Random demographic household surveys in highly mobile pastoral communities in Chad

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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 عربي, 中文, Français, Русский and Español at the end of each article.

Problem

An estimated 50 million pastoralists live in sub-Saharan Africa.[1] Extensive mobile livestock production systems in sub-Saharan arid and semi-arid zones are important drivers in national economies as fundamental and ecologically sustainable food providers.[2,3] 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.[4] 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 Kalsbeek.[5] 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.[6–10] 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 km^2 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.[11]

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.[12]

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.[12] 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,

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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**

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

staff requirement and comprehensibility. The interview team asked the questions in Arabic and answers were translated into French. In total we registered and interviewed 1081 women with 2541 children (1336 boys and 1205 girls). The number of individuals re-encountered is shown in Table 1.

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. ■

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ملخص

المسوحات الأسرية الديموغرافية العشوائية للمجتمعات الرعويّة المتنقّلة في تشاد

المشكلة تُعد المعطيات الديموغرافية الموثوق فيها مطلباً محورياً للتخطيط والإدارة الصحية، ولتنفيذ التدخلات الكافية. وتولي هذه الدراسة الاهتمام بنقص المعطيات الديموغرافية عن المجتمعات الرعوية المتنقلة في منطقة ساحل.

الطريقة أجريت مقابلات مع 1081 امرأة عربية وفولانية وحورانية، و2541 طفلاً (1336 ولداً، و1205 بنات) وجرى تسجيلهم بماسح قياس حيوي لبصمة الأصبع في خمس مسوحات ديموغرافية صحية عشوائية متكررة أجريت بدءاً من آذار/مارس 2007 حتى كانون الثاني/يناير 2008 في منطقة بحيرة تشاد في تشاد.

الوضع المحلي تضم المحددات الهامة لتخطيط وتنفيذ المسوحات الأسرية بين المجتمعات الرعوية المتنقلة: العوامل البيئية؛ النساء المتاح وجودهن لإجراء المقابلات؛ صعوبات التعرّف على الطفل "الوحيد"؛ والحاجة إلى حملات للمعلومات-والتعليم-والتواصل؛ والموافقة المستنيرة من الأزواج في مجتمعات تقليدية ذكورية.

التغيّرات ذات الصلة نظراً لكثرة التنقل، لم تتكرر المقابلة مرتين إلا في 5% فقط من النساء (1081/56). ولذلك لم يمكن إعداد مجموعة ديموغرافية وصحية أترابية.

الدروس المستفادة إن المجموعات الأترابية الديموغرافية والصحية المستقبلية هي أكثر الطرق دقة في تقييم وفيات الأطفال والمؤشرات الديموغرافية الأخرى. لكن تطبيقها عملياً في حالة المجتمعات الرعوية الكثيرة التنقل يظل في حاجة للتوضيح. والجهود العلمية المستقبلية المتعددة المجالات تحتاج إلى أن تستهدف طرقاً مبتكرة، وأدوات وأساليب لتضمين المجتمعات المُهمّشة في نظم الترصّد الصحيّة والديموغرافية.

摘要

乍得高流动性牧民社区中的随机人口入户调查

问题 可靠的人口数据是健康规划和管理以及适当干预实施的中心要求。本研究解决萨赫勒流动牧民社区中人口数据缺乏的问题。

方法 在乍得的乍得湖地区从2007年3月到2008年1月间共计采访了1081名阿拉伯、富拉尼和乍得北方妇女和2541名儿童(1336名男孩和1205名女孩),并且在此期间进行的五次重复随机横断面人口和健康调查中通过生物指纹扫描仪对被采访人进行人口登记。

当地状况 流动牧民社区中入户调查规划和实施的重要决定因素包括:环境因素、接受访问妇女的可获得性、界定"自己"孩子的困难、信息-教育-传播活动的需求以及丈夫的知情同意,特别是在父权社会。

相关变化 由于流动性高,仅有5%(56/1081)的登记妇女遇到两次。因此,不可能建立人口和健康群组。

经验教训 前瞻性人口和健康群组是评估儿童死亡率和其他人口指标的最准确方法。然而,其在高流动牧区情况下的可行性还有待证明。未来的跨学科科研工作需要以创新方式、工具以及方法为目标,从而将边缘化社区也包括在健康和人口统计监测系统中。

Résumé

Enquêtes démographiques aléatoires auprès des ménages dans les communautés pastorales hautement nomades du Tchad

Problème La fiabilité des données démographiques constitue un critère majeur, tant pour la planification et la gestion sanitaire que pour la mise en œuvre d'interventions adéquates. Cette étude s'intéresse au manque de données démographiques concernant les communautés pastorales nomades du Sahel.

Approche Au total, 1 081 femmes et 2 541 enfants (1 336 garçons et 1 205 filles) arabes, foulani et goranes ont été interrogés et enregistrés à l'aide d'un lecteur biométrique d'empreintes digitales, au cours de cinq enquêtes sanitaires et démographiques transversales aléatoires successives, réalisées entre mars 2007 et janvier 2008 dans la région du lac Tchad au Tchad.

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.

Leçons tirées Les cohortes démographiques et sanitaires prospectives constituent la méthode la plus précise pour évaluer la mortalité infantile et les autres indices démographiques. Cependant, leur faisabilité dans un contexte pastoral hautement nomade reste à prouver. Les prochains efforts scientifiques interdisciplinaires devront cibler des méthodes, des outils et des approches novateurs, permettant d'inclure les communautés marginalisées dans des systèmes de surveillance démographique et sanitaire opérationnels.

Резюме

Рандомизированные демографические обследования домохозяйств в высокоподвижных скотоводческих общинах в Чаде

Проблема Надежность демографических данных – основное требование, предъявляемое при планировании и управлении здравоохранением, а также при внедрении надлежащих мер вмешательства. Настоящее исследование посвящено проблеме дефицита демографических данных о подвижных скотоводческих общинах в зоне Сахели.

Подход В ходе пяти рандомизированных трансектных демографических и медико-санитарных обследований, проведенных в период с марта 2007 по январь 2008 года в Чаде (район озера Чад), в общей сложности 1081 женщина и 2541 ребенок (1336 мальчиков и 1205 девочек) арабской национальности и из племен фулани и горане были проинтервьюированы и зарегистрированы с помощью биометрического сканера отпечатков пальцев..

Местные условия К числу важных детерминантов планирования и проведения обследований домохозяйств в высокоподвижных скотоводческих общинах относятся: экологические факторы, возможность интервьюирования женщин, трудности при определении семейной принадлежности детей, необходимость проведения информационно-коммуникационных и образовательных кампаний и получение согласия мужей в традиционно патриархальных обществах.

Осуществленные изменения Из-за высокой мобильности респондентов лишь 5% (56 из 1081) зарегистрированных женщин удалось встретить вторично. Таким образом, оказалось невозможно сформировать когорты по демографическим и медико-санитарным признакам.

Выводы Проспективные когорты, формируемые по демографическим и медико-санитарным признакам, представляют собой наиболее точный метод оценки детской смертности и других демографических индикаторов. Однако их применимость в условиях высокомобильных скотоводческих общин еще необходимо доказать. В будущем необходимы междисциплинарные усилия ученых, позволяющие применять новаторские методы, инструменты и подходы с тем, чтобы охватить труднодоступные сообщества системами медико-санитарного и демографического наблюдения.

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 gestión sanitarias, así como para 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-biométrico 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.

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