

Health of mobile pastoralists in the Sahel – assessment of 15 years of research and development

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Abstract

In the Sahel, between Mauritania and Somalia including Northern Kenya, about 20–30 million people live as mobile pastoralists. The rhythm of their migration follows the seasons and the availability of resources such as water, pasture and salt. Despite their high exposure to zoonoses and problems caused by extreme climatic conditions, mobile pastoralists are virtually excluded from health services because the provision of social services adapted to their way of life is challenging. In cooperation with various partners in the region, the Swiss Tropical and Public Health Institute has been active in research and development in the Sahel for 15 years. Based on the perceived needs of mobile pastoralists and the necessities of development, interdisciplinary research has considerably contributed to better understanding of their situation and their problems. Close contact between humans and livestock necessitates close cooperation between human and animal health specialists. Such useful approaches should be continued and extended.

keywords health, mobile pastoralists, Sahel

Pastoralism in Sahelian countries

Mobile pastoralism is a way of life highly adapted to an environment that could not be used elsewhere in different parts of the world (Prior 1994). In the Sahel, between Mauritania and Somalia including Northern Kenya, about 20–30 million people live as mobile pastoralists. The rhythm of their migration follows the seasonal evolution of the climatic conditions and the availability of resources (Bille 1997).

The most important part of mobile pastoralists' lives is to ensure the well-being of their livestock: it is not only their livelihood and main source of income, but also the basis for recognition and respect (Krönke 2000; Schelling *et al.* 2008). To have access to the necessary resources for their livestock, the pastoralists in the Sahel are mobile. With the beginning of the rainy season, they move north and follow the availability of green pastures, often covering hundreds of kilometres (Weibel *et al.* 2008). The transhumance routes and the distances they travel depend on their rights to access land and pastures as well as the availability of key resources for humans and their livestock. For the livestock, these key resources are rich pastures, soil containing natron (sodium bicarbonate) and water.

The challenges

The mobility of the pastoralists and their close contact with their livestock (Figures 1 and 2) are reflected in their health. As for other livestock owners in rural and peri-urban zones, close contact between human and animals and consumption of raw milk and meat favour zoonotic infections such as anthrax, Q-fever, brucellosis and bovine tuberculosis (Schelling *et al.* 2003; Daugla *et al.* 2004; Wiese 2004; Diguimbaye-Djaibe *et al.* 2006). Furthermore, mobile pastoralists are barely sheltered from environmental conditions (Figure 3) that also affect their health: high humidity during the rainy season and the heat and dust of the dry season (Bechir 2000). Despite these high risks, mobile pastoralists are virtually excluded from health services because these services do not meet their needs and are not designed for mobile populations (Wyss *et al.* 2004a). The settled population, too, has difficulty in accessing health services but that of mobile pastoralists is considerably worse (Wiese *et al.* 2004a).

The most appropriate and cost-effective healthcare systems for mobile pastoralists have rarely been discussed. Loutan (Loutan 1989) underlines in his important analysis the need for comprehensive education in both human and animal health in collaboration with the veterinary



Figure 1 Daily dromedary market in the outskirts of Nouakchott, Mauritania (E. Schelling).



Figure 2 Wedding festivities with a dance on the horses near Dourbali, Chad (E. Schelling).

services because the majority of the pastoralists, including women, have a very good knowledge of the health of their livestock.

Many African governments do not recognise the potential of mobile pastoralists as producers for economic development. Access to education and health services is critical for engaging mobile pastoralists in development. Nonetheless, authorities often lack the will to provide social services that meet their needs. Thus, the relationship between the mobile communities and the authorities is often weak and marked by mutual distrust. Mobile pastoralists are barely represented in governmental institutions and therefore lack political influence (Zinsstag *et al.* 2006). In addition, they are often illiterate because their access to education is so limited (Krönke 2000;



Figure 3 Tent of a Fulani family at Lake Chad (E. Schelling).

