# Assessment of the health status and risk factors of Kham Tibetan pastoralists in the alpine grasslands of the Tibetan plateau

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Available online 4 August 2006

## Abstract

The health status of Tibetan herders in the Sanjiangyuan region of the Tibetan Plateau, in southwest Qinghai Province, is assessed in this paper. The field study was conducted in 2002 in the context of a broader community development and research framework, the ultimate goal of which is to achieve an effective region-specific programme of preventative health care and training for Tibetan pastoralists. Specifically, the authors analysed the impact of a number of potentially health-related environmental and lifestyle risk factors on self-reported health indicators, with a special emphasis on mother and child health. Several health status indicators were used, including a general morbidity index and a measurement of functional incapacity due to illness in the sample households. Maternal and child health findings were alarming with high rates of miscarriage and infant loss, with no traditional midwives to assist in pregnancy and delivery. Preventable childhood illnesses were also common. Other debilitating diseases included hepatitis, tuberculosis, arthritis (gout), gall bladder disease, peptic ulcers and back pain. Finally, binary logistic regression analysis showed a significant link between general morbidity and the time it takes to obtain water. The survey findings, validated by the focus groups, indicate a real need for increased accessibility and quality of health service provision to women and men and effective preventative health strategies.
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*Keywords:* Health status; Risk factors; Mother-and-child health; Pastoralists; Tibet

## Introduction

High morbidity and mortality levels among nomadic and semi-nomadic pastoral populations raise some of the world's most problematic issues in terms of public health (Foggin, Farkas, Shiirev-Adiya, & Chinbat, 1997; Foggin, Shiirev-Adiya, & Foggin, 2000; Swift, Toulmin, & Chatting, 1990; Wiese, Donnat, & Wyss, 2004; Wiley, 2004; Wyss,

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Fig. 1. Tibetan cultural realm and the study area.

Bechir, Schelling, Daugla, & Zinsstag, 2004; Wyss, Bechir, Schelling, Tanner, & Zinsstag, 2004; Yémadji, 2004; Zinsstag & Yosko, 2004). Indeed, this is a significant facet of the even broader question of inequalities and health which haunt the planet (Curtis, 2004; Lim, 2006). The objective of this paper is to present some key results from a self-reported health survey, together with focus group work, conducted recently among nomadic pastoralists in the headwaters of the Yangtze River, which originates in the centre of the Tibetan Plateau, a region covering much of western China and which coincides roughly with the Tibetan cultural realm. The study took place in Zhiduo County, in southwest Qinghai Province of the PRC, an area located more or less in the geographic centre of this vast territory (Fig. 1). The socio-political, cultural and economic contexts of this geographic area are complex, and it would be unwise to consider the state of health of a nomadic population without examining both regional and national scales of analysis. Indeed, through the 1980s and 1990s, Qinghai became one of the poorest provinces in the PRC, with 39 of 46 counties now classified at the provincial or national level as poverty-stricken (Goodman, 2004). Furthermore, most policies and actions undertaken as part of China's campaign to "Open up the West" (or the "Great Western Development Strategy" as it is also called) aim first

and foremost to address national concerns. However such decisions (such as the promotion of fencing) almost invariably also have dramatic impact on the livelihood and/or the daily life of rural farmers and herders (Foggin, 2005). Zhiduo County is such an area, inhabited chiefly by Tibetan pastoralists.

Situated in the heart of the Tibetan Plateau, this county encompasses the highest-altitude populated territory in the Yangtze River drainage basin. Its total area is $80,757 \, km^2$, roughly twice the size of Switzerland, with an average elevation over 4500 m above sea level. The environment is semi-arid and arid grassland, interspersed with ecologically significant wetland areas. Some small areas of scrubland are also found, while a much larger area of the county is covered with bare rock and snow. In terms of administrative divisions, the county has 6 townships each of which is further divided into "villages" ($n = 20$) and "communities" ($n = 68$).[1] A sense of

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[1]Township" (Chinese, *xiang*) is an administrative term used in China to refer to the sub-county level. It is also the modern name of the former communes (*gongshi*). In pastoral areas, "villages" are more conceptual than real as there is no agglomeration of houses per se, only a delineated geographic area. Such "villages" may also be referred to as pastoral committees (*muweihui*) or production brigades (*dadui*). The smallest administrative unit is comprised of communities of 20–50 households (*hu*). These communities coincide with the production teams (*xiaodui*) of the

community is still present at the township level and below, particularly in remoter parts of the county.

According to official sources the county population is 24,194 people (2000 national census, Zhang & Zhu, 2002, p. 915), in 5202 families (Ju, 2002; Zheng & Li, 2004). Ninety-eight percent of the people are Kham Tibetan, and nearly 90 percent are pastoralists, most of whom are nomadic. Altogether there are over 475,800 livestock (1,049,400 animal units[2]) in the county, mostly sheep and yak. Even when the western uninhabited region of the county known as the Kekexili is excluded (an extensive area of alpine desert steppe administered by the State Forest Bureau as the Kekexili Nature Reserve), the average population density of the populated area of Zhiduo County still amounts to only 0.57 people/km². When the county seat is excluded (population ca. 2500 people), the average rural population density is even lower, at 0.51 people/km².

Throughout the Tibetan region, the traditional way of life—nomadic pastoralism, or pastoralism with seasonal mobility—has been developed over hundreds of years and Tibetan herders have acquired an intricate ecological knowledge of their natural environment (Jones, 1996; Khazanov, 1984). A wide variety of livestock and rangeland management practices have enabled them to survive in the extremely harsh environment, including seasonal mobility of their livestock herds and a flexible, opportunistic approach (i.e., turning potential obstacles to their advantage) to many aspects of their pastoral livelihood. Today, however, the level of socio-economic development in most Tibetan areas of China remains exceptionally low. Among pastoralists in Qinghai Province, around 65 percent of men and 95 percent of women are illiterate. Few children have access to even basic education. With poor road conditions and limited access to vehicles, the sale of livestock products and hence opportunity for economic development is restricted. Limited access to information—itself tied closely to education and literacy, and to health—also means that what economic opportunities might be available to local herders are often missed, or that the herders are cheated by outside merchants because of their lack of literacy and/or numeracy.

The people's health situation also is cause for concern, with high levels of infant mortality in many areas of the Tibetan Plateau and very limited access to health care services overall. People may call on a village health worker who has very limited, if any, formal training. There are no traditional midwives. Nearly all health workers are men and women have no monitoring in pregnancy. If serious problems arise, it may take days before transport is found to reach a hospital and many people cannot afford the hospital care when they arrive….

The research reported here is part of a broader research framework. This paper deals primarily with the impact on self-reported health indicators, especially measures of mother and child health (MCH), of a number of potentially health-related environmental and lifestyle risk factors among nomadic pastoralists in southern Qinghai Province.[3] Although they are not developed explicitly in this article, the results reported here reflect the concerns expressed in the two other major goals of this research: (1) to test the validity and applicability of a bio-cultural model of health and disease in the context of a specific alpine grassland, developing world situation (see also Smith, 1982; Blaxter, 1990; Caldwell, 1993; Curtis & Taket, 1996; Oths, 1998),[4] and (2) through increased understanding of health status and risk factors (HSRF) and MCH inter-relationships, and by involving those people most affected at the grassroots level (i.e., local stake-holders), to achieve as a priority outcome of this work an effective region-specific programme of preventative health care and training for Tibetan pastoral populations.

## Methods

Fifty families in Suojia Township and 49 families in Zhahe Township were interviewed about their health, socio-economic conditions, household

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(*footnote continued*)
former communes. However these units do not entirely reflect the earlier community structures that were present in the pre-1950 hunting tribes (Foggin, 2005). Note, too, that the standard terminology used for villages in lowland farming areas of China (i.e., *cun* and *ziran cun*) is not used in this remote pastoral area of the Tibetan Plateau. *The study area is made up of the two westernmost townships of Zhiduo: Suojia and Zhahe.*

[2]Grazing pressure on rangelands is often measured in terms of animal units (sheep units) per area of land. One yak is equivalent to 5 sheep units, and one horse is equivalent to 6 sheep units. Zhiduo County has 134,900 yak, 334,100 sheep, and 6800 horses, which totals to 1,049,400 animal units.

[3]On-going integrated development work is being carried out by Plateau Perspectives and local partners in Zhiduo County in the context of the *Yangtze Headwaters Sustainable Development Project* (2004–2008). See URL: http://www.plateauperspectives. org.

[4]Particularly, the model elaborated by Oths (1998).

