DAVID A. CLEVELAND
Center for People, Food and Environment

Developmental Stage Age Groups and African Population Structure: The Kusasi of the West African Savanna

African population structures based on censuses exhibit a distinctive pattern of distortion. It is often assumed that the cause for this distortion is systematic biases in age estimates by census enumerators and respondents influenced by perceptions of social and biological development. African developmental stage age groups are the cultural codification of such perceptions. I describe developmental stage age groups among the Kusasi of Bawku District in northeast Ghana, and analyze their age and sex structure for a sample of 1,132 individuals from the village of Zorse. I show that differences between men and women reflect differences in biological and social development, and that cultural concepts of developmental stages could influence age estimates to produce the pattern of distortions typical of those found in African population structures based on censuses. This is supported by a comparison of Bawku District population structure based on the Ghana census and an ethnographic sample census in Zorse which eliminated most age estimate biases.

THE DIFFICULTY OF OBTAINING ACCURATE NUMERICAL AGES IN AFRICA is well known. Systematically biased age estimations in censuses and surveys result in patterns of age/sex distribution that are frequently adjusted by methods based on stable population theory. Categorization of people by social and biological degrees of development is often thought to be a major contributor to systematic biases.

African age systems, especially formalized age classes, are also well known. They have even been used to improve the accuracy of age estimation, as has knowledge of relative age in small residential groups. Many African groups have a system of developmental stages for each sex that defines people according to social and biological criteria.

The purpose of this article is to discuss indigenous developmental stage age group (informal age grade) systems and their relationship to population structure using data from a Kusasi village in northeast Ghana, located in the West African savanna. Their interpretation in terms of independently determined numerical ages provides insight into the process of social and biological development, and sheds some light on the origin of biases in population structures based on census data. To my knowledge this article presents the first such analysis.

African Population Structures

The structure of a population is the pattern of distribution of its members by age and sex. Population structure is determined by rates of mortality, fertility, and migration, which in turn are determined by a complex of biological, cultural, and social factors. Knowledge of population structure is essential for understanding population change and for analyzing all other demographic characteristics. It is therefore important for those collecting and using ethnographic data on age to separate artifact from reality.

DAVID A. CLEVELAND is Codirector of the Center for People, Food and Environment, 344 South Third Avenue, Tucson, AZ 85701.

Unadjusted national census data from Africa give population structures that are usually presumed to be highly distorted by age "misstatements" (van de Walle 1968:38–48). In comparison with stable population models, the most pronounced and consistent deviation shown by population structures based on census data is a deficit of females in the adolescent years and an excess of females in the preadolescent years and in the middle of the reproductive period. For males the pattern is similar, but the reproductive period peak is less pronounced and occurs somewhat later. Sex ratios (males/females) are usually less than unity for the under-five age group, then greater than unity until the beginning of the female reproductive years, less than unity through the end of the female reproductive span, and then greater than unity again.

Demographers typically explain these patterns of distortion from an idealized population structure as resulting from systematic errors in age statements and in estimations made by enumerators (van de Walle 1968:48–49). It is generally believed that a major cause of these errors is the changes in physical and social characteristics and social status occurring during an individual's life (Caldwell and Igun 1971; Gaisie 1976:17–18; van de Walle 1968:48–49), although this relationship has not been much studied (Ewbank 1981:2).

The typical age distributions from censuses are "usually so conspicuously distorted that they appear to serve only as demonstrations of inaccurate age reporting and patterns of biases," and "only differential age reporting and omissions can explain the standard pattern of sex ratios after early childhood" (van de Walle 1968:33, 43). Attention is therefore focused on adjusting age distributions in reference to stable population models usually based on European experience (van de Walle 1968:43). A stable population structure can be imputed using selected fertility and mortality data, assuming no migration or changes through time in fertility and mortality rates, both secular trends and those due to specific historical events such as wars, famines, or epidemics (Shryock and Siegel 1975:816).[1]

Census Age Estimates

Africa is probably the most difficult region of the world for which to obtain good estimates of numerical age. Even educated young people in urban settings may not report ages accurately (Sembajwe 1980). While calendars of national and local events have often been used in African censuses they are frequently of poor quality, and training and supervision of enumerators are inadequate. Even if high-quality calendars are used properly, local people may have difficulty relating birth dates to the calendar events, and the results may even lead to systematic errors (Ewbank 1981:89–96).

Explanations for this difficulty commonly offered by demographers include "ignorance of ages" (Byerlee and Terera 1981), that people are "not fundamentally interested in knowing . . . their exact ages" (van de Walle 1968:13), and that "concepts of age have little meaning" (Shryock and Siegel 1975:203). These are outside viewpoints, however, and it is more correct to say, especially for rural populations, that there is "an ignorance of age according to the western method of reckoning" (Blacker 1967), or that "the idea of *numerical* age is still largely a foreign import" (Caldwell 1966, emphasis added).

In fact, many African groups divide themselves into age-based categories that define individuals in relationship to each other and within society in functional ways. The members of an age category may have different numerical ages, and the average and range of ages for the category may change through time. Yet, in terms of reflecting biological and social reality they may, in fact, be more meaningful than the Westerner's numerical ages.

