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South American Indian Studies

Number 4, March 1994

The Demography of Small-Scale Societies:
Case Studies from Lowland South America

Kathleen Adams and David Price, Editors

BENNINGTON COLLEGE
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05201

CULTURAL CHANGE, POLYGYNY, AND FERTILITY AMONG THE SHIPIBO OF THE PERUVIAN AMAZON[1]

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Introduction

In my early studies of the health effects of cultural change among the Shipibo, I found one of the highest fertilities ever reported for a human group—a gross reproduction of 4.933 for the years from 1964 through 1969 (Hern 1977). This tribe is experiencing rapid cultural change, one aspect of which is a decline in the prevalence of polygyny. I decided to test the hypothesis that polygyny limits the fertility both of individual women and of the community as a whole through post-partum sexual abstinence and longer birth intervals. I found that the birth intervals of polygynously married women are indeed longer and their fertility lower. Moreover, the community's overall fertility rate is negatively associated with the proportion of polygynous birth intervals.

Worldwide, disruption of traditional cultural controls on fertility may provide an important explanation for the increased fertility that has been reported in some ethnic groups experiencing rapid cultural change (Nag 1980). Contributing factors would be a reduction in the length of breastfeeding and shorter post-partum sexual abstinence on the part of women. Such changes have certainly ocurred in Africa, although some contrary results have also been published (Dorjahn 1958; Caldwell and Caldwell 1977; Aborampah 1987; Chojnaka 1980; Cleveland 1987; Isaac 1980; Handwerker 1987; Page and Lesthaeghe 1981; Sembajwe 1979; Olusanya 1971). Polygyny has commonly been associated with longer post-partum sexual abstinence on the part of women, and this would logically lead to longer birth intervals (Whiting 1964; Schoenmaeckers, Shah, et al. 1981).

A flaw in many published studies is the lack of information on individual fertility that relates polygynous status to birth-interval length. In only a few studies has the fertility of polygynously and monogamously married women been compared within the same society. This is because cultural changes that affect fertility are most likely to occur in tribal or peasant societies without adequate records, and information about these societies tends to be collected by anthropologists who have not been trained in the collection of demographic data (Peterson 1975; Caldwell, Caldwell, and Caldwell 1987). In their study of the Sereer, Garenne and Van De Walle (1989) show lower fertility among polygynous women. Outside Africa, studies of groups as disparate as Mormons, residents of Bangladesh, and New Guinea tribes have shown that polygyny reduces women's fertility (Smith and Kunz 1976; Anderson and Emigh 1989; Bowers 1971; Van Arsdale 1978; Wood, Johnson, and Campbell 1985; Shaikh, Aziz, and Chowdhury 1987). A significant exception is the work of Borgerhoff Mulder (1989), whose study of the Kipsigis showed no important differences between the fertility of polygynous and monogamous women.

In lowland South American societies, polygyny is common (Siskind 1973; Jackson 1983), but its impact on fertility has not been well documented. Nearly all South American rates of polygyny are based on the number of polygynously married men, and a rate of 27 percent has been found in Cashinahua families, together with a tribal "population policy" that encourages fertility (Johnston, Kensinger, and Jantz 1969; Johnston and Kensinger 1971). Chagnon has noted polygyny rates as high as 50 percent among the Yanomamö, who observe strict post-partum sexual abstinence and among whom birth intervals are consequently longer (mean of 3.4 years) (Chagnon 1977, 1979:305). Birth intervals among the Xavante, who also favour sororal polygyny, are similarly long, and fertility is low—although this may be due to infanticide in both tribes (Neel and Chagnon 1968; Neel and Salzano 1970). Early and Peters (1990) have ascribed long birth intervals among the Mucajai Yanomama to prolonged lactation and induced abortion.

In my own early studies of the Shipibo, I noted a household polygyny rate of 7.1 per cent, with 9.8 percent of all women of reproductive age (aged 15 years or more) in polygynous unions. According to local accounts, the prevalence of polygyny was declining. Herbal contraceptives, which were widely used by Shipibo women, accomplished their putative effect by being associated with sexual abstinence (Hern 1976).

