A Cultural-historical Perspective on the Depressed Fertility among the Matrilineal Moso in Southwest China

by

Chuan-kang Shih, University of Illinois
Mark R. Jenike, Pomona College

Abstract

Family systems exert substantial influence on the demographic processes of populations. The Moso in Southwest China feature an institutionalized visiting sexual system, which differs from marriage, and a grand household system without conjugal units. Moso women enjoy virtually unlimited reproductive autonomy. Based on surveys of 127 Moso households conducted in 1988 and 1989, this paper analyzes the fertility experience of Moso women during the 20th century and the mortality rates of the Moso population in the post-World War II period. Moso fertility patterns are characterized by a late age at first birth (median 23 years), long interbirth intervals (median 3 years), and a high rate of childlessness (16%). We conclude that this pattern of low fertility is an outcome of the unique Moso cultural practices. For the cohorts of Moso women born between 1905 and 1929, pathological sterility caused by STD is likely to have depressed fertility as well.

Keywords: Family systems, anthropological demography, low fertility, sterility, sexual autonomy

A Cultural-historical Perspective on the Depressed Fertility among the Matrilineal Moso in Southwest China

by

Chuan-kang Shih, University of Illinois
Mark R. Jenike, Pomona College

INTRODUCTION

Country-level and regional population statistics can blur the boundaries between cultural groups whose territorial distribution may be neither continuous nor exclusive of other cultural groups. This is especially true of smaller minority populations living in remote regions. Cultural boundaries, however, may be more important than geographical boundaries for shaping population processes, because of the central role of culture in the production of behavior (Hammel, 1990). When significant differences in fertility and mortality exist between cultural groups that are either contiguous or co-resident in the same territory, differences in cultural practices, history, and status may underlie differences in population processes. Exploring the linkages between these variables and population processes leads to a more complete model of the determinants of fertility and mortality in populations.

The family system of a population has been identified as the utmost important cultural factor that influences the outcome of demographic processes. G. William Skinner argues against the idea that fertility was generally uncontrolled prior to the onset of modernity. "It is time," he suggests, " to discard these parochial notions and entertain the likelihood that family planning has been present in one form or another in most societies and throughout human history" (Skinner, 1997, p. 68). Based on a comparative analysis of the demographic processes in the agrarian societies in the vast Eurasian area, Skinner demonstrates that disregarding a population's level of "modernity," its family-system norms would exert substantial impact of the configuration and size of offspring sets. He further suggests that "sound demographic analysis must attend to the peculiarities of family systems" (Skinner, 1997, p. 53).

The Moso, a matrilineal group living in Southwest China, were largely unaffected by the influence of modernity until most recently. Yet they have been distinguished from their Pumi, Han, Naxi, Yi, and other neighbors by a lower rate of population growth. Because lowering China's rate of population growth has been a most important goal of the national government

since 1971, the Moso have been viewed positively by government officials in the county in which they live (Shih, 1993). Local officials have attributed the difference in population growth rates between the Moso and the Han majority to important cultural differences between these two groups. While the Han are known for their long tradition of a patrilineal grand family system in which the patriarch wields authority, the Moso feature a pattern of institutionalized visiting sexual union and a system of matrilineal grand household without conjugal units, in which women are situated at the center and enjoy virtually unlimited reproductive autonomy.

Despite being the subjects of intense ethnographic and sociological interest over the past two decades (Zhan, et al. 1980; Yan and Song, 1983; Shih, 1993; Weng, 1993; Knödel, 1995; Guo, 1997; Cai, 1997; Oppitz and Hsu, 1998) and despite their conspicuously low achieved fertility in a historically high fertility country, there has been no systematic study of Moso demography. In this paper, we describe the fertility experience of Moso women during the 20th century and the mortality rates of the Moso population in the post-World War II period using government vital statistics, vital statistics derived from household surveys conducted by Shih in 1988 and 1989, and ethnographic data gathered by Shih during field trips spanning from 1987 to 2000. We consider these in light of the Moso family system, the tumultuous history of this area of the People's Republic of China and the higher fertility and higher mortality experienced by the population of Ninlang county as a whole.

THE MOSO AND THEIR FAMILY SYSTEM

The Moso live on the highland near the upper reaches of Jinsha River in Southwest China. By the end of the 1980's, the Moso had a population of about 40,000, mainly distributed in Ninglang County of Yunnan Province and Yanyuan, Muli and Yanbian Counties in Sichuan Province (NLYZZZXZBJWYH, 1993). Most of the 15,000 Moso who live in Ninglang County are concentrated in what are now Yongning *xiang* and Labo *xiang*, or what we call the greater Yongning area.[1] Yongning basin, the center of Moso culture for centuries, was ethnically homogeneous until just a few decades ago. Today, however, the officially registered residents

[1]During the Ming and Qing Dynasties, the greater Yongning area was under the jurisdiction of *Yongning tu zhifu* or "the aboriginal prefect of Yongning." During the Maoist era, the area was divided into the Yongning People's Commune and the Labo People's Commune. The two People's communes were combined into Yongning District after the abolition of the People's Commune system in 1984. In

represent eight ethnic groups. In spite of the change, the Moso are still by far the dominant group in this area. According to the latest official statistics, by December 31, 1999, the Moso in the greater Yongning area numbered 10,749,[2] accounting for 36.9% of the total population of 29,112[3] of the eight ethnic groups.

Yongning proper, the center of Moso culture, is a basin of 41.23 square kilometers at an elevation of 2,650 meters, surrounded by mountains up to 4,332 meters above the sea level. Next to the basin is Lake Lugu, a plateau lake of 48.45 square meters straddling the Yunnan-Sichuan border (figures quoted from NLYZZZXZBJWYH, 1993; YNSCHJ, 1980). Rivers crisscross the basin area. The microclimate is fairly genial to farming. The Moso have long since developed irrigation agriculture and effective fishing techiniques. Their cultivars in recent decades include rice, corn, wheat, potato, highland barley, buckwheat, oats, barnyard millet, as well as a variety of beans and vegetables. Animal husbandry, the means of subsistence inherited from ancestors, has become a rather insignificant sideline.

The most conspicuous feature of Moso society is a duolocal visiting sexual system called *tisese* (pronounced approximately “tea-say-say”), literally meaning “walking back and forth,” which differs from marriage in that it is noncontractual, nonobligatory, and nonexclusive. A hefty majority of Moso adults practice *tisese* instead of marriage to fulfil their social and biological needs associated with sexuality. As the term suggests, the relationship normally does not involve cohabitation. The common practice is for the two partners to work and eat in their own matrilineal households. The man visits the woman, stays with her overnight, and goes back to his own household the next morning. The only prerequisite is a mutual agreement between the man and the woman to allow sexual access to each other. No ceremony, social recognition, or exchange of prestations is required to initiate or terminate a *tisese* relationship. Although it is not unusual for the man to help the woman's household in agricultural busy seasons, it is not a requirement. In principle, the relationship does not affect the partners' socioeconomic status and does not commit them to an exclusive or enduring union. Children born to such a union belong to the household in which they were born, usually the mother's household. Under no circumstances is a child considered illegitimate (Shih, 1993, Under review).

December, 1987, Yongning District was divided into Yongning *xiang* and Labo *xiang*.

[2]With 6,661 in Yongning and 4,082 in Labo.

As both cause and effect of *tisese*, most Moso live in grand households without any conjugal units. Such a grand household usually consists of three to four generations of matrilineal blood relatives. Members include mother's mother and her siblings; mother and her siblings, and the children of mother's mother's sisters; ego and ego's siblings, and mother's sisters' children; and the children of the female members of ego's generation, etc. In a typical Moso household, female adult members receive their male visitors at home, while male members go out to visit their female partners in their homes. The household economy is managed and supervised by the household head, who can be either a woman or a man. Property is collectively inherited and owned by all the members of the household (Shih, 1993). As a result, in contrast to most other societies, for the Moso it is the number and gender of the entire group of children born to co-resident sisters that is significant, not the size and configuration of any individual woman's offspring set. For purposes of managing agricultural production, a reasonably balanced gender composition in each generation is desirable. In addition, the first girl in a generation receives some special consideration, since she is the first warranty for the continuity of the hearth. A household would be concerned if not even a single daughter had been born to any of its child-bearing age females.