Table 1
Population of the villages and selected communities in Zhiduo County

| Township (*xiang*) | Village (*dadui*) | Village population | Community (*xiaodui*) | Community population | Families interviewed |
|---|---|---|---|---|---|
| Suojia township | | | | | |
| | Muqu *dadui* | 950 | Muqu Third | 220 | 12 |
| | Yaqu *dadui* | 1317 | Yaqu Third | 355 | 17 |
| | Jiongqu *dadui* | 523 | Jiongqu Second | 132 | 7 |
| | Dangqu *dadui* | 955 | Dangqu Fourth | 139 | 10 |
| | Cooperative[a] | ∼50 | — | — | 1 |
| | Township seat[b] | ∼150 | — | — | 3 |
| | Total population | ∼3945 | | | 50 |
| Zhahe township | | | | | |
| | Masai *dadui* | 1144 | Masai First | —[c] | 11 |
| | Dawang *dadui* | 1029 | Dawang First | —[c] | 10 |
| | Zhisai *dadui* | 1336 | Zhisai First | —[c] | 13 |
| | Kouqian *dadui* | 1364 | Kouqian Fourth | —[c] | 13 |
| Township seat[b] | 364 | — | — | 2 | |
| | Total population | 5237 | | | 49 |

[a]Suojia township has set aside an area of grassland for poor families who have lost all their livestock due to snowstorm disasters, and provided them with a small herd. This is called a 'poverty cooperative' (*hezuoshi*) and is managed at the same administrative level as the other villages (*dadui*).

[b]The township seat or administrative centre (*xiangcheng*) is distinct from the surrounding pastoral areas.

[c]Missing data.

conditions and the environment. Specifically, one community (*xiaodui*) was selected randomly in each of the eight villages (*dadui*) within the two townships (*xiang*), and then 25 percent of the families in each selected community were chosen at random to be interviewed (Arcury, Gaylord, & Cook, 1998; Baxter & Eyles, 1997; Bernard, 2001; Sechrest, 1970). The total populations of the eight villages and selected communities are shown in Table 1. Overall, the survey sample was made up of 467 people in 99 families, approximately 5 percent of the two townships' population.[5] In addition to showing the spatial distribution of general morbidity, Fig. 6 shows the location of the families that were interviewed.

There are two kinds of variables dealt with in this study: (1) health status indicators, viewed as the dependent variables, and (2) co-variates that may be viewed in some way as risk factors capable of compromising health (or, put another way, of impacting on levels of morbidity). The *health status indicators* were selected on the basis of health criteria used in similar research carried out in other contexts (Coons, Alabdulmohsin, Draugalis, & Hays, 1998; Graham, 1986; Hays, Sherbourne, & Mazel, 1993; Kohn & White, 1976). More specifically, these involved the measurement of illness, functional capacity being compromised, and the presence of some specific illnesses. As in so much of the relevant literature, in the absence of conceptual tools to measure health per se, we sought to measure its converse, the lack of health, or illness. In the questionnaire used to aid the interviews, this was done through an open question, the answer(s) to which the interviewers were trained to assign to one or more of 25 symptom categories related to parts of the body (e.g., ears, nose, head, stomach, etc.) and/or to 11 commonly recognised types of illness (e.g. colds, measles, diarrhoea, etc.). The second half of the equation—the *co-variates*, or potential *risk factors*—relates to situations which, at least hypothetically, may increase or decrease the risk of individuals becoming ill. The measurement of this part of the equation was based on operational variables (see Table 2) that flowed from the study's conceptual model.[6]

[6]Beyond the 'macro-risk' and 'micro-risk' factors cited by Oths, the conceptual model tested by this study posits that the health status of a community is a function of: (1) (cultural) lifestyle variables, (2) social and physical environmental factors,

Table 2
Hypothesized predictors of health status

| Health predictor | Variable | Question asked in health survey (categories: 1/0) |
| --- | --- | --- |
| Nomadic lifestyle | Movepasture | Do you move to different pastures during the year? (y/n) |
| Location | Township | What township do you live in? (Suojia or Zhahe township) |
| Literacy | Literacy | Is at least one person in this home able to read a book? (y/n) |
| Access to water | Watertime | How long does it take to collect water? ($>15$ or $\leqslant15$ min) |
| Smoking | Somesmoke | Does any member of this household smoke? (y/n) |
| Alcohol | Alcohol | When alcohol is available, is it drunk in this family? (y/n) |
| Mobility | Someaway | Is someone from this family away at the present time? (y/n) |
| High mobility | Awayoften | Is someone from this family frequently away? (y/n) |
| Residential mobility | Tentuse | Do members of this family sometimes live in a tent? (y/n) |
| Socioeconomic status | Income | Does the family have more or less than 1000 $Y$ income/year |
| Gender | Sex | Male or female |
| Age | Age | Five-year age groups, plus 70 and over |

Data were gathered through this household questionnaire using questions directly reflecting the components of the basic hypothesis of this study.[7] The questionnaire had been validated and used in previous cross-cultural studies (Kohn & White, 1976; Foggin & Aurillon, 1989; Foggin, Armijo-Hussein, Marigaux, Zhu, & Liu, 2001; Foggin et al., 1997), some of the questions having of necessity to be adapted to local realities (including translation into Mandarin and, verbally, into Kham Tibetan, the use of the latter's *written* form not being recommended at the local level[8]). This adaptation was very important given that this study is based on self-reported indicators of health status and related risk factors (Arbelot, 1995; Lonner & Berry, 1987). Response categories were used in the questionnaire because, after seeing many patients in the area, it was apparent that the local description of symptoms did not always correspond clearly to meanings commonly accepted in the West. Words used referred to multiple diagnoses and would be hard

to include in a numerical analysis. It was therefore more effective for the trained interviewers to categorize the answers given.[9]

Although the reported results are based on sample data and cannot, statistically, be extrapolated to a wider population (since the data are non-parametric), the target population is in one sense the approximately 250,000 Kham Tibetans[10] living in Yushu Tibetan Autonomous Prefecture of southwest Qinghai province of the PRC, particularly the herding pastoralists which comprise around 60 percent of the population. "Sampling in qualitative research cannot, and some say, should not obey the requirements of random sampling theory. More importantly, it should be relevant to the conceptual framework, the research questions addressed, the believability of the findings, and last but not least, to the criteria of both ethics and feasibility" (Berry,

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(*footnote continued*)
and (3) the availability, perception and utilization of health services (most particularly in the realm of preventative health care).

[7]The general hypothesis of this study corresponds in all points to the conceptual model outlined in footnote 6. In this paper, the hypothesized operational predictors of health status are based on an application of part of this generalized model.

[8]On the question of the written language used for the questionnaire, it was imperative to follow local advice. One of the problems is that formal written Tibetan, Kham or otherwise, is generally a stylistic literary form that is understood by relatively few people outside of the religious clergy. Care was therefore taken to insure that Kham-speaking interviewers fully understood each question before administering the questionnaire.

[9]The expression 'heart disease', for example, was used for *any* emotional or psychiatric health problem, unhappiness, chest pain, etc.—as self-reported by the questionnaire respondents. (The village doctors *before* training used the same terminology.) Although the question, "Have you ever had chest pain at the same time as a sharp pain going down the left arm?" is limited in its use as it can include other diagnoses, particularly arthritis, it was about the only question that seemed to be understood, on pre-testing, that related to heart disease. It thus was felt to give a counter balance to self-reported cases of heart disease, which bore almost no resemblance to its true prevalence. One of the authors, a doctor who has seen patients for many years in the study area, accompanied the interviewers and discussed with them each night, validating the symptoms—sometimes seeing serious cases the next day.

[10]The total population of Yushu Tibetan Autonomous Prefecture is actually officially 258,000 people, of which 97 percent are Tibetan—i.e., 250,000 Tibetan Khampa speakers (Cao, 2003; see also Liu & Wurm, 1987).