Zinsstag *et al.* 2002; Zinsstag & Yosko 2004; Bechir 2010). As they spend most of their lives in remote areas, they are rarely considered by national interventions and development activities (Zinsstag *et al.* 2006).

Conflicts between mobile pastoralists and the settled population also cause problems. Because of the seasonal change of rainfall, mobile pastoralists must be flexible in their choice of transhumance routes and campsites. Climate change increases the variability in rainfall, thus requiring even higher flexibility in planning, while demographic pressure causes stronger competition for existing resources (Bechir 2010). As adapted legal frameworks for land use are missing or not enforced, conflicts between mobile and settled communities occur frequently (Krönke 2000). Nowadays, some mobile pastoralists own land although traditionally, they had ancestral rights to use and access pastures. Today, these rights are often no longer respected. More and more water points are surrounded by cultivated land belonging to farmers. This leaves no choice to the pastoralists and their livestock but to invade the fields to gain access to the water, which results in yield loss to farmers and high fines and compensation payments to the pastoralists. These payments are frequently exaggerated (Krönke 2000), as mobile pastoralists are considered wealthy because they own livestock, and settlers try to benefit from them (Fokou *et al.* 2004). Hence, mobile pastoralists not only have to pay legal fees and fines but also have to make questionable and illegitimate payments (Bechir 2010). All these difficulties determine the context of healthcare provision.

Fifteen years of research in the nomade milieu

Following the objective of an improved access of mobile communities to social services, in cooperation with the Centre de Support en Santé Internationale (CSSI) and the

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Laboratoire de Recherches Vétérinaires et Zootechniques de Farcha (Tchad), which is the Institut de Recherches en Elevage pour le Développement (IREDE) today, as well as with different partners in Ethiopia, Mali and Mauretania, the Swiss Tropical and Public Health Institute has been active in the Sahel for 15 years in research and development (Tanner 2012). Starting in Chad, the work eventually extended to Mauretania, Mali and Ethiopia.

In the beginning, it was essential to better understand the situation and the needs of mobile pastoralists. Until then, not much was known about the health and demography of nomads in West and Central Africa. As they are mobile, dispersed and spend much of their life in remote areas, it is difficult but not impossible to collect even basic data (Schelling *et al.* 2003). The research was designed to respond to the needs of the mobile pastoralists and the necessities of interventions so that the new insights and results of the research could be transformed into development actions as quickly as possible. Research and development priorities were defined in repeated stakeholder workshops bringing together pastoralist representatives, local and national authorities and researchers. In this way, the main problems were identified in a participatory way, which improved the conception, planning and evaluation of future research and interventions (Wyss *et al.* 2004b).

With the help of an interdisciplinary research team, physicians, veterinarians, biologists, geographers and anthropologists studied the situation and the needs of the mobile pastoralists. To know more about their health, on the one hand, epidemiological studies were carried out, and on the other hand, anthropological and cultural studies contributed to better understand the nomads' concepts of health and their life, their perceptions of illness and their help-seeking behaviour (Krönke 2001; Münch 2012). Special attention was paid to balance observational studies and the assessment of perceptions of the targeted communities. A cultural science study using participant observation found that the Kel Alhavra in Northern Mali believe that the human body is submitted to two kinds of forces: cold and hot. This concept can be traced to ancient Greek philosophy. When the forces are in equilibrium, the body is healthy and works perfectly. The balance is influenced by the environment, the living conditions, nutrition and by diseases. When equilibrium is lost, this means that either the cold or the hot elements dominate, illness manifests itself. Therefore, the Kel Alhavra classify perceived illnesses into two distinct categories, cold and hot, depending on whether they are caused by a dominance of hot or cold elements. The classification of a disease also determines how it is treated (Münch 2012). In contrast, the Fulbe in Chad are

bound to a system of norms and values called *poulakou* which demands strong self-control and proscribes showing sickness in public (Krönke 2004). Clearly the term 'mobile pastoralists' represents great ethnic and cultural diversity. Suitable social services should therefore respond to the geographical, social and cultural context (Tanner 2012).