For the Moso, as with many other populations, fertility is, in part, a means to meet culturally conditioned social goals. Greenhalgh's (1988) cogent analysis reveals how the size and composition of offspring sets were carefully regulated in traditional Chinese society to meet the challenge of social mobility. In the household-oriented traditional Moso society, class status was inherited on a household basis and household membership was the only social affiliation throughout one's life for most people (Shih, 2000). While social mobility was therefore minimal in traditional Moso society, fertility nevertheless played an extremely important role in achieving a culturally conditioned social goal. This goal was household harmony, which requires an optimal number of members distributed across the two genders and over several generations**.**

The Moso household system provides some advantages in achieving these reproductive goals. Among the Han Chinese in the area, every couple is obliged to bear at least one son and quite often several unwanted daughters before the desired son is born. In contrast, Moso sisters' reproduction is complementary, each contributing to the same unitary household generation.

---

[3]With 18,296 in Yongning and 10,816 in Labo.

Therefore, once household continuity has been guaranteed by the birth of at least one daughter and two or three additional children to any of a group of co-resident sisters, especially if the gender composition is balanced, a household would grow less interested in having additional births. Women of childbearing age would instead be concerned with birth control. The pro-natalist pressure experienced by each individual Han woman is therefore completely absent for many later-born Moso women and much reduced for earlier born Moso women since no one individual woman bears responsibility for achieving household reproductive goals. If reproduction should exceed the ideal goal, the household would always divide before the internal household tension engendered by population growth reached the critical point. Division is the last stitch to save household harmony, and is considered by the whole society as a shame, or an indication of failing to live up to the cultural ideal. The reproduction of new members, therefore, plays an important role in maintaining the continued optimal operation of the household.

In a Moso household, only female members bear the responsibility of reproduction. A male member's interest in the next generation lies with his sisters' children rather than his own. He is responsible for helping to raise his sisters' children. They, in turn are collectively responsible for providing for him during his old age, as well as for any other members of his generation. Any children he may beget are members of their mother's household, and are not associated with him in any institutionalized sense. Alongside this responsibility, and representing perhaps the only case known to anthropology, Moso women have enjoyed virtually total autonomy over their sexuality and procreativity. Neither a woman's brother nor her mother's brother has a say in her sex-related decisions and activities. On the other hand, the flexibility of *tisese* determines that her partner does not have any more control over their relationship than she does, and normally children are considered as property of the mother's household but not the father's (Shih, 1993). With this important condition, the only constraint that would affect a Moso woman's decision to have or not to have children is the consideration of upholding harmony of the household in which she shares the central position with her mothers[4] and sisters. By examining the timing, size, composition, and discourse of household division, we find that household harmony is not only the highest value that defines the meaning of life for the Moso, but also the ultimate principle that regulates both their domestic and demographic processes.

[4] In Moso kinship terminology, the term for mother's sister is the same as that for mother, that is, *emi*.

LOCAL HISTORY, NATIONAL POLITICS AND DEMOGRAPHIC PROCESS, 1920-1961

Before the twentieth century, the Moso were self-sufficient and, except for occasional skirmishes and wars with some neighboring groups, had little interaction with the larger society. This relatively isolated situation remained until the late 1920s and early 1930s when the militant Yi in the adjacent mountains started to fund their acquisition of arms and ammunition by selling self-produced opium. Yongning became a center for the trade in Yi opium between the Cool Mountains and Tibet, and for the trade in other goods from Tibet to Lijiang and other parts of Yunnan. Local people, including the Chief's family and other aristocrats as well as commoners, were also involved in the long distance trading. Horse trains came in and out of Yongning basin during most parts of the year.

The People's Government of Ninglang County was established as early as 1950 and Yongning was chosen as the first county seat. During the first few years, however, the Moso community was not fully incorporated into the Chinese communist system and their style of life was basically unaffected. The former de facto Moso administrative power holder was appointed vice magistrate (*fu xianzhang*) of the county People's Government and local political structure was not immediately disturbed. The trajectories of Moso demographic processes in these few years also reflect an extension of the conditions in the traditional society (see results below). This situation, however, was fundamentally changed in 1956 when the Ninglang Yi Autonomous County was established[5] and the Democratic Reform with Peaceful Consultation was implemented. The first important strategic step taken by the government was to convert the traditional Moso society into a new society. Guided by the communist ideology, it was to uproot the old political system. "Work Groups" of the Communist Party were sent to villages to recruit activists and mobilize the villagers. Members of the upper class in the old system were severely criticized and denounced at public meetings; their properties forfeited; and many of them were arrested and jailed in prisons near the prefecture seat and provincial capital. The whole community was then classified into 7 classes (hired hand, poor peasant, lower middle peasant, middle peasant, upper middle peasant, rich peasant, and landlord) according to each household's

[5] Before the establishment of the Ninglang Yi Autonomous County, the title of the county government was changed into the National Democratic Coalition Government of Ninglang County in 1951. The county seat was moved from Yongning to the current seat Daxing Zhen in 1953.

economic standing during the period 1947-1949. Social prestige associated with economic standing was downright reversed. The lowest social stratum became the new elite and former land and serf owners became the "target of dictatorship" (*zhuanzheng duixiang*). In the wake of the Democratic Reform, Communist Party organizations were established at the basic level in 1957. From then on, every directive from the upper power centers would be carried out to the letter in every Moso village.

An unprecedented assault on the Moso family system came in 1958 when the Moso were told for the first time that *tisese* was "a primitive and backward form of marriage" and that it was shameful for all adult children to remain in mother's household. In the new society, the Moso were edified, monogamy should be the norm and the man and the woman who form a sexual union should live under one roof. All those who had any visiting relationships were asked to pin down their partnership and get properly married by going through a wedding ceremony. Day after day, collective wedding ceremonies were held for couples of all ages, often with grandchildren watching their grandmothers getting married.

In the same year, the Great Leap Forward movement, a radical nationwide project aimed at revolutionizing China's low economic productivity, was launched. All villages in the Yongning basin area were organized into a people's commune. "Great Eating Halls" (*da shitang*) were set up to take the place of household stoves. All villagers, old and young, ate at the eating halls free of charge. Family or household lost its function as an economic corporation. At first everyone could eat as much as he or she would like. The utopian heyday, however, lasted only a few months before the food reserve was depleted. Rationing ensued, then starvation. All able-bodied villagers were mobilized. Many were sent to build roads, others were engaged in the "Great Campaign of Making Steel, Iron, and Copper." A working day normally lasted over 18 hours and it was not unusual that months went by without a break. The workers ate at the eating halls and slept at the work site. Family life no longer existed. Many people did not return to their households for months. Household as the building block of Moso society was virtually destroyed. Even kitchen utensils were totally taken away from each household, either to be used in the great eating halls, or to be melted in an attempt to make steel, iron, or copper. Since available labor powers were fully engaged in building roads and making metals, often away from home, agricultural work was neglected and crops were left to rot in the field. As 1959 commenced,

starvation began to take its toll. An increasing number of people suffered from malnutrition and edema. Many died of starvation. Due to dearth, social stress, and disorientation of the family, 1960 witnessed the highest death rate and lowest population growth in Moso history. The way of life that the Moso were used to became a memory of the past. A Moso cadre recalled in an interview with Shih in 1997,

> "In those years life was so busy and stressful that even without the government's opposition it was impossible to keep a visiting relationship. People did not even live at home. The family organization was basically disintegrated. 1960 and 1961 were the worst years. Many people, particularly the landlords, rich peasants and those who had a big appetite, were starved to death. Very few children were born in those years. Traditionally, we Moso take very good care of pregnant women. Throughout their pregnancies we let them eat eggs, fermented glutinous rice, black sugar, honey, and chicken. They would stop working three months before delivery and would rest for another three months after the baby was born. During the Great Leap Forward, however, all these were impossible. In my village, only two children were born in those three or four years."

METHODS

Crude birth rates (CBR) and crude death rates (CDR) for Ninglang county come from *Ninglang Yizu Zizhixian Zhi* (*Gazetteer of Ninglang Yi Autonomous County*, NLYZZZXZBJWYH 1993:121-122). The rates are based on the yearly total population of the whole county during the period 1949-1990 (81,975 in 1949 and 200,560 in 1990). Data from the last two years are excluded from our analysis because our complete yearly Moso data end in 1988 (Shih's household survey was finished in mid 1989).

