New Perspectives on Tibetan Fertility and Population Decline
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new perspectives on Tibetan fertility and population decline

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The Demographic Transition Theory (DTT) explains the unprecedented population growth that began in northwest Europe in about the 18th century and has now spread throughout the world. It purports to explain the shift from a preindustrial population homeostasis in which high mortality canceled high fertility to a transition period in which reduced mortality, together with still high fertility, produced a population explosion in Europe. This transition period, the DTT argues, changed further in the mid-19th century when fertility rates began to decline. Eventually, as evidenced in contemporary European countries such as East and West Germany, a new homeostasis is produced wherein low mortality is balanced by low natality. The DTT sees the industrialization and modernization of European social and economic systems as the driving force behind this "transition" (Coale 1973).

Many of the assumptions and assertions of the traditional DTT have been challenged and refuted both with respect to its accuracy for Europe and its applicability to the non-European Third and Fourth World countries that comprise the majority of today's world population (Coale 1973; Wrigley 1976; Teitelbaum 1975). Anthropologists have also been critical of its assumption of high fertility and high mortality in preindustrial times, i.e., its minimal recognition of the effect of social and cultural variables on natality in traditional societies. Working with archaeological data and the few remaining preindustrial, premodern populations, anthropologists have demonstrated that high and uncontrolled natality was not an inherent feature of foraging and horticultural societies (Howell 1976; Neel and Chagnon 1968; Polgar 1972; Dumond 1975). Howell (1976:145), for example, reports that completed reproductivity for !Kung Bushman females 50 years or older is 5.2

The paper addresses the claim that traditional Tibetan society is anomalous among peasant preindustrial societies in that it has experienced population decline since the 7th century A.D. Even though Tibet was a relatively affluent society, psychological and social factors are claimed to have substantially reduced fertility levels. The paper challenges this position and argues instead that Tibetan fertility was/is moderately high. It also suggests that very high levels of fertility were not necessary in preindustrial peasant societies to balance high mortality and produce homeostasis or slight growth. [demographic anthropology, peasant fertility, demographic transition theory, Tibet, Nepal]

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births per female and the overall population growth rate for the !Kung is only 0.5 percent per annum.

While most anthropologists accept the idea that foraging and horticultural populations evolved and maintained population regulatory systems, the situation with respect to agriculturalists in complex state societies is not so clear. Cultural and social factors that reduce fertility are known to be relevant, but there is still widespread belief in the idea that high fertility (though not necessarily maximum fertility) was balanced by high mortality in such societies. Whether one argues that reproductive pressure stimulated agricultural intensification and the emergence of complex agricultural states (Boserup 1965) or the more Malthusian idea that the development of domesticated grain cultivation led to a neolithic population explosion, preindustrial peasants are generally thought to have high fertility and high mortality. For example, Dumond (1975:88) states: "Nevertheless, it is almost a truism that agricultural endeavor has commonly tended to encourage high natality, because additional offspring are thought to be economic benefits." Similarly, the *Report of the Commission on Population Growth and the American Future* (1972:9) states: "In preindustrial time, birthrates were high, but hunger, ignorance, and disease combined to stack the odds against an infant surviving to the age of parenthood. Societies required high birthrates simply to keep themselves going."

The preindustrial state of Tibet appears to deviate substantially from this model. Several statements illustrate the widespread scholarly and popular belief that low fertility and declining population characterized Tibet.

> Unfortunately we do not have the necessary figures for these rates, for there is no system of recording births and deaths among Tibetan speaking peoples. . . . But everyone is aware of the decline of the Tibetan population (Li An-che 1947:284).

> The population seems to grow steadily less. The reasons are manifold. First of all, the low birth rate, connected perhaps with the altitude and the climate (Moise 1956:167).

> The truth is that Tibet does not lack for cultivation, but lacks the men to till it. The population appears to be decreasing steadily owing to polyandry, to veneral diseases, and to the large number that live celibate lives in monasteries instead of raising families (Bell 1968:28).

The most elaborate and persuasive advocation of this position is made by Ekvall (1972), who argues that, despite economic conditions in Tibet seemingly favorable to high fertility and high population growth, Tibet has undergone substantial population decline since the Era of the Kings (7th to 9th century A.D.) primarily as a result of *low fertility*.

Ekvall's argument actually involves two separate aspects of Tibetan population dynamics: low birth rates for Tibet as a whole and particularly low birth rates for the pastoral portion of the Tibetan population. Unfortunately, neither firsthand demographic studies nor systematic demographic information were collected in traditional, precommunist Tibet. Ekvall's case derives predominantly from his own observations made during the years he served as a missionary in the Amdo region of Chinghai Province, China, an area of Tibetan-Chinese interface.

Ekvall's evidence for Tibet's diachronic population decline is based on the size of Tibetan armies during the Era of the Kings when Tibet expanded its borders in all directions and for a time conquered and held the major garrisons controlling the Central Asian silk route. Citing a T'ang dynasty account mentioned in Shakabpa's (1967:6) history of a 7th-century Tibetan army of 200,000 men and a Tibetan chronicle that talks of an army of 14 million horsemen, Ekvall concurs with Shakabpa's conclusion that the population of Tibet has declined over the centuries. Ekvall (1972:278) states that, during the period of the Kings, Tibet must have had a population base at least twice that of modern Tibet, although he does not indicate the basis of his calculation. Given a population of about 3 million in Tibet in 1950 (Karan 1976:52), this would mean a 7th-century population of about 6 million.

Ekvall's (1972) contention that Tibet is underpopulated derives from a variety of observations, some of which were also mentioned above.

1. "There are many permanently abandoned fields" (1972:278).
2. "Leaders of quasi-independent principalities and chiefdoms have told me that people are more important than land and they are more interested in attracting the allegiance of populations than in taking over territories" (1972:278).
3. "In all communities transients and drifters are welcome and find employment and subsistence with relative ease" (1972:278).
4. In traveling through a Chinese-Tibetan frontier area, Ekvall noticed that, although the crops, livestock, and climate were the same on the side of the river each ethnic group held, "by every criterion the Tibetan population appeared to be a shrinking one and the Chinese population a burgeoning one" (1972:281).

