

# Neonatal mortality and child health in a remote rural area in Nepal: a mixed methods study

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## ABSTRACT

**Objective** To assess neonatal and under-five mortality and the health situation for children in Dolpa, a remote rural area of Nepal.

**Study design** Mixed methods: quantitative (retrospective cross sectional) and qualitative (semistructured interviews).

**Rationale** Progress in reducing child and newborn mortality in Nepal has reached the remote areas to a limited extent. Furthermore, there may be substantial under-reporting and data may be unreliable.

**Setting and participants** The population of Dolpa district is approximately 35 000. We visited 10 randomly selected villages (plus one settlement) with approximately 12 000 inhabitants.

**Methodology** Records of the number of deliveries, neonatal and under-five deaths were collected. 100 children (10 different villages) were evaluated for common diseases present during the month prior to the investigation. 20 interviews were conducted about the cultural perceptions of neonatal death and morbidity; in each village at least one interview was undertaken.

**Results** The population of the 10 villages (plus one settlement) under investigation was 12 287. 300 deliveries have taken place during the last 12 months before the study. There were 30 children reported to have died; out of those 20 were in the neonatal period. This reflects an estimated neonatal mortality rate in Dolpa district of 67/1000 live births (95% CI 41–101/1000) and an estimated under-five mortality rate of 100/1000 (95% CI 70–140/1000). In the previous month, out of 100 children surveyed there had been 11 cases of acute lower respiratory infection (ALRI), 7 cases of diarrhoea, 3 cases of isolated malnutrition and 5 cases of malnutrition combined with ALRI or diarrhoea.

Based on qualitative interviews traditional beliefs still play a major role, and are partly a hindrance to progress in health. There is also mistrust in the health services and misconceptions about 'modern' medicine and treatment facilities.

**Conclusion** Despite progress in child morbidity and mortality in Nepal, some areas remain underserved by health services and neonatal mortality is far above the Nepalese average, which is 29/1000 live births. There is a substantial need to increase and train health staff. Health promotion should be encouraged but cultural perceptions have to be understood if positive behavioural change is to be achieved.

## What is known about the subject?

- Nepal has made significant progress reducing the child mortality rate.
- In spite of substantial improvements previous studies have shown considerable disparity in neonatal and under-five mortality in different parts of Nepal.

## What this study adds?

- There is under-reporting of neonatal mortality in the region.
- There is a substantial need to increase appropriately trained health staff, who also need to respond to the cultural context.
- There is need for adequate health promotion to improve hygiene and to work on better acceptance of health services.

## INTRODUCTION AND BACKGROUND

### The specific context of Nepal

Nepal is one of the least developed and poorest countries in Asia.<sup>1</sup> Many Nepalese continue to live a traditional life. Religion is of utmost importance. About 80% of the population are Hindus and adhere to the caste system; about 10% are Buddhists, mainly living in mountainous regions like Dolpa.

Many parts of the country had been almost impossible to access until 60 years ago, and modernisation has still not reached many areas. 'Purity' and traditional lifestyle are of high values, and for the majority of the population a struggle for survival is the reality of life. Innovations may be observed with interest, but changes and adaptations are not the strength of a conservative society.<sup>2</sup> Those statements are valid for Nepal as whole, and particularly for the Buddhist-dominated region of Dolpa.

Dolpa is a remote district in Western Nepal. It is highly mountainous with an altitude between 2500 and 4500 m above sea level, and is one of the highest populated locations on earth. The Dolpa area covers roughly



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10 000 km<sup>2</sup> and the population is about 35 000 people. There is no road network and most parts of the area can be only accessed when crossing passes above 5000 m. Dolpa is influenced culturally by Tibetan Buddhism. The Tibetans mainly live north of the district capital, Dunai, in scattered smaller villages. Around Dunai there are some relatively large Hindu Chhetri and Brahmin villages, representing about 40%–45% of the population. There are also a few Magar and Gurung villages. The people of Dolpa still live a traditional lifestyle, based on subsistence economy and trade.