Crude birth and death rates for Moso for the years 1949-1989 are based on a sample of 1492 individuals born between 1860 and 1988. The sample includes all the current and former members of the 127 households in the 4 villages in which Shih conducted comprehensive household surveys in the Yongning basin in 1988 and 1989. Former members were either dead or emigrated ex-members of the household according to the memory of the current members. The dates of demographic events were recorded as calendar years only. Of the 1492 individuals, 162

had unknown birth and death dates and were excluded from the sample. Circumstantial evidence such as the birth dates of their siblings or children suggest that all these individuals were likely to have been born before 1949. Therefore their births would not affect the numerator of the crude birth rates. However, to the extent that any of them lived past 1949, they should be included in the denominator and their deaths should be included in the calculation of the CDR. We believe, however, that most of them died before 1949 as well. Hence their exclusion may result in a slight overestimation of CBR and cause errors of both overestimation and underestimation in CDR, but we feel that the error is slight.

In addition, there are 61 individuals with known birth dates and unknown death dates. All of these individuals were born before 1929, 29 of them before 1900. They were also excluded from the analysis. Their exclusion results in the same types of potential error as discussed for those with missing birth and death dates. In this case the potential is greater however, since a considerable number might have lived past 1949. However, as the focus of our discussion here is fertility, we are not overly concerned. The effect on CBR will only be on the denominator. Our population size in 1949 is 495 individuals and grows to 958 by 1989. Therefore, if all 61 individuals survived through 1989, our CBR would overestimate the actual crude birth rates by 12% (23.7 instead of 21.2) for the period 1950-1954 and by 6% (15.2 instead of 14.3) for the period 1985-1989. In reality, the degree of overestimation must be significantly lower than these upper bounds since these 61 individuals must have died so long before the dates of census (1988-1989) that their death dates had been obliterated from their relatives' memory. Particularly by the end of our period of interest, the amount of error is probably negligible.

Finally, there are 18 individuals with known death dates and unknown birth dates. Of these individuals, 4 died prior to 1949 and were excluded from analysis. The other 14 were added to the starting population in 1949. Our total sample includes 42,451 person-years from 1,264 individuals. In order to smooth the data for graphic presentation, we calculated a five year moving average (du Toit *et al*., 1986) for both the Moso and the Ninglang county populations.

Period and cohort fertility rates are based on the experience of women from the same sample of 1492 individuals, of whom 756 were female. All women with unknown birth dates were excluded from these analyses. The fertility experience of women who died prior to reaching the end of their reproductive career was included in the calculation of age-specific fertility rates,

while the entire fertility records of women who gave birth on unknown dates were excluded. Analyses of completed fertility, age at first birth, age at last birth, and interbirth interval are based on reproductive histories of the 176 women with known dates of birth who survived to the age of 50 prior to the end of the census in 1989. Only closed birth intervals for which both the beginning and end dates were known were used in analyses of interbirth intervals.

All statistical analyses were carried out using SAS v. 6.12 (SAS Institute, Cary, NC).

RESULTS

Figure 1 shows the CBR and CDR for the Yongning Moso and for Ninlang county as a whole during the period 1949-1987. The trajectories of CBR and CDR for the Moso are strikingly similar to those for the county and remain substantially below the county levels for virtually the entire period. The Moso advantage in CDR is particularly significant up through 1957-58. The crude rates of natural increase in each population (see Fig. 2) closely parallel each other throughout the entire period, with the Moso rate higher than the county rate through 1959 and predominantly lower than the county level after 1959, when the combination of a rising Moso death rate and a falling county death rate more than compensated for the consistently lower fertility rates of the Moso.

The age specific fertility rates and the total fertility rates for these years are presented in Table I. Results are based on a sample of women between 12 and 50 years of age and ranging in number from 184 in 1949 to 295 in 1988. There were 744 births to these women during that time period. Rates were calculated separately for the periods 1949-1955, 1956-1961, 1962-1969, and 1970-1988, in order to reveal the effects of significant changes in the underlying fertility conditions to which the Moso were exposed. The period 1956-1961 was singled out because of the hardships associated with the Great Leap Forward. Nineteen sixty-two through 1969 were years of stable and relatively high fertility among the Moso according to the crude birth rate (see Fig. 1), while 1970-1988 saw a steady decline in the Moso crude birth rate. Table I shows that total fertility during the highest fertility period (1962-1969) is almost double that for the preceeding two periods (1949-1961). The total fertility rate remains near this peak level for the final period, 1970-1988. The age-specific fertility curves (see Fig. 3) for the first two periods are very similar while those for the latter two periods showed substantial increases in fertility during

the prime child-bearing years of 20-40. The latter period (1970-1988) shows greater relative increases in the 15-19 and 40-44 year age groups and smaller increases between the ages of 30-40.

Table II presents the completed fertility for all 176 Moso women who both reached the age of 50 prior to the census (1989) and have a known birth date. Their birthyears range from 1866 through 1939. Twenty-eight or approximately 16%, of the women in the sample are childless. The remaining 148 women gave birth to a total of 559 children. Among these women, 20% had only one child, 36% had two or fewer children, 52% had three or fewer children, and 34% had five or more children. The median completed fertility of the entire sample is 3.0 births. There are, however, important differences between the completed fertilities of individual 5-year birth cohorts. Figure 4 shows the median completed fertility, percent nulliparous at age 50 and percent nulliparous or primiparous at age 50 for the 5-year cohorts represented in Table II. Beginning with the cohort born between 1900 and 1904 there is an increase in the percent nulliparous and percent primiparous, as well as a decrease in median parity, from the previous cohort. This trend continues with peak levels of terminal nulliparity or primiparity in the cohorts born from 1905 through 1929, peak levels of terminal nulliparity in the cohorts born from 1910 through 1929, and significantly ($p<.001$, Kolmogorov-Smirnov two sample test) lower completed fertility for the cohorts born from 1905 through 1929. Median completed fertility more than doubles from the 1925-29 cohort to the 1930-34 cohort while the percent nulliparous drops by more than one half.

Table III presents the median ages at first and last birth, as well as the median interbirth interval for each of these cohorts. As seen in Figure 5, while the median age at first birth is relatively constant for the whole period, the median age at last birth is significantly lower for the cohorts born between 1905 and 1924 ($p<.01$, Kolmogorov-Smirnov two sample test), years of low completed fertility and peak percentages of terminal nulliparity or primiparity. Two of these low fertility and high nulliparity and primiparity cohorts (1910-1914, 1915-1919) show the longest median interbirth intervals (5.0 and 4.5 years respectively) during the study period. However, others (1905-1909, 1920-1924) have the shortest median interbirth intervals (3.0 years) observed.

DISCUSSION

Changes in birth and death rates between 1949 and 1988 clearly show that the demographic processes of the Moso and of the county as a whole were sensitive to the impact of the nationwide political movements during the period under consideration. The Moso, however, were especially susceptible to these political movements owing to their unusual family system and the attempts by the government to convert the system into a "normal" one. Compared with population changes at the county level, the Moso population consistently featured lower fertility and lower mortality during the period described. However, the Moso advantage in CDR eroded during the period of study. Except for brief interruptions from 1957 to 1961 and 1965-1967, CDR at the county level dropped steadily throughout the study period (from 26 per thousand in 1949 to 7 per thousand in 1988). At the same time the trajectory of the Moso CDR assumes a rising trend from the beginning, surging between 1956 and 1960 - the radical period of the Great Leap Forward. Though it declines sharply from 1960-65, it never again drops back to its level in 1949 (4.1 per thousand in 1949). As the CDR at the county level kept dropping, the Moso CDR surpassed the county rate in the first few years of the 1980s.

The rising death rate among the Moso around the Great Leap Forward, as much as the falling CBR, can be explained with the assault on their family system. The same Moso cadre who provided the above quoted information summarized eight advantages of the Moso family system. A theme running through several of his points is that the family, or a matrilineal grand household, is a warm, harmonious and reliable network of security for every member from birth to death. In traditional times no one ever had to leave the household he or she was born to, except those young men who cherished the ambition to get a Buddhist degree from Lhasa. Based in such households, Moso society knew no orphans, widows, widowers, or helpless seniors. Everyone was cared for and felt secure both in terms of psychological and material needs. Shih's household survey reveals that, even at the turn of the 20th century, a good number of individuals lived into advanced ages. When the household was torn apart during the Great Leap Forward, all the advantages were suddenly gone and the Moso found themselves exceptionally vulnerable in confronting drastic change. From the perspective of demographic processes, the Moso sustained much greater damage from the political radicalism than the county as a whole. They were also less well positioned to benefit from the well-known advancements in rural health care that the

PRC has achieved.