1968; Foggin et al., 2001, p. 1686, summarizing Curtis et al., 2000, p. 1003). This was the main consideration that informed the study's approach in the selection of the focus groups participants. In the sampling design for the questionnaire survey, however, stratified random sampling was used for the selection of the survey areas and households.[11]

For each survey period—Suojia in February 2002 and Zhahe in April 2002, both in the "cold season"—local health workers (e.g., township doctors) and government leaders (e.g., county health bureau staff, township leaders) were involved in project planning and trained in survey techniques. Other team members included members of the local Upper Yangtze Organization (UYO), one or more Plateau Perspectives staff, interviewers, translators and drivers. All the interviewers were first language Kham speakers and so conversant with the indigenous language of the households surveyed. On entering a home, the interviewer (who was from the area) introduced the questionnaire and its purpose and asked to interview the principle woman of the household. If for any reason she was not free to talk, the leader of the household (usually a man) would answer the questions instead, sometimes asking his wife if unsure of the answers. After the purpose of the questionnaire was explained, if the family leader agreed, we then asked the main respondent questions about the family's health status and other related factors. For questions regarding women's health, if the interviewer was a woman, she would ask questions of the woman of the house in the absence of any men, given the local taboo against asking questions of this nature across gender. If the interviewer was a man and the respondent a woman, they would go outside the house where no-one else could hear them conduct the interview. Some local doctors and community leaders also joined the survey team for shorter periods of time. On average, between 1 and $1\frac{1}{2}$ h were spent with each family. The results of these health-related interviews are presented below.

Focus group methodology was later used in 2004–2005 to further inform and validate the health survey (questionnaire) findings (Krueger, 1994;

Morgan, 1997).[12] Focus group work was carried out among the village doctors from the study area who had gathered for training (i.e., in the context of on-going development work in Zhiduo County). For ranking diseases, methods developed for health workers with low literacy rates were used (Werner & Bower, 1982). Two groups comprised of village doctors (all men, total $n = 25$) with little previous training were formed. In each case, warm-up sessions to encourage a permissive environment for talking and active participation were carried out, but specific medical training had not yet begun prior to the focus group discussions. The focus groups were conducted (with the help of an interpreter) by the MCH specialist of the research team (second author). In both groups, the doctors were split into smaller sub-groups and later brought back together for general feedback and discussions, to gain the advantages of group effect. Discussions with the village doctors were centred on common health issues and diseases. A third focus group was also formed with over 20 Tibetan women, future health workers, in which key issues of mother and child health were discussed. Their ages ranged from 17 to 21, except one woman who was over 30. They were all unmarried except for the 30+ year-old who had a son. These women had been chosen by their communities to receive training in woman and child health. Within their health training workshop, they were asked to give a description of their lives, and we recorded four sub-groups' descriptions of a typical day of their lives on the grassland.

## Results

Results are divided into five main sections:

(1) Characteristics of households and household members;
(2) Health outcomes, health status indicators, and diagnostic limitations;

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[11]Categorical data from a questionnaire survey are, in a sense, in a grey area because of the use of numbers. But in reality these kinds of data are qualitative and do not obey the rules of inferential statistics, which explains the use of non-parametric techniques for their analysis.

[12]Between 2002 and 2004 (the time taken to gain the appropriate permissions and to set up the focus group work), the main change that has occurred is that the county has become more 'open' to entry by foreigners. However, few outsiders entered the county in that time and no new health inputs were made in the study area. In 2004, part of the county also became part of a national nature reserve, but this has had little effect in this time span. Furthermore, although the number of motorbikes used in the area increased, the state of the roads has continued to deteriorate and access to health care therefore remained largely unchanged. On individual interviews with women, they did not note any changes in the last few years.

(3) Mother and child health;

(4) Lifestyle and environmental factors; and

(5) Predictor variables of seven health status indicators.

### Characteristics of households and household members

The age and sex distribution of the sample population in Suojia and Zhahe townships are shown in Fig. 2. Average family sizes were 5.1 persons per family for Suojia township and 4.4 persons per family for Zhahe township. The people in these two counties are Kham Tibetan pastoralists who practise seasonal migrations (involving the whole household) within their respective townships (Suojia township alone covers approximately 11,000 km$^2$!) in order to most efficiently utilise the alpine pasture resources. Five yak (or 25 animal units) per person are considered minimal subsistence level. All but two households in the study sample depended almost entirely on animal husbandry for their livelihood; the household leaders of the two that did not were a doctor and a teacher. The vast majority of these pastoralists live in tents for at least part of the year (Fig. 3). The tents are made of yak hair. They are heated by a mud yak-dung stove in the centre. People sleep on sheep wool mattresses on the floor. These also provide the seating during the day for mealtimes and relaxing. In one corner of the tent a pile of yak dung is stored

to fuel the fire. This corner is generally considered the dirty corner of the tent. The tents were reported to be too cold in winter and too hot in summer. Houses, on the other hand, are made of mud brick with a sheet-metal stove in the middle of the room. They usually have wooden beds, which provide the seating in the day when bedding is stored away. The houses usually have two rooms, but sometimes one or three. Such houses were reported to be warmer than the tents in winter. In some instances, people live in converted animal (livestock) shelters, which were provided by the government to improve animal survival.

As to food, the basic diet consists of roasted barley flour (*tsampa*), meat and milk products. Vegetables (which are seldom eaten) and wheat flour have to be 'imported' and so are scarce and expensive. The women and the children do most of the herding and all the milking, processing of milk products, collecting and drying dung, collecting the water, cooking and washing. The men kill the animals when needed and do the trading. When asked, women tended to say they did the milking and looked after the family while the men would explain that they were herders. When respondents (for each household) were asked if there had been a major life event in the last year, and if so what it was, 43% reported a major life event in the last year, of which 26% was 'building a house', 19% 'livestock dying' and 12% 'death in a family'.
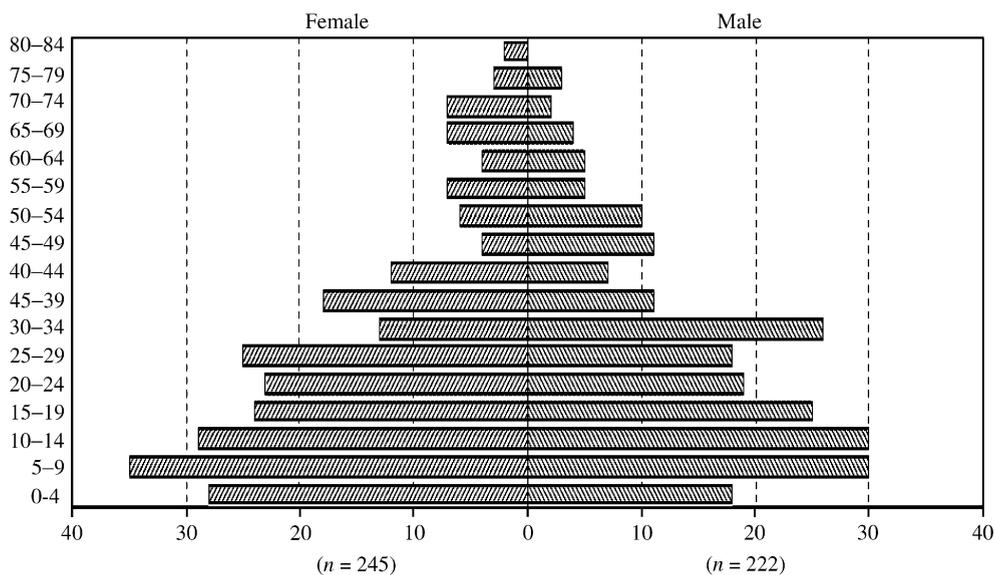


Fig. 2. Age and sex distribution of sample population in Suojia and Zhahe townships.
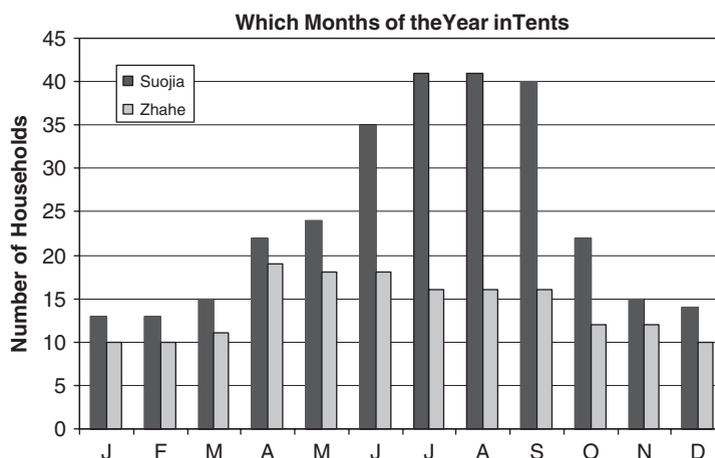
Fig. 3. Which months of the year the pastoralists of this study live in tents.