### The problem

Nepal has made a significant improvement reducing the child mortality rate.<sup>3</sup> Within 25 years the under-five mortality decreased from 133 deaths per 100 live births in 1991 to 39 deaths per 1000 live births in 2016,<sup>4,5</sup> according to national data. Even neonatal mortality, which has made the slowest progress globally, has decreased from 50 deaths per 1000 live births in 1991 to 29 in 2016.<sup>4,5</sup> Nepal has successfully improved coverage of effective interventions to prevent or treat the most important causes of child mortality through a variety of community-based approaches and national campaigns. These approaches have included high coverage of six monthly vitamin A supplementation and deworming, the integrated management of childhood illness (IMCI), high national immunisation coverage and moderate coverage of exclusive breast feeding of children under 6 months.<sup>6,7</sup>

However, access to healthcare and to community-based child health interventions varies. The northern part of Nepal remains isolated and in many parts there are no road connections to district hospitals and main health centres. Often several days of walking are needed to reach these healthcare facilities. In this situation most deliveries take place at home in traditional ways.

According to the 'Nepal Demographic and Health Survey 2016',<sup>4,8</sup> the overall figures regarding maternal health, the nutritional status of children and attendance at health centres are lowest in State 6, Karnali province. It is quite likely that there is under-reporting of stillbirth, neonatal death and child mortality.<sup>9</sup> Studies in 2000 in Mugu district (neighbouring district of Dolpa) have reported an infant mortality as high as 201/1000.<sup>10</sup>

The main reasons for neonatal mortality are prematurity, neonatal sepsis and intrapartum-related complications; for childhood morbidity are respiratory tract infections, diarrhoeal diseases and injuries.<sup>11</sup>

### Rationale

We designed this study to understand the health status of children in Dolpa district. We aimed to have quantitative estimations about neonatal and under-five mortality, children's health outcomes in general and qualitative information on possible cultural reasons for current neonatal care to understand the challenges to fulfilling Nepal's 'Every Newborn Action Plan'.<sup>6</sup>

The aim of the study was to analyse the obstacles, and to contribute to finding ways to improve the present situation in areas with limited access.

### METHODOLOGY

Ten villages (clusters) were randomly selected. These included villages with different ethnic groups,<sup>12</sup> two bigger villages mainly inhabited by Chhetri, one mainly inhabited by Magar, the district headquarter Dunai with a mixed but mainly Chhetri population and six other villages, five inhabited by Tibetans and one by Gurung.<sup>13</sup>

The 10 villages included in the study had a total population of about 12 000 out of the total Dolpa population of 35 000 people,<sup>13</sup> and the villages are representative of the geographical and ethnic distribution of the area.

### Childhood morbidity

For the investigation on childhood morbidity the sample size of 100 children (10 clusters with 10 children each cluster) was based on an expected prevalence of the presence of a disease of 20% and at a confidence level of 90%. Ten clusters (villages) were randomly selected. Ten children in each cluster (100 children in total) were examined. After discussions with the village leader and the village elders the randomly selected households were visited and after having received the consent of at least one of the parents, children under the age of 5 were enrolled in the study.

One hundred children were investigated (10 in each village) for malnutrition, and if they had acute lower respiratory infection (ALRI), acute watery diarrhoea, which are the prevalent childhood diseases,<sup>4</sup> or any other disease in the previous month, including currently. The selection was done by single-stage random sampling. Written consent was sought from the parents, and if given the children were included.

Due to lack of other facilities we used mid-upper arm circumference as a diagnostic tool for protein-energy malnutrition. Regarding ALRI we confined the definition to cough and fever, the assessment for fast breathing has been vague. For acute watery diarrhoea we used the usual definition of more than three loose stools per day for less than 14 days.