In consideration of the close contact between the humans and their livestock and the important role that animals play in the lives of pastoralists, an approach uniting human and animal health called 'one health' was chosen as a conceptual basis for research and interventions. 'One health' aims to show the added value in a quantitative and qualitative way of a better collaboration between human, animal and environmental health (Zinsstag *et al.* 2010). This implies to consider simultaneously human and animal health on the level of pathogens, individuals and communities including their natural and cultural environment (Zinsstag *et al.* 2009). Following this approach, after a study had shown that more livestock than children had been vaccinated, joint vaccination programmes targeting humans and animals in the same time were planned in Chad. These campaigns were carried out by human and animal healthcare professionals and allowed children under the age of 5 and women of reproductive age to get vaccinated. 15% of the costs could be saved by sharing of transport and the cold chain (Bechir *et al.* 2004; Schelling *et al.* 2007, 2008).

The majority of the studies were conducted in a close North–South research partnership (www.kfpe.ch). The cooperation and the fruitful exchanges between organisations and researchers in the North and the South facilitated better results based on a mutual learning and contributed to capacity building in African research institutions.

Results of the research

Human and animal health

In a study carried out in 1999/2000, more than a thousand mobile pastoralists were examined in Chad to determine the main health problems. It was found that the vast majority of them suffered from health problems (Daugla *et al.* 2004; Schelling *et al.* 2005). They rarely sought help in health centres, often only in a very advanced stage of sickness, and many diseases were left untreated. In Mauretania, child mortality is high in nomadic communities (Ould Taleb 2008). In Mali too, the child mortality rate is high and the likelihood that a newborn survives his or her fifth year is only 72% (Münch 2012).

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Although the health status of mobile pastoralists is in many regards comparable that of the settled population for diseases like malaria and parasitic infections (Bechir *et al.* 2012a), nomads face more risk factors because of the close contact with their livestock and their consumption of raw milk, which favours zoonotic infections. In Chad, a simultaneous study of humans and their livestock revealed low human prevalence of brucellosis (4%) and Q-fever (1%), although 7% of the cattle tested seropositive to brucellosis and 73% of the dromadaries to Q-fever. The connection between these diseases in humans and their livestock was statistically significant (Schelling *et al.* 2004). In south-east Ethiopia, 1.4% of the cattle and 9.6% of the goats tested seropositive to brucellosis; and 90% of the dromadaries were seropositive to Q-fever (Gumi 2011).

Also in Chad, most of the mobile pastoralists reported to consume raw milk and to have contact with body tissues from aborting animals which are both risk factors for abortion related zoonoses (Schelling *et al.* 2003). The fact that mostly men carry out obstetric tasks in their livestock might be an explanation why men are more often affected by brucellosis than women (Schelling *et al.* 2003). Most interviewed mobile pastoralists have good knowledge of animal diseases, whereas their knowledge of human health was limited (Münch 2012). The connection between human and animal health was rarely considered (Krönke 2004).

But also the pastoralists' exposure to extreme climatic conditions makes them more prone to certain diseases (Bechir 2000). During the dry season, heat and the dust often cause respiratory infections (Wiese *et al.* 2004a). Pulmonary diseases are more common in children under the age of 5 years (Schelling *et al.* 2005). During rainy season, strong fevers and febrile diarrhoea are more common because access to safe drinking water is difficult (Daugla *et al.* 2004; Schelling *et al.* 2005).

For births, women rarely attend health centres and antenatal care is almost never followed up (Münch 2012). Women and children have very low vaccination coverage (Bechir *et al.* 2004). Thus together with the Chadian public and animal health authorities, joint vaccination programmes targeting humans and animals at the same time were planned and carried out (Bechir *et al.* 2004; Zinsstag *et al.* 2005; Schelling *et al.* 2007).