## Health outcomes, health status indicators, and diagnostic limitations

Health status can be measured by a variety of indicators. To obtain such indicators it was necessary to use self-reported symptoms and in some cases self-reported diagnoses. Obviously, there are substantial limitations to this approach. For example, since tuberculosis is poorly recognised and diagnostic facilities are relatively inaccessible, we used the criterion of at least two of the three standard symptoms, namely daily cough for more than a month, blood in sputum and weight loss. Although this may give an overestimate, we learned from the focus groups that weight loss is rarely reported unless severe. Dealing with the question of heart disease was particularly problematic since anything related to the heart can have a plethora of non-biomedical meanings. Consequently we used a categorical question relating to two classic symptoms (see footnote 9).

Concerning MCH and pregnancies, self-reported symptoms included swelling of ankles and legs. Since women have no medical care in pregnancy, information about blood pressure was not available. Haemorrhage immediately after birth and some days after birth is obviously difficult to assess as people may well overestimate blood after delivery. Almost without exception, there are *no* traditional attendants, nor any kind of doctors, to assist in deliveries even when problems are serious. With regard to non-pregnancy related women's illnesses, kidney problems were over-estimated as it is a term used to cover all lower back pain, urinary and other related problems. With regard to tumours, self-reported breast infections, breast cancer and cancer of the womb are also only an indicator, at best. It is possible that benign breast lumps are felt to be breast infections or breast cancer, and that cancer of the womb includes other tumours and/or swellings in the lower abdominal area. These symptoms were chosen as women consider them to be common or problematic.

Furthermore, with regard to children's illnesses, since these are usually reported by the caregiver, there are once again diagnostic limitations. 'Underweight' is likely to be an underestimate as it is poorly recognised. Ear infections will also likely be limited to those in which there is pain or discharge. Anaemia will be limited to a parent's estimation of pallor as few will have had investigation. Whooping cough, although recognised clinically by the village doctors, will have been diagnosed by a characteristic cough but could include illnesses caused by respiratory viruses. Measles, although recognised by paediatricians in the hospital as common and also by the doctors in the focus group, is likely to include other viral illnesses and be an overestimate. These are the limitations of a self-reported health status survey.

Figs. 4 and 5 show several important health status indicators as percentages of households and individuals, respectively. The first two categories are general indicators of morbidity (Daugla, Daoud, Tanner, Zinsstag, & Schelling, 2004), but measure two different aspects of health and disease. The first refers to general morbidity (i.e., illness during the previous month, from any cause, see Fig. 6) and the second relates to functional incapacity due to illness (i.e., to be prevented from doing work or normal
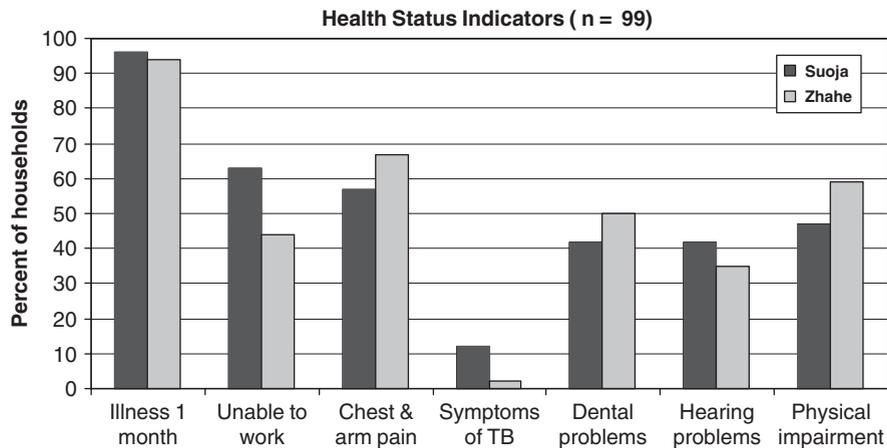
Health Status Indicators ( n = 99)



Fig. 4. Health status indicators by percentage of households.
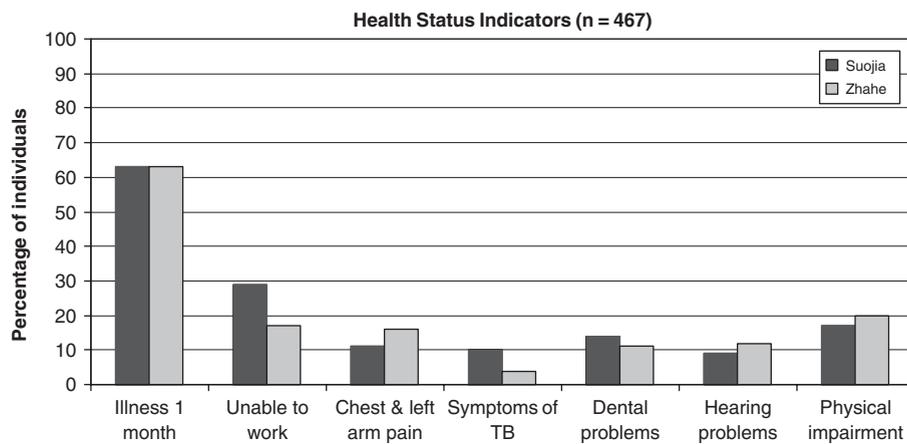
Health Status Indicators (n = 467)



Fig. 5. Health status indicators by percentage of individuals.

activities). Symptom-specific indicators included attempts to identify heart problems, tuberculosis, dental problems and hearing difficulties. A seventh indicator was a measure of physical disabilities, including blindness and impaired vision. The latter constituted over 50 percent of this category.[13]

In the focus group sessions, the top four most common reported health problems (diseases) were uniform across all three groups: "liver" problems, stomach problems, "gallbladder" problems and STDs. When asked what the most serious problems were in each of their communities, the respondents also described "swallowing problems" (often leading to death), hepatitis (which was described as the commonest infectious disease) and high blood pressure. Arthritis was described by all groups, and although not in the top four, it was felt to be important as it was very debilitating. The local doctors said it was limited to certain families, was more common in men, started in the same joints before progressively affecting all the joints, and was particularly serious in the spring and summer wet seasons.

After the focus group work was completed and while the village doctors were being trained, both their diagnostic ability and health concerns changed. For example, when pulmonary TB was taught, many of the doctors immediately recognised the symptoms and believed they had seen it on many occasions but had not recognised it. Some of the older doctors were aware of TB and were treating it. Similarly when shown slides of eye conditions, they recognised red eyes and cataracts as common. 'Red

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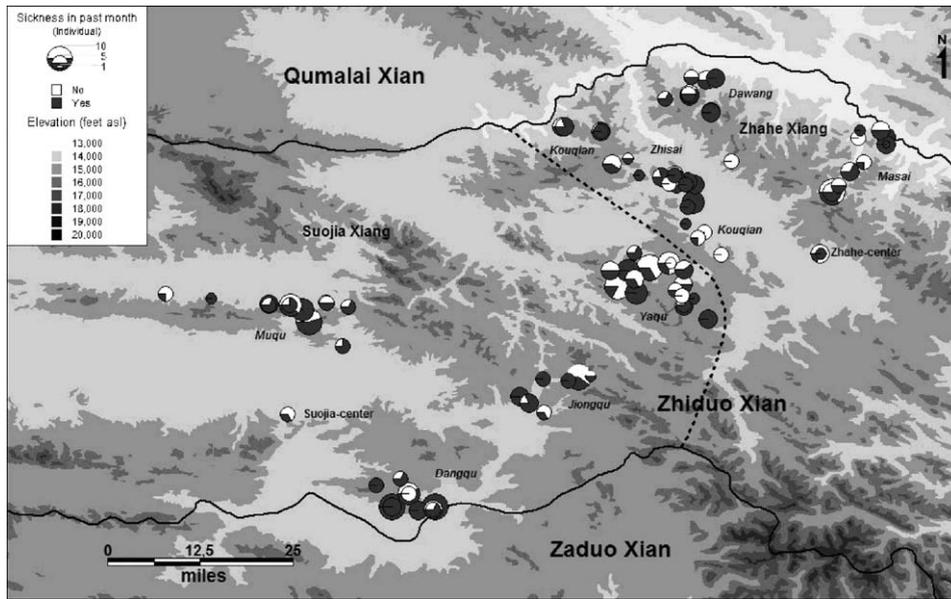[13]The terms disability and physical impairment are used synonymously.

Fig. 6. Location of sample households and general morbidity.

eyes' were recognized mostly as conjunctivitis of various causes and also included conjunctival haemorrhage.

