Polygyny as a Risk Factor for Child Mortality among the Dogon

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Polygyny was allowed in 83% of preindustrial societies in Murdock's (1967) Ethnographic Atlas [N = 849], evidence on sexual dimorphism suggests that polygyny was also the prevailing mating system over human evolutionary history (Alexander et al. 1979). In a classic book, the economist Gary Becker (1981) presents a theoretical model in which he explains the widespread occurrence of polygyny in terms of benefits for women. In essence, he agrees with George Bernard Shaw, who wrote, "The maternal instinct leads a woman to prefer a tenth share in a first-rate man to the exclusive possession of a third-rate one." Becker's view is similar to the polygyny-threshold model (Verner and Willson 1966, Orians 1969) developed for passerine birds and extended to humans (Borgerhoff Mulder 1988, 1990, Josephson 1993). In brief, the polygyny-threshold model proposes that "since polygyny must always be advantageous to males, its presence or absence must depend primarily upon the advantages or disadvantages to females" (Orians 1969). Becker's hypothesis and the polygyny-threshold model view polygyny as the outcome of female choice, but I shall argue that female choice is inadequate to account for the maintenance of polygyny among the Dogon of Mali.

An alternative to the female-choice model emphasizes conflicts of interest between members of the two sexes over the optimum mating system (Downhower and Armitage 1977, Irons 1983, Davies 1989, Chisholm and Burbank 1991). In humans, the conflict arises because males may benefit reproductively from concurrent marriages to multiple wives even if the result is lower average fitness for each wife. Thus, to the extent that male strategies win over female strategies in any given society, polygynous marriages may entail a cost to female fitness. Females may experience the cost of polygyny through a reduction in fertility or an increase in child mortality. Testing for an adverse effect of polygyny on the reproductive success of females was a pri-
mary a priori objective of 31 months of fieldwork among the Dogon initiated in 1986 and currently ongoing.

Demographers have examined the hypothesis that polygyny reduces female fertility, but their findings have often been equivocal and have failed to illuminate the underlying mechanisms (e.g., Dorjahn 1958; for review see Wood 1993). In view of the considerable interest generated by the possible link between polygyny and fertility, it is curious that the hypothesis that child mortality is higher under polygyny has drawn little attention. The few studies that have addressed this possibility (Chojnacka 1980; Roth and Kurup 1988; Isaac and Feinberg 1982; Borgerhoff Mulder 1989, 1990; Chisholm and Burbank 1991) have relied on retrospective data and have not controlled for other risk factors for mortality. By contrast with these studies, the data in this report constitute a prospective, longitudinal test of the polygyny-mortality hypothesis. Through logistic regression analysis (Hosmer and Lemeshow 1989), other significant predictors of mortality, including age, sex, wealth, nutrition, and family size, were controlled.

ETHNOGRAPHIC BACKGROUND

The Dogon live in the Malian Sahel in a landscape dominated by a 260-km sandstone cliff called the Bandiagara Escarpment. The study village, Sanguir, is situated on the plateau of the escarpment at 13° 29' N, 3° 19' W, and had a population of 460 in January 1988. At that time, 5.4% of the married men in the study village had one wife, 35% had two wives, and 11% had three wives. First wives enjoy the minor honor of having a sleeping room to the right of the husband's and other tokens of esteem but no material advantages. Polygyny is strictly nonporal, and wives are either ya biru (arranged) or ya kezu (taken from another man). Ideally they do not reside with the ige biru (arranged husband) until the birth of two children, who will be raised by their maternal grandparents. As a young girl matures, her fiancé presents minor gifts to his future parents-in-law including small amounts of cash, firewood, cowries, chickens, and grain. He also owes limited assistance in the fields, but there is no bride-price.

