High Fertility in a Peruvian Amazon Indian Village[1]

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The relation between fertility and cultural change in a Peruvian Amazon Indian village was studied initially in 1964 and in more detail in 1969. The 1969 study included observations concerning social, economic, environmental, cultural, and health changes. Population growth in the village is nearly 5% per year, and fertility appears to exceed that previously recorded for other groups. The factors that may be contributing to the high fertility are explored. They are thought to include early and prolonged parity, nearly universal marriage and fertility, high reproductive efficiency, short birth intervals, Western health intervention lowering both infant and maternal mortality rates, and a decline in the prevalence of polygyny.

KEY WORDS: human fertility; Amazon Indians; Peru; cultural change.

INTRODUCTION

The rate of population growth in Latin America as a whole is 2.9%, the highest in the world (Nortman, 1969), while published estimates for several Latin American countries are as high as over 3% per year (Collver, 1965). A possibly important factor in this population growth is the experience of indigenous peoples whose societies are in cultural transition. As a medical student in 1964, I visited the village described in this article for the purpose of doing ethnographic research. It was apparent from analysis of the community health data also

gathered at the time that rapid population growth was becoming an imporant, if not dominant, influence upon the life of the village.

Paococha is a Shipibo Indian village located on the Ucayali River, a major tributary of the Amazon, approximately 150 kilometers (km) downstream (north) from Pucallpa, Peru. The village is in a tropical rainforest. The people of the village are members of the Shipibo-Conibo tribe, which is distributed along a 400-km stretch of the Ucayali River. The Shipibo-Conibo constitute part of the riverine Panoan group (Lathrap, 1970). Although they have been experiencing Western contact for perhaps 100 years, such contact has become more intensive during the postwar era. According to reports of local inhabitants, Paococha was formed about 50 years ago in close cooperation with Adventist missionaries.

The economy is basically a subsistence economy, and fish and bananas are staples. Dried fish, hides, bananas, and other jungle products are sold for cash to mestizo river traders or in Pucallpa. Since 1960, an increasing number of the Indians have spent time living and working near Pucallpa at the Albert Schweitzer Amazon Hospital. The hospital has been an important source of health care and culture contact for the residents of Paococha.

Rice and beans are becoming important cash crops. Both crops were previously planted on sandbars during the dry season, but a large new area for planting has become available as the oxbow lake located by the village has disappeared. The lake was previously many kilometers from the river, but a meander of the river eroded this barrier, allowing the lake to empty during the dry season and leaving a rich soil for planting.

This has been accompanied, however, by extensive deforestation of surrounding jungle for the planting of other cash and subsistence crops in swidden plots. Swidden (shifting) agriculture was practiced long before the village was formed, but villagers agree that it has become much more intensive during the past 10 to 15 years. In 1974, many crops were destroyed by a devastating flood that may have resulted from similar deforestation occurring in numerous other villages upstream. The flooding caused the villagers to move their plantations to higher areas many kilometers away from the river. Lathrap (1968) asserts that continuous cultivation is possible along the Ucayali; however, the alluvial boundaries of the river are to be distinguished from the upland, interfluvial areas of lateritic soil that are more subject to rapid destruction. Lathrap (1970) has also pointed out that the fertile strips along Amazon tributaries are narrow.

Extensive contact with the Amazon Hospital appears to have made the village inhabitants much more willing to seek out and accept Western medical attention. For example, women with obstetrical problems are now taken promptly to a municipal hospital about 50 km downstream at Contamana, and Peruvian health officials are allowed to enter the village for the purpose of providing immunizations.

The population of the village doubled between the 1964 and 1969 censuses,[3,4] but only 16.6% of the 1969 population consisted of adult immigrants. The spectacular population growth rate has been accompanied by a transformation of the physical appearance of the village as the result of missionary activity, and by subtle changes in social organization. Some features of the transformation are a more formal arrangement of houses along an airstrip requested by the missionaries, development of a plaza urged by the missionaries, construction of a sawn lumber schoolhouse, and erection of a flagpole by the missionaries. Family ties are loosening and work projects are performed less by kin cooperation and more by wage payment. Another new development is the appearance of neolocal nuclear family households and the disruption of old residence patterns.