Polygyny does not affect women's fertility directly, but through its influence on post-partum sexual abstinence and frequency of coitus (Bongaarts 1978; Bongaarts and Potter 1983). Another proximate factor that affects fertility is post-natal infecundability caused by lactation-suppressed anovulatory amenorrhea—which appears to have been important among the !Kung (Konner and Worthman 1980; Lee 1980). Lactation is an uncertain method of suppressing ovulation, but it is probably more effective in tribal societies in which the infant can suckle at frequent intervals, as is the case among the Shipibo. In this study, polygynous status is

regarded as a proxy control variable (Greenland and Neutra 1980) for post-partum sexual abstinence, which is assumed to be one of the most important independent behavioural variables that affect fertility.

Background

The Shipibo-Conibo are horticulturalists who rely on fishing and hunting for the satisfaction of their protein needs and who are increasingly entering the Peruvian cash economy through rice crop cultivation (Behrens 1984 1989; Bergman 1980; Lathrap 1970). About 25,000 members of the tribe live in the Ucayali River Basin in the eastern Peruvian Amazon near the city of Pucallpa (Figure 1). They have maintained their cultural identity in spite of more than 300 years of western contact. By the early twentieth century, fewer than 3,000 remained. Somehow they escaped further decimation or complete extinction, while other Amazonian tribes succumbed to European diseases, enslavement, and intertribal warfare sponsored by rubber tappers. The last smallpox epidemic was in 1964. But now, in addition to modern plagues of tuburculosis and cholera, the Shipibo have a new health problem: high fertility, which places pressure on resources and takes a heavy toll on women's health.

Postmarital residence is matrilocal (Abelove 1978), and sororal polygyny is the common and preferred form of polygyny. A man may take as a second wife any woman whom his first wife calls sister, but in practice only the younger full sisters of first wives are married. Typically, each wife has her own household or at least her own hearth, usually adjacent to the hearths of other wives.

During the past 40 years, the Shipibo have experienced rapid cultural change and have increasingly participated in the Western economic system. The Shipibo are sometimes difficult to distinguish from their mestizo neighbors. Often the only remaining distinction is the ability to speak the Shipibo language. A private health facility, the Hospital Amazonico 'Albert Schweitzer', was established near Pucallpa, the nearest city, in 1962; more recently a high school was opened in Paoyhän, the largest village. My first experience of working with the Shipibo was as a third-year medical student at the Hospital Amazonico in 1964, followed by field trips to conduct censuses and health surveys

