The Nahuche health and demographic surveillance system

The challenge: inaccurate health data

Obtaining accurate data on critical health indicators is often difficult in resource-constrained environments. In Northern Nigeria, this problem is even worse because of cultural factors which restrain married women from being interviewed by men, low levels of educational attainment resulting in largely male-dominated fieldworker teams, and age distortions and other biases in the recall of information.

Lack of accuracy in health indicators for specific regions hampers effective planning and means that sufficient resources may not be allocated to places where they are most needed.

The response: HDSS monitors health and population changes

In 2009, PRRINN-MNCH established the Nahuche health and demographic surveillance system (HDSS) site to support studies aimed at assessing the wider progress and impact of strengthening health systems by longitudinal monitoring health and demographic events of populations at risk. The Nahuche HDSS site is 32 kilometres from the state capital, Gusau, and covers six districts: Bella, Gada, Karakai, Nahuche Keku, Nahuche Ubandawaki, and Rawayya.

Virtually all members in the study area are Hausa by ethnicity, traders, and practise subsistence farming. Within Nahuche, compounds or dwelling units are grouped into clusters. This provides an important opportunity to deploy selected interventions within selected clusters to allow for comparison. In Nahuche there are 100 demarcated clusters.

Key messages: **Accurate health data is crucial for making the right decisions on resource allocation.**

1. The Nahuche health and demographic surveillance system (HDSS) established by PRRINN-MNCH has helped to fill an enormous gap in availability of local information in Northern Nigeria.
2. This has enabled more precise tracking of health services coverage and health outcomes in local populations, which in turn allows more appropriate resource allocation and targeting to areas most in need.
3. The system has the potential to track causal links between interventions and health outcomes, and to monitor progress in the achievement of the Millennium Development Goals.

The key objectives of the Nahuche HDSS site are to:

- Monitor health and population changes
- Study links between maternal, newborn and child health service strategies and survival
- Monitor and evaluate the impact of health and related interventions

The results: better planning for resource allocation

The following results were achieved between 2010 and 2013:

A full baseline census for all six districts of the study area conducted between September and December 2010 (Round 0).

Nahuche was chosen to ensure a population large enough to detect events, such as neonatal deaths, within short intervals of time. The baseline census questionnaire collected information on names of household members, relationship to head of household, residence status, sex, date of birth, ethnicity, marital status, education, survival status of parents and household characteristics.

The fieldworkers interviewed the head of the household or a designated adult. After a maximum of three revisits, a non-response was recorded. A baseline population of 125,149 in 19,193 households was identified with an average 6.5 persons per household ranging from 5.6 in Karakai to 6.9 each in Nahuche-Ubandawaki and Rawayya.

About half (49.9%) of the population was female, representing a sex ratio (males/females) of almost unity. About 51% of the total population was under 15 years of age while 3% was 65 years or older. The average age was 19.6 years.

Four 'rounds' (two rounds annually: January-June and July-December) of data collection.

Fig 1: Nahuche baseline census information, 2010

Selected characteristics of 125,149 individuals.

Characteristics	Number
Usual population size*	125,149
Male	62,760
Female	62,389
Ratio male to female	1.01
Number of households	19,193
Mean household size (based on usual population)	6.5
% under five years	20.4
% under fifteen years	50.9
% sixty five + years	3.0
Mean age years	19.6
Median age years (minimum age is 0, maximum is 115)	14.0

* Usual population: the permanent population plus temporary migrants. These are people who usually stay in the household for 3 or more months each year.

Fig 2: Basic health indicators of Nahuche population

Selected vital statistics from the Nahuche HDSS site – 2012

Indicators	Statistics
Infant mortality rate	59.8 per 1000 live births
Child mortality rate	175.5 per 1000 children
Under-five mortality rate	224.8 per 1000 live births
Crude death rate	19.8 per 1000 midyear population
Total fertility rate	7.4 births per woman
Life expectancy (females)	55.2 years
Life expectancy (males)	54.3 years
Life expectancy (both sexes)	54.7 years
Maternal mortality ratio	1,049 deaths per 100,000 live births

Accurate and complete data allows for more effective health care planning.

This is to update events (ie information on births, deaths, migration, pregnancies and marriage) including collection of information on maternal and child health indicators. From January 2011, trained interviewers visited compounds within Nahuche in 120-day work cycles (a 'round'), recorded events in registers, and reported data to the Nahuche computer centre for processing. As of October 2012, the population under surveillance had grown to 137,823 individuals in 20,914 households.

Collection of verbal autopsy information from relatives of individuals reported dead from the surveillance population.

Analysis of data from round 1 provides evidence-based information on maternal mortality in Northern Nigeria. Further, the study complements some of the previous maternal mortality ratio (MMR) figures which have generally been speculative with reference to MMR being 'over 1,000 deaths per 100,000 live births'[1].

