Random demographic household surveys in highly mobile pastoral communities in Chad
Daniel Weibel, Mahamat Béchir, Jan Hattendorf, Bassirou Bonfoh, Jakob Zinsstag & Esther Schelling

Problem
Reliable demographic data is a central requirement for health planning and management, and for the implementation of adequate interventions. This study addresses the lack of demographic data on mobile pastoral communities in the Sahel.

Approach
A total of 1081 Arab, Fulani and Gorane women and 2541 children (1336 boys and 1205 girls) were interviewed and registered by a biometric fingerprint scanner in five repeated random transect demographic and health surveys conducted from March 2007 to January 2008 in the Lake Chad region in Chad.

Local setting
Important determinants for the planning and implementation of household surveys among mobile pastoral communities include: environmental factors; availability of women for interviews; difficulties in defining “own” children; the need for information-education-communication campaigns; and informed consent of husbands in typically patriarchal societies.

Relevant changes
Due to their high mobility, only 5% (56/1081) of registered women were encountered twice. Therefore, it was not possible to establish a demographic and health cohort.

Lessons learnt
Prospective demographic and health cohorts are the most accurate method to assess child mortality and other demographic indices. However, their feasibility in a highly mobile pastoral setting remains to be shown. Future interdisciplinary scientific efforts need to target innovative methods, tools and approaches to include marginalized communities in operational health and demographic surveillance systems.

Abstracts in 中文, Français, Русский и Español at the end of each article.

Problem
An estimated 50 million pastoralists live in sub-Saharan Africa. Extensive mobile livestock production systems in sub-Saharan arid and semi-arid zones are important drivers in national economics as fundamental and ecologically sustainable food providers. However, these mobile pastoralists are politically and economically marginalized and must be fostered. Social and health planning relies on accurate data for fertility, mortality and causes of death. Countries in the Sahelian region of Africa face considerable challenges in sampling and registering mobile pastoralists. No demographic surveillance system includes data from these mobile communities and few other approaches account for these people either. Water point and cross-sectional sampling methods for nomadic groups were discussed by Kalsbeck. Watkins and Fleisher draw from experiences in establishing a migrant tracking system in Ethiopia. However, overall, few studies on demographic indices among mobile pastoralists are available.

In this paper, we report on our effort to establish a demographic and health cohort based on reported data among mobile pastoral women in Chad (Box 1).

Approach
The study area in the semi-arid Sahelian belt covered a surface area of 4275 km² with a north–south extension of 45 km and an east–west extension of 95 km at the southern shores of Lake Chad in the region of Hadjer el Hamis, Chad. It covered the Gredaya zone where human and livestock vaccination campaigns were done from 2000 to 2007 by the Swiss Tropical and Public Health Institute and the Centre de Support en Santé Internationale in Chad.

One survey round of about two weeks consisted of several random transects and randomly selected headlands and islands on Lake Chad. Sequential random compass directions (cardinal and intermediate points) and distances (10 to 100km in 10km increments) were generated to select starting points and to establish series of transects. The reference point was the village Gredaya (geographical coordinates: 12° 57' 28.40" N, 15° 3' 51.55" E). On these random transects, all visible feriks (mobile pastoralists’ camps) were visited. Average visibility was about 1 km depending on weather conditions (e.g. dust and sand in the air) and vegetation.

Local setting
Whenever our team arrived in a ferik, we were always received by a group of men to whom we presented the scope and the implications of the survey. We asked for consent for the participation of all women older than 12 years. In such typically patriarchal societies, informed consent of a male relative was crucial. Women participants were interviewed and their fingerprints were registered with a biometric fingerprint scanner for re-identification in a subsequent survey round. Demographic data reported by mothers or female caregivers (year of birth, ethnic group, number of children who had died, age when child died and cause of death, and number of children alive at time of the interview, including, sex, age, date of death if deceased between survey rounds) have been collected by questionnaire interviews. The questionnaire was pre-tested on its feasibility with regard to time,
Lessons from the field

Household surveys in mobile communities in Chad

Daniel Weibel

Box 1. Summary of main lessons learnt

- Determinants for the planning and implementation of demographic and health surveys among mobile pastoral communities include: environmental and climatic factors, availability of women for interviews, the need for informed consent of husbands in typically patriarchal societies, the importance of information-education-communication campaigns, and difficulties defining a woman’s “own” children in mobile pastoral societies.
- It was not possible to establish a demographic cohort due to the low numbers of re-encountered individuals in random transect surveys among highly mobile pastoralist communities.
- Prospective cohorts are the most accurate method to assess basic demographic indices, but effective ways to establish such a cohort in a highly mobile setting remain to be tested.