He gives several possible factors underlying low birth rates for Tibetans: (1) living at high altitudes may adversely affect fertility; (2) the high incidence of venereal disease; and (3) the introduction of Buddhism and its denigration of the procreative function is particularly important since in a Buddhist milieu there is "no overriding imperative to have children" (1972:281). This is a critical factor for Ekvall (1972:281), who contrasts it to the Chinese value system in which "the desire to have sons is more than desire. It is a compulsion for both men and women. . . . Thus the Chinese, who also have venereal disease and whose diet at times is meagre, bred and bred; there is no stopping population growth."

Ekvall, therefore, argues that population decline in Tibet has occurred despite available land and affluence because of environmental, psychological, and social factors. If this assessment of Tibetan population history is correct, then Tibet deviates not only from its high-fertility neighbors, India and China, but also from the widely accepted basic peasant demographic pattern whereby population growth is kept in check primarily by resource limitations and mortality. Malthus (1970[1798]:249–250) argued that populations tend to increase beyond the means of subsistence and are held in check either by misery (mortality) or by voluntary means such as late marriage and celibacy. MacFarlane (1976:297), based on Ekvall, finds the Tibetan case so anomalous that he uses it as refutation of the necessary operation of Malthusian forces.

> Even in the absence of "vice, misery and moral restraint" population does not necessarily grow. A good example of this negative finding seems to be Tibet, whose population appears to have been declining since it reached its peak between 600 A.D. and 800. There are no obvious ecological or economic reasons to explain this; resources have been plentiful. Social and psychological factors have intervened.

Ekvall's analysis, however, while suggestive, is based on anecdotal evidence. He does not present data on the number of females at risk or on birth rates or completed fertility. He also confuses two causes of low fertility, as do Li An-che (1947), Bell (1968), Shakhabpa (1967), and Moise (1956). In traditional societies where contraceptive devices were (are) not available, it is essential to distinguish conceptually between individual and aggregate fertility. Low birth rates for a group can result from females in sexual unions (i.e., at risk) having few births (due to infecundity, etc.) or from significant numbers of females in the group being excluded from reproduction even though women in sexual unions have many births (i.e., high individual fertility). Moreover, it is obvious that mortality (and, theoretically, migration as well) can profoundly affect population growth or decline. This paper, therefore, will examine critically the claim that Tibet was characterized by low birth rates and population decline/underpopulation by analyzing new demographic data collected by the author and others among Tibetan-speaking populations living in Nepal and India.

demographic structure of Tibetan populations in Nepal

Recent studies of indigenous (i.e., nonrefugee) Tibetan-speaking groups in northern Nepal and Ladakh (Beall and Goldstein 1980; Bangham and Sacherer 1980; Goldstein 1976; Gupta 1978; Lang and Lang 1971; Levine 1977; Ross 1981; and Weitz, Pawson, Weitz, Lang, and Lang 1978) provide valuable new data on fertility. These recently studied populations fall into three groups: (1) the Sherpas of eastern Nepal and Kalimpong, India; (2) Tibetans from the Humla District of Karnali Zone in northwest Nepal; and (3) Ladakhis from northwest India.

Sherpas are Tibetans who migrated from Eastern Tibet to the Khumbu area of Nepal about 400 years ago. In Tibetan, the term *Sherpa* means simply "one from the east" and today refers to the Tibetan ethnic groups that claim descent from the original immigrants. They are located in three main areas in Nepal (Solu-Khumbu, Helambu, and Rolwaling) and in the Darjeeling District of West Bengal, India. Although Tibetan in language and culture, their way of life has undergone massive changes due to the introduction of the potato (their current staple crop), their substantial permanent and long-term migration to India and Kathmandu, and their involvement in the mountaineering and tourist-trekking industries.

The three populations of Humla (Limi, Dhinga, and Nyinba) are representative of Western Tibet (*stod*). Although these three societies differ internally with regard to subsistence economies and adherence to traditional Tibetan patterns, all are less affected by modernization than the Sherpas and are more Tibetan in marriage and family structure. Of the three Humla groups, the Tibetans of the Limi Valley (studied extensively by the author; see Goldstein 1976, 1978) are clearly the most typical of traditional Tibetan society and will be the population examined in greatest detail.

Limi is an area of about 520 sq. km. located in the northwest corner of Nepal abutting the Tibet-Nepal border. Geographically, it is an extension of the arid Central Asian mountain-plateau region and differs markedly from the more moist, monsoon environment of most other hill and mountain areas of Nepal. Limi consists of three villages occupying a narrow, high-altitude valley (at 3600 m., 3800 m., and 3870 m.) and extensive pasturelands (ranging from 3900 m. to 5100 m. in elevation). The approximately 800 persons inhabiting this remote area are completely Tibetan in culture, language, and ecological adaptation and have been visited by Westerners only recently. At the time this research began, only four Westerners had visited there. Limi is not an area of recent migrants. Tibetan textual materials mention Limi as an inhabited area in the early 13th century A.D. ('Bri gung gdan . . . 1896:490); and before the formal 1961 Sino-Nepalese Border Treaty, Limi was administratively linked to Tibet and Nepal, paying "people tax" (*mi khral*) to Tibet and "land tax" (*sa khral*) to Nepal.

Two types of detailed demographic data were obtained for the Limi village of Tsang (altitude 3870 m.). Vital statistics (births, deaths, migration) covering the period from winter 1973 to late fall 1977 were collected during the course of three field trips undertaken in spring and summer 1974, summer 1976, and fall 1977. These data were retrieved via village household composition records (in Tibetan), key informant interviewing, conversations with household members, and direct observation. Detailed reproductive histories were also collected for Tsang females.