Figure 1.
Pisqui and Central Ucayali Region

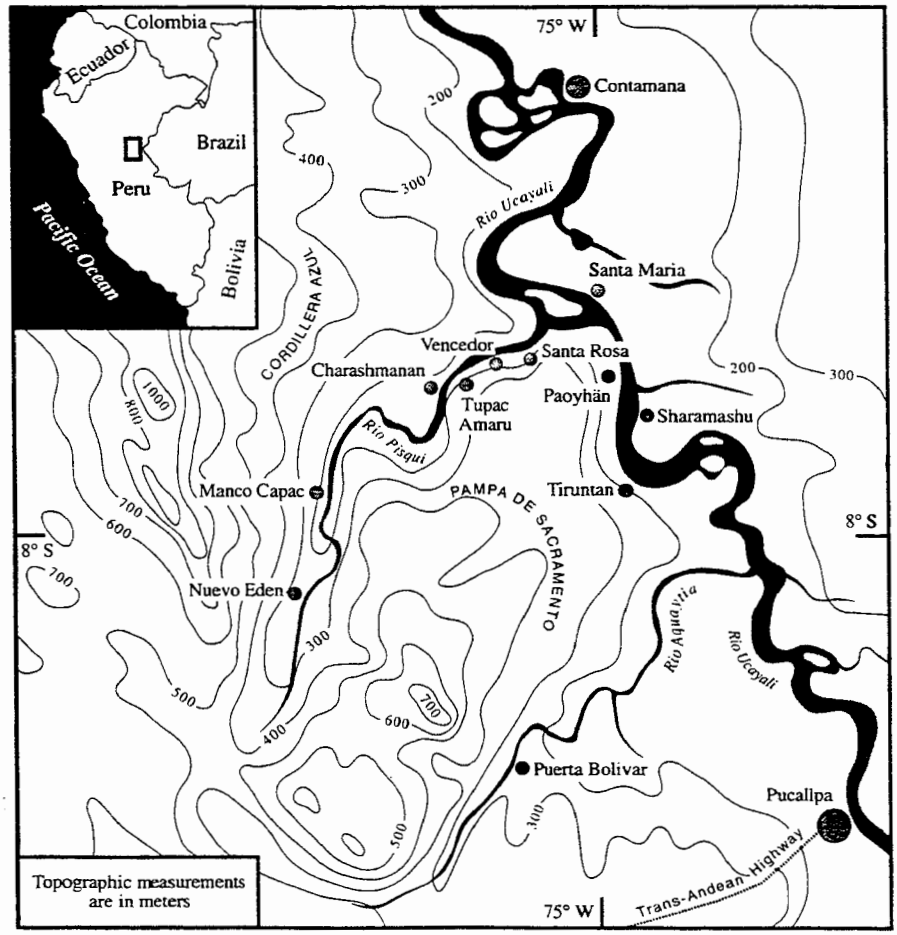


Table 1.
Population by Village

Charashmanan	203
Vencedor	114
Tupac Amaru	111
Irazola	84
Santa Rosa	127
9 de Octubre	48
Paococha	173
Paoyhan	585
Total	1,445

in 1964, 1969, 1974, and 1979, as well as a field study in 1983–84 (the subject of this report), for a total of about 20 months.

One of the most striking observations is the apparent decline in the prevalence of sororal polygyny (Hern 1988). Missionaries have discouraged polygyny since their earliest contacts with the Shipibo, and Protestant missionaries have continued this effort with apparent success, as I observed during a field trip in 1983-84. The Shipibo are now sensitive about their image and endeavor to be as *civilizado* as their mestizo neighbors.

Methods

I conducted a universal household interview in eight Shipibo communities on the Ucayali and Pisqui Rivers over a 14-month period in 1983 and 1984, and obtained a complete reproductive history from each woman aged 13 years or older (N=386). I identified each birth event and defined the length of birth intervals to the extent possible in each woman's reproductive span. I determined ages, durations of marriages, and timing and sequence of birth events. I made independent checks for accuracy through parallel estimates for sisters and other relatives, examination of existing birth records, and wide consultation with family members and neighbours.

Three definitions of polygynous effects were constructed:

(i) a woman was classified according to whether she had ever been in a polygynous marital relationship at any time;

(ii) a particular birth interval was classified according to whether it had occurred within the context of a polygynous relationship;

(iii) the mean length of closed birth intervals was calculated for each woman, as well as the proportion of each woman's closed birth intervals that were polygynous.

Table 2.
Age Structure of Population by Sex

	Males		Females		Total	
Age	N	%	N	%	N	%
0–4	152	20.6	136	19.2	288	19.9
5–9	114	15.5	120	16.9	234	16.2
10–14	94	12.8	97	13.7	191	13.2
15–19	82	11.1	77	10.9	159	11.0
20–24	68	9.2	61	8.6	129	8.9
25–29	43	5.8	45	6.4	88	6.1
30–34	46	6.2	38	5.4	84	5.8
35–39	30	4.1	42	5.9	72	5.0
40–44	33	4.5	36	5.1	69	4.8
45–49	21	2.8	11	1.6	32	2.2
50–54	19	2.6	16	2.3	35	2.4
55–59	14	1.9	9	1.3	23	1.6
60–64	7	0.9	13	1.8	20	1.4
65–69	6	0.8	4	0.6	10	0.7
70+	8	1.1	3	0.4	11	0.8
Total	737	100.0	708	100.0	1445	100.0

Results

Of a total of 1,445 individuals enumerated in *de jure* censuses of eight villages, more than one-third, 585, were located in Paoyhän (Table 1). The total population sex ratio was 104 men per 100 women, with considerable variation among villages. Table 2 shows an extremely young population, with nearly half (49.3 per cent) under the age of 15 and 60.3 percent under 20.

Crude birth rates for the census year ranged from 42.6 to 89.6 per 1000 (Table 3), and crude death rates from 14 to

Table 3.
Vital Rates by Village

Village	Midyear Population	Crude Birth Rate	Crude Death Rate	Rate of Natural Increase
Charashmanan	201.5	59.6	44.7	14.9
Vencedor	112.5	44.4	17.8	26.2
Tupac Amaru	109.5	45.7	43.8	1.9
Irazola	83.0	84.3	60.2	24.1
Santa Rosa	124.0	80.7	32.3	48.4
9 de Octubre	48.5	42.6	63.8	–21.2
Paococha	167.5	89.6	23.9	65.7
Paoyhan	572.5	57.6	14.0	43.6
All Villages	1419.0	62.7	26.1	36.6