African Age Systems and Numerical Age

African age systems include formal age classes (or age sets) of individuals of similar numerical age, age grades, or developmental stages based on social and biological development (which can be either formal or informal), and relative ages of individuals, which

are often reflected in terms of address. Age-class systems, combining age classes and formal age grades, are relatively common in Africa and are especially well known in East Africa (Bernardi 1985:11; Stewart 1977:16), for example among the Gikuyu (Kenyatta 1938:2, 106, 115–116, 134–135) and the Nuer (Evans-Pritchard 1940:105, 249–261). Age classes may have important social, political, military, and other functions (Bernardi 1985), as with the Bassari of southeastern Senegal, who have a system of eight to nine age classes each of six-year span, beginning at age six (Nolan 1986:22–23). Bassari sexual, ritual, and agricultural behaviors are strongly influenced by age class and grade.

Knowledge of African age-class systems has been used to improve estimates of numerical age. In Kenya "conversion tables" were constructed by establishing a relative chronology of age grades (Blacker 1967). Results for the Bukusu, with age grades for every other year, and the Gikuyu, with age grades for almost every year, showed a "moderately encouraging" reduction in excessive age-specific sex ratios in comparison with the population of Kenya based on the 1962 census.

Relative ages can also serve as the basis for estimating numerical ages. The method depends on the fact that "dans un village, tout le monde se connaît" (Pison 1982:42) and on individuals' "strong cultural concept of relative age" which is often "incorporated into regularly used terms of address" (Howell 1978:25–26), as in the case of the !Kung. Transforming this relative chronology to numerical ages involves ranking the population from youngest to oldest. One can begin with young people with established dates of birth and then use a local calendar to determine ages of older people. Or, one can fit the distribution to that of a stable model population, as did Howell (1979:29–31). Where circumcision places everyone in a class, relative chronologies from neighboring villages can be collated by establishing a relative chronology of circumcision classes, as among the Peul Bandé (Pison 1982:41–63) and the Mandenka (Langaney, Dallier, and Pison 1979), both of southeastern Senegal.

While probably present in most African societies, including those with age-class systems, developmental stages (informal age grades) are too broad to serve as an aid to estimating numerical ages. In contrast to age-class systems, developmental stages like those of the Kusasi are relatively loosely defined according to the individual's functional stage of social and biological development. Individuals pass from one stage or category as their social and biological characteristics change with increasing age (see Bernardi 1985:xiii, 172).

While many ethnographic accounts mention developmental stages, they have not been studied in regard to age structure or effect on census age estimates. Five similar "age categories" for males, beginning with "young boys," have been noted for the Barma of Chad (Reyna 1984:64–65), and four for each sex, beginning at about age 16, for the Kpelle of Liberia (Bledsoe 1980:122). The Gikuyu "use different words" for four stages of development preceding circumcision (Blacker 1967:126). Fortes described developmental stages for the Tallensi, culturally similar neighbors of the Kusasi (1949:187–201, 338). Neither the Tallensi (Fortes 1949:46, 337) nor the Kusasi have an age-class system.

Methods

This article is based on fieldwork carried out in northeast Ghana in the Kusasi village of Zorse, Bawku District, Upper Region, between October 1976 and March 1978. At that time Zorse consisted of 260 mud and thatch houses dispersed over an area of 18 km^2, situated between five and eleven kilometers from the district capital of Bawku town. I collected data by participant observation, informal and formal interviews, and several surveys in a 50% random sample of houses. The sample included 123 houses[2] containing 140 households (production/consumption units) and 1,031 residents in January 1977. By December 1977 there were 123 houses and 145 households with 989 residents.

I conducted a census of the Zorse sample which included questions on developmental stage, events at time of birth, and relationship to head of household. There were almost

no records of birth in the village. A few children had birth certificates written on a page from a school exercise book by an older sibling. About one-half of the young children had cards from the under-fives health clinic in Bawku town run by the local mission hospital. While many of these cards had dates of birth recorded, I found that they were usually quite inaccurate unless the first clinic visit occurred within a few months of birth. Otherwise the dates appear to have been faulty estimates made quickly by clinic staff.

Four quarterly surveys were conducted to assess changes in household composition and individual characteristics, child health, and anthropometry. Migration, marriage, and fertility histories of men and pregnancy histories of women were collected. I developed a 100-year calendar of locally recognizable events using information from the census and surveys, informal interviews in Zorse and elsewhere in Bawku District, and records in the National Archives in Accra. The calendar contained more than 50 locally recognizable events for the period 1900–76.

During the last six months of my stay in Zorse I used the local calendar and the data collected in the pregnancy history interview and the male vital rates history interview to adjust ages in the Zorse sample census. This cross-checking of information on ages through numerous follow-up interviews also increased the awareness and interest of the villagers in numerical ages. I feel that quite accurate ages were obtained, although the whole population was not ranked by relative ages. These are the ages reported in the Zorse sample census (cf. Dorjahn 1986:325).

The following analysis of the sample census that I conducted in Zorse is based on the de jure residential population for the year 1 January to 31 December 1977 (n = 1,134). This population was defined as all of those residing in Zorse for six months or more during the year, and those that had immigrated during the latter half of the year but had intended to live in Zorse for at least six months. Thus seasonal fluctuations due to short-term migration were eliminated as much as possible.

