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LOW REPRODUCTIVE PERFORMANCE AND WOMEN'S AGE AT THE ONSET OF REPRODUCTION

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Abstract: The low reproductive performance of late-maturing women is generally attributed to the impact of education and employment on women's attitudes towards family size. Data from a cohort of Kenyan Kipsigis women, married between 1940–1953, who had no opportunites for education or employment, show that younger-maturing Kipsigis women achieved higher lifetime reproductive success than did older-maturing women; this difference was due primarily to the lengthier reproductive lifespan and higher offspring survivorship of early-maturing women. These findings suggest that the negative correlation between age of a woman at the onset of reproduction and her subsequent reproductive performance may result, in part, from physiological rather than socioeconomic factors.

Key words: Low reproductive performance, Onset of reproduction, Age at menarche, Lifetime reproductive success, Kipsigis women (Kenya).

Introduction

There is growing evidence in both developed and developing nations that the age at which a woman starts to reproduce is negatively associated with her subsequent reproductive performance. Data from the western Malaysian family survey indicates that a woman's age at first birth is negatively correlated with completed family size, controlling for a number of socio-economic and racial effects (Aghajanian 1981). Similarly, in Nepal, a significant negative correlation is found between age of marriage and the number of children ever born to a woman (Gubhaju 1983). Evidence from developed nations is consistent. National Fertility Survey data from the USA indicate that younger-marrying women achieve larger family size than older-marrying women (Bumpass et al. 1978).

Three explanations have been proposed for these findings. First, the sooner a woman starts bearing children after menarche, the more available time remains for her to continue childbearing, assuming that age at first reproduction does not affect age at menopause. Second, it has been suggested that age at first birth affects subsequent reproduction as a result of attitudinal factors: thus Ryder (1969, 1976) argues that initial postponement of reproduction may permit a young woman to revise her fertility preferences downwards, perhaps because the experience of education or employment fosters sources of satisfaction other than motherhood (Aghajanian 1981). Third, closely related to the previous argument, it has been suggested that modernising influences such as education may be more acutely experienced by women without children than those with children (Aghajanian 1981).

Generally human demographers favour the second and third of these explanations (Aghajanian 1978, Bumpass et al. 1978), despite the fact that the association between delayed reproduction, socio-economic experiences and revised fertility goals has not been shown. Indeed, there is no evidence to date to indicate whether or not women's fertility goals are indeed consciously revised as a consequence of delayed initial reproduction.

In this paper the author examines the association between age at menarche and lifetime reproductive success in Kipsigis women of Kenya. This is a population where education has only recently been introduced, where employment opportunites for women are still

almost unknown, and where modern techniques of birth control are not used. Given the relatively homogeneous socioeconomic circumstances of this population, the results from this study suggest that the negative correlation between age of a woman at the onset of reproduction and her subsequent reproductive performance may result, in part, from physiological rather than socioeconomic factors.

Methods

Kipsigis are a Nilo-Hamitic Kalenjin-speaking people of Rift Valley Province, Kenya. Almost exclusively pastoralist until 1930, they rapidly shifted to an agro-pastoral economy, selling surplus maize for cash required for medical attention, clothing and additional items. Kipsigis women undergo a clitorectomy operation on reaching menarche (12–19 years), after which they traditionally spend 2–3 years in seclusion huts prior to marriage.

A Kipsigis population little affected by the rapid modernisation transforming much of rural Kenya was studied on the border of Kericho and Narok Districts (June 1982 – December 1983), (see Borgerhoff Mulder 1985). Systematic lifehistory interviews were conducted, determining the date of a woman's birth, circumcision operation and marriage, the number of her live-born children and the date at which the last child was born (see Borgerhoff Mulder 1987). Analyses were restricted to a cohort of women married between 1940–1953, who reported reaching menopause and for whom information on all relevant variables was available (N=33). Lifetime reproductive success (LRS) was measured as the number of surviving offspring born to a woman. LRS was broken down into 3 components – length of reproductive lifespan, fertility per year married and probability that offspring survive. Length of reproductive lifespan was measured as the interval, in years, between a woman's marriage and the birth of her last child, whether or not this child survived; fertility per year married was calculated as the number of liverbirths born to a woman divided by her reproductive lifespan; offspring survivorship was calculated as the number of a woman's surviving offspring divided by the number of livebirths she produced. Finally, age at menarche was estimated as the age of a girl at clitorectomy, because of the Kipsigis custom of performing this operation on a girl within a year of her reaching menarche.

Eighteen months' residence in the area, use of the kipsigis language and thorough checking of interview responses with relatives and neighbours ensure high reliability of these reported data. Past life history events were accurately dated to the year by cross-referencing with male circumcision ceremonies, severe droughts and other events of known date. All probability values are two-tailed.

Results and Discussion

The major factor associated with completed family size in this sample was age at menarche, measured as age at circumcision ($r=-.53$, $p=0.001$). This was independent of the effects of both husband's wealth and age on a woman's LRS (see Borgerhoff Mulder 1987). Women reaching menarche at 15 years of age or less produced, on average, 3 more surviving offspring (8.8 compared to 5.8) than those reaching menarche between 16–19 ($T_{19,14}=4.13$, $p < 0.001$). Further analyses of the components of LRS demonstrated that age at menarche was negatively associated with length of reproductive lifespan and with the probability that offspring survive, but not with fertility per year married (see Table 1).

Table 1. Pearson correlation coefficients between age at circumcision and lifetime reproductive success and its components for 33 Women married between 1940–1953

	Pearsons r	P-value
LRS	–.53	0.001
Reproductive lifespan	–.48	0.004
Fertility per year married	–.06	NS
Offspring survivorship	–.42	0.015

These results suggest that the attitudinal and socioeconomic explanations proposed by human demographers are not implicated in the Kipsigis case. First, the explanation rejected by human demographers, namely that early-maturing girls achieve longer reproductive lifespans, was supported with Kipsigis data. Second, there was no indication that the low reproductive performance of women who start to reproduce relatively late is a consequence of education or employment, in so far as none of the women in this sample received any education or followed any employment whatsoever. Third, the argument that childless women are more acutely influenced by modernisation is unlikely to account for the Kipsigis findings, again because of the homogeneity of the socioeconomic experiences of a cohort of women married within a 13 year period when education and employment for women was not yet available.

The precise nature of the association between age at menarche and both length of reproductive lifespan and probability that offspring survive cannot be determined in a retrospective demographic study such as this, where biological measures were not taken. Nevertheless, the general finding that age at menarche is negatively associated with measures of body condition and fat (Frisch and McArthur 1974, Frisch 1976), despite uncertainties regarding the mechanisms involved (Scott and Johnson 1985), suggests that the high reproductive performance of early-maturing Kipsigis women may be, in part, physiologically mediated. More generally, these results indicate that it may be incautious to attribute reproductive differentials to socioeconomic and attitudinal factors without first examining possible physiological and biological differences among women.

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