*Mother and child health*

Mother and child health (MCH) has been a major emphasis of this study (Wallace, Ryan, & Oglesby, 1988). In the 99 households that were surveyed, there were totals of 33 pregnancies in Suojia township and 23 pregnancies in Zhahe township over the previous 5 years.[14] A quarter of all infants born after 7 months of pregnancy in the previous 5 years died. On the other hand, during the same period, none of the pregnant women died, in either township, at any time in pregnancy or within 6 weeks after delivery. In 18 percent of the pregnancies women were reported to have suffered severe swelling of ankles and legs, 12 percent had postpartum haemorrhage (PPH) immediately after birth and 12 percent within a few days of birth, and

37 percent had a fever within a few days of birth (Fig. 7) (Wiley, 2002, 2004). In the focus groups, however, some women described knowledge of maternal death from childbirth—some in first-degree relatives.[15] They described a case of a mother spending a long time in labour and eventually dying with the baby not being born. Some women described "kidney problems" (a term the women give to any low back pain or urinary problem) or other abdominal pain during pregnancy. When asked how and where they gave birth, most women said they deliver at home with help (Fig. 8). In 86 percent of cases they were assisted by a relative (usually the mother of the pregnant woman) and only 5 percent were helped by a health worker/doctor. As there are no traditional midwives, the women have no regular check-ups. Only if there are serious problems during the delivery might they call for a village doctor—who is male, and probably far away. The young women in the focus group were those chosen by their communities to be trained to provide the first service available to pregnant women.

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[14]Information about women and children gathered from the questionnaire was based on the women and children of the sample households. From this we determined how many pregnancies there were in the area (this was the denominator) and then took events as a percentage of pregnancies. Similarly, we speak of all infants born over 7 months' gestation over the past five years. It was important to study MCH and the general symptoms categories together since they are totally interrelated.

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[15]The sisterhood method was not used as after 2 trials of it by colleagues in neighboring areas the results were poor. We therefore used a combination of survey questions and focus groups. The men's and the women's focus groups were analyzed separately.
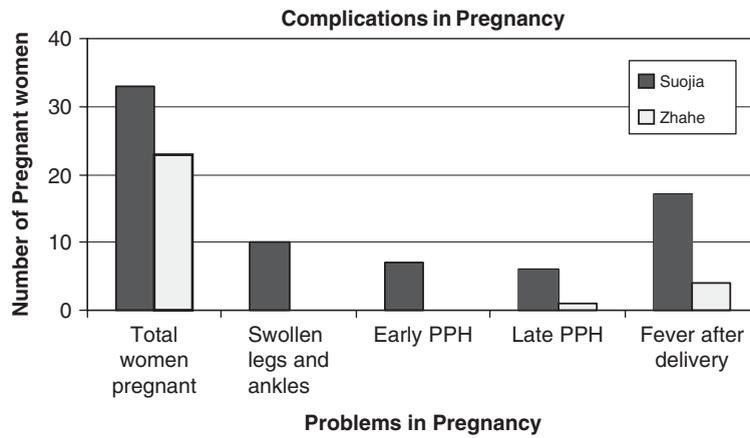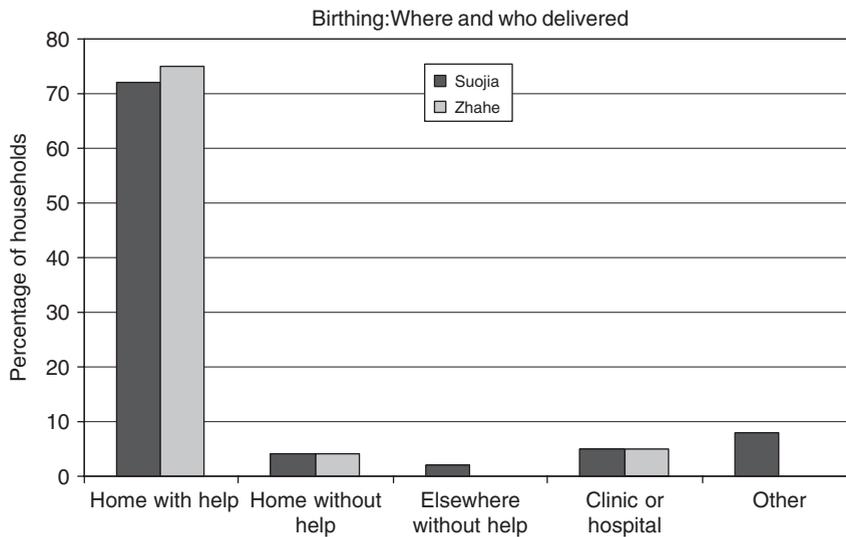
Fig. 7. Complications in pregnancy.



Fig. 8. Birthing: where and who delivered.

With regard to childhood deaths, in the Suojia sample population, 12 of the 46 infants born in the last 5 years were reported to have died (26 percent); in the Zhahe sample population, 10 of the 32 infants born in the last 5 years were reported to have died (32 percent). Many cases of childhood illness were also reported. Numbers of cases are given in Fig. 9, expressed as a percentage of the total number of under-fives in the sample population. Fever, cough and diarrhoea were commonly reported, as were many cases of 'red eye'. Some children were considered to be underweight, although the local criteria for this were variable and based on general impression. With regard to whooping cough and

measles, in the focus groups the village doctors diagnosed whooping cough on the basis of the type of cough (which may also indicate other respiratory conditions) and they gave a clear clinical description of measles. However, as cases are self-reported, it is likely that other conditions are included in the questionnaire survey-based figures for measles.

Concerning non-pregnancy related women's illnesses, most heads of households reported that at least one of the women in their household had kidney or urinary symptoms in the last year, but these cases were not identified at the individual level. A large proportion of households also reported that at least one woman had had menstrual
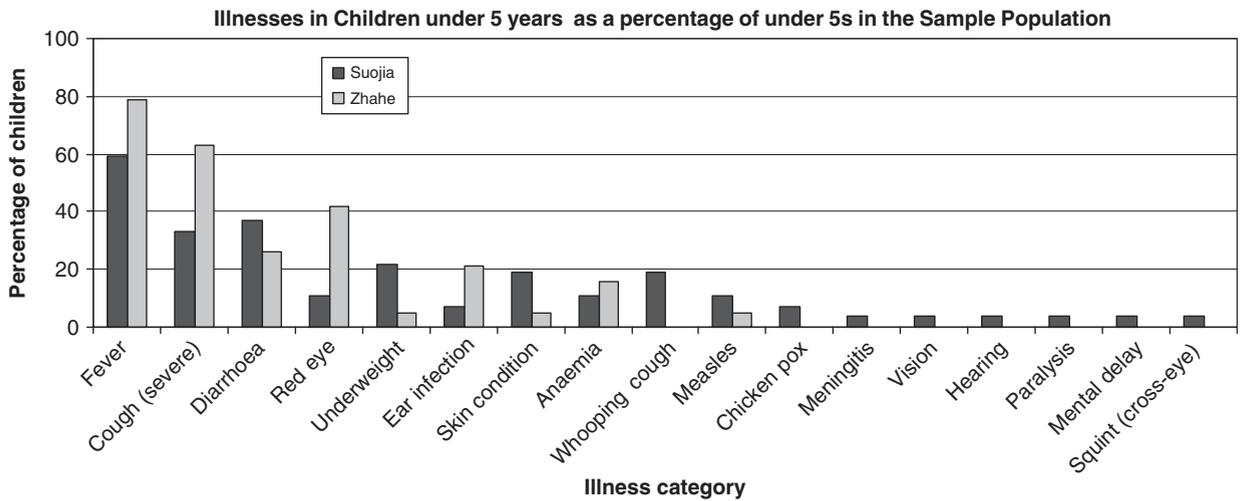
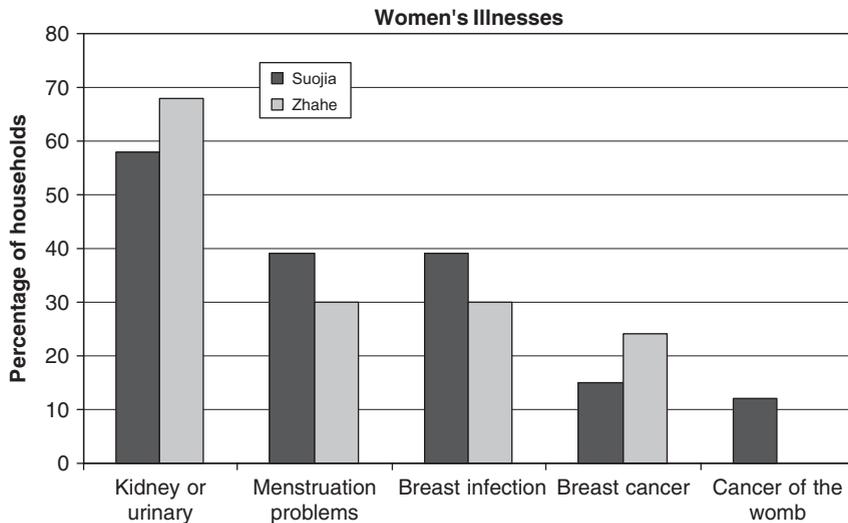Fig. 9. Illnesses in children under 5 years of age