Food security becomes an increasing problem (Figure 4) because nutrition consists mainly of milk and cereals. Cereals are bought from the profits of selling milk (Bechir *et al.* 2010; Münch 2012). The amount of milk available depends on the availability of pastures for the livestock. The less animals have to eat, the less milk they produce, which renders food security of mobile



Figure 4 Around the wells of Karnak, Chad (E. Schelling).

pastoralists periodically extremely difficult, especially at the end of the dry season (Bechir *et al.* 2011). This situation can become critical because it is so hot and dry that the pastoralists consume more energy, whereas pasture for livestock is rare and dairy production goes down (Schelling *et al.* 2005). This is why nomads are so vulnerable to variations in precipitation. Many women and children suffered from malnutrition during dry years (Bechir 2010; Bechir *et al.* 2010; Münch 2012), whereas malnutrition is rarely reported in years with much rain (Daugla *et al.* 2004; Zinsstag *et al.* 2010). Fresh fruit and vegetables are not consumed, so that milk is the only source of vitamin A, which can lead to deficiency symptoms (Zinsstag *et al.* 2002; Bechir *et al.* 2011, 2012b; Münch 2012). There is a direct relation between the levels of vitamin A in women's blood and levels in the milk of their livestock. Hence, while vitamin A levels in milk reflect the levels of beta-carotene of the pasture, human blood levels of vitamin A, which can be considered an indicator for health status, are determined by the quality of the ecosystem and the climatic conditions (Zinsstag *et al.* 2002).

Studies about tuberculosis in humans and animals

Within the framework of the research programme the first laboratory capable of isolating and cultivating mycobacteria was established in Chad. A clinical study in a pastoral setting showed a prevalence of suspected clinical tuberculosis of 4.5% (Daugla *et al.* 2004). The first strains of human tuberculosis isolated in Chad originated from institutions in N'Djamena. They consisted exclusively of *Mycobacterium tuberculosis* strains, 25% of which were resistant to Isoniazid (Diguimbaye *et al.* 2006). Sahelian cattle are infected with *Mycobacterium*

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bovis (Diguimbaye-Djaibe *et al.* 2006; Muller *et al.* 2008; Tschopp 2008; Tschopp *et al.* 2010; Gumi 2011). So far we found human *M. bovis* infection in Borana pastoralists and *M. tuberculosis* in a camel in south-west Ethiopia, but not in Chad, Mali and Mauritania (Gumi 2011; Gumi *et al.* 2012). *M. bovis* in Central Africa is dominated by strains that share a large genomic deletion called Af1 (Muller *et al.* 2009). Studies with a single intradermal comparative cervical tuberculin test in cattle revealed a better performance if the cut-off value was decreased to >2 mm than using the recommendations of the World Organization of Animal Health (OIE; Bongo Naré *et al.* 2009). Mobile pastoralists know tuberculosis in humans, and their concepts are in partial agreement with the modern medical concepts. Nonetheless, interviews in Chad and in Mauritania have shown that mobile pastoralists perceive tuberculosis as hereditary and incurable (Ould Taleb 2008). This result shows the importance of combining biomedical with sociocultural approaches to better identify barriers of access to health care.

Access to health services

Although there is a great diversity within mobile pastoralist communities, in general, they are vulnerable and have very limited access to social services because of their mobility, their remoteness but also because of socio-economic and cultural factors (Daugla *et al.* 2004; Yemadji 2004). Health care offers include on the one hand informal or traditional services such as *marabouts*, traditional healers and non-authorized drug sellers and on the other hand formal services provided by the state, such as hospitals mainly in big cities and health centres dispersed in the rural areas. However, there is a persistent lack of health service coverage in pastoral zones (Ould Taleb 2008). Although health centres exist, mobile pastoralists are hesitant to use them as service provision is often inadequate. Hence, traditional or informal practitioners are often preferred and health centres are only visited for serious and very advanced cases, many with a bleak prognosis. Unsurprisingly, one Kel Tamacheq women said: 'Hospitals are only for dying'.