The temporal and age-specific pattern of Moso women's reproductive behavior must also be considered in the context of *tisese*, the family system as a whole, and historical events prior to 1949. The fertility experience of the post-reproductive women in our sample shows that low Moso fertility results from a combination of late age at first birth, long interbirth intervals, early cessation of reproduction, and high rates of both nulliparity and primiparity among post-menopausal women. The median age at first birth for Moso women is 23 years, in spite of the fact that it is usual for Moso girls to become sexually active by the age of 17. There are several possible explanations for this lack of correspondence between sexual activity and fertility among the Moso.

First, although sexual activity begins during a girl's middle teen years, her first relationships tend to be experimental and short in duration. On the one hand, the inexperienced girl needs time to get used to sex life. On the other, the noncontractual, nonobligatory, and nonexclusive nature of *tisese* allows her to take her time. Unlike spouses in a marital relationship who live together and are usually obliged to answer each other's (more often the husband's) sexual advance, a Moso girl enjoys total autonomy over her sexuality. She is under no obligation to provide sexual service to anyone. She engages in sexual activity only when she likes it. Most importantly, she is under no pressure to bear children for her sexual partner(s). Consequently, the frequency of coitus in the early years of a Moso girl's sex life may be so low that conception is less likely. Second, as discussed above, Moso cultural practices act to reduce desired fertility of women in several ways. The kinship system makes no distinction between a female household member's children and her sisters' children, allowing the optimal size of offspring sets to be achieved through conscious coordination of sisters. In addition, the ideal reproductive output for the entire matrilineal household is relatively limited. A certain number of children with a balanced sex ratio is needed to perpetuate household continuity and prosperity. On the other hand, too many children by several sisters are practically perceived as a potential threat to household harmony. By far the most important goal for Moso households is to have a female heir. Once this goal is achieved, the pressure on the sisters to have children is relaxed. Therefore, this pressure is usually felt only by the eldest girl in her generation. We propose, therefore that this structural element, combined with the above explained reproductive autonomy, seems to be responsible for

the low fertility of Moso women in their early child-bearing years. It is also possible that among the Moso the typically 1-3 year period of adolescent subfecundity extends into the early 20s, the years of highest fertility in most natural fertility populations (Wood, 1994). This seems plausible since Moso girls report a later menarche than most other populations.[6] The Gainj swidden horticulturists from highland Papua New Guinea have an even later age at first birth (median 25.7 years) which has been ascribed tentatively to a combination of late age at menarche, late age at marriage, prolonged adolescent subfecundity, and irregular coitus early in marriages (Wood, 1994).

The 3 year median interbirth interval among the Moso is comparable to other low fertility, natural fertility populations, but long by the standards of most other populations (Wood, 1994). We believe that these relatively long interbirth intervals are most likely to result from a combination of lactational infecundability and previously described Moso cultural practices that foster a desire for reproductive restraint and empower women with the sexual autonomy necessary to achieve it. Moso women typically nurse their babies until the age of two or three and practice on-demand nursing around the clock, with mothers and infants in constant close proximity. Moreover, should the lactation period of one sister overlap with that of another, each sister would not only feed her own child, but her sister's as well. This common practice among the Moso tends to prolong a woman's lactation period. Intensive and prolonged lactation has been linked to fertility depression in other populations. (Wood, 1994; Wood *et al*., 1985; Konner and Worthman, 1980; Gray, 1994).

The absence of marriage and the sexual autonomy of women may also contribute to long interbirth intervals. Interbirth intervals allow mothers to recover from the physical and emotional stresses of pregnancy, birth and lactation. The stress imposed on fathers is very much less and recovery correspondingly less lengthy and significant. Therefore, *ceterus paribus*, males should desire shorter interbirth intervals than females. In a marriage system, a man's legitimate fertility is limited to that of his wife or wives. Male fertility desires may create pressure on wives to shorten interbirth intervals to less than the length that their wives would otherwise desire. Among the Moso, male fertility is not constrained by marriage and neither do men have an

[6.] Shih's field work reveals that for the majority of Moso girls menarche does not occur until they are seventeen or older (Shih, 1993).

explicit or implicit right to make demands on the potential fertility of women, a right that is contained in the marriage contract in other cultures (Holy, 1996; Goodenough, 1980; Lewis, 1976). Instead, women have the autonomy to achieve their own fertility goals and those of their natal household. These may include a slower pace of reproduction with longer interbirth intervals that allow for fuller recovery from the stress of gestating, delivering, and raising the previous infant.

Both early cessation of reproduction and high rates of terminal nulliparity and primiparity may stem from an earlier than expected onset of infertility among older women. Figure 4 shows that completed fertility is particularly reduced for the cohorts born between 1905 and 1929. For these cohorts, the combination of a low completed fertility, a high percentage of women with no more than one birth (see Fig. 4), and an early age at last birth (see Fig. 5) are consistent with the presence of pathological sterility for some members of the population. Pelvic inflammatory disease (PID), in particular, is known to cause pre-menopausal sterility (Weström and Mårdh, 1983; Belsey, 1983). It is most often secondary to repeated infections with sexually transmitted diseases (STDs), especially gonorrhea and chlamydia (Muir and Belsey, 1980; Mårdh *et al*., 1983). The proposition that PID-induced infertility may have affected Moso women born between 1905 and 1929 is consistent with ethnographic data (described below) concerning the spread of STD in the Moso region. Similar patterns of pathological infertility have been documented in numerous populations in Africa, Oceania, South Asia, and elsewhere (Belsey, 1983; Muir and Belsey, 1980; Frank, 1983; Howell, 1979; Wiley, 1998; Caldwell and Caldwell, 1983; Bailey and Aunger, 1995; Pennington and Harpending, 1991). In previously described cases, the onset of epidemics of STD induced infertility often corresponded with a disruption to the population, such as the opening of a new trade route, or occupation by an invading or colonial power (Muir and Belsey, 1980; Frank, 1983; Caldwell and Caldwell, 1983; Bailey and Aunger, 1995).

During Shih's dissertation fieldwork from 1987 to 1989, some of his informants who had personal interactions with Joseph Rock told him that the legendary *luo boshi* ("Dr. Rock")[7] used

[7.] For details about life and career of the Austrian born American self-taught batonist-turned-ethnologist, see Aris,1992; Luosangyishi and Ma, 1995; Sutton, 1974, 1982, 1992. The most well-known work on this part of China by Rock is the two volume *The Ancient Na-Khi Kingdom of Southwest China* published by Harvard University Press in 1947.

to distribute penicillin in the 1940s for free among those Moso who had become infected with syphilis. As the topic was considered too sensitive by the end of the 1980s and Shih was not confident enough about his working relationship with his subjects, he did not seek to gather any information on the topic of STD. During his summer fieldwork in the year 2000, however, opportunity offered itself to Shih. During a long casual chat with an old friend by a fish pond on a quiet afternoon, the topic of STD faded in from an earlier topic about the crime rate in America. Shih's friend reflected upon the local conditions and offered the following information:

> "Syphilis was most epidemic (in this area) in the late 1940s. It was never heard of among the previous generations. Perhaps it came to this area in the 1930s. It was called *yang mu chuang* (literally "foreign female sore") at that time. The term was a transliteration from three Chinese words. There is no term in Naru (the Moso language) for this disease. It was said that the disease was introduced to China by foreign women and hence the term. In his area most of those who have collapsed noses had suffered from the disease. When the symptoms became visible, the patient would be discriminated against. Every household would admonish their young members in their late teens and early twenties not to have any contact with the infected person. In 1957 or 1958, the government sent medical teams to take blood samples from every adult and child. So far as I can remember, ... (names of fellow villagers) in our village were tested positive even though they did not show any symptom. They were treated by the medical team and their conditions were cured. Since 1958 or 1959, I have never heard any incidence of syphilis again."