The Dogon are an appropriate population in which to test for an adverse effect of polygyny on female fitness because the interests of women are subordinated to those of men in several important respects. For example, through patrilineal descent and patrilocal residence, groups of related males form powerful coalitions (Smuts 1985, Hrdy 1996). Related women are not allowed to marry into the same patrilineage, which makes alliances among female kin difficult to maintain. Behavioral scans also provide evidence for male dominance: women spent 21% more time working than men (t = 5.10, d.f. = 127; p = 0.0001), and men spent 29% more time resting than women (t = 7.71; d.f. = 127; p = 0.0001) (Strassmann 1996). Although women assume the energetic demands of lactation and heavy physical labor, their diet is largely restricted to the sta-

1. © 1997 by The Wenner-Gren Foundation for Anthropological Research. All rights reserved 0011-3204/97/3804-0010$1.00. I thank Akeme Dolo and the Dogon of Sanguir for their generous hospitality. K. Sanogo for authorization to conduct this study, S. Moulin and T. Stevenson for participation in the fieldwork, S. Stocum for logistical help, B. Gillespie for statistical advice, K. Hunley for assistance with the preliminary analyses, and P. Cowaty, B. Hewlett, K. Hill, and S. Hrdy for helpful comments. This research was supported by the University of Michigan, the L. S. B. Leakey Foundation, and the National Science Foundation (BNS-8612291).
ple crop, millet, and men have almost exclusive access to meat [Strassmann 1996]. Animism, the traditional religion, is a powerful vehicle through which Dogon males attempt to assert control over female sexuality. For example, threats of supernatural punishment associated with animism, as well as social reprisals, help husbands and patrilineages to enforce the menstrual taboos. These prohibitions require menstruating women to advertise their menses (and presumed fertile period) by visiting a menstrual hut. Although all female informants \(N = 113\) viewed the menstrual taboos as restrictive and unpleasant, hormonal data revealed excellent compliance [Strassmann 1992, 1996]. Females are also clitoridectomized, which is intended to promote paternity certainty by reducing female sexual pleasure.

The greatest burden on Dogon women, however, is child mortality. In the study village, the mean number of live births for postreproductive women was 8.6, but 20% of children died in their first year of life and 46% died by age five \(N = 388\) [Strassmann 1992]. Impure drinking water, low levels of vaccination, and other manifestations of poverty contribute to the mortality toll by increasing exposure and lowering resistance to the three major endemic killers: malaria, measles, and diarrhea [Fabre-Test 1985].

**METHODS**

The study population included all children \(N = 205\) aged \(\leq 10\) years who were resident in the study village between 1986 and 1988. These children were individually known to me because I resided in the village for 10 months during the same years. The village was recensused in 1994 to determine which children had survived the intervening six-year period. Twenty children had left the village and were lost to follow-up, and 9 children lived with widowed grandmothers in domestic units that did not include any married adults. After excluding these 29 children, the effect of polygyny was tested on a final sample of 176 children, 86% of the total population aged \(\leq 10\) at the outset of the study. Data on age at death between 1988 and 1994 were not available; therefore I coded the dependent variable dichotomously [0 if the child was still alive in 1994 and 1 if he or she had died]. Since the dependent variable was dichotomous, I used logistic regression instead of survival analysis. All logistic regressions were performed in the statistical program SPSS 6.1 [SPSS 1994].

Any independent variable that improved overall model fit based on the likelihood ratio test [Hosmer and Lemeshow 1989] was included in the final models. To test whether the logit had a quadratic rather than a linear relationship with any of the continuous variables, I added squared terms. If a squared term did not improve model fit based on the likelihood ratio test it was omitted. The values for the independent variables were obtained from a combination of direct observation [e.g., child’s sex], private interviews [e.g., parent’s education], and quantitative measurement [e.g., economic rank]. To compare the economic resources [land, grain, onions, and livestock] of all families, the 340 cereal fields and 422 onion fields belonging to the people of Sangui were measured with a compass and meter tape, baskets of grain and onions were counted and weighed, and livestock were tallied by species, maturity [juvenile versus adult], and sex, as described in Strassmann [1990]. Year-to-year fluctuations in the wealth of the village from 1986 to 1994 occurred in response to changes in rainfall and market forces but had a negligible impact on the relative wealth of the families, which I expressed as a rank from 1 [lowest] to 59 [highest]. The 14 poorest families were headed by widowed grandmothers and did not contain any married adults. Since this study was about polygyny versus monogamy, no children from these groups were included in the sample of 176 children.