To reach a health centre, mobile pastoralists often have to cover big distances (Ould Taleb 2008; Münch 2012). In an advanced stage of illness, long and difficult journeys can only be made with an accompanying person. The longer the distance, the longer the absence from the campsite and the longer the livestock has to be entrusted to somebody else. But also the mobility of the campsites is challenging because it often makes it impossible for patients to visit a health centre repeatedly to maintain long-term treatment, as required for tuberculosis for

example. Therefore, adherence to healthcare instructions is problematic (Ould Taleb 2008). In the centres, communication with staff is often poor because they speak different languages (Hampshire 2002; Ould Taleb 2008).

High cost of treatments and drugs keeps pastoralists away from visiting the health centres (Ould Taleb 2008; Münch 2012). In addition, they regularly have to pay more than other users because they are considered rich (Wiese 2000; Fokou *et al.* 2004). Furthermore, the indirect costs of transport, food and the temporary care for the livestock need to be covered (Wiese *et al.* 2004b). It is especially difficult for women to see a doctor because they are dependent on the support of their husband or a family member (Hampshire 2002; Münch 2012), whereas men have an easier access to health care because of their mobility. Women self-medicate and delay consulting health centres (Ould Taleb 2008; Figure 5).

If the mobile pastoralists do reach health centres, they often find them technically inadequate and badly equipped, which does not meet their expectations (Wiese *et al.* 2004a). The combination of technical problems, high costs, long waiting hours and lack of compassion by health staff leads to the nomads' poor opinion of health centres. Received and treated badly, they are less likely to go there again.

Discussion

Perspectives for future research

The objective of all research about mobile pastoralists should be improvement of their condition and health status (Obrist *et al.* 2007, 2010; Zinsstag *et al.* 2011). That



Figure 5 Vaccination of a mobile pastoralist child in Chad in the framework of joint human and animal vaccination campaigns (Project Santé des Nomades au Tchad).

is why it is crucial that research is geared to the needs of the pastoralists and their sustainable development.

Research can play an important role in accompanying and evaluating implementations to detect and solve problems and difficulties as fast as possible and in assessing the effectiveness of interventions.

Information about the health and the demography of mobile pastoralists is essential to plan, implement and monitor interventions (Weibel *et al.* 2008). However, long-term studies are difficult to conduct in mobile pastoralist settings because the composition of the camps is highly dynamic and it is almost impossible to follow up the same persons over time (Schelling *et al.* 2003; Weibel *et al.* 2011). This is why the installation of a demographic surveillance system is very desirable. First attempts using biometric data like digital fingerprints proved to be impractical (Weibel 2009; Weibel *et al.* 2011). New trials with mobile phones are being carried out, and the first results show their effectiveness as tool for demographic and health surveillance (Jean-Richard 2013). Mobile phones have great potential for the follow up of transhumance routes, the surveillance of human and animal diseases, telemedicine, emergency evacuation and long-term follow-ups of treatments like an adaptation of the WHO strategy against tuberculosis for pastoral settings. In this way, a vast field of action including communication, surveillance and interventions has opened up and should lead to new solutions for a better handling of patients in remote pastoral settings.

The approach of North–South research partnership has proved to be fruitful because it facilitates the conception and running of research projects. This cooperation should therefore be extended, not only between partners of the North and the South, but also to foster South–South cooperation. To prevent failures, it is important to minimise the power imbalance. Especially when funds are provided by the North, it is critical that all partners be included in planning the research and interventions and follow the deontology of research partnerships (www.kfpe.ch/11-Principles/). The more funding is acquired by all partners, the better all partners engage with joint projects and perceive their ownership. This approach enhances ownership and takes better account of the priorities of all partners.