Table 4.
Fertility Rates by Village

Village	General Fertility Rate	Child/ Woman Ratio*	Total Fertility†	Gross Reprod. Index	Mean Compl. Fertility
Charashmanan	0.255	0.787	8.355	3.805	7.6
Vencedor	0.148	0.926	7.715	6.000	9.0
Tupac Amaru	0.217	0.826	5.865	2.665	6.8
Irazola	0.353	0.941	10.835	5.415	10.0
Santa Rosa	0.400	1.160	7.265	4.095	8.4
9 de Octubre	0.182	0.546	2.500	1.250	6.0
Paococha	0.378	1.108	13.835	8.750	8.0
Paoyhan	0.271	0.943	8.145	4.385	6.9
All Villages	0.278	0.932	8.467	4.379	7.6

* Children aged 0–4 per woman aged 15–49
† Sum of age-specific fertility rates

63.8 per 1000. The overall infant mortality rate was 138 per 1000. General fertility rate, total fertility rates, and gross reproduction rates also varied widely (Table 4). Mean completed fertility was lowest in the Pisqui village of 9 de Octobre, in which one of the highest rates of polygyny was found, and mean completed fertility was highest in Irazola, where the polygyny rate was low.

The median reported age at menarche (N=307) was 13, and the median reported age at first marriage (N=271) was 14 years (Tables 5 & 6). There was no difference in the mean age at menarche by polygynous status (13.2 monogamous v. 13.1 polygynous; p=0.144), but polygynous women tended to get married a year earlier (13.2 v. 14.1) than monogamous women (p = .001). The mean age of first delivery for all parous females with complete reproductive histories (N = 237) was 15.6 years, with a median of 15 and mode of 14. Mean age at first delivery was lower for polygynous women (15 years) than for monogamous women (15.8 years) (p < 0.01).

Table 5.
Frequency Distribution of Ages at Menarche, by Polygynous Status

	Monogamous		Polygynous		Total	
Age	N	%	N	%	N	%
11	3	1.2	1	1.6	4	1.3
12	44	18.0	12	19.4	56	18.2
13	117	47.8	35	56.5	152	49.5
14	57	23.3	11	17.7	68	22.1
15	21	8.6	3	4.8	24	7.8
16	3	1.2	0	0.0	3	1.0
Total	245	100.0	62	100.0	307	100.0

Table 6.
Frequency Distribution, Ages at First Marriage, by Polygynous Status

Age	Monogamous		Polygynous		Total	
	N	%	N	%	N	%
8	0	0.0	1	.4	1	.4
9	2	.7	0	0.0	2	.7
10	1	.4	3	1.1	4	1.5
11	6	2.2	2	.7	8	3.0
12	24	8.9	11	4.1	35	12.9
13	61	22.5	21	7.7	82	30.3
14	42	15.5	12	4.4	54	19.9
15	32	11.8	7	2.6	39	14.4
16	23	8.5	4	1.5	27	10.0
17	7	2.6	0	0.0	7	2.6
18	8	3.0	0	0.0	8	3.0
19	1	.4	0	0.0	1	.4
20	2	.7	0	0.0	2	.7
23	1	.4	0	0.0	1	.4
Total	210	77.5	61	22.5	271	100.0

Mean age of the 386 females aged 13 or older who had passed menarche and from whom reproductive histories were obtained was 30; median age was 27, and modal age 18. Both the mean and median parities in this group were four. Fifty-two women were pregnant at the time of the interview. Only one of the 56 women past the age of menopause had never been pregnant.

Table 7.
Frequency Distribution, Number of Births, All Females Aged 15+

	Number	Percent
0	62	17.5
1	31	8.8
2	26	7.3
3	37	10.5
4	30	8.5
5	32	9.0
6	18	5.1
7	37	10.5
8	19	5.4
9	20	5.6
10	20	5.6
11	17	4.8
12	3	0.8
13	2	0.6
Total	354	100.0

Table 8.
Birth Interval Length by Interval Number

Birth Interval Number	Mean	Median	Std. Dev.	N
1	31	24	24	248
2	31	25	16	225
3	30	27	15	187
4	32	28	21	158
5	28	26	13	132
6	33	29	19	111
7	34	30	18	81
8	30	27	13	60
9	35	29	19	42
10	36	32	19	21
11	30	26	12	6
12	26	26	—	2

Of all women aged 15 or older, 84.5 percent had experienced at least one pregnancy, 85.6 percent had been married, and 82.5 percent had experienced at least one term birth (Table 7). The mean and median ages at last delivery were 28.8 and 28.5, respectively, and the mean reproductive span for all parous women was 13 years. The mean birth interval for all women was 31.5 months with a median of 28.5. Mean and median birth intervals for women aged 45 or over (N=42) were 36.2 and 31.6 months, respectively. Among 1,274 birth intervals reported for all women of parity 2 or higher, mean birth interval was 31.0 months, and the median was 26.0.