The current situation is an outcome of many years of increasingly rapid cultural change. The major points of acceleration were: formation of the village with the assistance of Adventist missionaries in about 1930; induction of various village men into the Spanish-speaking Peruvian army from the early 1950s on; and development of the Amazon Hospital in the early 1960s, accompanied by intensive medical treatment and employment of the Indians by the hospital. The hospital also urged upon village leaders the acceptance of a herd of cattle, with subsequent clearing of forest to create pastureland. Both the pastureland and cattle herd proved to be unproductive.

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[3] The censuses were made by means of household interviews. The oldest still-active male or otherwise recognized leader of the family was interviewed in Spanish. Some information was obtained directly in Shipibo and, when necessary, through translation. Demographic and socioeconomic data were collected. Age was determined as closely as possible through documentation, where present, or through discussion if no documentation was available. Records of baptism or birth certificates were sometimes available as were records of military service. The ages of people 45 years or over appeared to be gross estimates of uncertain validity.

Vital events during the previous year were dated from the *fiestas patrias* (national holidays) which take place on July 28. The censuses in both 1964 and 1969 took place at exactly this time.

A careful reproductive history was taken from each woman in 1964 and 1969. In 1969, each woman was also asked about the use of herbal contraceptives or modern contraceptives.

One hundred fifteen residents were not enumerated in 1964 but were accounted for in the 1969 census. Those inhabitants of the village who were present and enumerated in the 1964 census are referred to as the "1964 enumerated cohort." Those determined in 1969 to have been present but not enumerated in 1964 are referred to as the "1964 unenumerated cohort." The fertility experience of both 1964 cohorts, separate and combined, is described and compared to the 1969 census population as whole.

[4] Results of the 1964 census data are summarized in Table IV. Female birth rates for 1964 enumerated cohort were: 15-19: .615; 20-24; .917; 25-29: .300; 30-34: .500; 35-39: 1.000; 40-44: .750; 45-49: .000. Female birth rates for 1964 unenumerated cohort were: 15-19: .833; 20-24: 1.00; 25-29: 1.00; 30-34: 1.00; 35-39: 1.00; 40-44: .00; 45-49: .000.

RESULTS

The census taken during the month of July 1969 revealed a permanent population of 549 individuals living in Paococha or Yarinacocha.[5] The age-sex distribution and population pyramid (Fig. 1) indicate that the population is very young. The mean age of the 1969 census population was 18.3 years; the median age was 12.7 years. As high as 53.6% of the population was reported to be under 15 years of age, and 61.7% were under 20 years of age. This is amost identical to the age distribution found by a Johns Hopkins study team in San Antonio, Peru, a mestizo village near Iquitos (Buck *et al.*, 1968). In San Antonio, 54.7% of the population was less than 15 years of age, and 61.9% was under 20 years of age. There is a high degree of similarity between the mestizo village (San Antonio), in which 97.7% of the individuals list Spanish as their first language, and the Shipibo Indian village (Paococha) in which only 3.5% of the individuals list Spanish as their first language.

The mean age of the heads of nuclear families was fairly high (34.7 years), considering the youth of the population, although the median was somewhat lower at 33.2 years, and the modal values were in the 25-29 age group. A total of 102 nuclear families made up 69 household units, arranged in 33 extended family compounds. Meal preparation involved the formation of cooking units in which several, perhaps unrelated, household units would combine for this specific purpose. Usually, however, the extended family compounds were the same as the 37 cooking unit groupings.

The mean number of persons per household (7.9) was almost identical to the median number per household (7.7), indicating a striking uniformity in household sizes. The mean and median ages of heads of households (38.8 years; 37.1 years) were somewhat higher than the ages of nuclear family heads, reflecting the fact that young couples frequently remained in the bride's household after marriage.