### Neonatal and under-five mortality

For neonatal mortality we estimated the total number of deliveries in the Dolpa district within 1 year at around 1000. We expected a neonatal mortality of around 50/1000 at a confidence level of 95%.

The total population of the villages under investigation was about 12 500 with a total of about 300 deliveries per year (from November 2017 until the time of the data collection, which started end of October 2018).

### Cultural perceptions of newborn and child health (qualitative part)

The interviews were conducted by one author (GK). He is a surgeon with a long background in public health

issues, and also with a background in social anthropology. The questions and answers were simultaneously translated into the local dialect by the accompanying health professional. The principles of discourse analysis were followed.<sup>14</sup> The participants were chosen as much as possible randomly, but partly also to convenience, as some have been more eager to speak out than others. Consenting parents were involved in a semistructured interview about neonatal deaths, their views on child health, the problems they faced and the actions they are and have been taking. We used a semistructured interview to understand: how the death of a newborn is perceived by the family; whether common childhood diseases are treated or prevented using local remedies; what solutions the community may propose to improve the child and newborn health status. One to three interviews were taken in each of 10 villages, a total of 20 interviews. Qualitative interviews were conducted in Nepali or Tibetan by the accompanying health assistant and then immediately transcribed in English. All interviews were done in a private environment respecting the dignity of the participants and with their full consent.

See also 'Semi-structured interview' (online supplementary file).

### Patient and public involvement

The main contact persons for investigation were local health staff, the village health committee and the village leaders. In the only hospital of the region, in Dunai, the nursing supervisor and the nurses in charge were carefully looking through and interpreting the records. In Tripurakot and Dangi Tara the nurse in charge provided the information. In Sahartara we asked five local families about any events during the last year. In Dho Tarap (including Shipcho), Tokyu and Rigmo due to the absence of health staff the village elders collected the village committee including the local female health volunteers to give us the exact numbers for mortality and morbidity. In Pugmo and Ranji the health assistant gave us the records for those villages. In Raha the health assistant helped us collect the data from the village health committee. The same health assistant accompanied us for the full journey, with his help we cross-checked all data collected from the nurses in charge by asking elders in the villages about the correctness of the information. As the villages are small, the informant villagers are well aware about all events, and as the information was cross-checked we consider the data to be as accurate as are possible from this region.

As part of the study the results were disseminated to the district authorities with the aim to improve interventions.

## RESULTS

### Childhood morbidity

For the data on morbidity we mainly relied on the information provided by parents. In the 10 villages (clusters) randomly selected there was a rather equal geographical

distribution. Parents of 11 out of 100 children surveyed reported an ALRI during the previous month.

Parents of seven children out of 100 reported their child suffering from acute watery diarrhoea during the previous month. Diarrhoea was more common in the Chhetri (five cases) than in the Tibetan population (two cases). In four cases there was a combination of malnourishment and diarrhoea and all those combined cases had occurred in Chhetri villages.

Eight children had malnutrition; in four cases there was a combination of malnutrition with diarrhoea, in one case a combination of pneumonia and malnutrition at the time of investigation. All cases of malnutrition were seen in the Chhetri villages; in the Tibetan villages no malnutrition was diagnosed.

One child suffering from malnutrition and ALRI had congenital heart disease. No other disease was diagnosed for the children under investigation.

Injuries including burns obviously did not play a major role for the childhood morbidity in Dolpa district, among the relatively small sample.

There was general agreement by parents and health workers that pneumonia followed by acute watery diarrhoea are the main problems for childhood morbidity.

### Estimated neonatal and childhood mortality

According to our investigation there were about 300 deliveries in the investigated villages (population of around 12500) during last year and 20 neonatal deaths were reported. This reflects an estimated neonatal mortality rate of 67/1000 (95% CI 41-101/1000).

The highest neonatal mortality appeared to be in Chhetri villages in the southern part of Dolpa with the exception of one village (Dangi Tara), where not a single death was reported (table 1). A possible reason for the exception is better access to health facilities due to proximity to the airport. There was general agreement that most deliveries take place at home without trained birth attendant and that neonatal deaths are usually not reported. Reasons for most of the neonatal deaths could not be given.