Table 1 illustrates the births over the four-year period 1973–77 when vital statistics were collected for Tsang village, Limi. There were 73 females of reproductive age (15–44) in that population, 41 (56 percent) of whom were married. No females of reproductive age died during this period, and 37 (51 percent) had at least one birth. A total of 51 births occurred, 88 percent of them to married females. Utilizing the average size of Tsang village during this four-year interval (299 persons), this yields a crude birth rate (CBR) of 42.6 [$(51 \div 299) \times (1000 \div 4)$] per annum. This CBR is on a par with the high fertility countries of the world

Table 1. Number of births to married and unmarried females aged 15-44 in Tsang, Limi, during 1973-77

	15-19	20-24	25-29	30-34	35-39	40-44	Total
No. females[a]	14	9	15	12	12	11	73
No. females married	4	2	11	7	8	9	41
Percentage of females married	29	22	75	58	67	82	56
No. females married and reproducing during interval	1	2	10	7	6	7	33
No. births to married females during interval	1	4	14	11	6	9[e]	45
No. females unmarried and reproducing during interval	0	3	1	0	0	0	4
No. births to unmarried females during interval	0	4	2	0	0	0	6
Total no. females reproducing during interval	1	5	11	7	6	7	37
Total births to females married and unmarried during interval	1	8	16	11	6	9	51

[a] On the basis of field studies in 1976 and 1977, ages for females have been revised and do not exactly correspond to those cited in Goldstein (1976).

[b] Includes one late miscarriage.

today; for example, the CBR for India in 1979 was 34 and for Pakistan, 44 (Population Reference Bureau 1979).

When the proportion of females in the population and the number of married females is taken into account through the computation of the general fertility rate (GFR = [(number of births to females aged 15-44) ÷ (number of females aged 15-44) × 1000] ÷ 4) and the marital fertility rate (MFR = [(number of births to married females aged 15-44) ÷ (number of married females aged 15-44) × 1000] ÷ 4), the high level of Limi fertility is corroborated. During the four-year interval in question, the GRF in Limi was 175 and the MFR was 274. By comparison, Iran in 1975 had a GFR of 205, which was one of the highest in the world (Population Reference Bureau 1978:18). The fertility data for 1973-77, therefore, do not support the Ekvall hypothesis, but indicate, to the contrary, that fertility in this population is high.

Since population decline can also result from high mortality offsetting high fertility, Table 2 presents the mortality data for the four-year interval. There were 25 deaths during this interval, with infant mortality accounting for the largest proportion (40 percent) of the deaths. Prereproductive and postreproductive mortality (under age 15 and over age 45) accounted for 96 percent of the deaths. However, only 20 percent of the children born during that period died in infancy. On the basis of these data, the crude death rate (CDR) for this population computes to 20.9 per annum and the crude rate of natural increase (CRNI) to 2.2 percent per annum. At that rate of increase, the Tsang population will double in 31 years. Interestingly, these figures almost exactly parallel those for Nepal as a whole (CBR = 44, CDR = 21, CRNI = 2.3; Population Reference Bureau 1979).

Table 2. Mortality in Limi during 1973-77 by age of deceased

Age	No. deaths	Percentage of all deaths
0-1	10	40
2-4	2	8
5-9	2	8
10-14	0	0
15-19	0	0
20-24	1	4
25-29	0	0
30-34	0	0
35-39	0	0
40-44	0	0
45-49	1	4
50-54	1	4
55-59	1	4
60-64	1	4
65-69	0	0
70+	6	24
	25	100

Thus, the four-year vital statistics indicate high fertility despite the fact that only 56 percent of the females of reproductive age were married, and despite late first birth. Only one female under 20 years of age gave birth and only 18 percent of the births occurred to females under 25 years of age. Mortality, moreover, despite the absence of Western medical services, was not extremely high and in no way compensated for the high fertility. The vital statistics reveal a population with a high growth rate and do not support the Ekvall hypothesis.

Demographic data based on direct observation and intensive interviewing such as those presented above, while highly accurate, may not be the best indicators of population dynamics in a population such as this because of the small size of that population and the relatively short period of time the data reflect. Howell (1976, 1979) has discussed this issue in her work on !Kung demography and has advocated using retrospective interviewing techniques to obtain an accurate understanding of demographic processes in traditional societies where registration systems do not exist and national census data, when available, are unreliable. Counting the number of children born to some actual group of women who

Table 3. Number of live births and surviving offspring per married and unmarried females aged 40-44 and 45+ in Tsang, Limi

Age	Marital status	No. females	No. live births	$\bar{X}$ births per female	No. of surviving offspring	$\bar{X}$ surviving offspring
40-44	Married	9	64	7.1	36	4
	Unmarried	2	6	3	4	2
	Both	11	70	6.36	40	3.63
45+	Married	17	126	7.4	72	4.2
	Unmarried	4	7	1.8	4	1
	Both	21	133	6.33	76	3.61

have completed their childbearing period is probably the most useful measure of fertility for such populations. This measure has been called by various names, such as the "total maternity ratio" (TMR) and the "completed fertility rate" (CFR); I shall use the latter term. The CFR reflects the reproductive history of a cohort of females during their childbearing years; it tells us how many children, on the average, a cohort of females had during their reproductive years. Table 3 presents these data for Tsang females aged 40–44 and 45+.

Table 3 demonstrates that females aged 45+ who are married averaged 7.4 live births per female, while females aged 40–44 averaged 7.1 births. However, when all females aged 45+ are considered, the CFR drops to 6.3 births per female because 19 percent of the females aged 45+ are unmarried and reproduced at much lower rates than married women (see Goldstein 1976 for a discussion of this).

Is a society in which women average 6.3 births throughout their reproductive years high? Among populations in which there is no conscious, planned behavior to affect fertility no matter how many children a woman has borne, maximal fertility is represented by the Hutterites (Eaton and Mayer 1953) of the United States and Canada who average 10.4 births per woman (CFR = 10.4). At the other extreme are the !Kung Bushmen, where women aged 45+ in 1968 reported an average of 4.69 births per woman and those aged 50+ averaged 5.2 births per woman (Howell 1979). Nag (1968:17) divides CFR into three categories: high (5.51 and up) low (3.01–5.50) and very low (below 3.0). According to these data, Limi's CFR falls toward the bottom of the "high" category and represents moderately high fertility.