Polygyny, the independent variable of key interest, was defined first by the mother’s marital status: first, second, third, or sole wife. This definition excluded from the analysis 46 children whose mothers were widowed, engaged, divorced, or deceased, reducing the sample size to 130. Second, I computed polygyny as the ratio of married women to married men in the child’s work-eat group, defined as the people who cultivate the same millet fields and assemble in one compound to eat together. Members of a work-eat group defer to the same head of the family and depend on one another economically. Married women cultivate millet alongside the other members of their work-eat group [both male and female] and do not plant their own individual millet fields. The sample size for polygyny of the work-eat group was 176 children and the mean ± S.D. work-eat group size was 15.60 ± 10.64, with a range of 3–41. Work-eat groups do not correspond to households: if a work-eat group contains several married men, their families sleep in different compounds. Cowives and their children also sometimes have separate compounds.

**RESULTS AND DISCUSSION**

Univariate results revealed strikingly lower survivorship among the children whose mothers were polygynously married \(x^2 = 9.57, d.f. = 2, p = 0.008; N = 130\), particularly if the mothers were first wives. When the ratio of married women to married men in the child’s work-eat group was plotted against the number of children who lived or died, a step function was obtained with high survivorship below and low survivorship above 1.5 [fig. 1]. Specifically, a total of 37 children died and 81 children survived in the groups with a ratio of married women to married men of \(\geq 1.5\) [hereafter defined as polygynous], while only 3 children died and 55 children survived in the groups with a ratio of \(< 1.5\) [hereafter defined as monogamous] \(x^2 = 15.18, d.f. = 1, p = 0.0001\). Because the relationship between polygyny of the work-eat group and child mortality was a step function, I modeled work-eat group polygyny as a categorical variable. Whether I used the polygyny index of the work-eat group for 1988 or for 1994 had no effect on
sex of the child (0 = female, 1 = male), and the economic rank of the child's work-eat group (15–59). In addition, model 1 contains the number of children (aged ≤10 years) in the child's work-eat group, whereas model 2 contains the dependency ratio, number of children (aged ≤10 years) per married adults in the work-eat group. Because these two variables were correlated (r = 0.33; p = 0.005), it was useful to consider them in separate models. In both models, work-eat group polygyny was the single strongest predictor of child mortality in terms of effect size. In model 1, the odds of death were 7 times higher in the polygynous groups than in the monogamous groups (p = 0.005). In model 2, the odds of death were 11 times higher under polygyny (p = 0.001). These effect sizes could reflect my choice of a married women-to-married men ratio of 1.5 as the cut point between monogamy and polygyny. This cut point was based on the data in figure 1. I could not find any variable that, if added to either model, caused the polygyny variable to become nonsignificant.

No interaction terms were significant when added to either model [p > 0.15] except sex and age, which was marginally significant based on the likelihood ratio test (model 1: p = 0.05; model 2: p = 0.06). For a one-year increase in age in model 1, the odds of death for girls decreased by a factor of 0.84 (95% confidence interval: 0.64–1.10) and the odds of death for boys decreased by a factor of 0.56 (95% confidence interval: 0.41–0.75). In model 2 the results were virtually identical (odds ratio for girls = 0.83; odds ratio for boys = 0.56). Including the age-sex interaction in the model increased the sig-

![Percentage of children who died and polygyny index of the work-eat group. Numbers above bars indicate sample sizes. N_total = 176.](image)

The conclusions. The results reported in this paper are for the average index in these two years.

The two best-fitting final models are shown in table 1 [N = 176]. Both models contain the polygyny index of the work-eat group (0 = monogamous, 1 = polygynous), age of the child at the outset of the study (0–10 years),

| TABLE 1 |
| Predictors of Child Mortality from 1986 to 1994 (N = 176) |

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio</td>
<td>95% Confidence Interval</td>
</tr>
<tr>
<td>Polygyny status of the work-eat group</td>
<td>7.32****</td>
<td>1.82–29.42</td>
</tr>
<tr>
<td>[0 = monogamous, 1 = polygynous]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of child [0–10]</td>
<td>0.66*****</td>
<td>0.55–0.81</td>
</tr>
<tr>
<td>Sex of child [0 = female, 1 = male]</td>
<td>3.53*</td>
<td>1.02–6.39</td>
</tr>
<tr>
<td>Number of children in family [1–19]</td>
<td>1.35***</td>
<td>1.08–1.44</td>
</tr>
<tr>
<td>Number of children per married adults [0.33–2.33]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic rank [14–59]</td>
<td>0.43*</td>
<td>0.22–0.85</td>
</tr>
<tr>
<td>Economic rank squared</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Monogamous, ratio of married women to married men <1.5; polygynous, ratio of married women to married men ≥1.5.