Fig. 10. Women's illnesses in Suojia and Zhahe townships.

problems, and many respondents reported breast infections, breast cancer or cancer of the womb[16] (Fig. 10). From the focus group work, however, it is fairly certain that some lower back pain in women, which has generally been ascribed to kidney disease, may in fact be due to simple musculo-skeletal problems. As reported earlier, when asked to give further details of what they meant by 'kidney problems' the village doctors and women health workers simply meant back pain. However, none of the members of the focus groups was able to

distinguish between low back pain resulting from musculo-skeletal problems (these were poorly recognized) and pain that was genuinely related to kidney disease. Interviews with non-health workers equally were clear about other urinary symptoms, which were common.

### Lifestyle and environmental factors

Since health status is often affected by people's lifestyle (Blaxter, 1990; Gesler, 1992; Galaty & Johnson, 1990; Hertzel & McMichael, 1989; Kooiker & Christiansen, 1995) as well as social and natural environments (Foggin et al., 2001; May,

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[16]Cancer of the womb was also a self-reported disease and will include other benign tumours and abdominal conditions.

1994; McCray, 2004; Perz, 1997), questions were also asked about these categories of risk factor. The local populations, particularly the pastoralists of Suojia township, care for their livestock (yak and sheep) by moving them between pastures two or more times per year (80 percent of the households in Suojia, as compared with 40 percent in Zhahe). Not surprisingly, the majority of the herders in Suojia (83 percent) and 50 percent in Zhahe live in tents for at least part of the year, mostly during the summer months (see Fig. 3). In both townships the herders and their households move from site to site (i.e., between pastures) with yak as the main form of transport. Although most people live within 15 min of a water supply, a significant proportion of the families take over 1 h to collect water. This coincides with the account given by the women's health workers, who consider anything up to half an hour as normal.

It should be noted that all the pastoralists who move seasonally are mobile and that it is the whole family that moves when it is time to change pastures.[17] Remoteness from the village doctor is virtually unaffected by change of site although travel to distant services can be extremely difficult in the summer when rivers are hard to cross and the ground is wet. The focus groups indicated little variation in distance from water, although in winter they may gather water in the form of ice or snow.

Opinions varied about the availability of water, compared with the past. However, there was the general view among most families that the grassland now was more degraded than 10 years ago, with less perceived change reported in Suojia. Availability of water is also important for the care of livestock, which are almost all taken to water every day. A majority of the households in Suojia township feels that there is less water available now, or they are uncertain about changes, but this is not nearly so clear in Zhahe township.

When the women's focus group was asked to list the three main women's health issues, all mentioned hygiene, specifically a lack of washing after periods, lack of hand-washing after collecting dung and hence increased likelihood of contamination of milk and milk products, and lack of understanding about hygiene generally. Many of these women also mentioned sexually transmitted diseases and urinary tract infections. The most serious problems they described were death due to obstructed labour,[18] death from late postpartum haemorrhage, and the death of newborn infants. In the two other focus groups, the men felt that the main cause of miscarriage and health problems in pregnancy was that women had to work so hard even during their pregnancy, yet they could see no solution to this.

### Predictors of health status indicators

Given the nature of most of the data involved in the health survey component of this study, the use of binary logistic regression analysis (SPSS 13.0) was indicated (Freeman, 1987). Seven health status indicators resulted from compilations of data from the questionnaire survey where there were explicit variables that could be considered to be indicators of various aspects of health status (see Figs. 4 and 5). Ten hypothesised predictors of health status (plus age and sex) were tested as co-variates with each of the seven health status indicators (HSI) measured in this study (using individual-level data, see Fig. 5). For a co-variate to be selected it had to be: (1) a variable that corresponded to one of the hypotheses of our conceptual model (e.g. lifestyle, physical and social environments), (2) a variable that would not reduce our overall sample of individuals[19] by more than 5 percent, due to missing

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[17]The word 'village' here is purely an administrative term referring to a vast area: tents and houses are individually very remote from each other and are *not set in groups* as may occur elsewhere.

[18]Women described prolonged labour lasting 1–2 days in which the baby failed to come down (to be born) and the mother died.

[19]This analysis is based on individual-level data, hence $N = 461$ (6 less than the total $N$ of 467, due to missing data on some co-variates). A separate, unique value for each individual was obtained for each of the health status indicators. Since in almost every case there are two or more individuals per household, it is possible that household level clustering is occurring. This fact represents a potential weakness in the analytical design used due to possible hierarchical effects on the data. Arguably a multi-level model might have been used in this analysis, although it might not have been easy to distinguish the impact of individual level factors from family level effects in this case, given that limited data were available on individual's characteristics'. In fact, all the predictor co-variates, with the exception of sex and age, are based on household data. On any given variable the household value is applied to each member of the household in order to have an individual-level data matrix. In some ways this operational necessity is justifiable, since the life-style and environmental variables apply to all members of the household.. For example, one person smoking in the very limited space per person of the nomads' tent will certainly impact everyone in it. By comparison, while the central, yak-dung stove, for heating and cooking, may not evacuate all the smoke from the tent, it does not have within it the additional effects of nicotine.

data, and (3) a variable that showed a statistically significant association with at least one of the health status indicators.[20] There is little doubt that there are confounding factors at work, that is, independent variables that distort the association between another independent variable (see Table 2) and the problem under study (the health status indicators), as it is related to both (Varkevisser, Pathmanathan, & Brownlee, 2003). Age, gender, and possibly income-levels, were thought to be potential confounding variables and so have been included in the logistic regression analyses as co-variates. Consequently, we can be fairly confident that at least these criteria are controlled for as we seek to understand the results of this analysis.

It must be emphasised at this juncture that the results that are reported here really only reveal statistical associations and we make no attempt to establish links of causality. There is often no clear and/or plausible causal pathway to the dependent variable (which is already a very limited diagnosis based on self-reported symptoms). Therefore the relationships reported[21] in this section can best be viewed as suggested avenues for further research.

In these tables, the key columns for interpreting the logistic binary regression tables are the Sig. column, which indicates the level of statistical significance (probability of error), and the Exp(*B*) column, in which the values are referred to as *odds ratios* (OR). When the odds ratio is higher than 1.0, there is positive association between the value of the predictor variable and the health status indicator (e.g., in Table 3, see the predictor *watertime* and the health status indicator 'sick over last month' or general morbidity). Conversely, when the odds ratio is less than 1.0, this indicates that the co-variate is *potentially* a preventative characteristic rather than a risk factor.

The main value of using the 'stepwise method' is that it allows us to know the order in which predictor variables are entered into the final regression equation, and hence to determine which are the most important co-variates. The health status indicators (see Fig. 5) are each considered in turn as a dependant variable. The

results from these analyses, each time using the same hypothesised independent variables (Table 2), give different models showing the key predictors of health status (Tables 3–9). In every table, the first variable is the most powerful predictor of the dependant variable, and (where there is more than one) the others are listed in the order each was introduced through the stepwise regression process. Only significant predictors are presented in Tables 3–9.

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[20]Other co-variates were tried (e.g. breastfeeding, weaning age, diet, boiling water, comfort level within dwellings/tents, numeracy and horse ownership) but they did not meet this criterion, so were not included in the Tables 3–9. The cut-off point for inclusion in the seven models (Tables 3–9) was $p = 0.1$.

[21]The word 'predictor' in this text is used in a statistical, and certainly not a causal, sense.

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Table 3

Predictors of HSI-1 (general morbidity, or 'sick over the last month')

| $Y =$ General morbidity | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| **Step 4** | | | | | | |
| Watertime | 2.228 | .603 | 14.400 | 1 | **.000** | **9.853** |
| Township | −2.039 | .554 | 13.552 | 1 | **.000** | **0.130** |
| Movepasture | −1.971 | .628 | 9.861 | 1 | **.002** | **0.139** |
| Age | 0.185 | .085 | 4.747 | 1 | **.029** | **1.203** |
| Constant | 5.996 | 1.210 | 24.542 | 1 | .000 | 401.774 |

Logistic binary regression (method = forward stepwise (Wald); variables in the equation, n= 461).