Calculations of household composition indicate strength of the extended family. Nearly 80% of the households contained either three or four generations, and nearly 85% of the individuals were living in three- and four-generation households. Redoing the calculations with reference to extended family compounds rather than households would change both to nearly 100%.

Matrilocal and neolocal residence patterns predominated (60.9% and 27.5%, respectively), although a fairly large proportion (10.1%) of the house-

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[5] For the purposes of calculating vital rates, the family of one individual who died in April of the census year (August 1, 1968 to July 31, 1969) was included even though they had left the village, giving a total of 552. The 30-year-old spouse of the deceased was included among the females 15-49 years of age for the purposes of calculating fertility rates but was not included in the analysis of mean parity distributions. All community-wide calculations except vital rates were calculated on the basis of 549 individuals since the survivors of the deceased were not available for interview.
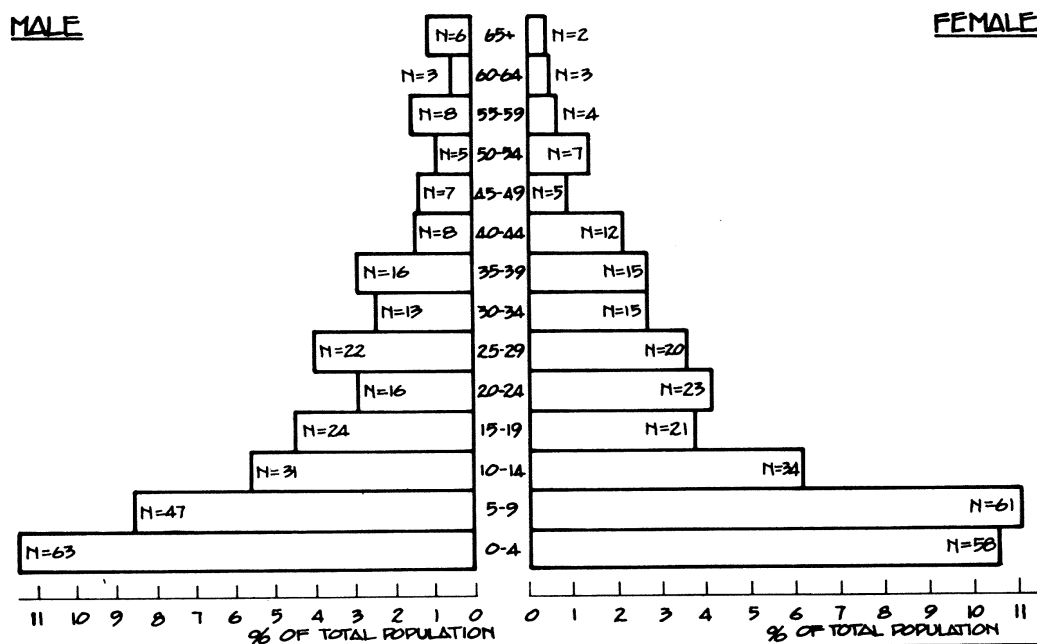
MALE   **FEMALE**

Male N	Age	Female N
N=6	65+	N=2
N=3	60-64	N=3
N=8	55-59	N=4
N=5	50-54	N=7
N=7	45-49	N=5
N=8	40-44	N=12
N=16	35-39	N=15
N=13	30-34	N=15
N=22	25-29	N=20
N=16	20-24	N=23
N=24	15-19	N=21
N=31	10-14	N=34
N=47	5-9	N=61
N=63	0-4	N=58

% OF TOTAL POPULATION   % OF TOTAL POPULATION

Fig. 1. Popuation distribution by age and sex, Paococha, 1969. Females: $N = 280$; males: $N = 269$; male/female ratio: 0.96.

holds were patrilocal. Monogamous family structure was the most common by far (87% of the households), with polygynous households representing only 7.1% of the total. Polygynous households, on average, had more individuals; nearly 11% of the individuals lived in a household with a polygynous family structure.