Ten children older than 28 days had died during last year, five were suffering from pneumonia, and five were suffering from bloody diarrhoea. The under-five mortality rate for the area of study was estimated to be 100 per 1000 live births (95% CI 70-140/1000).

### Interviews

General discussions were held with the members of the women's committee of the villages. Randomly we selected one to three women in each of the 10 villages, altogether 20 women. They were asked about their perception of neonatal death and about any sickness of their children as well as their approach for a solution.

*How the death of a newborn is perceived by the family:* Families generally agreed that the death of a newborn is a natural event which has to be accepted. The reason behind are *karma* (destiny) and that it is God's will. It has been also

**Table 1** Neonatal and under-five deaths

| Village       | Population | Ethnic           | Under-five population | Deliveries | Neonatal deaths | Under-five deaths |
|---------------|------------|------------------|-----------------------|------------|-----------------|-------------------|
| Dunai         | 2592       | Chhetri (mainly) | 310                   | 75         | 5               | 8                 |
| Tripurakot    | 2697       | Chhetri          | 420                   | 75         | 8               | 12                |
| Raha          | 923        | Chhetri          | 150                   | 24         | 3               | 5                 |
| Dangi Tara    | 2279       | Chhetri          | 300                   | 40         | 0               | 0                 |
| Dho Tarap     | 520        | Tibetan          | 52                    | 12         | 1               | 2                 |
| Shipcho       | 100        | Tibetan          | 6                     | 3          | 0               | 0                 |
| Tokyu         | 500        | Tibetan          | 51                    | 11         | 1               | 1                 |
| Rigmo         | 300        | Tibetan          | 25                    | 10         | 1               | 1                 |
| Pugmo         | 250        | Tibetan          | 20                    | 6          | 0               | 0                 |
| Sahartara     | 1976       | Magar            | 245                   | 40         | 1               | 1                 |
| Ranji         | 150        | Gurung           | 18                    | 4          | 0               | 0                 |
| Chhetri total | 8491       |                  | 1180                  | 214        | 16              | 25                |
| Tibetan total | 1670       |                  | 154                   | 42         | 3               | 4                 |
| Others total  | 2126       |                  | 263                   | 44         | 1               | 1                 |
| Total         | 12287      |                  | 1597                  | 300        | 20              | 30                |

not considered as a major blow of fate as usually there is still the possibility of having more children. It is not considered as reason to look for better ante-natal care.

The names of the mothers at the end of the interviews do not reflect their real names.

I have been married at a very young age and had twice a female baby who died immediately after birth. Yes, I have been very sad, but I did not really worry. I was told that it is a common occurrence and it is the will of God. So I was looking forward to get pregnant again. Now I have three children and they are all healthy and strong. (Ditya, mother of two sons and one daughter)

My marriage took place when I was only 14 years old. Only few years later I got pregnant for the first time. I do not know how old I have been then. After a baby girl was born I had to stay for nine days at home. It was winter and was very cold. The baby got sick shortly after delivery. I was thinking to go to a doctor but I was told that the cause of the fever is *bhut* (bad spirit, evil eye) and whatever happens would be God's will. After two weeks the baby died. Fortunately a year later I got pregnant again and gave birth to a healthy son. My family was very happy. (Sabitri, mother of two sons and two daughters)

For a long time I did not get pregnant. My first baby was very weak and got sick immediately after delivery, which took place at my home. It died a few days later. I knew I would get pregnant again so I was not too unhappy. 18 months later I gave birth to a healthy

boy. Now I have two boys, they are fine. (Dolma, mother of two sons)

*How the main childhood diseases like ALRI's and diarrhoeal diseases are prevented by local remedies:* Most families try to get modern medicine like antibiotics in case of any disease of their children.