Table 4

Predictors of HSI-2 (functional incapacity, or 'too ill to work')

| $Y =$ Functional incapacity | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| **Step 3** | | | | | | |
| Age | 0.182 | .029 | 38.371 | 1 | **.000** | **1.200** |
| Township | −0.903 | .246 | 13.529 | 1 | **.000** | **0.405** |
| Alcohol | −1.003 | −.433 | 5.368 | 1 | **.021** | **0.367** |
| Constant | −0.915 | .400 | 5.247 | 1 | .022 | 0.400 |

Logistic binary regression (method = forward stepwise (Wald); variables in the equation, *n*= 461).

Table 5

Predictors of HSI-3 (potential heart problem, 'chest and acute left arm pain')

| $Y =$ Chest and arm pain | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| **Step 3** | | | | | | |
| Age | 0.196 | .035 | 30.963 | 1 | **.000** | **1.217** |
| Sex | 1.251 | .324 | 14.933 | 1 | **.000** | **3.493** |
| Township | 0.757 | .300 | 6.394 | 1 | **.011** | **2.133** |
| Constant | −6.343 | .859 | 54.523 | 1 | .000 | 0.002 |

Logistic binary regression (method = forward stepwise (Wald); variables in the equation, *n*= 461).

Table 6
Predictors of HSI-4 (tuberculosis—at least 2 of 3 standard symptoms)

| Y = Tuberculosis (TB) | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Step 1 | | | | | | |
| Township | −1.046 | 0.418 | 6.274 | 1 | **.012** | **0.351** |
| Constant | −1.147 | 0.555 | 4.274 | 1 | .039 | 0.318 |

Logistic binary regression (method = forward stepwise (Wald); variables in the equation, n= 462.

Table 7
Predictors of HSI-5 (dental problems)

| Y = Dental problems | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Step 1 | | | | | | |
| Age | | 0.131 | .034 | 14.790 | 1 | **.000** | **1.140** |
| Constant | −2,783 | | .283 | 96.368 | 1 | .000 | 0.062 |

Logistic binary regression (method = forward stepwise (Wald); variables in the equation, n= 461.

Table 8
Predictors of HSI-6 (hearing problems)

| Y = Hearing problems | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Step 2 | | | | | | |
| Age | | 0.305 | .042 | 52.201 | 1 | **.000** | **1.357** |
| Movepasture | −0.875 | .341 | 6.568 | 1 | **.010** | **0.417** |
| Constant | −3.937 | .454 | 75.190 | 1 | .000 | 0.020 |

Logistic binary regression (method = forward stepwise (Wald); variables in the equation, n= 461).

Table 9
Predictors of HSI-7 (physical impairment)

| Y = Physical impairment | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Step 2 | | | | | | |
| Age | | 0.331 | .037 | 78.237 | 1 | **.000** | **1.392** |
| Income | −0.653 | .287 | 5.198 | 1 | **.023** | **0.520** |
| Constant | −3.522 | .338 | 108.535 | 1 | .000 | 0.030 |

Logistic binary regression (method = forward stepwise (Wald); variables in the equation, n= 461.

## HSI-1: general morbidity (Table 3)

The first analysis was of the predictors of general morbidity (those who had been 'sick over the last month' prior to the survey[22]). This

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[22]By far the greatest number of self-reported symptoms of morbidity had to do with contagious illnesses, particularly upper

first health status indicator is the broadest measurement of morbidity, since it includes all cases of illness, whatever the symptom. Most striking is that the data clearly show that those who have to spend more time collecting water (*watertime*) are much more likely to be ill than the sample population as a whole (OR = 9.853). Secondly, the simple variation between the two townships accounts for a large part of the variation in general morbidity (OR = 0.130). Furthermore, those practicing a form of semi-nomadic pastoralism (movepasture) have much less likelihood of becoming ill than the sample population as a whole (OR = 0.139). Age is not a highly significant covariate (p = .029) and is a fairly weak predictor of general morbidity (OR = 1.203). Gender, showing no statistically significant association with this indicator of general morbidity, does not appear in Table 3.

## HSI-2: functional incapacity (Table 4)

In the analysis on the dependant variable (health status indicator) 'functional incapacity' (i.e., too ill to work or carry out normal activities during the three months prior to the survey), belonging to one township or another is a predictor (OR = 0.405) of whether people will be prevented by illness from carrying out their normal activities (see Fig. 5). In addition, there is less likelihood (OR = 0.367) that people from households where alcohol is consumed will have been too ill to work in the recent past. Age appears to play a minor role with regard to this health indicator (OR = 1.200).

## HSI-3: potential heart problems (Table 5)

With regard to the third health status indicator (i.e., 'chest and acute left arm pain'), age and particularly gender are predictors of the occurrence of potential heart problems (ORs, respectively = 1.217 and 3.493). Furthermore, people in one of the two townships (Zhahe, see Fig. 5) appear to be more susceptible to this health status indicator (OR = 2.133).

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(footnote continued)
respiratory—57 percent of all 'first' illnesses (n = 287) reported. Among those reporting a 'second' illness (n = 106), 21 percent were 'chest infections' and 35 percent were less specific, saying they had had a fever for over 2 days during the previous month.

*HSI-4: tuberculosis (Table 6)*

In the case of the fourth indicator (i.e., 2 out of 3 standard symptoms of tuberculosis—these being daily cough for over 1 month, blood in sputum, and weight loss), belonging to one township or another (see Fig. 5) was the only significant predictor (OR = 0.351).

*HSI-5: dental problems (Table 7)*

As can be seen from Table 7, in the case of dental problems, there was a significant association only with age, but there is little or no predictive power in terms of this co-variate (OR = 1.140).

*HSI-6: hearing problems (Table 8)*

With regard to hearing difficulties (Table 8), there is a positive link (OR = 1.357) between this health status indicator and age (so that the older one is the more likely hearing loss is to occur) and a negative relationship between hearing problems and the pastoral lifestyle (OR = 0.417), indicating that the more the traditional way of life is practiced the less one might expect to have problems of hearing.

*HSI-7: physical impairment (Table 9)*

Finally, with regard to physical impairments, it can be seen in Table 9 that there are two co-variates that can be viewed as predictors of this health status indicator: age and income. In the case of age (OR = 1.392), one can quite logically infer that the older one is the more one is likely to have a physical impairment. In contrast, the negative link between this health indicator and income (OR = 0.520) would indicate that the lower a family's disposable income (and by extension, socio-economic status), the more the likelihood of suffering from some kind of physical impairment.

## Discussion

The age distribution of the people involved in the survey (Fig. 2) shows that a high proportion of our sample population is young, with a rapid fall off—particularly in the case of women in their 30s and 40s. Many additional facets of lifestyle emerged from the focus group discussions, particularly with the women. For all of them, they were up by 5 am to milk the yak, followed by the gathering of yak dung and other 'chores'. The rest of the day was spent gathering water, herding, making butter, yoghurt and cheese, making meals and working until 10 or 11 pm at night. Few in the group took less than half an hour to gather water. They affirmed that pregnant women were allowed only 3 days of rest after having a baby. They also said some women would deliver their baby while out herding livestock, something they considered to be very dangerous. Most of the participants were unmarried and when asked what their greatest concern with regard to getting married was, they said to get on with their in-laws, and to make sure they did not seem lazy and learned how to do things in the way of their husbands' families. Once married and getting on with their in-laws, they said their chief concern would be worrying about the future of their children—especially in terms of their health, their behaviour and their education.[23] The high proportion of individuals that had been ill during the month preceding the questionnaire interview (63 percent, Fig. 5), and the large number of households reporting illness over the preceding 3 months that rendered some of their members unable to work (45 percent for Zhahe and 63 percent for Suojia, Fig. 4), confirms the general need for improved health care delivery (Shannon & Dever, 1974; Wiess et al., 2004).