Anthropological studies of small populations, while generally highly accurate, characteristically present a "sampling" problem regarding the extent to which one can generalize from them to the larger cultural universe to which the village population belongs (Howell 1979:3). By contrast, large-scale demographic surveys based on sophisticated sampling techniques suffer from very serious accuracy shortcomings. Chen and Murray (1976:241) have described such technically elegant surveys as follows: "A rural Third World survey is the careful collection, tabulation and analysis of wild guesses, half truths, and outright lies meticulously recorded by gullible outsiders during interviews with suspicious, intimidated but outwardly compliant villagers." While there is no way to avoid completely the shortcomings of either of these approaches, with regard to this essay the generalizability of the data presented for Limi is enhanced by virtue of the close fit between them and other demographic data collected independently in other Tibetan areas. Table 4 compares Limi with other Tibetan, Sherpa, and Ladakhi groups in Nepal and India.

Dhinga and Nyinba are located in the Humla-Karnali River area near Simikot at altitudes of less than 3000 m. They are a three- or four-day walk southeast of Limi over a high mountain range, and they differ significantly from Limi in climate, being a part of the typical Nepal monsoon system. Nonetheless, they are clearly ethnically Tibetan in language, religion, dress, marriage, and family organization. Table 4 demonstrates a striking equivalence in both CFR and the number of surviving children for these three populations. Limi and Nyinba have the same CFR (for all females) and differ by only 0.3 in the average number of surviving children. Limi and Dhinga females differ by only 0.3 in CFR (for all females) and by 0.1 in the average number of surviving children. This amazing equivalence is further buttressed by the Ladakh data.

Data on Ladakh were collected during the summer of 1980 in the village of Kyilung (a pseudonym) situated at 3540 m. near Leh, the capital of Ladakh. Household census and fertility data were collected as part of a larger project, but extreme reticence on the part of Kyilung females to list offspring who died in infancy and childhood prevented accurate direct assessment of completed fertility. By contrast, data on the number and sex of living children were readily provided and cross-checked for accuracy. These data indicate that for married females aged 45+, the average number of living children was 3.6 (the same as Limi), and for all females aged 45+ (N = 92), it was 3.3.

Table 4. Completed fertility rate and number of surviving children for seven Tibetan populations

	Group	Age	Completed fertility rate (all females)	$\overline{X}$ surviving children (all females)	Completed fertility rate (married females only)
Humla Tibetans	1. Limi	45+	6.3 (21)[a]	3.6	7.4 (17)[a]
	2. Dhinga (Ross 1981)	45+	6.0 (18)[b]	3.7	6.7 (16)[b]
	3. Nyinba (Levine 1977)	45+	6.3 (19)	3.3	—
Sherpas	4A. Khumbu[c] (Weitz et al. 1978) including Tibetan refugees	50+	4.77 (104)	3.0	—
	4B. Khumbu (Weitz 1980 pers. comm.) excluding Tibetan refugees	50+	5.2 (81)	3.3	6.2 (NA)
	4C. Khumbu (Lang and Lang 1971)	45+	6.0[d] (103)	—	—
	4D. Khumbu (Gupta 1978)	45+	—	—	4.5 (23)
	5. Kalimpong (Gupta 1978)	45+	—	—	7.4 (94)
	6. Helambu (Beall and Goldstein 1980)	45+	6.8 (21)	3.5	7.2 (20)
Ladhakis	7. Kyilung	45+	—	3.3 (92)	—

[a] Figures in parentheses represent the number of individuals included.
[b] These figures differ from Goldstein (1981) due to a correction by Ross (1981).
[c] The four Khumbu samples all refer to the same population.
[d] Refers to pregnancies rather than live births.

CFR, however, can be calculated indirectly. Repeated questioning by the author and his village assistant regarding mortality *in general* in Kyilung universally produced answers that mortality was very high and that it was common for half of a woman's offspring not to survive. Applying a 50 percent mortality level to Kyilung data yields a CRF of 6.6. The Ladakh data, therefore, are strikingly parallel with the Humla data and are clearly not supportive of the argument that Tibetan society was characterized by low fertility.

The demographic data for Sherpas are more problematic as there are several varying accounts of Sherpa fertility (the most detailed discussion of this can be found in Weitz et al. 1978). Based on research conducted in 1971, they calculate the CFR of married and unmarried females aged 50+ to be 4.77, a figure far lower than Limi and the other Humla communities. However, the 4.77 CFR figure includes recent Tibetan refugees to Khumbu (Weitz's [Weitz et al. 1978:182] "socioeconomic category number two") who fled from the Chinese regime in Tibet in the early 1960s. My own research (Beall and Goldstein 1980) with Tibetan refugees in Nepal (Pokhara and Kathmandu) indicates that Tibetan refugees such as these include a disproportionate number of nulliparous and low-fertility females. When questioned, the Tibetans corroborated our hypothesis that families with many children, particularly small ones, commonly decided to remain behind in Tibet. The difficulties of the flight, joined with the belief that their exile would be short, as it had been earlier in this century, kept many females with large families in Tibet. Thus, the Tibetan refugees represent a skewed sample. Their CFR is not representative and should be excluded from the "pure" Sherpa data. When this is done, the Khumbu Sherpa CFR increases to 5.2 and is, therefore, about one birth less per woman than that of Limi (Weitz 1980: personal communication).

A few years after Weitz et al. worked in Khumbu, another fertility study in Khumbu was made by Gupta (1978). As Table 4 indicates, he reports the CFR for married women living in wedlock as a very low 4.5, and my own calculation of his raw data yields a CFR of 4.26. Both of these figures are lower than those for the !Kung Bushmen, even though they exclude unmarried women. Gupta (1978) also conducted a study among Sherpa migrants from Khumbu living in Kalimpong, West Bengal, India, and he reports that the CFR for married women is 7.4. I suggest that his Khumbu data are questionable and appear to suffer from a serious underreporting of births. In Table 5 of his 1978 article, he lists the number of live births by the age of married women. For women aged 45-49 in Khumbu, he cites a CFR of 5.7; for those aged 50-54, a CFR of 4; and for those aged 55+, a CFR of only 3.3. It seems apparent that the fewer births claimed by older females is a reflection of faulty memory or outright informant deceit rather than a demographic pattern. If it does reflect some idiosyncratic historical event or process, Gupta does not discuss it.