Although the prevalence of STD in the later decades of the first half of the twentieth century in the Yongning area is hardly a secret, the above quotation is the only substantial testimony that we have heard directly from any local source. From the perspective of a local witness, this piece of information not only verifies the historical presence of syphilis in Yongning, but also provides the local perception of and reaction to this disease. Even without any definite figures, this piece of information gives us a clear sense of the extent of the epidemic by referring to the 100% blood sample test by the government medical teams, the collapsed nose as a sequela of syphilis and to the informant's fellow villagers who were tested positive in 1958**.** All the information in this

quotation is consistent with and complimentary to the brief records about STD in this area in the official Ninglang county gazetteer (NLYZZZXZBJWYH, 1993). What we find the most illuminating and reassuring in this piece of information, however, is the time line provided by this local witness, which is perfectly consistent with the period of particularly depressed fertility, and with our knowledge about the local history of interaction with the larger society.

Among the Moso it is the cohort of 1905 that gives first evidence of a very high rate of terminal nulliparity or primiparity. The women in this cohort would have begun to be sexually active in the early 1920s and would have given birth to their first child, on average, between 1928 and 1934. This period, as we noted earlier, coincides with the transformation of Yongning into an opium trade and distribution center by the neighboring Yi and Tibetans. Tibetan traders came in and out of Yongning in large numbers. An informant told Shih:

> "When I was young my household often received Tibetan opium traders with over a thousand horses. The opium was wrapped with large leaves and the dried leaves needed to be replaced. My *eyi* (mother's mother) used to gather the replaced leaves and scrape opium from them. Sometimes she could scrape one *liang* (50 grams) opium in a single day."

In between long and difficult treks in the high mountains, the traders would stay in Yongning for some time, resting or waiting for their goods to arrive or to sell. It was not uncommon for the cash loaded traders to take advantage of *tisese*. This was the first time in history that the Moso had frequent visitors from the outside on a considerable scale. As the above quoted information indicates, this period was also the onset of the syphilis epidemic. We therefore suggest that the depressed fertility of Moso women born after 1904 was due, in part, to pathological sterility in a significant portion of the population.

The hardships and consequent low fertility during the years of the Great Leap Forward (1957-1961) probably shortened the reproductive careers of some Moso women who might otherwise have given birth to their last child during those years. That disruption, however, cannot fully account for the pattern of early reproductive cessation that we see in the 1905-1924 cohort. Women of that cohort would have ranged from 33 to 56 years of age during the years 1957-1961, meaning that the termination of reproduction through menopause would have occurred prior to the Great Leap Forward for women born early in the cohort, while those born

late in the cohort would have been young enough after those years to continue reproducing for some time.

The conditions that led to low fertility seemed to have reversed themselves for the cohorts born after 1929. This would correspond temporally to the retreat of pathological sterility in other parts of the world (Bailey and Aunger, 1995; Caldwell and Caldwell, 1983) and may be due to the introduction of antibiotic treatment for venereal disease in the period after WWII. The Sanitation and Antiepidemic Station of Ninglang County was established in 1956. According to the gazetteer of Ninglang County published in 1993, in 1958, two years after the opening of the Sanitation and Antiepidemic Station (SAS), a health care team in charge of prevention and control of STDs was sent by the Yunnan Provincial Department of Public Health to Ninglang. The team conducted investigation and offered treatment to patients free of charge. Throughout the county, the team found 487 cases of STD (syphilis and gonorrhea) and treated all of them (NLYZZZXZBJWYH, 1993, pp. 24, 587).

At that time (1958), the cohort born between 1930 and 1934, whose fertility patterns suggest the retreat of pathological sterility, would have been between 24 and 28 years old. There are several reasons to believe that the availability of effective treatment for STDs might have prevented sterility in women as old as 24 to 28 years. First, since only a segment of the male population may have been both infected and infectious, initial infection may not occur before a woman has had the chance to have multiple sex partners. Second, younger males (the most likely sex partners for younger females) would be less likely to be infected themselves and therefore less likely to pass an infection to their partners. Third, the risk of infertility is highest only after repeated episodes of PID (Muir and Belsey, 1980; Weström and Mårdh, 1983). The median age at last birth begins to rise with the preceding cohort (1925-1929, see Fig. 5), suggesting that the potential fertility of some of the women who were between 29 and 33 years of age in 1958 was also rescued by the actions of the government health care team in 1958. The high rate of terminal nulliparity in that cohort suggests that for others the treatment came too late.

In 1980, the county SAS conducted a sample in some mountainous villages in the greater Yongning area and found 60 people infected with STD. Of those 22 were treated. In 1981, a follow-up check was conducted for all those who were infected. Most had been cured. In 1987, seven cases of gonorrhea were found and all the patients have been treated

(NLYZZZXZBJWYH, 1993, pp. 24, 587). It should be noted that an inflammatory response to STD can also cause sterility in males (Wood, 1994). This phenomenon is less well studied, but male sterility could also be a contributing factor in the Moso case. The lack of reliable fertility data for Moso males prevents further investigation of this possibility.

One additional underlying cause of early reproductive cessation among the Moso may be celibacy. During Shih's household survey, some Moso men and women were reported as having practiced celibacy. Those data may represent response bias, memory error, or correct historical reality. Unfortunately, in designing our database, we failed to include a field indicating celibacy and so are unable at present to discuss its frequency and significance for the fertility of the population.

CONCLUSION

Moso are a distinct cultural minority population living among culture groups characterized by higher fertility, higher mortality, and higher population growth during most of this century. The Moso pattern of low fertility is characterized by a late age at first reproduction, long interbirth intervals, and early reproductive cessation. During the past century, the cohort born between 1905 and 1929 experienced particularly high rates of terminal nulliparity and primiparity, and early ages at cessation of reproduction. This was probably related to a surge in the activity of Tibetan traders in the Moso region beginning in the 1920s. This influx of outsiders seems to have coincided with the spread of STD among the Moso, which persisted in the population until the introduction of effective antibiotic treatment in the mid-1950s. The spread of STD is likely to have led to an increased incidence of PID-induced infertility.

In spite of the apparently significant effect of premature infertility on the reproduction of the cohort of Moso women born between 1905 and 1929, we believe that over the long term, low population growth among the Moso, is primarily a result of cultural practices that fostered a desire for reproductive restraint among women and empowered women with the sexual autonomy necessary to achieve it. First, the offspring set composition ideal is located at the level of a matrilineal household, rather than at the level of an individual woman or conjugal unit. We hypothesize that under these conditions, the optimal offspring set may be achieved more quickly and efficiently, depressing demand for children earlier in the reproductive life of a *set of co-*

resident sisters. Second, the absolute autonomy over their own sexual activity that Moso women enjoy allows for achievement of reproductive restraint once the reproductive goals *of the household* for that generation have been reached. Third, female reproductive autonomy may contribute to a reduced pace of fertility among the Moso. Indeed, in light of Moso household organization and cultural ideals, it may be appropriate and informative to analyze the fertility of sister sets as well as that of individuals. We hope to develop and deploy appropriate analytical tools for that enterprise in a future paper.

The Moso case demonstrates the importance of cultural practices and cultural boundaries, as well as historical events for understanding fertility variation. It also suggests that one route to fertility reduction is through increased female reproductive autonomy, a conclusion echoed by the Programme of Action adopted at the International Conference on Population and Development, Cairo, 1994 (1995).

REFERENCES

Aris, M. (1992) *Lamas, Princes, and Brigands: Joseph Rock's Photographs of the Tibetan Borderlands of China*. China House Gallery, China Institute in America, New York City.

Bailey, R.C., and Aunger R.V. (1995) Sexuality, infertility and sexually transmitted disease among farmers and foragers in Central Africa. In Abramson, P.R. and Pinkerton, S.D. (eds.), *Sexual Nature, Sexual Culture*. University of Chicago Press, Chicago, pp. 195-222.

Belsey M.A. (1983) Epidemiologic apects of infertility. In Holmes, K.K. and Mardh, P-A. (eds.), *International Perspectives on Neglected Sexually Transmitted Diseases*. Hemisphere Publishing Corporation, Washington, pp. 269-297.

Cai, Hua. (1997) *Une Société sans père ni mari: Les Na de Chine (A Society with neither Father nor Husband: The Na of China)*. Presses Universitaires de France, Paris.