The prevalence of tuberculosis symptoms (especially in Suojia, see Figs. 4 and 5) is another important finding and indicates a need for greater understanding by village doctors and the local community, as well as the need for public health measures. The analysis of general morbidity (Table 3) may well discourage the adoption of the sedentary lifestyle that has so often been promoted by legislators, planners and administrators (Foggin, 2005; Spicer, 2005; Wiese et al., 2004; Wyss, Bechir, Schelling, Tanner, et al., 2004; Yémadji, 2004). Dental health is also a major problem among this population of pastoralists (Figs. 4 and 5) and this reveals a great need for professional care, particularly for preventative dental health education. On the other hand, the reasons for frequently reported poor hearing are not clear, but extrapolating from other areas in the world and individual cases seen in the area, one concern is that of the inappropriate use of certain ototoxic antibiotics (Crummer &

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[23]In contrast to single women, married women in the broader community described considerable concern about childbirth and its accompanying risks.

Hassam, 2004; de Hoog, van Zanten, Hoeve, Blom, & van den Anker, 2002; Fausti et al., 1999). Viral infections such as seen in the relatively high prevalence of measles (Fig. 9) need to be investigated (Omer, 1999). Indeed, the most striking health needs in the survey area, as anticipated, were those of women and children. The rates of miscarriage and infant death are very high (see also Matteson, Burr, & Marshall, 1998; Mazess, 1965; Millard, 1994). Rates of complication in pregnancy (including pre-eclampsia, post-partum haemorrhage and fever after delivery) are also high (Fig. 7). Most women deliver their babies at home, assisted by a relative, in very poor sanitary conditions (Fig. 8).

The focus groups not only provided validation of some of the results but also helped in the interpretation and understanding of them (Kitzinger, 1994). With regard to the general health status indicators, illness in the past month was said to be seasonally related with colds and respiratory infections predominating in the winter, and with hepatitis and arthritis more common in spring. Much of the arthritis as described by the focus group participants and confirmed by medical assessment fitted with a diagnosis of gout. It is a familial condition and commoner among male relatives in the one township. It certainly causes significant disability and renders people unable to work and could certainly account for some of the township differences in illness that prevent the carrying out of regular activities.

The level of training of the village health workers limited their diagnostic ability, and their descriptions reflected the communities' beliefs and understanding of disease. For example, pain in the abdomen was regularly diagnosed as gallbladder or liver disease, back pain was assumed to be the result of kidney disease, and heart and circulatory problems are understood to reflect either mental health problems or physical heart disease. We chose to ask about chest and left arm pain as potential symptoms in order to try and exclude mental health problems associated with the word 'heart'. However, results may still be inaccurate due to the possible inclusion of some cases of arthritis and exclusion of other cases of heart disease presenting with different symptoms. Furthermore, the diagnosis of tuberculosis is clearly too low as confirmed by the difference between answers given to survey questions pertaining to symptoms and the response of the village doctors after training. Tuberculosis is a significant issue that needs to be seriously dealt with in terms of both treatment and prevention. The health workers did not bring up dental issues, possibly as it is not seen as a serious disease. Hearing and eye problems were discussed and it is clear that cataracts also contribute to the high rates of reported disability. It would be interesting and helpful to repeat the focus group work with the village doctors *after* they have been working for some time following a training course.

With regard to women's health, it was clear from the account of daily life given by the women's health workers that young women are expected to work extremely hard, much harder than any other family members (including their mothers and mothers-in-law)—regardless of whether they are pregnant or not (McCray, 2004; Ojanuga & Gilbert, 1992). Taking up to half an hour to collect water was considered completely normal. The young unmarried women described their work situation but were surprisingly uninformed about pregnancy and delivery. It is interesting that the male village doctors felt that hard work in pregnancy was a significant causal factor for the high rate of miscarriage and infant loss. The young women, when describing where delivery took place, and the clothing used, clearly described the perception that delivery is a dirty process and should take place in a dirty part of the tent and with dirty cloths so that nothing good was soiled. To spill even milk in other parts of the tent (never mind products of delivery) was described as bringing bad fortune on the family. As late postpartum haemorrhage is often related to infection, these practices are likely to be contributing factors. Once they understood this, however, the young women began to think of practical options that could improve birthing conditions. As the women's focus group participants did not report any early postpartum haemorrhage there was no information to explain why there was difference in the reporting of cases of postpartum haemorrhage between the townships in the health survey questionnaire. With regard to pre-eclampsia, all the young women (i.e., the women's health workers) from both townships seemed to think that it was not uncommon, and so no explanation was found here either for the noted discrepancy between the townships. In the household survey it is quite possible that pre-eclampsia may be over reported since it may include cases of simple oedema in pregnancy not associated with pre-eclampsia. The women's health workers, although they may have a better knowledge than

the community at large, are also likely to have included other causes of swelling.

All the focus groups named sexually transmitted infections as common, but they did not volunteer any possible link with poor maternal health, miscarriage or infant loss and their understanding of the complications of these illnesses was limited; in the training afterwards they were surprised and some horrified when the complications were explained. It would seem very possible that sexually transmitted infections could be a significant contributory factor in poor maternal health and infant survival (CDC, 2005).

The issue of kidney problems was complicated. Urinary symptoms, both during and outside of pregnancy, are a common experience of the women, and both male and female health workers were clearly aware of this. Low back pain, as explained in the results, may or may not be due to kidney problems. Mechanical back pain is poorly recognised except in the elderly. However the women's health workers believed urinary problems were due to poor hygiene, even though they struggled to find a solution to the challenges they face. They felt that it was almost impossible for a woman to have sufficient privacy to wash well even after menstrual flow or delivery. This could contribute not only to postpartum problems but also to the noted frequency of urinary tract infections.

At another level, young and older women alike knew very little about breast-feeding and causes of breast problems (e.g., abscesses, etc.). Such lack of knowledge could make breast infections more likely. In all the focus groups, understanding about underweight children and diarrhoea was also very limited, and there was very little comprehension of the importance of breast-feeding or of early nutrition in general (Stuart-Macadam & Dettwyler, 1995). Based on a number of revealing discussions, it is very likely that underweight children are underreported in the survey. There is a strong belief that many women cannot breast feed, but that as long as the infant receives some milk by the 3rd day of life, then there will be no harm. If bottle-feeding, they give half yak milk and half water. This, together with poor hygiene, is a likely contributor to the high figures for infant mortality. Child health problems were not volunteered by the male village doctors and only alluded to by the women's health workers when discussing anxieties that a mother might face. There was a considerable lack of knowledge about pregnancy and child health in all

the focus groups. The tendency of every group was to immediately focus on liver or gallbladder as the biggest health problems, yet when examined closely these names (categories) are applied to any pain in the abdomen or lower chest—including ordinary diarrhoeal illnesses and lower lung problems. The more disease-specific the question or discussion, the more carefully the results have needed to be examined.

## Conclusion

The question remains: What can be done to improve the health status of this kind of pastoralist population? The questionnaire-based findings, further expanded by the focus groups, together indicate a real need for the training of accessible village doctors and/or midwives to monitor pregnancies and to aid in delivery. Education of the women directly would also make a large contribution to the reduction of foetal and infant loss. There also seems to be a high rate of urinary problems, which could be reduced by the same training strategy. The area of woman and child health appears to be that of greatest need in the project area, and therefore the type of intervention that would provide the greatest impact on herders' health and living conditions. Finally, the presence of cases of measles and whooping cough (Fig. 9) in the project area also indicates an urgent need for the delivery of effective immunisations to the population of children. This includes attention to the cold chain as well as people's access to the immunisations.

The stakeholders were able to express their views in many ways (see Foggin, 2005). A community participatory video was carried out in which the people expressed a strong request for female health workers and good local doctors. A local non-governmental organization, of which two members are co-authors of this paper, led discussions with the communities. Village doctors themselves, local village leaders and government leaders at the township level, and the county health bureau leaders—all believed that giving training to some women so that they could become health workers and increasing the knowledge and skills of current village doctors would both greatly increase access to and quality of health care. In June–July of 2005, at the time of first writing this paper at an altitude of 4200 m in the county seat of Zhiduo, just such a training course was being conducted, in which 23

young Tibetan women were being trained in MCH and midwifery as part of an on-going development project.

This study demonstrates once again that improving the health status of a population, such as the pastoralists of southern Qinghai Province, clearly involves *multiple dimensions*: education (for an improved understanding of health issues and early nutrition), environmental protection and sustainable resource management (income generation), training of village-level doctors in preventative as well as curative health care, adequate transportation (which would greatly increase access to health care and immunisations), and perhaps most basic of all, an adequate and accessible water supply for every family (Sillanpää, Hulkkonen, & Manderscheid, 2004). In concrete terms, the member organizations involved in this survey, namely the local Upper Yangtze Organization, Plateau Perspectives and the county government together with the local Tibetan communities, are working together in this multi-dimensional approach to improve the health of these communities.

## Acknowledgements

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