Regression analysis of birth-interval number on birth-interval length shows no increase of length with interval number (Table 8; $\beta = 0.0442$, adjusted $r^2 = .0012$; $F = 2.49$; $p = 0.115$). A similar comparison of mother's age at the beginning of each birth interval with the length of the birth interval shows little correlation ($\beta = 0.032$; $r^2 = 0.001$). Birth intervals do not lengthen appreciably as women age.

An Individual Fertility Rate (IFR) was calculated for each woman by dividing her parity by her reproductive span in years and multiplying by 100 (Hern 1990). *Reproductive span* is defined as the interval between the first birth and the last (whether term or premature) in months divided by 12. The mean Individual Fertility Rate was 56.8 with a median of 49.1.

Of the 386 women aged 13 or over, 75 (19.4%) had at some time participated in a polygynous union. Among these women, including some who were under 15 or over 45 years old (13.0 percent of the total), 50 were in polygynous unions at the time of the study. The 45 who were of reproductive age (15-44) constituted 15.7 percent of all women in this category, with the highest proportions in the Pisqui villages of 9 de Octubre (45.5 per cent), Vencedor, Tupac Amaru, and Charashmanan. The highest community prevalence of polygynous birth-interval lengths in the various villages was 56.6 percent and the lowest was 5.3 per cent.

Table 9.
Proportion of Men 15+ Years of Age in Polygynous Marriages, by Village

Village	Number of Households	Monog. or Unmarried	Polygynous		Total
Charashmanan	25	47	9	(16.7%)	56
Vencedor	14	25	7	(21.9%)	32
Tupac Amaru	8	28	4	(12.5%)	32
Irazola	13	23	1	(4.2%)	24
Santa Rosa	16	33	2	(5.7%)	35
9 de Octubre	8	12	2	(14.3%)	14
Paococha	25	29	5	(14.7%)	34
Paoyhan	92	143	5	(3.4%)	148
Total	211	340	35	(9.3%)	375

The overall proportion of men over the age of 14 in polyynous unions at the time of the interview was 9.3 percent (16.6 percent of all households) with ranges from 3.4 percent (Paoyhän) to 21.9 percent (Vencedor) (Table 9).

Effect of Polygyny on Birth Interval and Individual Fertility

An important finding is that mean birth intervals were four months longer for polygynous than for monogamous women ($p < 0.02$; Table 10). Mean Individual Fertility Rates were significantly lower for polygynous women, who had

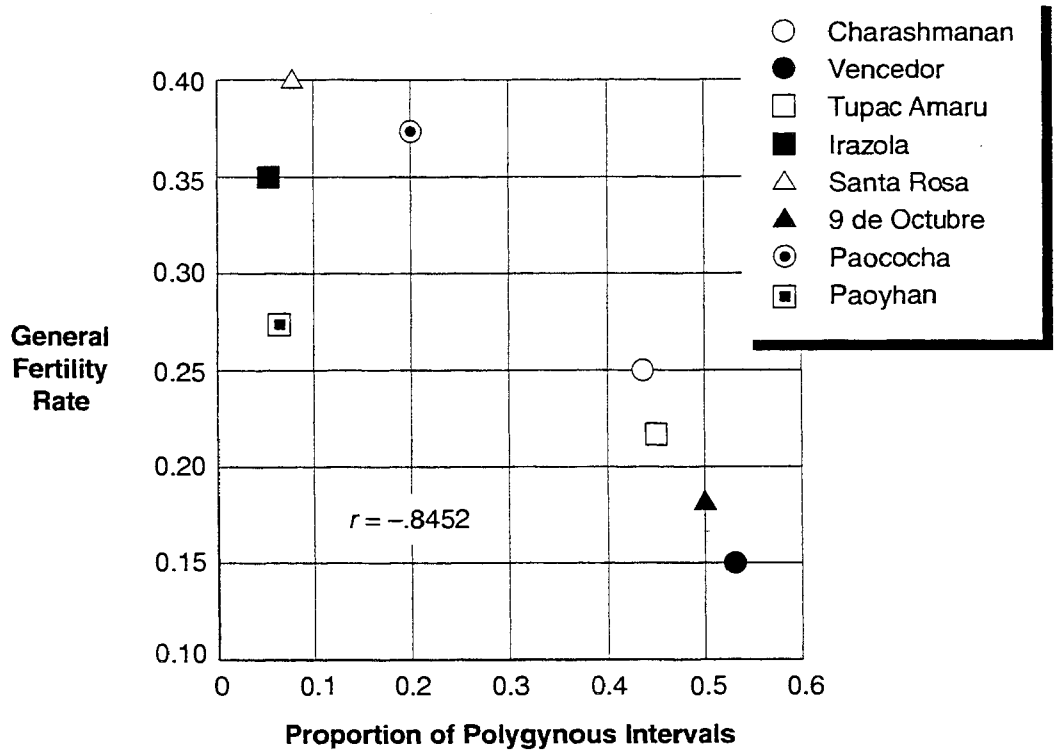
Table 10.
Mean Birth Interval Lengths by Polygynous Status