My son was coughing a lot. He did not eat properly and had high fever for several days. I asked our village leader if he has some medicine from foreigners. He gave me a few tablets. I smashed those pills and gave it to my son with hot water. He still continued to have fever and cough for a couple of days. But then he improved. (Hara, mother of one son and three daughters)

My daughter had diarrhoea for a couple of days. I also noticed that she there was blood in her stool. She was very sick and lost a lot of weight. I was very worried that she would die. So I went to the next health post. The nurse gave me medicine, but it still did not improve. Then I looked for our *amchi* (doctor practising traditional medicine). He took very well care of my daughter and finally after weeks she recovered. Now she is a strong young girl. (Yangchen, mother of one daughter)

When my son was about two years old he had repeated attacks of diarrhoea. He started to lose weight. After one to two months I thought he might die. We went to our health post but the health worker was not present. So we performed a ceremony (*chakri*) at our

home. A few days later my son recovered and since then he hardly got sick anymore. (Goma, mother of one son)

*Which solutions the community is proposing as prevention:* The three women interviewed in the district capital Dunai were satisfied with the service of the district hospital. They said that most of the time nurses are present and are providing a proper service to patients.

Two women living close to Taprizia also appreciated the service provided by the health post there.

The other 15 women, living in villages with far distance to a health post or experiencing the constant absence of staff all expressed the wish for a health post with permanent staffing. The answers were all similar.

The following reply in Dho Tarap, a Tibetan village:

We find it useless to go to a health post. Most of the time there is no health worker anyway and if we find him he does not have medicine. If our children are sick we have to fly to Kathmandu. But that is very expensive and most of us cannot afford that. So usually we ask our friends if they have at home some medicine which they might have taken with them during the last visit to the capital or we hope that some tourists give us some western medicine. All of us wish that we would have a health post with a permanent staff, who are able to give us medicine.

## DISCUSSION

In this study we were able to not only describe the newborn and child health status of children in a remote, rural district in Nepal but also unpack the factors influencing mortality and morbidity. We found that neonatal mortality was well above average for Nepal, while morbidity patterns were similar to the rest of Nepal. Factors contributing to poor child health status in this region were largely due to poor health systems and infrastructure, poor health literacy, inadequately trained health workers, and exacerbated by socio-cultural factors.<sup>4 8 15–18</sup>

Respiratory infections were common in the colder regions inhabited by mainly Tibetans whereas diarrhoea has been more common in the lower regions mainly inhabited by Chhetris.

Malnourished children were only found in two villages, both of them Chhetri villages, Tripurakot and Raha, whereas in the other villages malnutrition was not identified as a problem.

In our study there has been general agreement by parents and health staff that many neonatal deaths are not reported. Deliveries are usually taking place at home and are attended by an 'experienced' family member like the mother or an aunt or a person who is considered to be skilled.

We did not hear of maternal deaths during the last year, though it was reported that there have been some

in previous years. If finances are allowing a few pregnant mothers are going to Kathmandu for delivery.

The qualitative part of this study identified several traditions that affect child and newborn health.

In the Chhetri villages girls are married at an early age, some of them at the age of 14 and in few cases even below that age. The first pregnancy is taking place as a consequence mostly before having reached the age of 20. Birth and the neonatal period are always strongly connected with supernatural beliefs. For the first days after delivery the neonates should not leave the room, they are supposed not to be exposed to sunlight, otherwise bad spirits will get power over them. Early breastfeeding is also rather discouraged as the colostrum is considered to be dirty. In spite of repeated campaigns encouraging breastfeeding traditional conceptions continue to be influential.

The general perception has been that medical help is only possible in the main towns of Nepal like Kathmandu or Pokhara. The judgements of some interviewed mothers might be also based on misconceptions, like medicine from tourists is 'good medicine'. To go for medical treatment to Kathmandu seemed to be also a question of social status and the dedication of local nurses and the importance of medical knowledge and proper clinical examination have been generally underestimated and the possibilities in the capital with CT and other expensive procedures highly overestimated.