Kusasi Developmental Stages

The developmental stages used by the Kusasi are described in Table 1. People enter and leave these stages based on their biological and social state of development, which in turn is closely tied to the primary social values of production and reproduction.

Like most Kusasi, and many other people in the West African savanna, the people of Zorse make their living primarily from subsistence farming of sorghum and millet under increasingly difficult circumstances. The annual rainfall of 1,000 mm is highly variable in both space and time. Sheet and gully erosion are widespread, as is the deterioration of range vegetation and tree resources. People must be good managers and hard workers to survive.

Social development is strongly tied to male and female roles in crop production, animal husbandry, and food processing. Because of the labor intensity of agriculture, children are highly valued as additions to the household work force (cf. Weil 1986). Work done by young children, such as herding, child care, scaring birds from fields, washing pots, and fetching water and wood, frees adults for heavier tasks. In effect, marriage is trading of sisters and daughters for wives and daughters-in-law who can increase the labor strength of the lineage by bearing its children.

Age Structure of Developmental Stages

In Table 2 and Figure 1 the chronological ages from the census are compared for males and females in the seven Kusasi developmental stages. For the first two stages the ages are the same for both sexes. Beginning with stage 3, as social and biological differences become increasingly important, the average age for women becomes significantly lower than that for men. Women in stages 4 to 6 are seven to eight years younger than males in these stages. Since there was only one man in stage 7, no comparisons could be made.

Table 1
Kusasi developmental stages.

No.	Male	Female	Kusasi definition
1	*bilia;* pl., *bilias*		From birth until child is able to sit and crawl
2	*bibil;* pl., *bibibis* or *biig;* pl., *biis*		Spends most of time playing, but begins helping by carrying water, watching younger children, and herding animals
	buribimbil pl., *buribimbibis*	*bupumbil* pl., *bupumbibis*	
3	*buribing* pl., *buribis*	*bupung* pl., *bupumis*	Becomes important productive member of the household; males do heavy farm work; females fetch wood and water in medium-size pots, and wash dishes
4	*dasan* pl., *dasam*	*poasaddrr* pl., *poasada*	Becomes sexually mature, considered marriageable, courting begins; women develop breasts, experience menarche; circumcision of both sexes traditionally occurs during this stage; takes on full adult workload
5	*dao* pl., *dab*	*poa* pl., *poap*	Most people are married and recognized as adult members of the community; the reproductive years
6	*bunkudug* pl., *bunkuda*	*poyang* pl., *poyaas*	Workload and social responsibilities begin decreasing; a man's beard begins turning white; women have passed menopause
7	*bunkudyawaung* pl., *bunkudyawina*	*poyangkudug* pl., *poyankuda*	Very old people, becoming senile, engage in little productive activity

Table 2
Chronological ages for males and females in the Zorse census by developmental stage.

		Chronological ages								
		Male				Female				Prob.
Developmental stage	Sex ratio	*n*	Mean	Median	s.d.	*n*	Mean	Median	s.d.	2-tail *t* test
1	105.7	37	0.5	0.5	0.56	35	0.5	0.4	0.49	ns
2	114.9	139	5.1	4.8	2.69	121	4.7	4.8	2.49	ns
3	128.9	125	13.0	12.8	3.47	97	11.6	11.5	3.34	0.002
4	167.6	57	23.9	23.1	5.94	34	16.9	16.9	2.94	<0.001
5	75.6	130	39.4	38.5	10.84	172	31.4	30.6	9.61	<0.001
6	57.0	65	63.5	61.5	9.81	114	56.0	55.8	11.01	<0.001
7	20.0	1	87.0	87.0	na	5	69.4	66.0	9.40	na
Total	95.7	554	25.7	18.7	21.20	579[a]	27.1	23.6	20.79	

[a]Includes one female for whom developmental stage unknown.

Standard deviations are similar for both sexes except in stage 4, when it is much smaller for women. The sex ratio is also highest for this stage.

The primary criterion defining *dasam* and *poasada* is sexual maturity, which is much more clearly marked in women than in men because of menarche, which is accompanied by the appearance of pubic hair and breast buds. These signs are highly correlated with each other in terms of their appearance, and also with peak height velocity (Tanner