Sister marriage[6] was far more common than polygyny, and it had a low degree of association with polygyny. Marriage occurs early, especially for females: 89.4% of all females over the age of 12 had been married, and 96.9% of those over age 15 had been married. However, only 84.6% of the ever-married females over age 15 were currently in a consensual union, and 9.8% of all ever-married females over age 15 were currently in a polygynous union. The mean and median reported ages at first marriage for females were 14.6 and 14.2 years, respectively.

The median age at first delivery was reported as 15.9 years, with 15 years as the modal reported value. Moreover, 96.3% of the females aged 15 or more reported that they had been pregnant at least once, and 95.7% had had at least one live birth by this age. All females aged 10 or more averaged 3.1 living children each, and all females aged 15 or more averaged 3.3 living children each. The

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[6] Ordinarily, sister marriage refers to two or more brothers marrying women who are sisters and living with them in monogamous unions. However, it sometimes happens that one of the brothers marries two or more women who are sisters. Marriage here means any continuous cohabiting relationship. Only one Indian couple in the village had been formally married.

percentage of children ever born who are living was calculated for each adult woman, and the mean was 68.25%.

Among females aged 15 or more, there was an average of 5.5 pregnancies, 5.0 births, and 0.5 abortions. Fifty-nine pregnancies ending in fetal death are included in the *aborta* classification, resulting in a total fetal death rate of 8.5% among pregnancies not in progress in the 1969 census female population. (The definition of fetal death used here includes induced and spontaneous abortion and stillbirths.) Mean complete fertility for all females over age 45 was 7.5.[7]

Reliable information regarding length of postpartum sexual abstinence and lactation was difficult to obtain. Reports varied from immediate resumption of sexual relations after delivery to 6 months' delay. Lactation times were given variously as 9 months to 3 years.

Sterility is uncommon: two women reported that they were sterile, and only five women could be regarded as subfecund by comparison with their peers.

VITAL RATES AND FERTILITY

Forty-one births and 14 deaths were reported as occurring in Paococha during the census year August 1, 1968 through July 31, 1969. Seven of the deaths were among children aged 1 to 14 years, and four were infant deaths under 1 year of age. Two of the infant deaths were neonatal deaths.

On the basis of a census population of 552 as of August 1, 1969, the estimated midyear population (February 1, 1969) was calculated at 538.5. This figure was rounded off to 539 without significant effect on the calculation of vital rates. Using a midyear population of 539, the crude death rate was 26.0 per 1000 and the crude birth rate was 76.1 per 1000, giving a rate of natural increase of 5.01% per year. The calculated doubling time of the population with this rate of natural increase is 14.2 years.

Infant mortality stood at 97.5 per 1000 live births (4/41), with a neonatal mortality rate of 48.8 per 1000. The child mortality rate (1-4 years) was 75 per 1000 and the perinatal mortality rate was 11.4 per 1000 perinatal events (live births plus late fetal deaths). The fetal death rate (fetal deaths per 1000 population) was 5.5 and the fetal death ratio (ratio of fetal deaths to live births) was

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[7] The discrepancy in mean completed fertility numbers between the 1964, 1969, and 1964-1969 cohort number is confusing and not subject to easy explanation. The most probable cause is the likelihood that some elderly women might not remember stillbirths and early infant deaths that occurred some four decades previously. The 1964-1969 cohort data are probably the most accurate, since all subjects were long-time village residents whose children were readily available to provide corrections, and did so in a few instances. The age of the woman at the time of giving birth is used in the computations.

Table I. Total Fertility Rate and Gross Reproduction
Rate for the Census Year 1968-1969, Paococha

Age	N	Male births	Female births	Birth rate	Female birth rate
15-19	21	4	3	.333	.1429
20-24	23	7	8	.652	.3478
25-29	20	7	2	.450	.1000
30-34	16	3	3	.375	.1875
35-39	15	1	2	.200	.1333
40-44	12	0	1	.082	.0833
45-49	4	0	0	.000	.0000
	111	22	19	2.092	.9948
				×5	

Total fertility rate   =   10.460

×5

Gross reproduction rate   =   4.9740

78.2 per 1000. The proportional mortality rate (ratio of the number of deaths of persons 50 years of age or older to total number of deaths) was 7.1 per 100.

