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Demographic Surveillance System (DSS) in Suba District, Kenya

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WHAT IS DSS?

Research hypotheses have to be based on evidence from the observation of subjects. In the field of public health research, the source of information for an evidence-based hypothesis should come from communities or well-defined populations. Such information can be used for “public” research itself and for evaluation of interventions in public health. Furthermore, it can be useful in the formulation, implementation and evaluation of health policies. In many developed countries, this kind of information is usually obtainable from already existing statistical data such as vital statistics, infectious disease surveillance, national nutritional and health surveys, medical facility statistics, cancer registries and other health information systems. In Sub-Saharan Africa, however, it is quite difficult to obtain such information due to a lack of governmental infrastructures for the collection of basic information at the national and community levels. In this situation, the most efficient way to acquire this crucial health information in a well-defined population is to set-up a “Demographic Surveillance System (DSS)”.

A DSS longitudinally captures information on demography, morbidity, and mortality in study areas where reliable data are non-existent. Thus, a DSS can provide essential information not only for planning and designing new studies concerning endemic and epidemic diseases, but also for planning and monitoring health policy [1, 2, 3]. Furthermore, it provides a platform for training and educating local professionals and young scientists in the field.

THE DSS LAUNCHED BY NUITM

The Nagasaki University Institute of Tropical Medicine (NUITM) has launched, in collaboration with the Kenya Medical Research Institute (KEMRI), a new research project on tropical diseases and health related problems in East African countries from 2005 (the NUITM-KEMRI project).

The concept of this project is to deploy various research programmes based on research hypotheses formulated using DSS information (Figure 1). The project integrates different scientific and operational research projects which aim at solving problems not only in the DSS sites, but also in areas where similar challenges prevail, especially with regard to the goals specified in the UN Millennium Project [4].

In Kenya, there are three major DSS programmes operated by three different institutions: Kisumu DSS by CDC-KEMRI project [5], Kilifi DSS by Wellcome-KEMRI Research programme [6], and Nairobi Urban DSS by APHRC (African Population and Health Research Centre) [7]. The underlying components of the DSS are the same in all programmes and are designed to complement each other, since they are located in different geographical areas with different environmental, epidemiological and cultural backgrounds. Due to different overlying research concepts, different objectives, and different management systems, however, there is little collaboration between the different DSS. Furthermore, it is difficult to establish our research programmes on the basis of the existing DSS operated by different institutions. Therefore, we intend to establish a new DSS programme to serve as the “cornerstone” or “backbone” of the NUITM-KEMRI project. The specific objectives of our DSS program are as follows;

- (i) To establish baseline data on the demographic, socio-economic, environmental and health characteristics of the communities in Suba Districts in Kenya.
- (ii) To document all births, deaths, in-migrations, out-migrations, socio-economic status, pregnancy outcome, and causes of death at given intervals.
- (iii) To investigate and evaluate interrelationships between health and socio-economic interventions, and their impact on morbidity and mortality.
- (iv) To provide a platform for scientific studies in the prevention, management and control of parasitic, viral, bacterial, and degenerative and lifestyle-related diseases.

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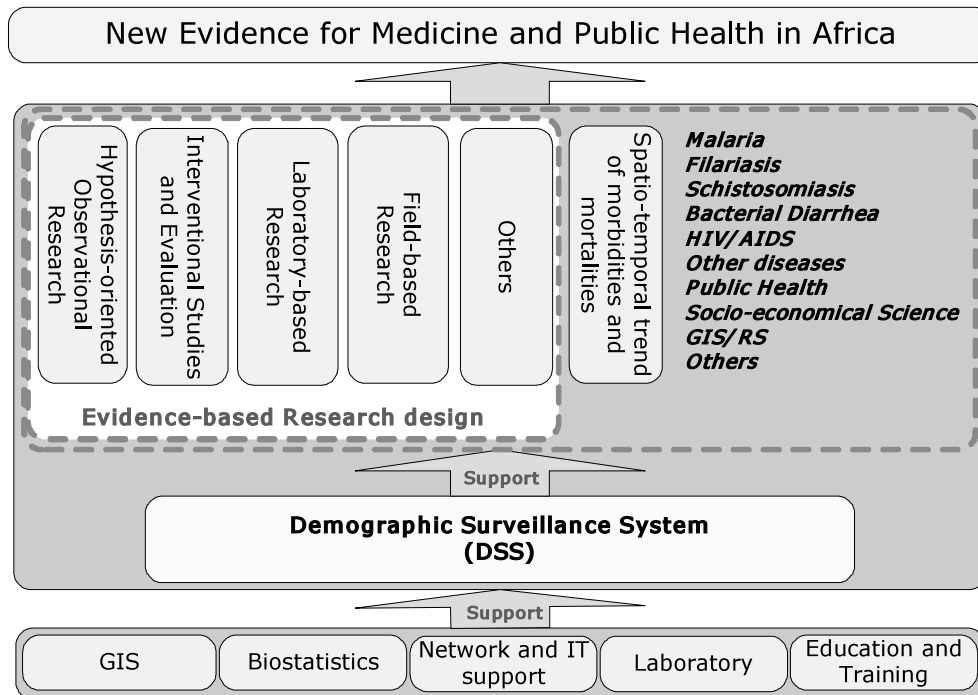