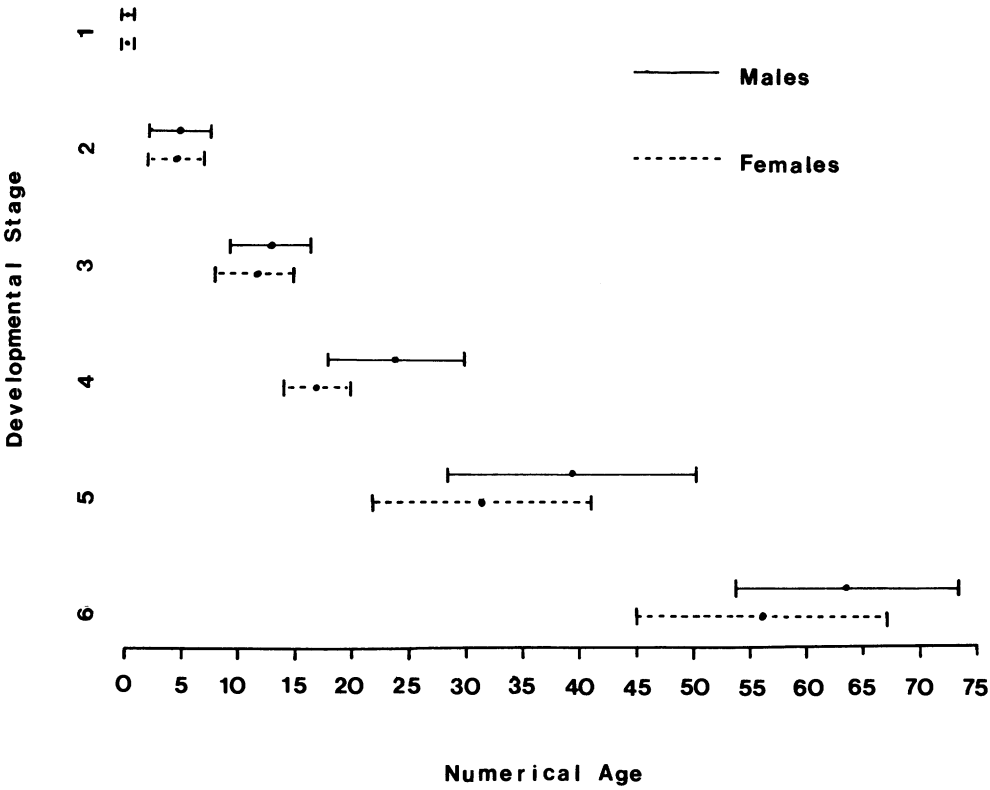

Figure 1
Age distribution (mean and standard deviation) of developmental stage age groups in the Zorse sample census.

1962:38). Women are married and begin giving birth soon after becoming sexually mature, and so enter stage 5. Thus the compactness of stage 4 for females reflects biological and social reality. The mean and standard deviation for numerical age of *poasada* is 16.9 ± 2.9. In comparison, mean age at first birth in the pregnancy history survey of women in the Zorse sample census was 18.0 (Cleveland 1986:283), while average age at menarche in African rural populations is typically 15 years or older (Leridon 1977:10).

Marriage marks entry into adulthood and stage 5. The earlier biological and social maturation of women is again reflected in their earlier ages at marriage as revealed by the Zorse sample census (Cleveland 1986:280–282). Marriage begins at age 10–14 for women, when 2.9% are married (in comparison, 12 is two standard deviations from the mean age of developmental stage 5). Men begin to marry at age 15–19, when 2.2% are married (in comparison, 18 is two standard deviations from the mean age of developmental stage 5). Most women (60%) are married by age 15–19, whereas this does not occur for men (66%) until age 25–29. By age 20–24 virtually all women have been married, whereas the proportion for men never married decreases gradually from 35% at age 25–29 to about 5% in ages 40–44 to 50–54.

One of a woman's most important roles in Kusasi society is as a producing and reproducing member of her husband's patrilineage. There is indeed a very clear relationship for the Kusasi between the four bridewealth cows given to the wife's father's lineage and the number of children she bears for her husband's lineage. This is especially clear in the case of divorce or death of the husband, when the husband's lineage may demand return

of bridewealth cows in accordance with the number of children the wife has borne. A deceased husband's lineage will attempt to maintain control over a younger widow's reproductive powers by attempting to remarry her to one of the lineage members. Her father will pressure her to quickly remarry so that he will not have to return any of the cows that were given to him as bridewealth.

As women pass menopause and become widowed they do not remarry. In contrast, older men quickly remarry and, when they can afford it, take a second and occasionally a third wife. This explains why women enter stage 6 sooner than men. The proportion of widowed and divorced women in the Zorse census increases steadily from 2.9% at age 30–34 to 15.8% at 50–54, then rises dramatically to 54.5% and then 84.6% for those 65 and older. The pattern for men is a small proportion of widowed and divorced beginning at age 30–34 and with only 9.7% for those 65 and older.

Population Structure: The Role of Developmental Stages and Other Factors

In this section I discuss the role that cultural concepts of social and biological development, embodied in Kusasi developmental stages, may play in distorting the population structure based on census data, using the Bawku District census. This is illustrated by comparison with the population structure for Zorse based on my sample census, in which the age estimation methods eliminated most bias due to developmental stages.

Figure 2 shows the distribution of the population by age and sex for Zorse, and for Bawku District based on the 1970 Ghana census. The great majority of Bawku residents are Kusasis, and this allows comparison of a population for which most age-estimate bias has been eliminated with one for which it is presumably present. A stable population for Ghana calculated by Gaisie is shown for reference.[3] Figure 3 shows the age-specific sex ratios for Zorse and for Bawku.

However, there are two other important sources of distortion, migration, and sampling error. Migration tends to remove people in the reproductive ages from the population, men more than women. Even though the deviations of the Zorse age distribution from the hypothetical smooth distribution are statistically significant,[4] sampling error no doubt adds to the deviation in ethnographic censuses like that of Zorse because of the small sample size, especially in older age groups with smaller numbers.