Perspectives for future development

Aiming at sustainable development, a participatory and transdisciplinary approach bringing together scientists, authorities and pastoralist community representatives is essential so that different parties can discuss their expectations and express their priorities. By including mobile pastoralists in the process of planning and implementation of

interventions, they gain ownership and assume their responsibilities more easily.

Based on the results of the research and the participatory stakeholder workshops, an intersectoral policy to support mobile pastoralist communities was elaborated in Chad, conceived for a length of 10 years. It was prepared under the patronage of the Ministry for Economy and Planning and should simultaneously improve health, education and access to natural resources of mobile pastoralists. However, so far this policy has not been implemented, as rapidly changing ministers and the inherent organisational structure of governments favour single-sector policies. In March 2013, the Ministry of Health of Chad announced the creation of a directorate of pastoralist health and there is increasingly tangible self-organisation among pastoralist communities.

Similar long-term research and support programmes are certainly desirable. Even if these programmes can be conceived and elaborated with the help of NGOs or international organisations, in the end, it is the state that has to assume its responsibility to implement large-scale programmes. Only in this way could the situation of the mobile pastoralists be improved in a sustainable way. Ultimately, political will and financial and administrative power are indispensable, which emerge slowly at the example of the planned directorate for the health of mobile pastoralists in Chad. In Sahelian countries, where the state is often unable to provide social services to the settled population, it is particularly difficult to initiate development programmes for nomads. Even if these intersectoral programmes are the most sustainable choice, their initiation is long and their implementation complicated. As the experience in Chad has shown, the realisation of such a programme can be delayed for a very long time. Ideas about a more specific programme focused on health are currently being discussed, which might be easier to implement and would have better chances to be realised although the results would be less comprehensive than the intersectoral approach. In the case of Chad, multi-sector approaches are, however, increasingly being considered. They were recommended at the national development forum in January 2012 and during the Transhumance Festival in November 2012 in Ouadi Djedid. The Chadian government is currently considering the establishment of water points, health centres, schools, animal health centres, food stocks and the creation of markets at several sites in the country.

Medium-term interventions could be envisaged, implemented at least initially in close collaboration with organisations of development cooperation. These approaches include information, education and communication campaigns to inform mobile pastoralists about the

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existence, symptoms and transmission of diseases in humans and animals. In this way, risk factors and therefore the transmission of diseases could be reduced. Furthermore, sensitisation campaigns initiated by the health centres could contribute to improving their acceptance with the mobile pastoralists so that they seek treatment earlier and more easily in case of serious sickness. These interventions need to be based on the support and participation of the pastoral communities and authorities to target access and the intrinsic capacity of communities to face threats to their health and well-being. Searching for better access to health services for mobile pastoralists remains a challenge.

In addition, the education of community healthcare workers like nurses, midwives and animal health extension workers would be very helpful. They would reach remote communities, be mobile and would either accompany the pastoralist groups or be called when needed. They could treat daily health issues and contribute to prevention with the help of modern communication technologies. All this has become much easier with the new technologies of mobile communication. Mobile schools or other forms of basic education are also essential to improve individual capacities of mobile pastoralists and to consolidate their position in society.

It would also be of great benefit to try to institutionalise the dialogue between settled farmers and mobile pastoralists. These two groups often compete for the same rare resources – land and water – leading to conflicts. Regular mutual exchanges could help a more peaceful living together.

Due to the close contact between the pastoralists and their livestock, the health of humans and animals cannot be considered separately because the well-being of both is closely entwined. That is why the approach of ‘one health’ in interventions is highly beneficial to both human and animal health. Based on the experience gained from research and interventions during the past years, the advantages and synergies of such an approach have become evident. This knowledge can be transferred and used in other populations which live in close contact with animals. Beyond the better cooperation of human and animal health, environmental and ecological considerations should also be taken into. We therefore increasingly use the approach of ecohealth (www.ecohealth.net), which accounts for the provision of health services within a sustainable socio-ecological system.

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