Of a total of 127 females aged 15 or over in the total population of 552 as of August 1, 111 were aged between 15 and 49. Of the 111 females in the reproductive age range 13.5% (N = 15) were reported to be pregnant when interviewed. As noted before, the 111 females had experienced 41 births, giving a general fertility rate of .369. The effective fertility ratio was also high, at 1.09, both indices being nearly identical with those recorded in 1964. The total fertility rate, calculated from the sums of the age-specific birth rates, was 10.46, and the gross reproduction rate, based on the application of the proportion of female births to all age-specific births rates, was 4.9740 (Table I).

In order to treat the females in the 1969 census as a 5-year cohort, the total live births to the 111 females in the 15-49 age group were counted. Of 111 females, 108, or 97.3%, had given birth since 1964, for a total of 156 live births, or 31.2 births per year. The 5-year mean general fertility rate (number of live births/number of females aged 15-49) was calculated at 31.2/111 = .284 for the entire group. This assumes continuous fecundity in all age groups of the cohort from 1964 to 1969.

Another and more precise method of determining the 5-year fertility trend is to analyze the experience of individuals living permanently in the village since 1964. Of the 254 individuals enumerated in 1964, 209 were enumerated in the 1969 census[8]: 13 had died and 32 had moved away (Table II). No

[8] This includes the three survivors of the individual who had died just prior to the 1969 census, assuming survival since April 1969 and no reproduction in the wife or daughter of the deceased.

Table II. Census Flow Chart, 1964-1969

Enumerated in 1964	Not Enumerated in 1964

<div align="center">1964</div>

254	Enumerated	115	Not enumerated
−13	Died since 1964	−6	Died since 1964
−32	Moved away — no knowledge of survival or re-production (includes 12 survivors of two who died)		
209	Survivors	109	Survivors
+69	Surviving offspring	+43	Surviving off-spring

$$\begin{Bmatrix} 81 \text{ born} \\ -\underline{12} \text{ died} \end{Bmatrix}$$

$$\begin{Bmatrix} 53 \text{ born} \\ -\underline{10} \text{ died} \end{Bmatrix}$$

69	43
278	152

<div align="center">1969</div>

278
+152

430	Permanent residents enumerated in 1969 census
+122	Immigrants plus offspring enumerated in 1969 census[a]
552	Enumerated in 1969 census[b] (549 = N for computer tabulations)

[a]Profile of immigrants: 90 members of intact family; 25 young men attached to permanent Paococha families; 8 fathers of enumerated 1964 cohort offspring; 6 fathers of unenumerated 1964 cohort offspring; 7 no visible family ties.

[b]Three are survivors of permanent resident who died during census year.

information was available regarding survival or reproduction among the 32 who moved away, including 12 survivors of two of the deceased. Due to this lack of information, 2 of the 13 deaths among the 1964 enumerated cohort are not included in the vital rate calculations for that cohort.

The 220 members of the 1964 enumerated cohort who could be accounted for in 1969 had experienced a total of 81 births since the 1964 census; from these, 69 offspring survived. Excluding the deaths of the two individuals whose survivors had long since moved away, the original 220 had also experienced 11 other deaths, for a total of 23 deaths. The 209 survivors of the 1964 enumerated

cohort plus the 69 surviving offspring left a 1969 population of 278 (Table II). The 5-year average population of the 1964 enumerated cohort was calculated at 243.5. Using this mean 5-year population figure, the 1964 enumerated cohort experienced a crude birth rate of 66.5 per 1000 and a crude death rate of 18.9 per 1000. The calculated rate of natural increase was 4.76%, giving a doubling time of just under 15 years.

Analysis of the fertility experience of these 57 women from the 1964 enumerated cohort who were reported in 1969 to be in the 15-49 age group showed a general fertility rate of .284 and an effective fertility ratio of 1.21. The total fertility rate for this group was 8.191 and the gross reproduction rate was 4.082.

