to fertility even less is known about mortality patterns of

pastoral peoples. Analogous to the nutrition-breastfeeding debate a similar controversy exists with the critical variables, infectious disease and nutrition.

In regard to the impact of infectious disease anthropologists suggested that mortality increased with the advent of sedentism (Cockburn 1975). In support of this view Brainard's (1981) study of sedentary Turkana groups cites sanitary practices concerning garbage disposal, elimination of human wastes, and personal hygiene act as important disease vectors in sedentary, higher density conditions. In contrast, Harpending and Wandsnider (1981) note nomadic !Kung hunter-gatherers feature worse mortality with increased mobility. They suggest this correlates with geographically heterogeneous pathogens, against which diminished immunity is demonstrated in experimental conditions.

One noteworthy test of the relationships between disease, nutrition and mortality is that by Hill et al. (1983) on five rural Mali populations: 1) sedentary Bambara millet farmers, 2) agro-pastoral delta Fulani, 3) semi-nomadic Seno-Mango Fulani, 4) fully nomadic Kel Tamasheq (arid zone) and, 5) fully nomadic Kel Tamasheq (delta zone). The authors assumed that farmers and agro-pastoralists would feature better mortality conditions, due to stable food crops. In addition, they assumed groups exploiting the dual cultivation systems of the delta, one dependent on the Niger flood, the other on rainfall, would produce more reliable food stores. The expected ranking of infant and child mortality levels are shown in Table 2. This table also shows the realized survivorship values (1x in life table format), as well as the observed rankings, based on these values.

From these surprising findings the authors concluded that food was not the most important variable in child survival. Rather it was secondary to infectious disease. Food, it was suggested, diminished in importance due to the general availability of milk for infants and children,, while important sources of infection for delta groups included stagnant pools, which during the rainy season acted as disease reservoirs for insect-borne disease.

Another important disease source for pastoralists is the actual animals that constitute their livelihood. Anthropologists (cf. Cockburn 1975) have speculated on the importance of zoonoses in prehistory, while recent medical studies from India (Simmons et al. 1980) and Africa (Woodruff et al. 1983) note the current high incidence and prevalence of tetanus arising from animal spoors. While these studies denote inherent pastoral disease vectors medical studies also suggest biological adaptations to pastoral life. For example, despite a diet extremely rich in animal fats including milk, meat, and blood Kenyan Maasai tested by Biss et al. (1971) exhibited low serum cholesterol and beta lipoprotein levels, factors associated with arteriosclerosis and heart disease in Western populations. Metabolic examination revealed very high capacities for intestinal absorption of dietary cholesterol in the Maasai, hypothesized as genetic in nature. Similarly, Maasai gall bladder bile exhibited a high capacity to dissolve cholesterol, protecting them from cholesterol-gallstone formation. Genetic examination revealed an unusually high and early prevalence of serum immune globulin, IgA, important in immune responses to infectious pathogenic organisms.

Such genetic factors combined with arduous work patterns, noted absence of obesity, and seasonal shifts in nutritional intake, indicate that distinctive morbidity and mortality patterns for pastoral peoples may be hypothesized. Once agin research in this area has lagged behind that

undertaken for nomadic hunter-gatherers (cf. Tursswell and Hansen 1976). Examples such as the Maasai, combined with the finding of a low incidence of heart disease for Somali pastoralists whose diet is also extremely high in animal fats (Lipiccierella et al. 1962), point to the potential for future research in this area.

Migration

It is ironic that the literature on nomadic pastoralism contains little reference to demographic analyses of in- and out-migration. Instead anthropologists have concentrated, rightfully, on the rationale for group and herd migrations, rather than on quantifying migration patterns per se. Yet the demographic study of migration certainly appears rewarding. Hjort's (1981) analysis of Turkana-Samburu migration records ethnic ascription, and acculturation, resulting in out-migration from pastoral areas and sedentarization. Such "natural" migration patterns could beneficially be compared and contrasted with the planned migration and resettlement of Somali pastoralists following the 1974-75 drought (cf. Merryman 1982), as well as that now being undertaken in drought-stricken Ethiopia.

Discussion and Summary

Our present knowledge of the demographic regimes of pastoral nomadic peoples is slight. Knowledge of biological and/or social mechanisms underlying these regimes is almost non-existent. The preceding review outlined potential research avenues, based on present findings, knowledge, and paradigms. From this the following steps are suggested.

First, more data on fertility, mortality, and migration are needed. Anthropologists may have collected such data during fieldwork the primary goal of which was other than demographic. If so this data should be analyzed and published, to fill in the current dearth of knowledge on basic demographic rates and patterns. Usually, however, data amenable to demographic analysis must be collected within a demographic format. Having identified demographic studies as a priority in pastoral group research (cf. Horowitz 1981) anthropologists must now launch primarily demographic projects.