Most households had some antibiotics available, either collected during a stay in Kathmandu or given by tourists. The medicine is usually given without proper knowledge of dosage or indication. The main reasons for observed improvements appear to be successful vaccination campaigns and economic progress in some regions. On the other hand there is obvious lack of ante- and postnatal care, home deliveries without the presence of skilled birth attendants are still taking place in the majority of cases and there is lack of hygienic conditions as warm water is hardly available.

Despite these strong traditions, people were open and were hoping for improvements. They have been grateful for health services provided and expressed their wish for a permanent service. Although fatalism has been often addressed as a key factor for non-reporting of neonatal deaths and non-acceptance of changes, an approach including more active community participation through strengthening of health promotion could lead to positive results.<sup>9</sup> There is surely readiness and hope from the side of the community.

## Limitations

Major difficulties for the collection of data were the lack of health facilities, and if health facilities were present there was lack of health staff, and overall there was lack of records. The interviewed health workers generally agreed that most children are not taken to a health facility if sick and due to the high number of home deliveries cases of neonatal death are usually not reported. So we were

mostly dependent on information from parents or village elders.

Because of the small scale of the study it has not been possible to get exact data about the average age for the first delivery, the spacing, the educational level and the economic status, but it was obvious that there is a difference between the mainly by Chhetri populated villages in the south of Dolpa and the Tibetan villages in the north. The acceptance of family planning and the economic status in the Tibetan villages seems to be higher resulting in relatively fewer children per family and a better nutritional status. Also education is considered in the Tibetan villages as equally important for male and female. However there is also an obvious lack of available health facilities and in general people are reluctant to go to a health post as in their opinion they do not provide an adequate service.

## SUMMARY AND CONCLUSION

In the mountain areas of Nepal the neonatal mortality rate is higher than the Nepal average.<sup>10</sup>

The main reasons are lack of infrastructure, lack of trained staff, lack of birth facilities, lack of education and lack of health promotion. Most deliveries still take place without a skilled birth attendant under non-hygienic conditions.<sup>7</sup>

Religio-cultural factors play a major role for the lack of improvements. Acceptance of neonatal death as it interpreted as *karma*, as fate due to previous bad deeds, is one of the major reasons that treatable conditions are neglected.<sup>9</sup>

By this study we did not only rely on retrospective data from different health posts, but we collected the information mostly directly from the people concerned. We could show that it is possible to do with relatively little financial means. It has helped to fill the gap of un-reported data, especially regarding neonatal mortality.

The interviews have shown that many local perceptions affect healthcare seeking, referral patterns and outcomes. Due to lack of trust into the local health facilities, antibiotics and other medicines are used indifferently and much funds are spent on often unnecessary referrals into the main centres.

There is need for proper staffing in the existing health posts with the goal to be successful by simple interventions, which have been successful in Nepal during the last years, especially the Aama programme, the female community health volunteer programme, the community-based IMCI and the community-based newborn care.<sup>19</sup>

Health promotion efforts should focus on improving hygiene and better access to and acceptance of quality health services.

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**Contributors** GK collected the data and has done the interviews. BKK and GK did the study design. GK has developed the section on methodology. BKK and GK did the analysis and interpretation of data, BKK and GK together developed the discussion as well as the summary and conclusion. GK served as the senior academic adviser.

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**Data availability statement** All data relevant to the study are included in the article or uploaded as supplementary information.

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## Correction: *neonatal mortality and child health in a remote rural area in Nepal: a mixed methods study*

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This article was previously published with an error.

Correct Contributors statement is:

Contributors: GK collected the data and has done the interviews, BK and GK did the study design, GK has developed the section on methodology, BK and GK did the analysis of the data and the interpretation of the data, BK and GK developed together the discussion as well as the summary and conclusion. Professor Trevor Duke (TD) served as senior academic adviser.

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