The issue of the validity of data that this raises is heightened by his apparent lack of understanding of the Tibetan age system and by a very large discrepancy between the mortality data of Gupta and that of Weitz. Gupta (1978:5) states that due to "great difficulties in the assessment of age," it was "estimated with reference to some important local events." Based on this, it appears that he was not aware that Tibetans traditionally utilize a 12- and 60-year animal/element cycle so that each Tibetan knows the animal year in which he or she was born. This animal year can be easily converted to yield a Western age estimated within one year. Furthermore, whereas Gupta (1978: Table 8) claims that infant mortality is only 6.98 percent for mothers aged 45+, Weitz et al. (1978:185), in his Table 3, cites an infant mortality figure that is more than twice as high (15.4 percent) for children born to women aged 50+. Gupta (1978: Table 3) claims that only 4 percent of his Khumbu sample of women aged 45+ had no pregnancies (or live births), while Weitz (1980: personal communication) indicates that 12 percent of the women aged 50+ had no live births and 10 percent had no pregnancies.

Problems with Sherpa fertility are confused even more by studies conducted with Sherpa in Helambu, Solu, and Arun Valley. A biocultural study on aging conducted in 1979 among Sherpas of Helambu (Beall and Goldstein 1980), retrieved data on fertility and mortality for 21 females aged 45+. As can be seen in Table 4, these data indicate fertility levels comparable to Humla (CFR = 6.8) and higher than those cited for the Khumbu Sherpas. Another report of Sherpa fertility (Bangham and Sacherer 1980), which includes one of the villages studied by Beall and Goldstein (1980), reports a CFR of 7.6 for Helambu. However, because of their sampling techniques and sample size, Bangham and Sacherer's data are of little value. For example, in Helambu they collected data from 40 females aged 45+ living in 15 different villages. This is an average of only 2.6 females per village, a figure clearly unrepresentative and ungeneralizable, given that they did not sample these villages but used any female aged 45+ who volunteered and who visited them in their house.[1]

The Sherpa data suggest, therefore, that with the exception of Khumbu, fertility was equivalent to that of the Humla Tibetans. Two factors, however, may account for the lower fertility in Khumbu. Fetal wastage in Khumbu is reported to be very high. Lang and Lang (1971) report a CFR (for pregnancies) of 6.0 per woman aged 45+ and Weitz's survey (Weitz 1980: personal communication), based in part on Lang and Lang's survey, indicates an average of 5.9 pregnancies per female aged 50+. Both of these demonstrate that about one birth per woman is lost via fetal mortality. Weitz (1980: personal communication) suggests that a high incidence of goiter may be the cause. In any case, the high rate of fetal wastage equals roughly the difference in CFR between Limi and Khumbu. Moreover, the massive socioeconomic changes that have occurred in Khumbu may account for their alleged lower fertility, e.g., by reducing the value of children and encouraging the use of contraceptives.[2] The questions raised concerning the Sherpa data cannot be currently resolved and it is prudent in this paper to concentrate the analysis on Limi (and the Humla Tibetans).

Mortality, however, must also be discussed, since it is possible that declining population among Tibetan groups is the result of high mortality balancing or outstripping fertility, as the DTT predicts. Table 4 presents an indirect measure of mortality, that is, the number of children surviving to females who have completed their childbearing. In Limi, 49 percent of the children born to married females aged 45+ had died by the time of survey. This resulted in an average of 3.6 surviving children for females who have completed childbearing. Table 4 also illustrates a concordance concerning the average number of surviving children for the Tibetan (and Sherpa) groups regardless of their CFR. While the percentage of surviving children varies between 51 and 57, the actual number surviving remains similar. For the six populations for which data exist—Limi, Dhinga, Nyinba, Khumbu (Weitz 1980: personal communication), Helambu, and Ladakh—the average number of surviving children is 3.5 and no population varies more than 0.2 from that figure. Given the number of surviving children, these six populations appear to be increasing, not declining. Even if we assume that the sex ratio at birth favors males and is 110 to 100,[3] using the Limi average number of surviving children of 3.61, the number of daughters surviving to replace each woman aged 45+ would be 1.74, a figure that would result in more than a 50 percent increase each generation (Polgar 1972:205). Thus, while mortality is high and 43 percent of the children born to Limi women now past menopause did not survive, this level of mortality is not sufficient to balance the fertility levels encountered. Mortality data, both from vital statistics and retrospective interviewing, do not support the Ekvall hypothesis.

Based on these data, we would predict that, barring substantial out-migration (for which there is no evidence for non-Sherpa Tibetans), these Tibetan populations would be expanding in their localities. In Limi, for example, this appears to be the case. Limi has virtually no emigration; and external markers, such as attempts to open new fields and greater dependence on nonagricultural economic opportunities, corroborate the view that there is an increasing population. Moreover, the local Limi headman himself, perceives population growth as a problem. But, observers of the Sherpas of Khumbu (Lang and Lang, Weitz et al.) have commented that Khumbu does not appear to be a growing population. Khumbu, in contrast to Limi, has undergone tremendous emigration over the past five decades. I suggest that this alleged decline—if it is really accurate—is an artifact of out-migration rather than a balance between fertility and mortality.

What of traditional Tibet itself? Are these data from Tibetan groups in Nepal relevant to Tibet, and if so how do we explain the agreement of so many observers, untrained though they may have been? Ekvall's observations were made in a Sino-Tibetan border area in China proper, and thus the Nepal data is no less relevant than his. Moreover, Limi, because of its remoteness, its Tibetan ecology, and its adherence to traditional Tibetan beliefs and practices, is particularly representative of traditional western and central Tibetan society. Many of the so-called markers of underpopulation noted by Ekvall and others also have alternative explanations. For example, the presence of ruined fields and villages does not necessarily imply population decline. These ruins could equally result from the abandonment of an area due to decreased agricultural productivity caused either by overuse or environmental changes, e.g., shifts in water flow. Because Tibet is mountainous and arid, arable land must: (1) be beneath the maximum cultivatable altitude (generally between 3900 m. and 4200 m.); (2) have reliable sources of irrigation; and (3) be of gentle slope so that secure terraces can be constructed and maintained. Because of these factors and the geomorphology of Tibet, potentially arable new land is not normally contiguous with current fields, and opening new fields for cultivation is likely to entail moving several kilometers upstream or downstream (or over a ridge). Under these circumstances, it would not be unusual for new villages to be constructed at the site of the new fields and the old village abandoned with the discarded fields.