Second, socio-economic, cultural, and/or biological variables must be linked to these data to assess their effects on demographic parameters. In this pursuit anthropological perspectives can be beneficially used. Where others see homogeneous egalitarian groups anthropologists note heterogeneous, non-egalitarian roles, statuses and tasks within groups (cf. Begler 1978; Cashden 1980). Linking these social inequalities with demographic differentials will offer insights into the relationships between social conditions and biological events.

Third, we must attempt to assess these relationships in terms not only of causality, but of rationality. This assessment should not be the relatively easy one from our viewpoint and from the plethora of theoretical positions currently available, but from the study population's viewpoint, which is extremely difficult. For example, the demographic literature is replete with

examples of fertility strategies such as "child replacement" or "child hoarding" models, by which populations regulate their fertility in relation to changing mortality levels. While these models are amenable to mathematical modeling, empirical analyses frequently indicate the study populations are not practicing any discernable strategy (cf. Roth et al. 1983). The parallel anthropological position is the adaptatist approach. Carried to its extreme this is the antithesis of the view presented at the beginning of this article, that human populations are merely the highest trophic level in any ecosystem. In contrast, the adaptatist perspective frequently views human populations as omnipotent collective thinkers, manipulating the environment to their own ends. In doing so they "often conflate effect with internal process" (Friedman 1979:255). In the adaptatist perspective sheer survival becomes equated with the phenomenon of adaptation. This is not to disparage the existence of cultural adaptations, or what demographers call "unconscious rationality", behaviours which benefit a population without individual members being cognizant of the advantages (Wrigley 1978). Yet before we wholeheartedly assumed that age-sets, polygyny, gerontocracy, post-partum abstinence taboos, or even infanticide are group mechanisms to maintain some anthropological ideal of "population homeostasis" we need the creation of a more rigorous methodology linking cultural practices with demographic results. Paramount in this endeavour must be means to determine the study groups' awareness of the demographic concomitants of their behaviour. Demographers have approached this problem via mathematical procedures (cf. Olson 1980). Anthropologists may attempt to explore these possible interactions via qualitative approaches, including interviews, observations and focused biographies.

In summary this paper outlines potential research avenues in the demographic study of pastoral peoples. What is intended is more than another plea for demographic data (cf. Swift 1977). The review undertaken here indicates a pressing need for us to encourage and initiate demographic field studies of pastoral peoples.

TABLE 1. FERTILITY AND MORTALITY CHANGE OF SEDENTARY POPULATIONS RELATIVE TO NOMADIC COUNTERPARTS

POPULATION	REFERENCE	LOCALE	FERTILITY	MORTALITY
A) Hunter-Gatherers				
Ghanzi and Ngamiland !Kung	Harpending & Wandsnider 1982	Botswana	0	-
James Bay Cree	Romaniuk 1974	Canada	+	-
Nunamiut	Binford and Chasko 1976	Alaska	+	-
Kutchin Athapaskans	Roth 1981 a,b	Canada	+	-
B) Horticulturalists				
Juang	Roth and Ray in Press	Botswana	+	0
C) Pastoralists				
Turkana	Brainard 1980	Kenya	-	-
Somali	Somalia, Central Statistical Dept, 1981	Somalia	+	0
Baggara	Henin 1968 1969	Sudan	+	0
Kawahla	Henin, 1961 1969	Sudan	+	-
Fulani	Ganon 1975 Dankoussou et al. 1975	Niger	+	+
Tuareg	Ganon 1985, Dankoussou et al. 1975	Niger	+	-
Fulani	Gallais	Mali	+	+
Fulani	Podlewski	Cameroun	+	+

KEY: (+) Increased (-) Decreased (0) Unchanged

TABLE 2: CUMULATIVE PROPORTIONS SURVIVING (1X) TO SELECTED AGES OF CHILDHOOD 1x VALUES

Age In years	Bambara	Delta Tamasheq	Delta Fulani	Seno Fulani	Gourma Tamasheq
1	.796	.875	.778	.849	.845
2	.743	.805	.675	.785	.780
5	.624	.713	.501	.677	.674
10	.592	.664	.464	.628	.604

RANKING

EXPECTED	OBSERVED
1. Delta Fulani	1. Delta Tamasheq
2. Bambara	1. Gourma Tamasheq
3. Seno-Mango Fulani	3. Seno-Mango Fulani
4. Delta Tamasheq	4. Bambara
5. Gourma Tamasheq	5. Delta Fulani

(1 = lowest level of mortality, 5=highest level)

(Adapted from Hill et al 1983)

Spearman's Rho = - 0.9

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