Developmental Stages

The Kusasi developmental stages, with earlier maturation of women and an emphasis on the transition to the adult activities and responsibilities of production and reproduction, could be a major factor underlying the systematically biased age estimates characteristic of African census data.

In comparison with the Ghana stable population, the Bawku population structure is typical of African population structures based on censuses, as described above, especially for younger age groups. For women there is a pronounced deficit in the adolescent years (10–14 to 15–29), when most are in the transitional Stage 4 *(poasadrr)*, and are therefore probably transferred to neighboring age groups in the process of age estimation (cf. Gaisie 1976:149; van de Walle 1968:49).[5] There is an excess in the preadolescent period (0–4 to 5–9) and even more in the reproductive period (20–24 to 35–39). The reproductive peak reflects the primary emphasis on the production and reproductive role of stage 5 *(poa)* (with mean age of 31). The pattern is similar for men, with the adolescent deficit period occurring when most are in stage 4 *(dasan)*, extended from 10–14 to 30–34. The reproductive period excess is much less pronounced.

The sex ratios for Bawku District follow an age pattern typical of African censuses. This reflects in part the earlier social maturation of women as shown in the significantly

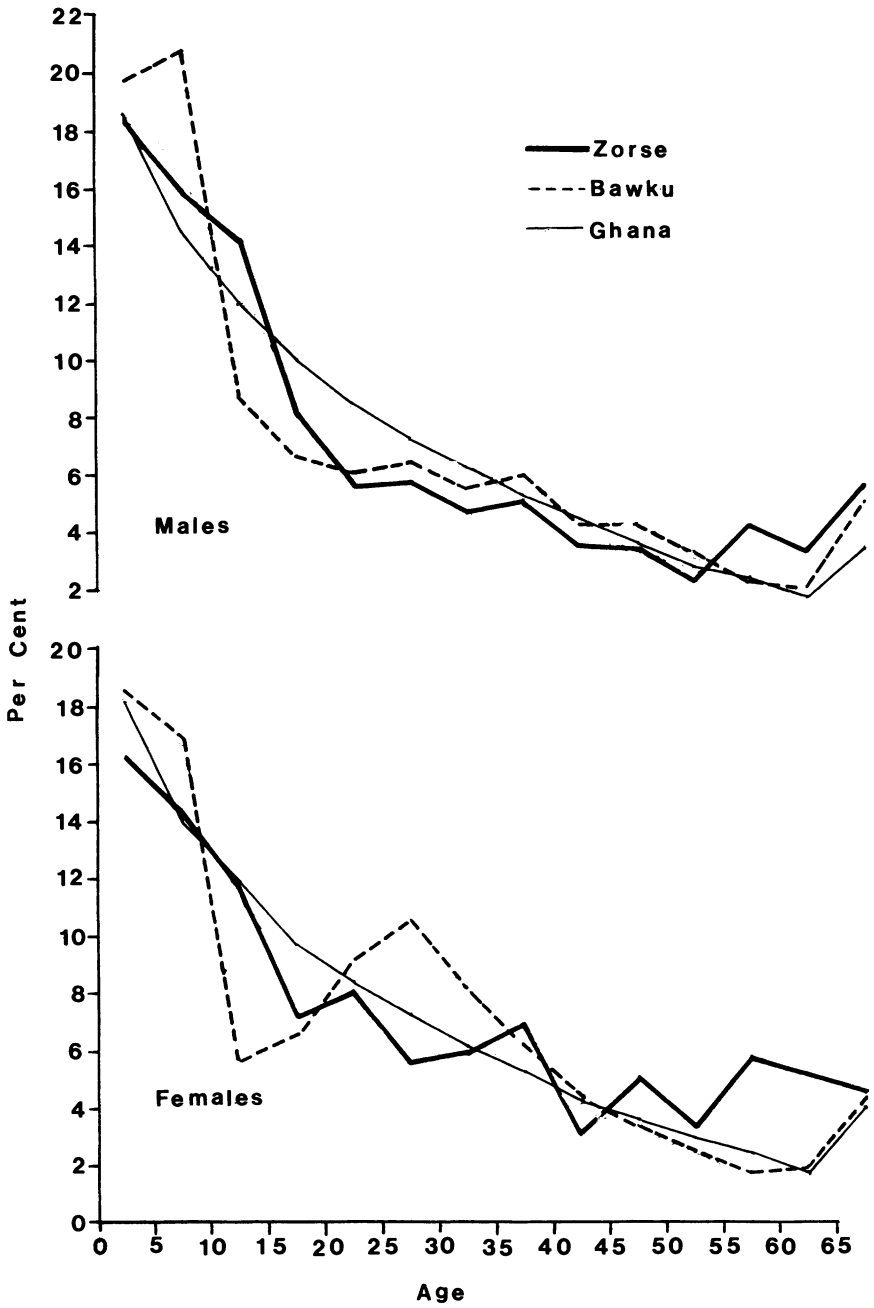

Figure 2
Age distribution for Zorse, Bawku District, and a Ghana stable population. (Data for Zorse from my sample census, for Bawku from calculations based on Ghana Census Office data [1975:82–85, 90]), and for Ghana from Gaisie [1976:147].)