Agricultural decline, however, is not the only reason villages might be abandoned. An observation made by a British officer who traveled to Tibet in 1783 suggests that villages were abandoned for medical reasons (Turner 1971[1800]:218–219).

> Near the road were seen the ruins of many villages, deserted, I conjecture, during the prevalance of the small-pox, which is a disorder not less dreaded by the inhabitants of Tibet, than the plague. . . . but as soon as the first appearance of it is publicly known in any village the healthy hasten to desert it, and leave the infected abandoned to chance.

Tibetan disease etiology includes a "personalistic" aspect in that sickness can be caused by the malevolent intervention of a variety of supernatural beings, such as village and mountain gods who reside in specific localities. Similarly, one cause of natural calamities such as drought and hail is gods such as these who have been angered. When epidemics (to humans and/or animals) and other major environmental misfortunes occur for several years despite the attempts of the villagers and monks to identify and propitiate the angered god, abandoning the village and thus the agent of misfortune is a possible course of action. In Limi, for example, there is an area called *Tsamdo,* where the ruins of houses and fields can still be seen. The Limis say that at one time this was the only village in Limi and that the three present villages resulted from the abandonment of this village after a series of misfortunes occurred. In fact, recent attempts by the Limi headman to encourage poor villagers to resettle the area and renovate the fields have been unsuccessful in part due to the continued belief that the area is too "dangerous" because of the malevolent supernatural residing there. What is important, however, is that whatever the actual cause or causes of the original abandonment, it was not abandoned due to population decline.

Similarly, the figures for ancient armies are notoriously exaggerated. Tibetan histories were written hundreds of years after the Era of the Kings and were meant to glorify the development and expansion of Buddhism in Tibet during that era, not to provide a chronicle of past events. In fact, historical information regarding secular affairs is rare, and these works are typified by Buddhist hyperbole. Moreover, even if we assume that Tibet fielded large armies during the Era of the Kings, it is by no means clear that these consisted solely of Tibetan troops. It is very likely that substantial segments of these forces were composed of subject and allied peoples.

The most serious factor, and the one most difficult to explain, is the observation by writers such as Bell (1968) and Ekvall (1972) that there was a serious labor shortage in Tibet and in the Chinese borderlands (where Ekvall lived). My own research with Tibetan refugees in India (Goldstein 1971a, 1971b, 1971c) also indicated that work opportunities were widely available and that this acted to moderate many of the more oppressive dimensions of the Tibetan serf system. However, like the other factors discussed above, the availability of work need not reflect underpopulation. To a degree, the availability of work in Tibet stems from the control by lords and certain strata of serfs of large amounts of arable land that they cannot work themselves. This concentration of land produces a need for labor to work the land but, critically, not to own it. Landlords are usually eager to increase the number of their tenants/laborers since this reduces the power of the workers and makes them more dependent on the landlords. If a serf were to flee to a new area, he would probably be welcomed, for his presence would undercut the relative strength of the workers already present vis-à-vis their landlord. It was not that there was available land at no cost to Tibetans, but rather that there were large segments of land held by lords and land-holding serfs that required tenants and laborers.

The above discussion demonstrates that much of the anecdotal evidence cited by Ekvall and others for declining population in Tibet can be attributed to causes other than low fertility. Yet, to a certain extent, the Ekvall hypothesis may have some validity, although not to the degree he stated and not for the same reasons. I suggest that while the Tibetan populations in Nepal and Tibet do not appear to be declining now, this may be a recent phenomenon and they may have been characterized by lower fertility throughout earlier periods. Three factors operative in the past could have reduced fertility rates.

Cultural practices that preclude or minimize sexual unions for females of reproductive age obviously decrease fertility levels. Table 3 illustrates this, showing that there is an average difference of 5.6 births between females aged 45+ who are married and unmarried. Table 3 also shows that 19 percent of the females aged 45+ and 18 percent of the females aged 40–44 are unmarried. When the CFR for all females aged 45+ (i.e., both married and unmarried) is compared to that of married women alone, the CFR is 1.1 births higher for the married females.

The most important factor producing this category of unmarried women in Limi is the presence of fraternal polyandry, the marital union in which two or more brothers jointly share a wife. Since the effect of polyandry on fertility has been discussed in an earlier paper (Goldstein 1976), only a brief summary will be presented here.

Because fraternal polyandry links two, three, four, or more brothers to *one* wife, unless there is either an extraordinary sex imbalance at birth or female infanticide,[4] a surplus of unmarried females will result. The more frequently polyandry is selected over monogamy by siblings, the more females will be culturally excluded from marriage and normal reproduction since, as indicated above (Table 3), unmarried females have very low fertility. Any factor that decreases the amount of fraternal polyandry or facilitates brothers fissioning from their polyandrous families and setting up independent nuclear families with new wives will, therefore, increase aggregrate fertility by reducing the number of celibate families. Limi data indicate that new economic opportunities encountered over the past three decades have lowered the cost of monogamy and led to a decrease in the amount of fraternal polyandry (see Goldstein 1978; similar data were collected by the author in Ladakh). The effect of such a shift on fertility could be significant.

Table 5 explores this effect by depicting the hypothetical consequence of an additional three females in Limi (of the total of 21) remaining unmarried, i.e., an increase in the category of unmarried females from 19 to 33 percent. Assuming the same fertility and mortality levels as actually exist in Limi, this increase in the proportion of unmarried females reduces the CFR from 6.3 to 5.6 and the average number of surviving children from 3.6 to 3.1. Assuming, again, a high male to female ratio of 110 to 100, 32 of the 66 surviving offspring would be female and the average number of daughters per female would be 1.5 versus the 1.7 for the actual situation.