One hundred fifteen individuals present in 1964 were not enumerated then but were accounted for in 1969. Six of these had died by 1969, and the group had had 53 births with 43 offspring surviving to 1969. With a 1964 population of 115 and a 1969 population of 152, the 1964 unenumerated cohort had an average population over the 5 years of 133.5. On the basis of this 5-year mean population figure, it was calculated that the 1964 unenumerated cohort experienced a crude birth rate of 79.4 per 1000 and a crude death rate of 24.0 per 1000. The calculated rate of natural increase for this group since 1964 was 5.54%.

Analysis of the 5-year fertility experience of the 1964 unenumerated cohort revealed a general fertility rate of .354 and an effective fertility ratio of 1.433. The total fertility rate for this group of 30 women aged 15-49 in 1969 was 10.134 and the gross reproduction rate was 4.833.

For a more accurate assessment of the 5-year fertility experience of those living in the village since 1964, the data from both the enumerated and unenu-

Table III. Combined 5-Year Total Fertility Rate and Gross Reproduction Rate for 1964 Enumerated and Unenumerated Cohort

Age	N^a	Male births	Female births	Birth rate	Female birth rate
15-19	20	10	13	1.15	.650
20-24	17	23	19	2.471	1.118
25-29	14	20	7	1.929	.500
30-34	13	10	8	1.385	.615
35-39	10	7	13	2.000	1.300
40-44	4	0	3	.750	.750
45-49	4	1	0	.250	.000
	82	71	63	9.935	4.933

Total fertility rate = 9.935
Gross reproduction rate = 4.933

$^a N$ is average number of women in each age group from 1964 to 1969.

Table IV. Fertility Comparison Chart, Ages 15-49[a]

	CBR	CDR	RONI	GFR	EFR	TFR	GRR	MCF	NRR
Paococha (1964)	84.7	36.3	48.4	.362	1.03	10.065	4.530	9.8	
Paococha (1969)	76.1	26.0	50.1	.369	1.09	10.460	4.974	7.5	
Paococha (5 year)									
1964 enumerated cohort	66.5	18.9	47.6	.284	1.21	8.191	4.082	9.3	
1964 unenumerated cohort	79.4	24.0	55.4	.354	1.43	10.134	4.833		
1964 combined	69.3	20.4	48.9	.305	1.30	9.935	4.933	9.3	
San Antonio, Peru		40.2		.212	1.15				
Hutterites (Eaton, 1953)	45.9	4.4	41.5	.198	.963		4.0036	10.4	3.66
Cocos-Keeling Islanders (Smith, 1960)	57.7	19.9	37.8	.239	.854		4.212	8.4	
Atitecos, Guatemala (Early, 1970)	52.4	23.0	29.4	.232	.950	8.2	4.00	9.2	
Colombia, 1964 (Agualimpia, 1969)	49.3	[14.0]	[35.3][b]	.211	.874	7.7 (8.8)	3.70 (4.20)[c]	6.9	
United States, 1967 (*Vital Statistics of the U.S.*, 1967)	17.8	9.4	8.4	.088		2.573	1.255	2.9	

[a] Definition of terms:

Crude Birth Rate (CBR): $\dfrac{\text{number of live births}}{\text{total midyear population}} \times 1000$

Crude Death Rate (CDR): $\dfrac{\text{number of deaths}}{\text{total midyear population}} \times 1000$

General Fertility Rate (GFR): $\dfrac{\text{number of live births}}{\text{number of females aged 15-49}}$

Rate of Natural Increase (RONI): CBR—CDR

Effective Fertility Ratio (EFR): child/woman ratio, or $\dfrac{\text{number of children under age 5}}{\text{number of females 15-49}}$

Total Fertility Rate (TFR): sum of age-specific birth rates

Gross Reproduction Rate (GRR): sum of age-specific female birth rates

Mean Completed Fertility (MCF): average number of live births among women of completed fertility age 50+

Net Reproduction Rate (NRR): sum of age-specific female survival rates

[b] From Nortman (1969).