Caldwell, J., and Caldwell, P. (1983) The demographic evidence for the incidence and course of abnormally low fertility in tropical Africa. *World Health Statistics Quarterly* 36*:*2-34.

du Toit, S.H.C., Steyn, A.G.W., and Stumpf, R.H. (1986) *Graphical Exploratory Data Analysis*. Springer –Verlag, New York.

Frank, O. (1983) Infertility in sub-Saharan Africa: estimates and implications. *Population and Development Review* 9*:*137-144.

Goodenough, W.H. (1980) *Description and Comparison in Cultural Anthropology*. Cambridge University Press, New York.

Gray, S.J. (1994) Comparison of effects of breast-feeding practices on birth-spacing in three societies: Nomadic Turkana, Gainj, and Quechua. *Journal of Biosocial Science* 26*:*69-90.

Greenhalgh, S. (1988) Fertility as mobility: Sinic transitions. *Population and Development Review* 14*:*629-74.

Guo, X. (1997) *Rice Ears and Cattle Tails: A Comparative Study of Rural Economy and Society in Yunnan, Southwest China.* Ph.D. dissertation, The University of British Columbia, **City?**.

Hammel, E.A. (1990) A theory of culture for demography. *Population and Development Review* 16*:*455-85.

Holy, L. (1996) *Anthropological Perspectives on Kinship*. Pluto Press, Chicago.

Howell, N. (1979) *Demography of the Dobe !Kung*. Academic Press, New York.

International Conference on Population and Development, Cairo, 1994 (1995) *Population and Development: Programme of Action adopted at the International Conference on Population and Development, Cairo, 5-13 September 1994*. United Nations, Department for Economic and Social Information and Policy Analysis, New York.

Knodel, S. (1995) *Die matrilinearen Mosuo von Yongning: Eine quellenkritische Auswertung moderner chinesische Ethnographien*. (Kolner Ethnologische Studien Band 22). Lit Verlag, Munster.

Konner, M. and Worthman, C. (1980) Nursing frequency, gonadal function, and birth-spacing among !Kung hunter-gatherers. *Science* 207*:*788-791.

Lewis, I.M. (1985) *Social Anthropology in Perspective: The Relevance of Social Anthropology*. Cambridge University Press, New York.

Luosangyishi and Ma, Jidian, Dictated by His Eminence Luosangyishi, recorded and edited by Ma Jidian. (1995) *Nuerguo Dansang de Huofo: Luosangyishi Huofo Huiyilu (A Living Buddha born in the Girl's Land: Memoir of His Eminence Luosangyishi)*. Yunnan Minzu Chubanshe, Kunming.

Mårdh, P-A., Weström, L., Ripa, K.T., and Møller, B.R. (1983) Pelvic inflammatory disease: clinical, etiologic, and pathophysiologic studies. In Holmes, K.K. and Mardh, P-A. (eds.), *International Perspectives on Neglected Sexually Transmitted Diseases*. Hemisphere Publishing Corporation, Washington, pp. 251-268.

Muir, D.G., and Belsey, M.A. (1980) Pelvic inflammatory disease and its consequences in the developing world. *American Journal of Obstetrics and Gynecology* 138*:*913-928.

NLYZZZXZBJWYH (Compiling Committee of Gazetteer of Ninglang Yi Autonomous County). (1993) *Ninglang Yizu ZiZhixian Zhi (Gazetteer of Ninglang Yi Autonomous County)*. Yunnan Minzuchubanshe, Kunming.

Oppitz, M., and .Hsu, E., eds. (1998) *Naxi and Moso Ethnography: Kin, Rites, Pictographs*. Volkerkundemuseum, Zurich.

Pennington, R., and Harpending, H.A. (1991) Infertility in Herero pastoralists of Southern Africa. *American Journal of Human Biology* 3*:*135-153.

Rock, J.F. (1947) *The Ancient Na-Khi Kingdom of Southwest China*. Harvard University Press, Cambridge, Massachusetts.

Shih, C.K. (1993) *The Yongning Moso: Sexual Union, Household Organization, Gender and Ethnicity in a Matrilineal Duolocal Society in Southwest China*. Ph.D. dissertation, Stanford University, Palo Alto.

Shih, C.K. (2000) *Tisese* and its anthropological significance: issues around the visiting sexual system among the Moso. *L'Homme* 154-155: 697-712.

Shih, C.K. (Under review) *In Pursuit of Harmony: The Traditional Moso Systems of Sexual Union and Household Organization*. Stanford University Press, Palo Alto.

Skinner, G.W. (1997) Family systems and demographic processes. In Kertzer, D.I. and Fricke, T. (eds.): *Anthropological Demography*. University of Chicago Press, Chicago, pp. 53-95.

Sutton, S. B. (1974) *In China's Border Provinces: The Turbulent Career of Joseph Rock, Botanist-Explorer*. Hastings House, New York.

Sutton, S. B. (1982) Joseph Rock, "foreign prince" of China's western provinces. *Harvard Magazine* , no. Jan-Feb.

Sutton, S. B. (1992) Joseph Rock: restless spirit. In Aris, M. (ed.) *Lamas, Princes, and Brigands: Joseph Rock's Photographs of the Tibetan Borderlands of China.* China House Gallery, China Institute in America, New York City, 22-27.

Weng, N. (1993) *The Mother House: The Symbolism and Practice of Gender among the Naze in Southwest China.* Ph.D. dissertation, University of Rochester, Rochester, NY.

Weström, L., and Mårdh, P-A. (1983) Pelvic inflammatory disease: epidemiology, diagnosis, clinical manifestations, and sequelae. In Holmes, K.K. and Mardh, P-A. (eds.), *International Perspectives on Neglected Sexually Transmitted Diseases*. Hemisphere Publishing Corporation, Washington, pp. 235-250.

Wiley, A.S. (1998) The ecology of low natural fertility in Ladakh. *Journal of Biosocial Science* 30*:*457-80.

Wood, J.W. (1994) Dynamics of human reproduction. Aldine De Gruyter, New York.

Wood, J.W., Lai, D., Johnson, P.L., Campbell, K.L., and Maslar, I.A. (1985) Lactation and birth spacing in highland New Guinea. *Journal of Biosocial Science* Supplement 9*:*159-173.

Yan R.X., and Song, Z.L. (1983) *Yongning Naxizu de Muxi Zhi (The Matrilineal System of the Yongning Naxi)* . Yunnan Renmin Chubanshe, Kunming, Yunnan.

YNSCHJ (Yunnan Provincial Bureau of Cartography) (1980) *Ninglang Yizu Zizhi Xian (Map of Ninglang Yi Autonomout County)*. Yunnansheng Cehuiju, Kunming, Yunnan.

Zhan, C.X., Wang, C.Q., Li, J.C., and Liu, L.C. (1980) *Yongning Naxizu de Azhu Hunyin he Muxi Jiating (The Azhu Marriage and Matrilineal Family of the Yongning Naxi)*. Shanghai Renmin Chubanshe, Shanghai.

Table I. Age Specific Fertility, 1949-1988

Age (yrs)	Period			
	1949-1955	1956-1961	1962-1969	1970-1988
12	0.00	0.00	0.00	0.01
13	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00
12-14	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.01
16	0.00	0.00	0.00	0.00
17	0.00	0.00	0.02	0.02
18	0.00	0.00	0.05	0.09
19	0.03	0.12	0.02	0.09
15-19	0.01	0.02	0.02	0.04
20	0.03	0.14	0.11	0.19
21	0.21	0.09	0.16	0.13
22	0.08	0.19	0.17	0.19
23	0.14	0.07	0.41	0.19
24	0.16	0.23	0.13	0.25
20-24	0.12	0.14	0.20	0.19
25	0.16	0.13	0.31	0.33
26	0.14	0.13	0.20	0.16
27	0.16	0.14	0.32	0.32
28	0.09	0.09	0.21	0.23
29	0.06	0.16	0.14	0.16
25-29	0.12	0.13	0.24	0.24
30	0.09	0.09	0.29	0.24
31	0.11	0.05	0.27	0.12
32	0.00	0.08	0.22	0.23
33	0.17	0.17	0.31	0.09
34	0.17	0.00	0.13	0.11
30-34	0.11	0.08	0.24	0.16
35	0.03	0.03	0.21	0.10
36	0.09	0.06	0.11	0.07
37	0.03	0.04	0.20	0.09
38	0.03	0.18	0.12	0.14
39	0.06	0.00	0.11	0.11
35-39	0.05	0.06	0.15	0.10
40	0.03	0.00	0.05	0.10
41	0.03	0.00	0.10	0.11
42	0.04	0.11	0.03	0.06
43	0.04	0.04	0.05	0.13