Table 1. Women and children encountered in five random transect demographic household surveys of mobile pastoral communities conducted from March 2007 to January 2008 in Chad

<table>
<thead>
<tr>
<th>Survey</th>
<th>Dates of survey</th>
<th>Women</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15–27 March 2007</td>
<td>240</td>
<td>188</td>
<td>179</td>
<td>607</td>
</tr>
<tr>
<td>2</td>
<td>23 April–15 May 2007</td>
<td>365</td>
<td>476</td>
<td>440</td>
<td>1281</td>
</tr>
<tr>
<td>3</td>
<td>25 July–2 August 2007</td>
<td>230</td>
<td>306</td>
<td>295</td>
<td>831</td>
</tr>
<tr>
<td>4</td>
<td>18–30 November 2007</td>
<td>199</td>
<td>274</td>
<td>223</td>
<td>696</td>
</tr>
<tr>
<td>5</td>
<td>22–28 January 2008</td>
<td>103</td>
<td>164</td>
<td>146</td>
<td>413</td>
</tr>
<tr>
<td>Encountered twice</td>
<td></td>
<td>–56</td>
<td>–72</td>
<td>–78</td>
<td>–206</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1081</td>
<td>1336</td>
<td>1205</td>
<td>3622</td>
</tr>
</tbody>
</table>

The five survey rounds took place from March 2007 to January 2008. In this period, the main ethnic groups of Arab, Fulani and Gorane were gathered in the study area after transhumant movements of several hundred kilometres between rainy and dry season pastures. These highly mobile cattle breeders use the dry season pastures on the shores of Lake Chad or in proximity of accessible ground.3

Ethical considerations

The Chadian Ministry of Health and the Ethical Committee of the Cantons of Basel and Baselland in Switzerland approved this study, including the collection, storage and analysis of biometric data. Participation was voluntary. To preserve the anonymity of participants, all fingerprint-related information, demographic and health data and geographical coordinates were stored in three separate databases and were only linked for final analysis via unique identification numbers. All data were treated confidentially.

Challenges

The goal of the surveys was to establish a demographic and health cohort using biometric fingerprint registration of the mothers. Success of this approach relied on re-encountering individuals reasonably frequently and accurate reporting of deaths. The applied biometric fingerprint tool was crucial for unique identification of individuals, who did not have identification cards.12 Due to the low numbers of registered women (5%, 56/1081) encountered twice, it was not possible to establish a cohort to capture changes in demographic and health parameters in this highly mobile community.

It is likely there was a sampling bias of under-representation of women without children due to stigma of infertility. The proportion of these women in the feriks and the number of women that did not participate in the survey was unknown. Some women in the oldest age group presented their grandchildren or children from other family members as their own children. This reflects the difficulty in defining a woman’s “own” child in pastoralist cultural settings.

Accompanying health service provision including information-education-communication campaigns involving pastoralist chiefs and spiritual leaders were crucial in obtaining permission to participate in the surveys. However, given the lack of existing health services, the interviewed women may have slightly over-reported deaths of children in the hope of receiving more health services for their community. The same child may have been reported by different individuals between different rounds. However, since we only encountered 5% (56/1081) of all registered women twice, we expect that the double-reporting would have been low.

The most accurate method to obtain robust and consistent mortality information is demographic and health surveys with a prospective cohort rather than estimates based on retrospective and reported data.13 A prospective cohort requires visiting the same households at regular intervals. In a mobile pastoralist context, this requires local assistance and knowledge from people such as community health workers, chiefs and other authorities on locating the households and their members (the composition of a household varies according to the season). If the establishment of a cohort were feasible, the visits would require greater resources to reach a meaningful number of representative households from all three ethnic groups. Our survey showed that the high proportion of Fulani people (61%; 659/1081) in the sample was mainly due to the selection of the study area on the shores of Lake Chad, which is predominately populated by Fulani pastoralists in the dry season. The presence of Goranes and Arabs was much more variable between survey rounds and their transhumance into the study zone was not as consistent as for the Fulani. Because there was no data available on population sizes for different ethnic groups of mobile pastoralists in the dry season at Lake Chad, it was impossible to make any statement on the representativeness of the sample.