**Odds ratio for an increase of 1 year in age.

*Odds ratio for each additional child.

**Odds ratio for an increase of 10 ranks.

*p ≤ 0.05.

**p < 0.01.

***p ≤ 0.005.

****p < 0.0001.

−2 log likelihood: 135.1 (model 1) and 132.8 (model 2)

Goodness-of-fit statistic: 173.9 (model 1) and 148.6 (model 2)
nificance of all the other independent variables including polygyny. Moreover, the odds ratio for polygyny increased to 8.7 (model 1) and 13.8 (model 2).

To assess the goodness of fit of the final models, I compared the observed and predicted outcomes [lived or died] for each child. In model 1, 81.8% of all children were correctly predicted, and in model 2, 79.2% were correctly predicted. Plot of the squared standardized residuals against the predicted probabilities of death also indicated good model fit. In both models, only 4 of the 176 children had squared standardized residuals greater than 4, indicating that they were not well predicted by the model [see Hosmer and Lemeshow 1989:162–63]. All 4 were children from polygynous families who had high predicted probabilities of survival due to variables other than polygyny. Consistent with the polygyny-mortality hypothesis, these 4 children actually died. The leverage statistics for models 1 and 2 indicated that no observations had undue influence on model fit.

Several variables were tested for an effect on survivorship and found to be nonsignificant \( p > 0.05 \). One of these was age of the father or mother. Neither the number of married men nor the number of married women in the work-eat group was significant, only the ratio of the two. Children who had more paternal siblings were not at greater risk of death; what mattered was the total number of children in the work-eat group. This result may reflect competition among children or increased exposure to infectious diseases such as measles and gastroenteritis [Aaby et al. 1984, Desai 1995]. Surprisingly, child mortality was not predicted by whether or not the father or mother was resident in the village. Nonresident fathers included young men from other villages who had fiancées and children in Sangui, deceased fathers, and fathers who had left temporarily to work in the city. Children whose fathers were not resident lived with relatives: usually mothers, grandparents, or paternal uncles. If the mother was deceased or had divorced and left the village, the child lived with the father or grandparents. A total of 144 of the 176 children in the study had both parents resident in the village. The fact that residence of the parents did not predict survivorship speaks to the strength of the extended family. Whereas the women had no schooling, some of the men had a few years of primary school education, but father’s education did not predict child mortality. Many of the men had previously worked in the city for a year or two, but these experiences also did not predict mortality.

In some cases a child’s parents were in a monogamous union but other adults in the work-eat group werepolygynously married (or vice versa). This raised the question whether mother’s marital status or the polygyny index for the work-eat group as a whole was more important for survivorship. To address this question, I compared alternative multivariate models that differed only with respect to the pologygyny variable (either mother’s marital status or work-eat group polGYGNY). In these models work-eat group polGYGNY was more predictive of mortality than mother’s marital status. Specifically, after controlling for the other predictors of mortality in model 2, the odds of death for the children of polygynously married women were 3.6 times higher than for the children of sole wives, but this result was not significant \( p = 0.10, N = 130 \). When work-eat group polGYGNY was substituted for mother’s marital status, the odds of death were 9.8 times higher under polGYGNY \( p = 0.003, N = 130 \). Moreover, the model with work-eat group polGYGNY had a smaller \( -2 \log \)-likelihood statistic \( 101.3 \) versus \( 109.9 \), indicating better model fit. To confirm the conclusion that work-eat group polGYGNY is critical, I deleted from the sample the children for whom mother’s marital status and work-eat group polGYGNY differed. As expected, the results for the remaining children were significant and identical for both mother’s marital status and work-eat group polGYGNY (odds ratio = 16.18; \( p = 0.009; N = 111 \)).