Table 5. Hypothetical fertility data for Limi assuming 33 percent of the females aged 45+ are unmarried but fertility and mortality levels unchanged from Table 3

	Number	Number of live births	$\overline{X}$ births	Number of surviving children	$\overline{X}$ children surviving
Married	14	104	7.4	59	4.2
Unmarried	7	13	1.8	7	1
Both	21	117	5.6	66	3.1

Two other factors — monasticism and venereal disease — may also be relevant since both, in different ways, increase female celibacy. In precommunist Tibet, it is generally agreed that as many as 20 percent of the males were celibate monks throughout their lives. As we have seen, this is often cited as a reason for low fertility and underpopulation in Tibet. Since virtually none of the monks in the Tibetan groups in Nepal are celibate, on the surface monasticism could account for much lower fertility in the past in Tibet.

If monogamy is the marital norm in a population, and if there is no polygyny, the more numerous the celibate monks, the fewer will be the males available for marriage and the larger will be the category of unmarried females. In Tibet, however, since fraternal polyandry was widespread (and still is in Limi, Dhinga, and Nyinba), this would not be the expected result. It is extremely rare for a Tibetan family to make their only son a monk. The widespread *corvée* (monk tax), for example, requires that only families with three or more sons (or sometimes two or more) must make one a monk for life. Thus, virtually all Tibetan monks have brothers who are laymen and who marry. Given the presence and value of fraternal polyandry, it is reasonable to assume that if these celibate monks were not celibate they would most likely join their brother(s) in a polyandrous union, rather than set up new nuclear families. Because of this, the large number of celibate monks in Tibet (but not Nepal) does not imply a much larger number of unmarried women. This is not to say that increased monastic celibacy would have no effect on fertility. Despite the fact that most monks in Limi, for example, are not celibate and, as expected, married polyandrously, there were a number of monks who did marry monogamously, splitting off from their brothers and reducing the pool of unmarried females. Increased monasticism in Tibet, therefore, probably did have a slight reducing effect on fertility levels.

Venereal disease is also relevant since very little has been reported for the Tibetan groups in Nepal,[5] whereas it is said to be widespread in many regions of Tibet. This might produce greater sterility in Tibet than in Nepal, and thus lower fertility in the Tibetan groups in Tibet. However, if one assumes, as with monasticism, that there is already a sizable pool of unmarried females due to polyandry, the presence of more sterile females would result only in unmarried females being substituted as wives for sterile but married ones; it is unlikely to substantially affect fertility. Nonetheless, like monasticism it could have a slight effect on fertility since husbands with sterile wives may neither divorce them nor take a second wife. There were actually several examples of this in Limi.

Because of these three mediating factors, it is not unreasonable to suggest that in the past, in both Nepal and in Tibet-China, Tibetan fertility was somewhat lower than the current demographic data indicate. Table 5 shows that by assuming an increase of 14 percent in the number of females aged 45+ who are unmarried, the CFR was decreased from 6.3 to 5.6. This level of fertility is almost within the "low" category of Nag (1968) and not much greater than the 5.2 CFR reported by Howell (1976) for the hunting and gathering !Kung Bushmen. If we assume that 38 percent (rather than 33 percent) of the females aged 45+ were unmarried in the past, the CFR is further reduced to 5.2 and the number of surviving children drops to 3.0 per female aged 45+. Utilizing the same 110 to 100 male to female ratio at birth, this results in a reproductive figure of 1.4 female children surviving to women aged 45+.

An estimate of population growth is the ratio of the sizes of successive generations; one way to do this is to determine, for women past menopause, the average number of daughters who survive to the mean age of childbearing. If the result is one daughter per female, the successive generation will be the same size; if it is two, the population will double every generation (Coale 1974:17). We saw that under the assumption of 33 percent unmarried, the average number of surviving daughters per woman aged 45+ in Limi was 1.5. However, while this figure takes into account infant and child mortality, it does not reflect the additional mortality that will occur during the reproductive period of the surviving offspring of these women. Estimating this additional mortality depends to a large extent on the age distribution of the Limi women aged 45+, since the higher the proportion of older women, the older will be their offspring. The Limi data indicate that almost half (49 percent) of these women were between ages 55 and 70 and that the average age of the surviving children was 23 years. Because mortality is concentrated in the under-15 years and over-45 years age categories (see Table 2), we can assume relatively little additional mortality, perhaps 7 percent between age 23 and the mean age of childbearing (which is about 28 years). This additional 7 percent mortality reduces the number of surviving daughters per woman aged 45+ from 1.5 to 1.39, which in turn implies a population increase of about 40 percent per generation and an annual growth rate of over 1 percent per annum.

Long-term growth patterns can also be examined by comparing the different rates of mortality and fertility needed to produce zero populaton growth. If a given population has mortality rates such as those found in Limi, wherein 50 percent of the females born survive to mean childbearing age, each woman would have to produce an average of 2 children for that population to remain constant in size (Coale 1974). However, since generally more males than females are born, and using the 110 to 100 male to female ratio introduced above, the total number of children each female must bear to achieve zero population growth is 4.2 (2.10 × 2.0) and the number of daughters per woman is 1.99 (4.2 × .476).

We have seen, however, that the actual number (CFR) of children born to women aged 45+ in Limi is 6.3 and that, even under the assumption of lower fertility in the past, the CFR decreased to only 5.6 and 5.25, both of which are substantially higher than the 4.2 level necessary for zero population growth. Consequently, even when we assume that 33 percent of the females aged 45+ had never married and that mortality levels existed wherein 50 percent of the females born do not survive to the mean age of childbearing, these populations would have been increasing by over 1 percent per annum. Growth rates such as these, however, could not have been sustained over long periods of time due to the force of exponential growth.

While it is not possible to determine the population size of Tibet in A.D. 650 (the reign of the first of the great Kings of Tibet), the evidence for Ekvall's contention that Tibet's population was twice as large as in 1950 (i.e., about 6 million) is unconvincing. There are, however, very good demographic data for Tibet in the 13th century A.D., the period during which the Mongols established suzerainty over Tibet. According to a Mongol census undertaken for tax purposes in 1268, (see Tucci 1949:251–252), a total of 36,031 households were recorded in Central Tibet, including Sakya. Each household was estimated to consist of 6 persons, so this computes to a total population of about 215,000 persons. This census does not include monks and only concerns Central Tibet. It excludes very large and populous areas such as Eastern Tibet (*khams* and *a mdo*) and Western Tibet (*mga' ris*), and probably also misses scattered households and possibly landless units as well. Consequently, one might argue that the population of Tibet in the 13th century was three or four times higher than the census implies; that is to say, about 1 million persons.