lower mean ages for developmental stages 3 to 6. Under the assumption that age estimates are biased toward the average age of the developmental stage in which people are classified, the estimated census age for women in stages 3 to 6 would tend to be younger

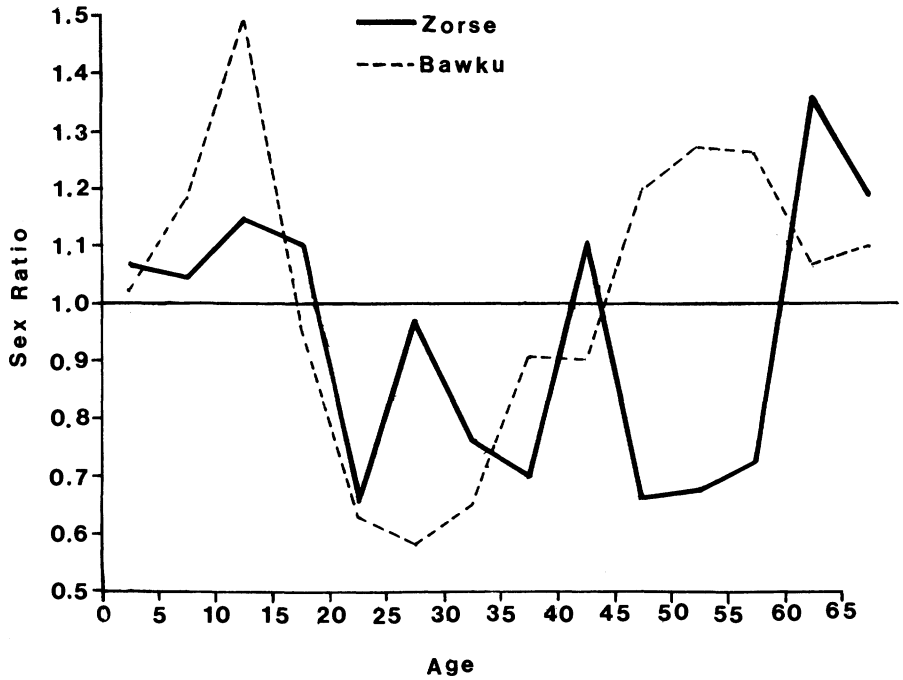

Figure 3
Sex ratios for Zorse and Bawku District (for sources see Figure 2).

than that for men of the same age in these stages because the mean age for the women's developmental stage is younger (cf. Gaisie 1976:19, 149; van de Walle 1968:48).[6] In fact this is what appears to be happening in the Zorse case.[7] Thus, on average men would tend to be shifted to older and women to younger ages, resulting in a relative deficit of men during the reproductive period, and an excess afterwards.

Age distribution of the Zorse sample census population is closer to the smooth distribution of the Ghana model stable population for younger age groups (0–4 to 15–19 for men and 5–9 to 30–34 for women). For males the sum of absolute differences for age groups 0–4 to 15–19 between Bawku and Ghana stable distributions is 14.0 points, compared with 5.6 for Zorse. For females, the differences for age groups 0–4 to 30–34 are 18.2 for Bawku and 7.1 for Zorse.

While some systematic age estimate bias undoubtedly remains in the Zorse sample census, it is probably less for those in younger age groups, because it was easier for their older relatives to remember events at the time of their birth. In addition, most mothers and their children were included in the pregnancy history survey, which served as an additional check on ages. Compared with Zorse, sex ratios in the prereproductive and reproductive age groups for Bawku show much more of the exaggeration typical of African census data.

Migration

There is currently a pattern of extensive labor migration, both seasonal and long term, from rural savanna West Africa to cities and coastal areas (Zachariah and Nair 1980). This migration began at the turn of the century with forced migration under French and British colonial rule.

Much of the deviation from a smooth age distribution in both the Zorse and Bawku populations is, in fact, probably due to the high rate of long-term migration, especially

for males (Cleveland 1989). Compared with the smooth age distribution of the stable population, the proportion of men in the Zorse sample census is less from age 15–19 to 45–49. Household heads in the Zorse census reported a total of 144 sons, brothers, and brothers' sons not living in Zorse in 1977, or 50% of the male population over 15 years of age in 1977. Data from the Zorse pregnancy history on current residence of offspring alive in 1977 show a similar age distribution of emigration. Between the ages of 15–19 and 44–49, 46% of men and 11% of women are resident outside of the Upper Region.[8] Thus, migration would tend to produce the low proportions and low sex ratios in the Zorse population in the reproductive years, followed by high proportions.

The effect of migration on the Bawku population structure can be extrapolated from census data for the Upper Region (which includes Bawku).[9] Data from the 1970 Ghana census at the regional level show region of birth for all those enumerated, from which one can infer migration. For the age groups 15–19 to 44–49, 30–48% of men born in the Upper Region are shown as residing in other regions, compared with 23–25% of the women (calculated from Ghana Census Office 1975:106–110). Since migration begins at the end of adolescence (15–19) and continues through the reproductive period, it would tend to reinforce the effect of developmental stages at their earlier ages, and reduce it at later ages.