Figure 1. Research and public health approaches built-on the DSS

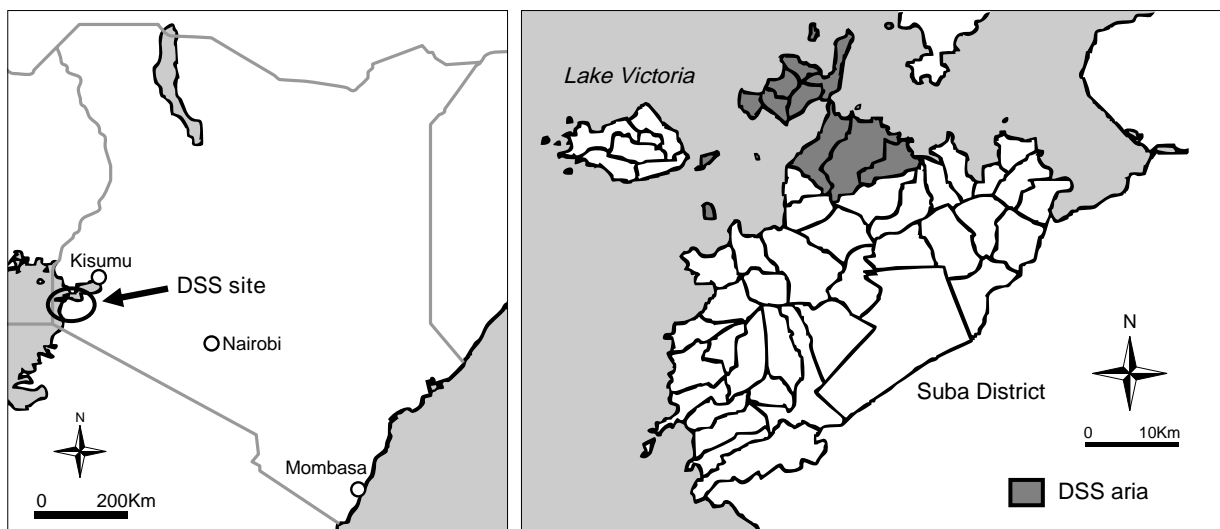


Figure 2. DSS area of NUITM-KEMRI project in Kenya

- (v) To provide a platform for education and training; and multidisciplinary research for health professionals, graduate students and researchers.

WHY DSS IN SUBA DISTRICT?

Our DSS area is located in Suba districts, Nyanza province along the shore of Lake Victoria in Western Kenya, about 400km west of Nairobi city (Figure 2). The area is one of the poorest in Kenya [8]. A sampling survey [9] conducted

at the provincial level revealed the highest infant mortality rate (133/1000 live births) and HIV prevalence (34%) in Kenya, but the real situation is still unknown. The area is endemic for malaria, schistosomiasis and tuberculosis. The situation here is ideal for the overall purposes of the NUITM-KEMRI project. Furthermore, our scientists have been conducting malaria research in this area for the last decade [10, 11], and we have already established a human network suitable for launching the DSS project in this area. In addition, an international research and development or-

ganzation called ICIPE (International Centre for Insect Physiology and Ecology) provides facilities such as offices, laboratories and accommodations. After considering all the factors mentioned above, we selected Suba district for our DSS program and the subject of a new challenge for our institute.