Status	Mean	Median	N
Polygynous	34.5	31.4	68
Monogamous	30.3	27.7	167
Total	31.5	28.5	235

Table 11.
Individual Fertility Rate by Polygynous Status

Status	Mean	Median	N
Polygynous	47.09	44.44	68
Monogamous	60.64	51.53	167
Total	56.75	49.12	235

Figure 2.
Relationship of Polygyny and Fertility in Eight Shipibo Villages



1.3 fewer children per reproductive span than monogamous women ($p < 0.001$, 2-tailed probability; Table 11). The percentage of living children was higher among monogamous than among polygynous women (70.9 compared with 63.2), although this may be accounted for by the relatively greater age of the polygynous women, whose mean age was 40.4 compared with 29.8 for monogamous women.

Table 12.
General Fertility Rates
and Proportion of Polygynous Birth Intervals by Village

Village	General Fertility Rate	Proportion of Polygynous Birth Intervals
Charashmanan	0.255	0.433
Vencedor	0.148	0.523
Tupac Amaru	0.217	0.455
Irazola	0.353	0.067
Santa Rosa	0.400	0.080
9 de Octubre	0.182	0.500
Paococha	0.378	0.201
Paoyhan	0.271	0.070
All villages	0.278	0.224

Regression of the proportion of polygynous birth intervals on Individual Fertility Rate yields $\beta = -0.25067$ and adjusted $R^2 = 0.05885$, $F = 15.8$ ($p = 0.0001$). This slight negative correlation confirms the dampening effect of polygyny on fertility.

At the community level, the strongest negative correlation between the cumulative proportion of polygynous birth intervals and a fertility variable is with the General Fertility Rate (Table 12; Figure 2). There is a strong negative correlation between polygyny and fertility ($\beta = -0.84515$), with an adjusted R^2 of 0.6667 ($F = 15$; $p < 0.01$; Table 13).

The clearest and strongest demonstration of the relationship between polygyny and fertility is a regression, for Pisqui villages, of the general fertility rate on the cumulative proportion of polygynous birth intervals, which yields a nearly straight-line negative correlation ($\beta = -0.96058$ and R^2 is 0.92271, with $p < 0.01$). The same analysis carried out for all villages except Paoyhän yields a similarly strong relationship ($\beta = -0.94786$).

In sum, the evidence shows that:

- birth intervals for polygynous women are a little more than four months longer than for nonpolygynous women;
- individual fertility is lower for polygynous women, who have an average of 4.7 births during their reproductive span, than for monogamous women, who have on average 6.0 births;

Table 13.
Regression of Proportion of Polygynous Birth Intervals
on the General Fertility Rate, for Eight Shipibo Villages

Multiple R	.84515				
R Square	.71428				
Adjusted R Square	.66666				
Standard Error	.05384				
Analysis of Variance					
	DF	Sum of Squares		Mean Square	
Regression	1	.04348		.04348	
Residual	6	.01739		.00290	
F = 14.99944	Signif F = .0082				
Equation Number 1	Dependent Variable		GFR		
Variable	B	SE B	Beta	T	Sig T
PROPOLY	–.38314	.09893	–.84515	–3.873	.0082
(constant)	.38704	.03452		11.211	.0000

• there is a weak but statistically significant positive relationship between polygyny and individual mean birth interval;

• polygyny has a dampening effect on individual fertility; and

• all of these findings demonstrate an unequivocably negative relationship between the prevalence of polygyny in a community and its rate of fertility.