The comparison of mother’s marital status and work-eat group polGYGNY is of particular interest because it shows the importance of family structure. When members of a patrilineal extended family are economically interdependent, children are affected by the polgygny status of their own parents as well as the polgygny status of their paternal relatives.

Resource dilution. To explain why child mortality was dramatically higher in polgygnyous work-eat groups after controlling for confounding variables, I tested the a priori hypothesis that polgygnyous groups were wealthier in terms of total resources but poorer on a per capita basis [see Chojacka 1980, Brabin 1984, Oyedeji 1984, Hames 1996]. I found a positive correlation between the wealth rank of the group and the ratio of married females to married males \( r^2 = 0.28, N = 45, p = 0.0001 \) \( \text{[fig. 2, left]} \). Work-eat groups with \( \geq 1.5 \) females per males farmed more land \( p = 0.001 \) and produced more grain \( p = 0.009 \) and more onions \( p = 0.002 \) than did families with \( < 1.5 \) females per males \( \text{[fig. 2, right]} \).

Next I standardized the wealth of each family by its daily energy requirements. I computed the energy requirements of each family from the number of individual members, adjusted for age and sex, using guidelines of the FAO/WHO [1973]. The standardized wealth of polgygnyous groups was still slightly higher than that of monogamous groups \( r^2 = 0.09; N = 45, p = 0.03 \) \[fig. 3, left\] because polgygnyous groups had more revenues from onions \( p = 0.01 \) \[fig. 3, right\]. On other measures of wealth, polgygnyous and monogamous families were comparable. These data contradict the hypothesis that the dilution of wealth accounts for the high mortality of children in polgygnyous families. The dependency ratio provides another estimate of the parental resources \[e.g., wealth, time\] available to children. As this variable increased by one additional child, the odds of death increased by a factor of \( 2.9 (p = 0.02) \). However, as

1. In the comparison, I used the sample of 110 children for whom data were available on both mother’s marital status and work-eat group polGYGNY. The 46 children who did not live with married mothers (see above) were omitted from both analyses to ensure that the statistical power of the two analyses was the same.
shown by model 2, mortality was much higher under polygyny even after controlling for the dependency ratio (table 1).

To find out whether children in polygynous families were less well nourished, I used cross-sectional anthropometric data on 77 children aged 6 years or younger in 1988. In particular, I compared their observed and expected values for weight/height. The expected weight/height for each girl or boy was obtained from quadratic regressions of weight/height against age. These equations are as follows: weight/height_{Dagga phys} = 9.17 + Age_{1.53} + Age^2_{-0.10} [r^2 = 0.74; N = 34; p < 0.0001]; and weight/height_{Dagga boul} = 9.47 + Age_{1.98} + Age^2_{-0.16} [r^2 = 0.71; N = 43; p < 0.0001]. If the children in the polygynous families were leaner than those in the monogamous families, then they should have tended toward negative residuals (observed weight/height < expected weight/height) while the children in monoga-

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**Fig. 2.** Left, regression of the wealth rank of the work-eat group on the polygyny index (number of married women/number of married men) of the work-eat group. N = 44. Groups in which an elderly widow or widower worked alone or with a grandchild are excluded. Right, mean wealth (CFA or, for land, ha) of polygynous (<1.5 married women/married men) and monogamous (>1.5 married women/married men) work-eat groups. Error bars are 95% confidence limits. [□, livestock (p = 0.222); ■, onions (p = 0.002); ○, grain (p = 0.009); ●, land (p = 0.001); ◼, commerce (p = 0.148). In 1987, 310 CFA = $US1.**

**Fig. 3.** Left, regression of work-eat group wealth (CFA)/energy requirements (MJ) on the polygyny index. N = 45. Right, mean wealth (CFA or ha)/energy requirements (MJ) of polygynous and monogamous work-eat groups. Error bars are 95% confidence limits. [□, livestock (p = 0.967); ■, onions (p = 0.012); ○, grain (p = 0.567); ●, land (p = 0.314); ◼, commerce (p = 0.793).**
mous families should have tended toward positive residuals (observed weight/height > expected weight/height). As shown in figure 4, there was a very weak tendency in the predicted direction that was not quite significant ($r^2 = 0.04; N = 74; p = 0.07$). Controlling for this weak relationship had no effect on the coefficient for polygyny in the subset of observations ($N = 74$) for which weight for height measurements were available. These results indicate that the mechanism causing low child survivorship in polygynous families was probably not nutritional.