Conclusion

It is important for those collecting and using African age data to be aware of the artifacts that can be introduced by age estimate biases. The analysis of Kusasi developmental stages presented in this article provides evidence for systematic biases underlying the misreporting of numerical age in Africa. When a village population structure based on age estimations made from an in-depth study is compared to that of the census for the district in which the village is located, a decrease in skewing of age distribution is seen. This indicates a reduction in biasing of estimates based on developmental stages. Thus, while this analysis does not clearly establish a causal role for developmental stage age groups, it does provide strong circumstantial evidence of their influence. Much of the deviation from the age structure of the Zorse sample census found in the Bawku census data can probably be attributed to systematic errors made by census enumerators and respondents under the influence of the local concepts of developmental stage age groups.

This provides support for the use of stable model techniques to adjust age data not collected with careful attention to eliminating age estimate bias. This approach can produce valuable information on basic demographic parameters which can be compared with those of other populations. The application of such demographic techniques to ethnographic data has been extremely powerful and productive in recent years (Howell 1986).

However, the purpose of adjusting census age distributions is "to produce an age distribution that is not necessarily smoother than the original, but which is arguably closer to the true distribution than the original; and . . . the argument to this effect is as important as the resultant distribution" (Feeney 1980:14). In the case of in-depth ethnographic censuses where ages are quite accurately estimated, adjusting the age distribution using conventional demographic techniques may lead to "using preconception to explain away fact" (Feeney 1975:20–21, 42).

The age/sex structures of West African savanna populations based on census data are likely to contain deviations from a smooth distribution because of systematic age estimate bias, migration, and, for ethnographic censuses, sampling error due to small numbers. An assumption that deviations from a smooth distribution are primarily the result of age estimate bias must be supported by evidence that migration during reproductive years is not significant. On the other hand, inferring migration from the shape of the distribution requires independent evidence of migration and/or well-documented methods of elimi-

nating systematic bias in age estimates. In-depth ethnographic sample censuses, where attention is paid to accurate age estimation, may have the potential to play an important role in unraveling the complexities of African population structures.

Notes

Acknowledgments. Many people played an important part in this article, first and foremost the people of Zorse and Bawku District, to whom it is dedicated. I would like to thank the Zorse Naba, who welcomed me and supported my work in his village; Mbod Awindago and his family, who took me into their home; and my field assistants, especially John Anyagre Mbod, my senior field assistant. I thank Daniela Soleri, W. Penn Handwerker, Robert M. Netting, and two anonymous reviewers for many valuable comments on drafts of this article, but am fully responsible for its contents. Field research in Ghana was supported through a 211d grant to the University of Arizona from the U.S. Agency for International Development.

[1]Quasi-stable models assume a sustained decline in mortality, and thus a growing population (Shryock and Siegel 1975:826).

[2]The seven Fulani houses in Zorse were eliminated from the base population, leaving 253. The 50% random sample was thus 127, which was reduced to 123 because 4 houses chose not to participate in the study.

[3]Gaisie's model is for the 1960 Ghana population, and is actually of a quasi-stable population, since he included a declining mortality rate, based on evidence for a decline beginning in the early 1940s. Ethnic groups that were "predominantly of foreign origin" were also removed (Gaisie 1976:145). My purpose in including this stable population age distribution is not to provide the basis for a detailed comparison, but to detect major deviations from a smooth distribution.

[4]A chi-square goodness of fit test with 13 degrees of freedom is significant at the 0.01 level for both females and males.

[5]Gaisie states, "It is most probable therefore that the criteria used (bodily developments, marital status, parity of the girl, etc.) in estimating the ages of teenage girls led to transfers across the age boundaries in both directions" (1976:149); and van de Walle, "Estimation of age by reference to an assumed 'normal' age at marriage" may " 'evacuate' the age interval at which the normal age at marriage is assumed to occur. Unmarried girls may be assigned to a younger interval, and married girls to an older" (1968:49).

[6]Gaisie states, "The pattern of displacements among the central age groups indicates that there is a tendency among females to systematically understate their ages" (1976:149).

[7]A crude test of the effects of Kusasi developmental stages under this assumption involves calculating a developmental stage age (DSA) for each five-year age group by multiplying the number in each developmental stage in each age group by the average age for that developmental stage, summing the results, and dividing by the total number of people in that age group. The results show that up to age 15–19 for females and 20–24 for males, the DSA falls within the census age group. For males 25–29 to 30–34 it is greater than the census age group, and from 45–49 to 60–64 it is less than the census age group. Males would therefore tend to be pushed toward the 35–39 to 40–44 age groups from either side. For females the pattern is similar, but occurs earlier, with the DSA greater than the numerical age from 20–24 to 25–29, and less than numerical age beginning at age 40–44. Thus females would tend to be pushed toward the 30–34 to 35–39 age groups from either side.

[8]Most women who leave move to other areas of Bawku District with their husbands and are replaced by incoming wives of Zorse men.

[9]Available census data do not provide birth place at the District level. The distributions by age and sex of the Bawku and Upper Region populations in the 1970 census, however, are almost identical.