[c] Rural rates using ages 15-54.

merated 1964 cohorts were combined in two ways. The first set of calculations excludes the two deceased whose 12 survivors moved away from the village permanently and whose survival and reproduction experience is unknown. The second method includes the two deceased and their survivors and assumes survivorship and no reproduction.

By the first method of calculation, a total of 335 individuals were living in Paococha in 1964. They experienced a total of 134 births and 39 deaths by the time of the 1969 census for a crude birth rate of 69.3, a crude death rate of 20.4, and a rate of natural increase of 4.89%. The general fertility rate for the 87 women aged 15-49 at the time of the 1969 census had been .305 and the effective fertility ratio was 1.30. The total fertility rate for this group, using the average numbers of women in each age group for the 5 years, was 9.935 and the gross reproduction rate was 4.933 (Table III).[9] The second method of calculation, which necessarily excluded many fertility measures due to lack of information, revealed a crude birth rate of 68.7, a crude death rate of 21.2, and a rate of natural increase of 4.75% per year.

It appears that the most reliable set of calculations showing the continuous high fertility of the 1964 cohort over 5 years is the analysis of the combined cohort, which excludes two deceased individuals and their 12 survivors. Comparisons of various results in analyzing the Paococha data are shown in Table IV, along with fertility indices from similar populations which have shown high fertility. It is evident that the Paococha population has the highest indices of fertility in nearly every respect.

CONCLUSION

Assuming that certain fertility control practices, such as infanticide and postpartum sexual abstinence, were common among Shipibos at one time (Weisbard, 1957), they are apparently either not practiced or not effective at the present time. There is little to indicate that the use of herbal contraceptives is effective (Hern, 1976), in spite of other reports to the contrary (Maxwell, 1970).

There appears to be no evidence to support the notion that the use of herbal contraceptives has an important effect (either way) on the overall fertility of the village women. The reputation for effectiveness of herbal contraceptives may stem from their use in a polygynous setting along with prolonged postpartum sexual abstinence. In other words, a statistical association between

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[9]The number of women in each age group from the combined unenumerated and enumerated 1964 cohort at the time of the 1969 census was: 15-19: 19; 20-24: 20; 25-29: 14; 30-34: 13; 35-39: 13; 40-44: 6; 45-49: 2. The total fertility rate and gross reproduction rate calculated with these numbers are lower but probably not as accurate.

herbal contraceptive usage and lower mean parity may simply be a secondary, noncausal association.

Numerous individuals reported a decline in the prevalence of polygyny in the village. Whiting (1964) and Lorimer (1954) indicate that polygyny is common among the more complex preindustrial societies and that there is a close association between polygyny, patrilocality, and a prolonged postpartum sexual taboo. Dorjahn (1958) asserts that the effect of polygyny on females is to lower fertility, although his principal analysis is restricted to the fertility experience of males. Polygyny could have two effects: to lower the number of children per married woman by lengthening birth intervals, and to increase the proportion of women ever married. The former effect would be to decrease individual and overall fertility, and the latter would be to increase overall fertility.

If polygyny does result in lower fertility due to longer birth intervals, the alleged decrease in the prevalence of polygyny in Paococha may have been a factor in reducing the length of postpartum sexual abstinence and therefore birth intervals. This could be the direct consequence of culture change, since the missionaries were reported to have actively discouraged polygyny as well as infanticide. It is difficult to see how the proportion of women ever married in Paococha could be much higher than currently reported.

The early age of cohabitation does not seem to be the result of culture change, since many women in their later reproductive years reported having been *entregada* (betrothed) to their husbands *before* puberty. Sexual activity customarily began shortly after the first menses. Surely the missionaries did not approve of this custom.