Maternal mortality estimates

As part of round 1 (Jan-Jun 2011) activities, data were collected from women of reproductive age in 17,173 households using a questionnaire which focused on maternal and child health-seeking behaviour topics as well as sisterhood questions. A maternal death was defined as the death of a woman during pregnancy, childbirth, or in the 42 days after delivery.

Results from the maternal mortality analysis shows that a total of 17,087 respondents reported 38,761 maternal sisters of reproductive age (15-49 years). Out of the 38,761 sisters, 3,592 were reported dead and 1,261 of those dead were maternal deaths. The total lifetime risk of maternal death was 8% and using 7.5 as the total fertility rate for Zamfara state, the estimated maternal mortality ratio (MMR) for the surveillance site was 1,049 deaths per 100,000 live births (95% confidence intervals: 1,021-1,136).

Peer-reviewed scientific publications:

Doctor HV, Olatunji A, Findley SE, Afenyadu GY, Abdulwahab A, and Jumare A. 2012a. "Maternal mortality in Northern Nigeria: findings from a health and demographic surveillance system in Zamfara State." Tropical Doctor 42(3): 140-143.

Doctor HV, Olatunji A, and Jumare A. 2012b. "Bridging the Communication Gap: Successes and Challenges of Mobile Phone Technology in a Health and Demographic Surveillance System in Northern Nigeria" Online Journal of Public Health Informatics, Vol. 4, No. 3.

Doctor HV, Findley SE, and Jumare A. 2011. "Evidence-based health programme planning in northern Nigeria: Results from the Nahuche Health and Demographic Surveillance System pilot census." Journal of Rural and Tropical Public Health 10: 21–28.

Studies conducted in Nahuche:

- Baseline, midterm, and endline MNCH household surveys
- 'Bringing MNCH services to the door step' cluster of studies:
  - Outreach services pilot in Yobe
  - Community-based service delivery (CBSD) pilot in Jigawa
  - Mobile primary health care (PHC) in Katsina
- Performance-based financing (PBF) studies
  - Demand side in Jigawa, Yobe and Zamfara
  - Supply side in Katsina
- Midwife recruitment and retention scheme (MRRS) pilot studies
- Emergency transport scheme (ETS) studies (social support and funding mechanisms) – all four states
- Universal anaesthesia machine (UAM) – tested in three facilities – one each in Katsina, Zamfara and Kano states

1. This is far greater than the national average of 545 as reported in the 2008 Nigeria Demographic & Health Survey.

Fig 3: HDSS capacity and Millennium Development Goals

Millennium Development Goals	Capacity of HDSS to produce data
MDG 1, Target 2: Prevalence of underweight children under five years	Routine collection of nutrition indicators for children aged 5 years and below
MDG 2, Target 3 Net enrolment ratio in primary education	Routine updates on educational status of all members aged 6 years and above
Proportion of pupils starting grade 1 who reach grade 5	Routine follow-up on all school-age children
MDG 4, Target 5 Child and infant mortality rates	Routine monitoring of death events among children aged 5 years and below
MDG 5, Target 6 Maternal mortality ratio	Routine monitoring of maternal-related deaths among women of reproductive age
% of births attended by skilled health personnel	Routine collection of antenatal care and delivery data for all new births

The Nahuche HDSS site has been accepted as a member of the international network for the demographic evaluation of populations and their health (INDEPTH Network: www.indepth-network.org) in November 2012. Initiatives to sustain the centre, such as the strategic MOU with Usmanu Danfodiyo University, Sokoto, represent an important achievement, as the state government alone cannot sustain the centre.

Policy implications

The availability of data that is more accurate for specific locations than that obtained in national surveys is extremely useful for more effective planning and resource allocation. It also allows health planners to target resources to where they are most needed.

Users of the data can establish causal links between interventions and health outcomes. This is extremely important in monitoring activities to verify if they are really leading to the desired results.

Besides the 'direct' health-related indices, the HDSS site has the capacity to collect information on other MDG indicators (see Fig 3)

Conclusion

The Nahuche HDSS is monitoring health and demographic dynamics under exceedingly complex circumstances. Despite these essential difficulties, information continues to be recorded, edited and reported on population dynamics in a large population. The Nahuche HDSS baseline census and update round activities have demonstrated the replication of surveillance technology in a resource-constrained environment and become a model for other longitudinal health and demographic research projects in Nigeria and northern states in particular.

Nahuche has not only demonstrated a capacity for conducting detailed research; it has developed a platform for testing feasible interventions as we draw closer to the Millennium Development Goals.

Partnership for Reviving Routine Immunisation in Northern Nigeria; Maternal Newborn and Child Health Initiative

The PRRINN-MNCH programme works with federal, state and local governments and local communities to improve the quality and availability of maternal, newborn and child health services.

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