While this does not preclude the possibility that Tibet's population declined from the 7th century to the 13th century, it suggests that between 1268 and 1950 there was actually a slight increase in population size. Taking the 1950 population of Tibet as 3 million, Tibet experienced a twofold increase in this 682-year period. In order to achieve such an increase, however, only very meager growth rates would have been needed, actually only about 0.21 percent per annum. By contrast, at the 1 percent growth rate discussed above, Tibet's population would have increased to about 1 billion by 1950. Thus, while it appears that Tibet's population did not decline after the 13th or even the 7th century A.D., if, in fact, it grew, it did so at rates lower than most of the post DTT industrial nations.

Given the Limi mortality rates, if low fertility rates were responsible for this level of growth, each female would have to have borne, on the average, only 4.2 live births throughout her reproductive years. We have seen, however, that for the more traditional Tibetan groups in Humla this is far lower than both actual and adjusted fertility levels. Even for the less traditional Sherpas, this is well below reported fertility levels. Consequently, the data suggest that, even if we assume slight growth over the past 700 years, levels of mortality higher than 50 percent (of the females dying before mean age of childbearing) are needed. Tibet, therefore, must have experienced regular high infant and child mortality, or periodic epidemics, or, more likely, both. Fertility, while moderate, would have had to be balanced by high mortality throughout Tibet's history.

conclusion

This paper has examined the contention that Tibet represents an anomalous peasant society in that its population has declined since the 7th century due to low fertility levels generated by cultural and psychological factors. Data presented and analyzed from a number of recently studied Tibetan populations in Nepal, particularly fertility levels for these groups, do not support that contention. Even when downward adjustments to Limi fertility data were made on the basis of assumptions of a greater prevalence of fertility-reducing sociocultural factors in previous periods in Tibet, fertility levels were still sufficiently high to produce substantial population growth. Historical data also suggest a twofold increase since the 13th century. The fertility levels discussed for Limi (6.3, 5.68, 5.25) are sufficiently high that equally high death rates—mortality levels wherein over 60 percent of the children born do not survive to the mean age of childbearing (67, 63, and 60 percent)—would have been necessary to produce population homeostasis. Tibet, therefore, does not represent an unusual anti-Malthusian example. The data and analysis indicate that low rates of growth, or homeostasis, had to be the result of Malthusian positive checks, i.e., high mortality.

The study also shows the substantial effect of sociocultural (though not psychological) factors fertility. There was a decrease of one birth per female aged 45+ as a result of the nonmarriage of a portion of these women. Moreover, .it is suggested that in the past sociocultural and biological factors in Tibet reduced fertility levels even more. However, despite such substantial reductions, the paper demonstrates that unusually high mortality would have been necessary to produce population homeostasis or decline.

In this regard, the paper also demonstrates that the common belief that high fertility was necessary to balance high mortality in preindustrial peasant societies is an oversimplication. Polgar (1972:205) has pointed out that there is some consensus that high mortality (defined as 50 percent mortality between birth and the beginning of the reproductive period) was typical of preindustrial societies. This analysis supports Polgar's claim that such a level of mortality would have produced substantial diachronic population growth. To achieve homeostasis in a population where women, on the average, had 8 births (CFR = 8), for example, about 74 percent of the female children would have had to die before the mean age of childbearing. This suggests, then, that the pre-demographic-transition period for peasant populations was characterized by high mortality balancing *moderate* to *low* fertility. Peasant societies based on agriculture, such as Tibet, did not require high fertility to offset high mortality and keep themselves going; to the contrary, the Tibetan data suggest that they required moderate fertility to avoid a sustained population explosion. Unless we posit extraordinarily high levels of mortality, it appears obvious that biocultural factors reducing fertility must have played a focal role in producing the low rates of population growth that typify that period after the neolithic and before the mid-18th century demographic transition.

notes

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[1] Although both the Bangham and Sacherer (1980) and the Gupta (1978) articles suggest that the reported fertility difference between the Sherpas of Khumbu and other Sherpas is caused by the fertility-reducing effects of high altitude, a phenomenon documented for the Andes (see Baker and Dutt 1972), the Humla data do not agree. Tsang village in Limi is a high-altitude area. The village is located at 3930 m. and the inhabitants live for months with their animals at altitudes higher than that (up to 4940 m). However, fertility levels there were roughly the same as in the other two Humla populations (Dhinga and Nyinba), which are located at altitudes of less than 3048 m. Moreover, when unmarried women (i.e., women not considered to be at risk of pregnancy) are excluded, Limi fertility is high (e.g., as Table 4 shows, in Limi the CFR for married women is 7.4). The Limi data suggest, therefore, that high altitude does not underlie the low fertility reported for the Sherpas of Khumbu.

[2] A recent study (Fisher 1980) asserts that contraception is widespread in Khumbu and varies according to the degree of involvement in the outside cash economy. For example, in Kunde, "all fertile females—with only 7 exceptions, who had living husbands and two or more living children were practicing some form of birth control" (1980:23). This supports my own impression from work with the Sherpas of Helambu and suggests that the lower fertility in Khumbu may be the result of contraception.

[3] Altitude is generally considered to raise the sex ratio at birth.

[4] Although Levine (1977:317ff.) reports high sex ratios that she explains by indirect female infanticide (i.e., poorer treatment and care of females causing higher female mortality), age-sex pyramids from Limi, Dhinga, and Khumbu all manifest parity in sex ratio. Tibetans, moreover, generally afford women a higher status than their Chinese and Hindu neighbors, and they decry infanticide. The predominate demographic and cultural data support a situation with no systematic conscious or unconscious culling of females.

[5] Lang and Lang (1971:5) report 6 cases of gonorrhea out of 2,293 outpatient cases treated. Five of these were young men who had returned from Kathmandu and the other was a female contact.

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