PROFILES OF OUR DSS

We cover an area of 121.9km² and a population of about 50,000 residents. Demographic information is collected during the baseline survey, while health information such as morbidity, mortality, birth, pregnancy, and migration is collected during the follow-up survey at two-week intervals. The procedures for collecting information from the communities are based on a paperless design using handheld computers (PDAs) (Figure 3). Thirtythree field assistants recruited from local communities visit every single household in the area, conduct interviews and enter the data on site. We also use new technologies like satellitebased remote sensing (Quickbird imageries with 60 cm ground resolution) and GPS (geographical positioning system) for digital mapping of all human dwellings that we link to ground survey data, e.g., malaria mosquito breeding sites. We also plan to conduct a verbal autopsy (VA) survey to infer causes of death for diseased persons in the DSS area. The VA has been conducted in various geographic areas, but the World Health Organization (WHO) has started to standardize the VA forms with the development of DSS globally [12]. The

information collected using the above systems is interactively linked and implemented comprehensively to grasp current problems through multivariate and spatio-temporal analyses. The outcome enables us to formulate hypotheses for the next research as well as to monitor the effects of intervention and the spatio-temporal trends of epidemiological data.

FURTHER CHALLENGES

Our DSS program was launched in August 2006, and we have completed the baseline survey in the pilot area, recording individuals living in the communities (Figure 2, Rusinga Island). The preliminary results indicate the presence of about 24,000 inhabitants and 5,400 households on the island.

We have been expanding the DSS area to adjacent land and adding several activities to the DSS like a follow-up survey, VA survey and malaria mosquito control programme. To accomplish these activities, however, several issues need to be solved, including system and network development for data transfer and management, management of field assistants including health insurance and welfare, stabilization of logistics, liaison activities for several research and community-based activities from Japan and other countries, etc. Furthermore, activities apart from the DSS programmes are required to support and help communities with regard to health and local economy in order to ensure the participation of the communities and to provide feed-back from our

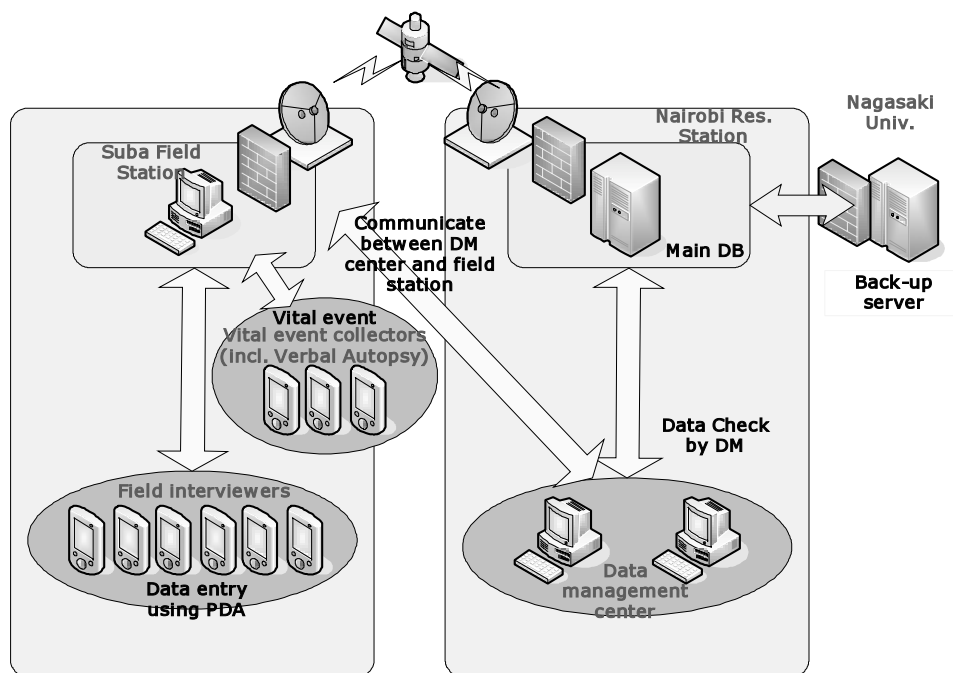


Figure 3. Data handling procedures and data back-up system in our DSS program

results. For this purpose, we are planning several activities like an outreach clinic and a grass-root project funded by JICA in our DSS area, which plays an essential role in our project in terms of providing medical and public health services and interventions in the communities as well as collaboration in our research activities. Planning and evaluation of the JICA grass-root project can be done using data from the DSS programme, and insufficient data can be complemented by additional surveys or research activities. Such interactive and spiral relationships between DSS and other programmes are a new style of research and community development in the rural areas in developing countries. The next 10 years will be a crucial period in our efforts to overcome the various challenges.

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