It would appear, however, that outside forces of change have played a significant role in producing a suddenly increased rate of population growth in Paococha. The primary factor is probably Western health intervention, bringing about probable declines in both maternal and infant mortality rates. A decreased maternal mortality rate could be extremely significant in a society such as this characterized by early and prolonged parity, almost universal marriage, and high fecundity. It is also possible that social factors may have played an important part if the prevalence of polygyny has declined and, along with it, the length of birth intervals.

The biotic environment has changed also, but this is more difficult to document in detailed fashion. Paococha residents report, however, that game is significantly scarcer than it was 10 or 5 years previously, even in the distant parts of the forest. The people themselves attribute these differences to population pressure: there are more people seeking food, and both animals and fish are taken before maturity. The deforestation not only affects soil conditions but has also reduced wildlife habitat. The people say it is harder to get wild meat, so they must buy chickens and raise rice to pay for them. The flooding river makes the cultivation of cash crops such as rice increasingly possible.

It may be some time before the full effects of the rapid rate of population growth on the social fabric of Paococha and upon the adjacent environment are understood. It may not be possible to understand the effects without considering the context in which they occur: namely, high fertility and rapid environmental destruction in neighboring or even distant communities, some of them Indian, some non-Indian. For the present, there is only the vague feeling of social disruption and an interruption of the tranquillity of the village. There is a clear perception that the fish are smaller and harder to obtain than they were a few years ago, and that it is getting harder to know everyone and to maintain close ties with one's neighbors.

ACKNOWLEDGMENTS

REFERENCES

Agualimpia, C. M., Pabon, A. R., Galan, R. M., Gomez S., L. C., and Gonzalez, L. E. (1969). Demographic facts of Colombia. *Milbank Memorial Fund Quarterly* 47: 255-296.

Buck, A. A., Sasaki, T. T., and Anderson, R. I. (1968). *Health and Disease in Four Peruvian Villages.* Johns Hopkins Press, Baltimore.

Collver, O. A. (1965). *Birth Rates in Latin America.* University of California, Berkeley.

Dorjahn, V. R. (1958). Fertility, polygyny, and their interrelations in Temne society. *American Anthropologist* 60: 838-860.

Early, J. D. (1970). Demographic profile of a Maya community. *Milbank Memorial Fund Quarterly* 48(2): 167-178.

Eaton, J. W., and Mayer, A. J. (1953). The social biology of very high fertility among the Hutterites. *Human Biology* 25: 206-264.

Hern, W. M. (1976). Knowledge and use of herbal contraceptives in a Peruvian Amazon village. *Human Organization* 35: 9-19.

Lathrap, D. W. (1968). The "hunting" economies of the tropical forest zone of South America: An attempt at historical perspective. In Lee, R. B., and DeVore, I. (eds.), *Man the Hunter.* Aldine, Chicago, pp. 23-29.

Lathrap, D. W. (1970). *The Upper Amazon.* Praeger, New York.

Lorimer, F. (1954). *Culture and Human Fertility.* UNESCO, Paris, pp. 58-105; 199-206.

Maxwell, N. (1970). Attitudes of four Peruvian jungle tribes towards plants employed as oral contraceptives. Presented at the 39th International Congress of Americanists, Lima, Peru, August 4, 1970 (mimeo).

Nortman, D. (1969). *Population and Family Planning Programs: A Factbook. Reports on Population/Family Planning,* no. 2. Population Council, New York.

Smith, T. E. (1960). The Cocos-Keeling Islands: A demographic laboratory. *Population Studies* 14: 94-130.

Vital Statistics of the United States, 1967 (1969). Vol. I — *Natality*, Section 1, Tables 1-1,
    1-2, 1-4, p. 13; Table 1-15, p. 1-15; Vol. II — *Mortality*, Part A, Section 1, Table 1-1,
    p. 1-2. U.S. Department of Health, Education and Welfare, Washington, D.C.

Weisbard, S. R. (1957). Indios Shamas de Peru. *Ethnographie* 53: 19-74.

Whiting, J. W. M. (1964). Effects of climate on certain cultural practices. In Goodenough,
    W. M. (ed.), *Explorations in Current Anthropology*. McGraw-Hill, New York.