It is difficult to achieve same time intervals between survey rounds in a highly mobile setting because one cannot predict availability of guides or the time needed to encounter the required number of households. In addition, the surveys were interrupted by climatic (e.g. heavy rainfalls) and political events (fights between the national Chadian army and rebel armed forces on the outskirts of the study area in January/February 2008). The randomly sampled women per survey round varied between 103 and 365 and the number of children between 310 and 916 according to the days spent in the field (from 7–23 days).
On average, we could interview 14–15 women per day because the women had a high workload and their availability was limited. In addition, the team often needed male consent (usually the woman’s husband, who commonly was absent from the ferik during the day), further delaying the interviews.

Conclusion
In conclusion, the random transect surveys are appropriate. However, many resources were required to maintain several survey rounds and did not lead to a follow-up cohort. Tracking technologies such as global positioning systems and mobile phones could be used to follow up nomadic households. Health cohort surveys and demographic surveillance could also integrate with multisectoral interventions and infrastructure services such as domestic markets and water, finance and social services. Future interdisciplinary research needs to target innovative methods and tools to include marginalized communities such as mobile pastoralists in health surveillance.

Acknowledgements
We thank M Tanner, director of the Swiss Tropical and Public Health Institute, DM Daugla, director of Centre de Support en Santé Internationale, the Chadian authorities and the nomadic communities for their support to this study.

Funding: The research was carried out within the Transversal Package Project “Pastoral Production System” of the Swiss National Centre of Competence in Research North–South: Research Partnerships for Mitigating Syndromes of Global Change, co-funded by the Swiss National Science Foundation and the Swiss Agency for Development and Cooperation and the participating institutions. The author had full control of all primary data.

Competing interests: None declared.
Environnement locale Les facteurs déterminants pour la planification et la mise en œuvre d’enquêtes auprès des ménages des communautés pastorales nomades comprennent: les facteurs environnementaux, la disponibilité des femmes pour les entretiens, les difficultés à identifier leurs «propres» enfants, le besoin en campagnes d’information, d’éducation et de communication, ainsi que le consentement éclairé des époux au sein de ces sociétés typiquement patriarcales.

Changements significatifs Du fait de leur grande mobilité, seulement 5% (56/1 081) des femmes enregistrées ont été rencontrées à deux reprises. Il n’a donc pas été possible d’établir de cohorte démographique et sanitaire.

Resumen

Encuestas demográficas domiciliarias y aleatorizadas en comunidades pecuarias de elevada movilidad en Chad

Situación Contar con datos demográficos fiables es un requisito fundamental para la planificación y la puesta en marcha de las medidas necesarias. El estudio aborda la falta de datos demográficos en las comunidades nómadas de pastores de la región del Sahel.

Enfoque Se realizaron entrevistas a un total de 1081 mujeres y de 2541 niños (1336 niños y 1205 niñas) árabes, fulanís y goraneses, y se les incluyó en un registro mediante un lector óptico-biometrico de las huellas dactilares en cinco encuestas demográficas y de salud aleatorias, repetidas y transversales que se realizaron entre marzo de 2007 y enero de 2008 en la región del Lago Chad, en Chad.

Marco regional Entre los determinantes más importantes de la planificación y la puesta en marcha de las encuestas domiciliarias en las comunidades nómadas pastoriles se encuentran: los factores medioambientales, la disponibilidad de las mujeres para realizar las entrevistas, las dificultades para definir cuáles son «sus» hijos, la necesidad de desarrollar campañas de información-educación-comunicación y la obtención de los consentimientos informados de los maridos en las sociedades patriarcales típicas.

Cambios importantes Debido a su elevada movilidad, sólo pudimos volver a encontrarnos con el 5% (56:1081) de las mujeres registradas. Por lo tanto, no fue posible establecer una cohorte demográfica y sanitaria.

Lecciones aprendidas Las cohortes prospectivas de carácter demográfico y sanitario son el método más preciso para evaluar la mortalidad infantil y otros índices demográficos. No obstante, sigue sin demostrarse su viabilidad en grupos de pastores que se desplazan mucho. Los futuros esfuerzos científicos interdisciplinarios deben dirigirse a la obtención de métodos, herramientas y enfoques innovadores que incluyan a las comunidades marginadas en los sistemas operativos de control demográfico y sanitario.
References