**Cowife competition.** The indigenous Dogon explanation is that poor survivorship under polygyny reflects competition among cowives. Cowives are not related, and the rivalry among them extends to their sons, who, upon the death of their father, almost invariably stop farming together. In addition to accusations of neglect and mistreatment, it was widely assumed that cowives often fatally poisoned each other’s children. I witnessed special masked dance rituals intended by husbands to deter this behavior. Cowife aggression is extensively documented in Malian court cases with confessions and convictions for poisoning. These cases raise the possibility that Dogon sorcery might have a measurable demographic impact—a view that is consistent with the extraordinarily high mortality of males compared with females. Males are said to be the preferred targets because daughters marry out of the patrilineage whereas sons remain to compete for land. Even if women do not poison each other’s children, widespread belief in the hostility of the mother’s cowive must be a source of stress. Stressful family environments, including residence with a stepfather and half-siblings, have been shown to affect childhood cortisol levels and can lead to immunosuppression and a high frequency of illness [Flinn and England 1995]. In the United States, the risk of fatal abuse is approximately 100 times greater for stepchildren than children living with two genetic parents [Daly and Wilson 1988:89]. However, regardless of whether or not female-female competition results in neglect, immunosuppression, or poisoning, the focus on cowives alone is too narrow. If cowives adversely affect each other’s offspring, one would not expect work-eat group polygyny to be a better predictor of survivorship than mother’s marital status.

**Paternal investment.** An alternative hypothesis is that the children in polygynous families are the victims of lower paternal investment. The monogamous fathers have a greater stake in the survival of each of their children. The polygynous fathers eventually produce a greater number of offspring, so each child is less important for the father’s total lifetime reproductive success. Controlling for age, polygynists (aged 24–69) had on average two more living offspring for each additional wife ($r^2 = 0.25; N = 70; p = 0.0001$).

What aspect of paternal care is crucial for survivorship but lacking in the polygynous families? Behavioral scan data show that the men in both the polygynous and monogamous families do very little direct child care (fig. 5), so it is unlikely that the key difference is the amount of time spent with children. Given the prevalence of parasitic and infectious diseases, differential access to medical care could have a dramatic impact on mortality. If the children in the polygynous families are less likely to be given costly medicines and other Western or indigenous treatments for illness, then this could cause the striking decrement in survivorship observed in this study. This hypothesis needs to be tested by monitoring differences in morbidity and treatment under monogamy and polygyny.

If polygynous men invest less per child, where do they divert their efforts? Children with more paternal

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**Figure 4.** Regression of weight for height residuals on the polygyny index of the work-eat group. $N = 74$.

**Figure 5.** Percentage of observations of females and males engaged in child care at various ages, from behavioral scan sampling in the agricultural fields and village (Sangu). Stars indicate significant differences between the sexes.
siblings were not at greater risk of death, so it does not appear that polygynous men are simply spreading their investment among a greater number of existing children. Instead they may be diverting resources to mating effort (and the prospect of producing future offspring) or even to somatic effort (buying meat or beer in the marketplace).

_Nepotistic investment_. Yet the paternal investment hypothesis can be criticized along the same lines as the cowife competition hypothesis. If polygynously married men invest less per child than monogamously married men, then it is not clear why work-eat group polygyny is a better predictor of child survivorship than parent's marital status. A potential solution is to broaden the paternal investment hypothesis to include the nepotistic investment of relatives other than fathers. Polygynous work-eat groups may be less inclined to pay for medicines and other treatments for childhood illnesses. Such groups have higher reproductive potential than monogamous groups and are more likely to produce a surplus of sons relative to the hectarage of land to be inherited. With each successive generation, the competition for land within the family becomes increasingly intense. Some of the sons emigrate; the other children may be less indulged than those in monogamous work-eat groups, even if their own father is monogamously married. The father himself is not necessarily the one who withholds investment; instead it may be the uncle or grandfather, whoever is work-eat group boss (ginu du bangla). Thus, to explain the high mortality rates of children in polygynous work-eat groups, further study is needed to identify possible differences in the spending patterns of the men and women of these groups compared with monogamous groups. Conflict of interest between work-eat group members is another area for inquiry. Such conflicts were frequently reported and led to a high frequency of work-eat group fission (Strassmann, unpublished data).