44	0.11	0.00	0.00	0.04
40-44	0.05	0.03	0.05	0.09
45	0.00	0.00	0.00	0.01
46	0.00	0.00	0.00	0.01
47	0.00	0.00	0.00	0.00
48	0.00	0.05	0.00	0.00
49	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00
51	0.04	0.00	0.00	0.00
45-51	0.01	0.01	0.00	0.00
TFR	2.33	2.38	4.45	4.12

Table II. Completed Fertility

Parity	Birth Cohort										
	Pre-1895	1895-1899	1900-1904	1905-1909	1910-1914	1915-1919	1920-1924	1925-1929	1930-1934	1935-1939	total
0	3	1	1	2	4	4	4	7	2	0	28
1	3	0	1	5	5	2	5	6	0	0	29
2	1	1	2	3	3	4	4	4	2	0	24
3	4	4	1	1	2	2	3	4	1	2	24
4	4	4	1	1	2	2	0	4	1	1	20
5	1	3	1	2	2	2	0	1	4	2	18
6	2	1	1	0	0	0	0	2	3	4	13
7	0	0	0	0	0	0	1	1	2	5	9
8	1	1	0	0	0	0	0	1	2	0	5
9	0	0	0	0	0	0	1	0	0	2	3
10	0	0	0	0	0	0	0	0	1	0	1
11	0	0	0	1	0	0	0	1	0	0	2
n	19	15	8	15	18	16	18	31	18	18	176
median	3.0	4.0	2.5	2.0	1.5	2.0	1.5	2.0	5.0	6.0	3.0

Table III. Pace of Fertility

		Birth Cohort										
		Pre-1895	1895-1899	1900-1904	1905-1909	1910-1914	1915-1919	1920-1924	1925-1929	1930-1934	1935-1939	total
Age at first birth	median (yrs.)	24.0	25.0	24.0	22.0	24.0	24.5	23.0	22.5	22.0	22.5	23.0
	n	16	14	7	13	13	12	14	24	16	18	147
Age at last birth	median (yrs.)	35.5	38.5	39.0	28.0	30.5	35.5	32.0	38.5	41.5	39.5	37.0
	n	16	14	7	13	14	12	14	24	16	18	148
Interbirth Interval	median (yrs.)	4.0	4.0	4.0	3.0	5.0	4.5	3.0	4.0	3.0	3.0	3.0
	N	39	42	16	26	18	22	24	61	68	74	390

FIGURE CAPTIONS

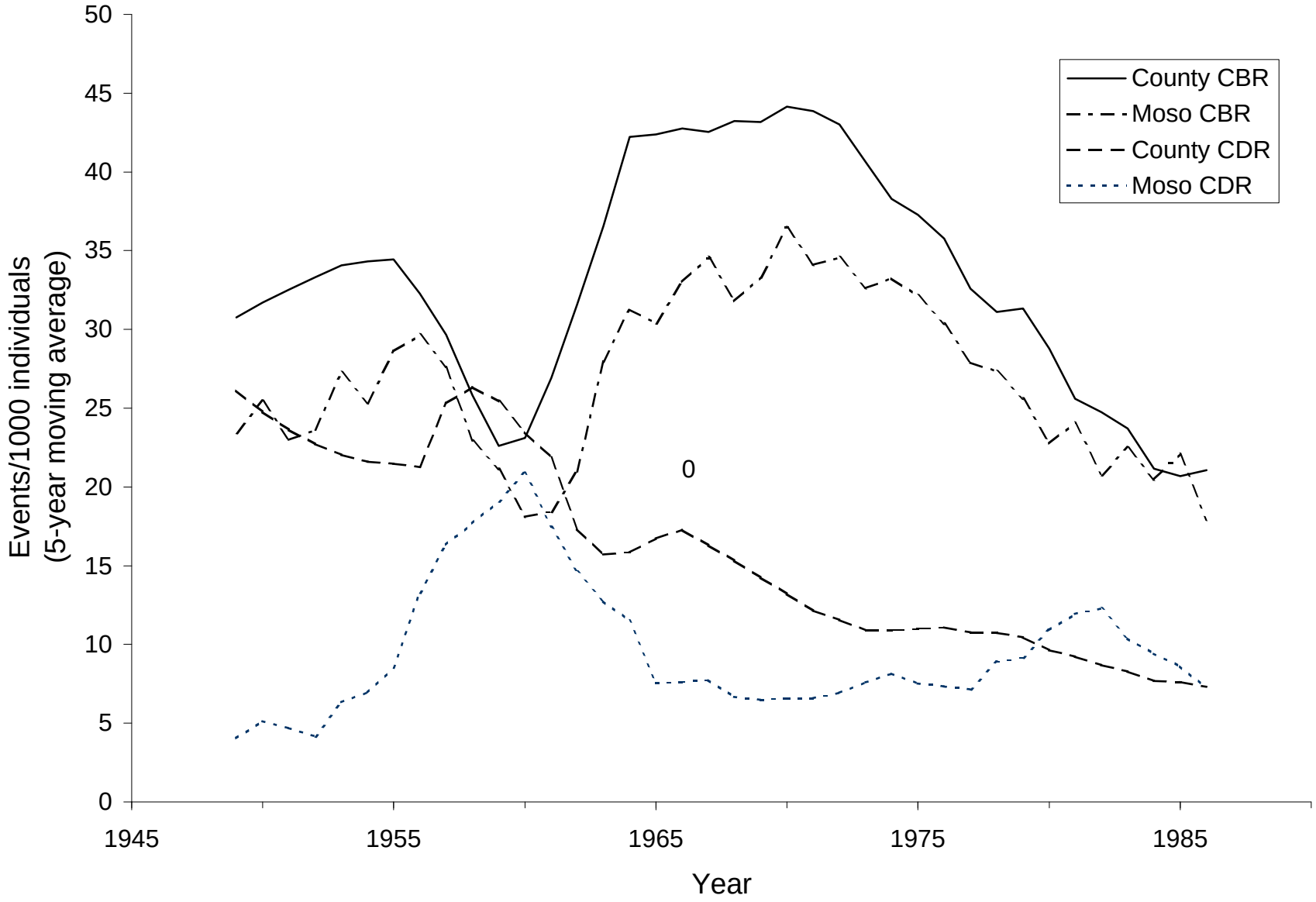
Figure 1. Crude birth and death rates 1949-1987. The size of the Ninglang county population varied from 81,975 in 1949 to 200,560 by 1990. The Moso population varied 495 in 1949 to 958 in 1989. See pp. 6-9 for a description of the tumultuous events of 1956-1961.

Figure 2. Crude rates of natural increase, 1949-1987. See caption for Figure 1.