References Cited

Bernardi, Bernardo
1985 Age Class Systems: Social Institutions and Polities Based on Age. Cambridge: Cambridge University Press.

Blacker, J. G. C.
1967 Use of Sample Surveys to Obtain Data on Age Structure of the Population where Respondents in a Regular Census Enumeration Cannot Give Accurate Data: Some Kenya Experiments. *In* Proceedings of the World Population Conference. Vol. III: Selected Papers and Summaries. Projections, Measurement of Population Trends. New York: United Nations.

Bledsoe, Caroline H.
1980 Women and Marriage in Kpelle Society. Stanford: Stanford University Press.
Byerlee, D., and G. Terera
1981 Factors Affecting Reliability in Age Estimation in Rural West Africa: A Statistical Approach. Population Studies 35:455–465.
Caldwell, John C.
1966 Study of Age Misstatement Among Young Children in Ghana. Demography 3:477–490.
Caldwell, John C., and A. A. Igun
1971 An Experiment With Census-Type Age Enumeration in Nigeria. Population Studies 25:287–302.
Cleveland, David A.
1986 The Political Economy of Fertility Regulation: The Kusasi of Savanna West Africa (Ghana). *In* Culture and Reproduction: An Anthropological Critique of Demographic Transition Theory. W. P. Handwerker, ed. Pp. 263–293. Boulder, CO: Westview.
1989 Migration in Northeast Ghana: A Village Perspective. Unpublished ms.
Dorjahn, Vernon R.
1986 Temne Fertility: Rural Continuity, Urban Change, Rural-Urban Difference, and Public Policy Problems. *In* Culture and Reproduction: An Anthropological Critique of Demographic Transition Theory. W. P. Handwerker, ed. Pp. 321–349. Boulder, CO: Westview.
Evans-Pritchard, E. E.
1940 The Nuer. New York: Oxford University Press.
Ewbank, Douglas
1981 Age Misreporting and Age-Selective Underenumeration: Sources, Patterns, and Consequences for Demographic Analysis. National Research Council, Committee on Population and Demography, Report No. 4. Washington: National Academy Press.
Fenney, Griffith
1975 Demographic Concepts and Techniques for the Study of Small Populations. *In* Pacific Atoll Populations. Vern Carroll, ed. Pp. 20–63. Honolulu: University Press of Hawaii.
1980 Griffith Feeney Responds to Malaker's Letter. Asia and Pacific Census Forum 7(2):14.
Fortes, Meyer
1949 The Web of Kinship Among the Tallensi. London: Oxford University Press.
Gaisie, S. K.
1976 Estimating Ghanaian Fertility, Mortality, and Age Structure. University of Ghana Populations Studies, No. 5. Legon, Ghana: The Population Dynamics Program, University of Ghana.
Ghana Census Office
1975 Demographic Characteristics of Local Authorities, Region and Total Country. 1970 Population Census of Ghana, Vol. 3. Accra: Ministry of Information on Behalf of the Central Bureau of Statistics.
Howell, Nancy
1979 Demography of the Dobe !Kung. New York: Academic Press.
1986 Demographic Anthropology. Annual Review of Anthropology 15:219–246.
Kenyatta, Jomo
1938 Facing Mount Kenya: The Tribal Life of the Gikuyu. London: Secker & Warburg.
Langaney, André, Sophie Dallier, and Gilles Pison
1979 Démographie sans État Civil: Structure par Age des Mandenka du Niokholo. Population 34(4–5):909–915.
Leridon, Henri
1977 Human Fertility: The Basic Components. Chicago: University of Chicago Press.
Nolan, Riall W.
1986 Bassari Migrations: The Quiet Revolution. Boulder, CO: Westview Press.
Pison, Gilles
1982 Dynamique d'une Population Traditionnelle: Les Peul Bandé (Sénégal Oriental). Institut National d'Études Démographiques, Travaux et Documents, Cahier no. 99. Paris: Presses Universitaires de France.
Reyna, Stephen P.
1984 Barma Bridewealth: Socialization and the Reproduction of Labour in a Domestic African Economy. Africa 54:59–72, 88.

Sembajwe, Israel S. L.
1980 Education and Accuracy of Age Reporting Among Yoruba Females in Western Nigeria. Social Biology 27:94–303.
Shryock, Henry S., and Jacob S. Siegel
1975 The Methods and Materials of Demography. Washington: United States Government Printing Office for the Bureau of the Census.
Stewart, Frank H.
1977 Fundamentals of Age-Group Systems. New York: Academic Press.
Tanner, J. M.
1962 Growth at Adolescence. 2nd edition. Oxford: Blackwell.
van de Walle, Etienne
1968 Characteristics of African Demographic Data. *In* The Demography of Tropical Africa. W. I. Brass et al., eds. Pp. 12–87. Princeton: Princeton University Press.
Weil, Peter
1986 Agricultural Intensification and Fertility in The Gambia (West Africa). *In* Culture and Reproduction: An Anthropological Critique of Demographic Transition Theory. W. P. Handwerker, ed. Pp. 294–320. Boulder, CO: Westview.
Zachariah, K. C., and N. K. Nair (preparers)
1980 Demographic Aspects of Migration in West Africa. 2 vols. Washington: World Bank.