Discussion

Other studies show that polygyny is almost universally linked with post-partum sexual abstinence, lactational amenorrhoea, and long birth intervals, and relate these factors to low fertility, better child survival, and lower maternal mortality among preindustrial groups (Yerushalmy 1945; Wolfers and Scrimshaw 1975; De Sweener 1984). The Shipibo have had polygynous family structures since the earliest recorded contacts, and polygyny is important enough for them to have taken violent reprisals against those who discouraged this custom (Steward and Metraux 1948). They share this social-structural feature with a wide variety of lowland South American Indian tribes, some of them, including other Panoan groups, with close linguistic ties to the Shipibo.

What does a difference of four months between the mean birth intervals of polygynous and monogamous women really mean? Potter, et al. (1963) suggest that mean birth intervals in excess of 30 months reflect a mean length of post-partum amenorrhoea of nearly a year and are presumably evidence of lengthy breastfeeding. A difference of four months may account for the observed differences between the fertility of polygynous and monogamous women. Bongaarts (1981) has shown that even moderate declines in the post-partum nonsusceptible period, which lasted nine months among the Yoruba, would produce increases of over 32 percent in marital fertility. Shipibo women nurse their children for between one and three years, but with variable intensity. Shipibo infants are slung on the hip and kept there virtually until they can walk, and during that time they nurse on demand. I did not notice any differences between the nursing practices of monogamous and polygynous women.

Among the Shipibo, however, polygyny is positively correlated with long birth intervals and negatively correlated with fertility in every respect. Fertility is not particularly related to age of first birth, nor are birth intervals much affected by age, interval number, or birth order (Bean and Mineau 1986). The mean length of birth intervals is not affected by village location.

All measures of community and cumulative individual fertility are influenced by the prevalence of polygyny in the community, but the General Fertility Rate is the most general measure and has the most striking and statistically significant negative association with the cumulative community index of the proportion of polygynous birth intervals.[23] If any prediction can be made on the basis of the present study, it would be that the major increases in fertility among the Shipibo studied may be still ahead.

Conclusions

For the Shipibo communities investigated, it appears that:

- Polygyny is associated with lower individual fertility;
- Modernization results in a decline in the prevalence of polygyny;
- Modernization is associated with higher, not lower, fertility.

These results support the general hypothesis that the disruption of traditional cultural patterns that maintain fertility at low levels contributes to higher and even uncontrolled fertility. The results must be interpreted with caution since it is not possible to determine the extent to which they are representative of all Shipibo or other indigenous populations in general. But to the extent that they are, they support an important conclusion: fertility can be expected to increase as tribal peoples experience rapid cultural change from traditional to peasant to urban societies.

Notes

1. This research was supported in part by the Wenner-Gren Foundation for Anthropological Research. I wish to acknowledge the assistance of Linda Hodge in collecting these data and the indispensable help of Connor and Mary Nixon. I also wish to acknowledge the dedicated help of my Shipibo assistants and the warm hospitality of the Shipibo people. I thank J. C. Caldwell, A. R. Omran, E. A. Hammel, M. Nag, P. Reining, N. A. Chagnon, M. Borgerhoff-Mulder, and J. B. Lancaster for their helpful comments and encouragement. Other versions of this paper were presented at the annual meeting of the Population Association of America, in Toronto, Canada, May 5, 1990 and published in *Population Studies* (46:53–64, 1992).

2. Demographic measures used here were taken from a variety of texts, but principally H. S. Shryock, J. S. Siegel, *et al.*, *The Materials and Methods of Demography*, Condensed Edition (New York 1976), M. Spiegelman, *Introduction to Demography*, Revised Edition (Cambridge, Massachusetts, 1968, and G. Barclay, *Techniques of Population Analysis* (New York 1958).

3. An important potential source of bias could be selective survival or selective migration. Another possible source of bias includes a differential exposure to venereal disease and to modern contraceptives according to location by village or by other sources of cultural change. No evidence of these sources of bias was found.

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