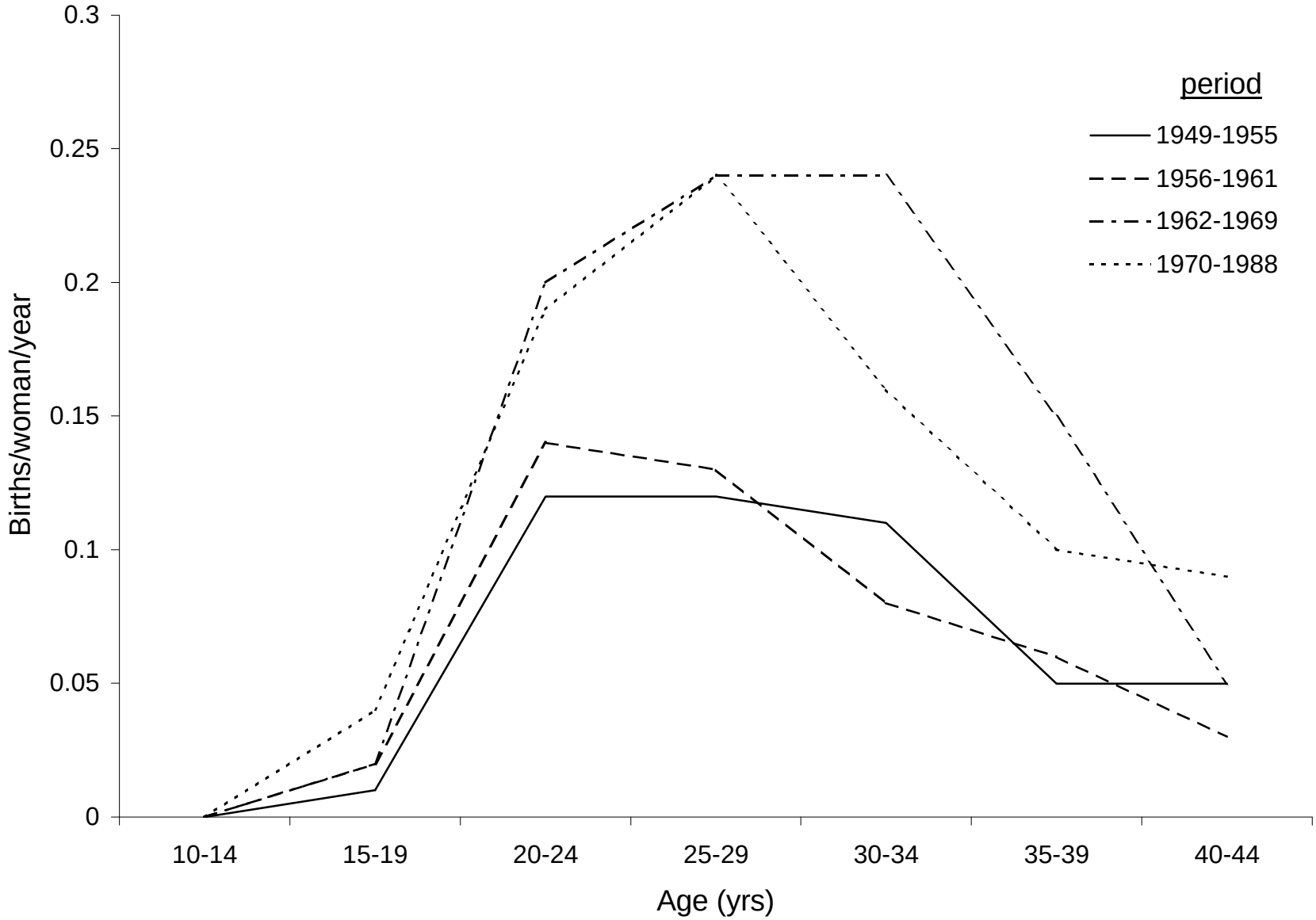
Figure 3. Moso age specific fertility, 1949-1988. The fertility histories on which these rates are based reflect 184 person-years of exposure to the risk of birth in 1949. The number of person-years of exposure grows to 295 by 1988.

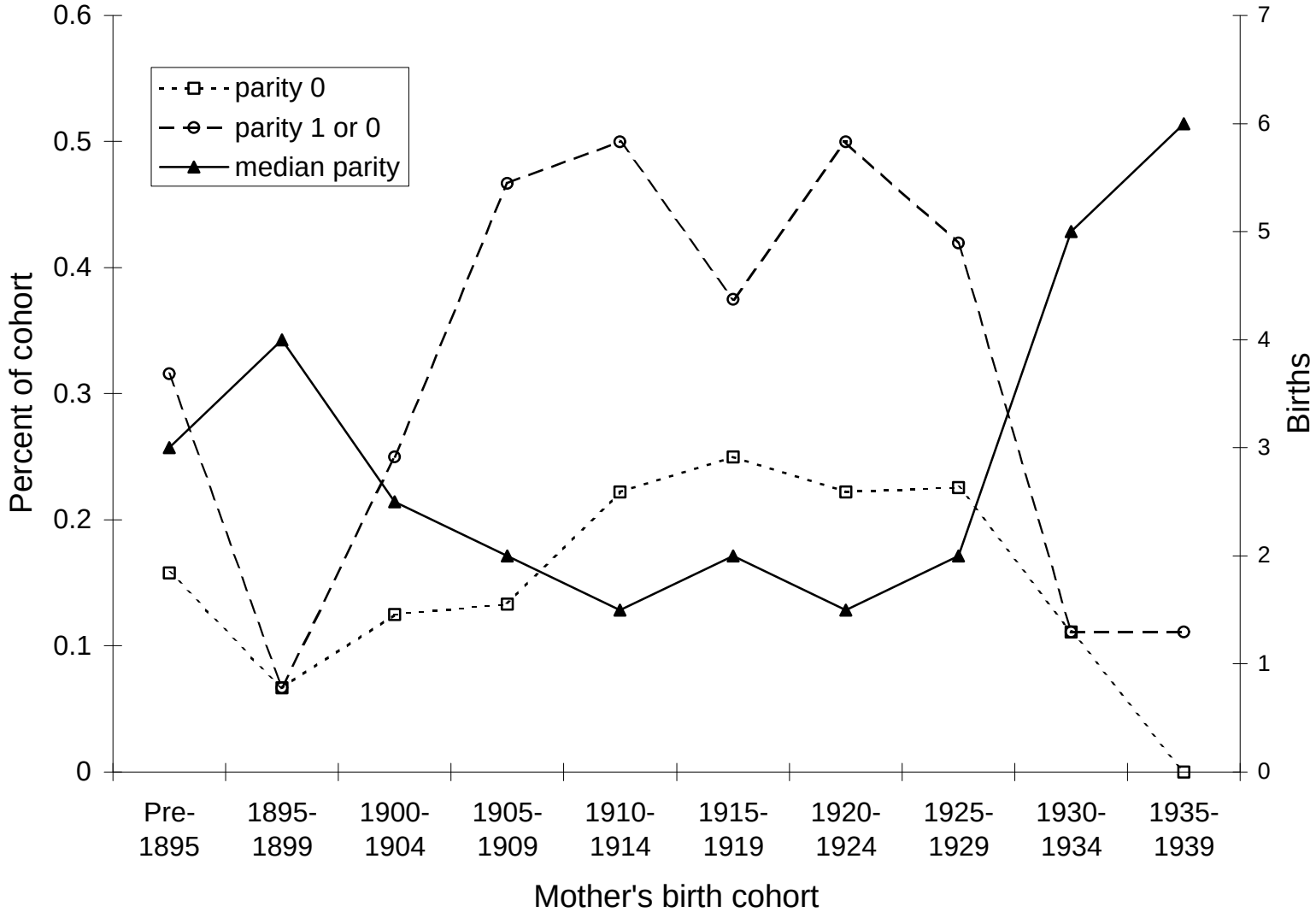
Figure 4. Completed fertility of Moso cohorts, born 1866-1939. Results are based on the fertility histories of all women in the sample with known dates of birth, and who were known to have survived to the age of 50 by 1989.

Figure 5. Commencement and cessation of reproduction among Moso cohorts, born 1866-1939. See caption for Figure 4. Results are based on the fertility histories of all women in the sample with known dates of birth and parturition, and who were known to have survived to the age of 50 by 1989.


50
45
40
35
30
25
20
15
10
5
0
Events/1000 individuals
(5-year moving average)
1945
1955
1965
1975
1985
Year
County CBR
Moso CBR
County CDR
Moso CDR
0


40
30
20
10
0
-10
1945
1955
1965
1975
1985
Year
(births-deaths)/1000 individuals
(5-year moving average)
County
Moso


0.3
0.25
0.2
0.15
0.1
0.05
0
Births/woman/year
10-14
15-19
20-24
25-29
30-34
35-39
40-44
Age (yrs)
period
1949-1955
1956-1961
1962-1969
1970-1988


parity 0
parity 1 or 0
median parity
Percent of cohort
Births
0.6
0.5
0.4
0.3
0.2
0.1
0
7
6
5
4
3
2
1
0
Pre-1895
1895-1899
1900-1904
1905-1909
1910-1914
1915-1919
1920-1924
1925-1929
1930-1934
1935-1939
Mother's birth cohort


45
40
35
30
25
20
15
10
5
0
Years
Median age at first birth
Median age at last birth
Pre-1895
1895-1899
1900-1904
1905-1909
1910-1914
1915-1919
1920-1924
1925-1929
1930-1934
1935-1939
Mother's birth cohort