Why do women marry polygynously? In view of the high mortality of children in polygynous work-eat groups, it is surprising that Dogon women are willing to marry into such families. But there are not enough monogamous work-eat groups for all the women on the marriage market. The number of women exceeds the number of men on the marriage market for reasons which have been widely overlooked. First, Dogon wives are on average eight years younger than their husbands. When the age-structure of a population is pyramidal, a difference in mean age at marriage ensures that the cohort of women looking for husbands is larger than the cohort of men looking for wives, forcing some women into polygyny (fig. 6) [Dorjahn 1959, Pison 1985, Chisholm and Burbank 1991]. Second, a tendency for men to marry at a later age or to die at a younger age produces a surplus of widows relative to widowers. If these widows generally remarry, this will also result in a surplus of women on the marriage market [Pison 1985]. The remarriage of widows will promote polygyny regardless of the age-structure of the population. Third, it is well known that a female-biased sex ratio will promote polygyny [e.g., Dorjahn 1959]. Among the Dogon, the skew is caused by excess male mortality and the departure of males to the cities in search of wage labor. Finally, even those women who enter monogamous marriages cannot assume that their marriages will remain monogamous. In this study, the excess mortality under polygyny was greatest among the offspring of first wives, most of whom had not known that their marriages would become polygynous.

Most Dogon women are in a polygynous marriage at some time during their lives, and in preparation young girls are taught to sing, "I'm not afraid of my husband's other wife." But interviews of all the adult men \((N = 71)\) and women \((N = 113)\) in Sangui indicate that women do sometimes fight polygyny with some success. The primary strategy is divorce, which both sexes agree is predominantly female-initiated. In a sample of 88 divorces, the wife said that she had been the initiator in 95% of divorces, and the four most frequently cited reasons were [1] husband pursuing wage labor in the city (25%), [2] dislike of husband (18%), [3] dislike of cowife (10%), and [4] too many children died in that marriage (6%). Miscellaneous other reasons, each of which was less commonly cited than the above, accounted for 41% of cases. The absence of a decrease in "per capita" economic status in polygynous work-eat groups (fig. 3) provides further evidence for female resistance to polygyny. Dogon informants said that men cannot attract women into polygynous marriages unless they at least appear to have sufficient wealth.

**CONCLUSION**

The results reported here provide the strongest evidence to date for an adverse effect of polygyny on child mortal-

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3. Polygynously married Dogon women had fewer surviving offspring than monogamously married women. Although I expect that they also usually had fewer surviving grandchildren, empirical verification is required.
ity in a human population. The odds of death for Dogon children [N = 176] in polygynous work-eat groups were 7 to 11 times higher than for children in monogamous groups. By contrast with previous studies, this conclusion is based on prospective rather than retrospective data. Moreover, other significant predictors of mortality were controlled, including age of the child, sex of the child, number of children in the work-eat group, dependency ratio of the work-eat group, and economic status. Postulated explanations for why polygyny is a risk factor focus on resource dilution, co-wife competition, paternal investment, and nepotistic investment. The data did not support resource dilution, but further study is needed to discriminate among the other possibilities.

Becker’s economic model and the polygyny-threshold model view polygyny as the outcome of female preference. However, the eight-year difference in the age of spouses generates a surplus of Dogon women on the marriage market, forcing many men into polygyny. Dogon men who achieve polygyny gain reproductively while their wives lose, indicating that male preference is more likely to be the driving force behind this marriage system. The practical import of this study is that polygyny is a much neglected but crucial variable in prospective studies of child health.

References Cited


