

Nigerian Case Study: Lessons Learned in Piloting the National Health Management Information System in Bauchi, Enugu, and Oyo States

Toyin Akpan
VISION Project, Nigeria
takpan@vision-ng.org

Hannah Searing
EngenderHealth, New York
hsearing@engenderhealth.org

Ade Adetunji
VISION Project, Nigeria
aadetunji@vision-ng.org

Abstract

The Vision Project (VISION) and the Federal Ministry of Health of Nigeria (FMOH) are collaboratively implementing a three-year (2001-2004) family planning and reproductive health (FP/RH) project in three states and 15 Local Government Areas (LGAs) in Nigeria, with funding and support from the United States Agency for International Development (USAID). During the proposal design process, the FMOH underscored a vital need for routine data to plan health programs. To meet this need, as part of the program, VISION agreed to pilot test the FMOH's National Health Information System (NHMIS), which the FMOH designed in the late 1990s but never fully implemented. The purpose of the pilot is to support the institutionalization of a sustainable, federally endorsed system that provides routine health data to Nigerians to help them to plan and manage their health programs. This paper describes how Nigerians are working towards this goal, discusses major challenges they have encountered, solutions they have implemented, and provides recommendations for other countries that wish to learn from their experience.

1. From theory to practice

According to the British Medical Informatics Society, health informatics is the “place where health, information, and computer sciences, psychology, epidemiology, and engineering intersect” (<http://www.bmis.org>). To the authors of this paper, the NHMIS pilot test is the intersection of these fields of study as we are working in the health sector at the national level to improve Nigerian's ability to use routine health indicators. According to Soriyan, Information Systems Development (ISD) in developing countries has unique features based on context and environment, particularly impacting sustainability and affordability of systems [1]. In fact, we already have found that the implementation of Nigeria's NHMIS faces serious financial and sustainability issues. And, we have found that the

financial challenges in particular have resulted in the development of parallel MIS systems that have further impeded the Nigerian health sector from gathering accurate and current service statistics. Since the project began, we have conducted one informal assessment of the NHMIS and related systems, and a brief literature review of our own field of study. In our initial review, we learned that improvements to information systems would occur more easily if we focus on the use of information to improve health services, rather than on information systems improvement for its own sake [2]. We also found that USAID has supported the development of other national MIS systems. For example, USAID supported ISD in Egypt's health sector during the late 1990s, expending approximately \$35 million on systems support and technical assistance. One review of these activities criticized the project for its lack of local leadership, stating that, “if [future] information system investment cannot be sustained locally, technically, and financially, it should not be done” [3].

In some ways, the Nigerian NHMIS pilot test is a hybrid model of the Egyptian system. Although the technical assistance and funds are being supplied by an external organization, Nigerian nationals work in and manage the VISION offices. In fact, all technical support for the NHMIS pilot test, including information technology (IT) support has come entirely from Nigerians. Therefore, the Nigerians are at least several steps ahead of the Egyptian program since the Nigerian FMOH developed the NHMIS and requested VISION's assistance to pilot test it.

A second major USAID-funded ISD project is the Family Planning Management and Development project (FPMD) that USAID supported throughout the 1990s in more than 30 countries and four continents. The goal of this project was to institutionalize management systems, including MIS. According to one review of the FPMD program, successful MIS development and deployment requires six key elements: a) work only where the partner organization is ready for change, b) frame the MIS work plan on the organization's strategic goals, c) focus on the

use of information, not just on data processing, d) computerize at a pace appropriate to local capacity, e) base MIS technical assistance on a broad understanding of reproductive health and family planning programs, and f) maintain consistency in technical assistance [4].

This paper will demonstrate that VISION is implementing the majority of the required elements. For example, we are working with a partner organization that is ready for change (FMOH), and focusing on the use of data for management decision-making and programming, not just on the collection process. In sum, this paper and the NHMIS pilot test has the potential of adding to academia's understanding of national level MIS field implementation while, at the same time, building on the lessons learned from other USAID-funded projects.

2. Background

Nigeria hosts the largest population in Africa, and is projected to increase from 134 million people in 2003 to 205 million by 2025 [5]. In comparison to other sub-Saharan African countries, Nigeria's modern contraceptive prevalence rate (CPR) is quite low, and varies considerably by region (the six regions in Nigeria are: the northeast, northwest, northcentral, southeast, southsouth and southwest). Among currently married women of reproductive age, CPR is 8.6 percent, and ranges from 2.2 percent in the northeast to 15.5 percent in the southwest [6]. In 2001, approximately 3.2 million adults were living with HIV/AIDS and the infection rate stood at 5.8 percent [7]. Life expectancy is 47 years [8]. The gross national product per capita is 300 US dollars per annum. Health expenditure as a percentage of the gross domestic product is 2.8 percent [5]. As the data shows, the health needs of Nigeria's growing population are extensive. Current and accurate health statistics are vital to effective health planning in an era of limited governmental investment.

Nigeria is divided into 36 states and the Federal Capital Territory (Abuja). These states are sub-divided into 744 local government areas (LGA). Each state has a range of 10 to 44 LGAs, with an average of 20 LGAs per state. Health facilities include hospitals, clinics, maternities, pharmacies, and patent medicine stores. Approximately 84% of all facilities providing family planning services are supported by the private sector, while 16% are supported by the public sector [9]. The public sector is managed by three autonomous levels of government--the federal, state, and LGA levels--each with its own budget, agenda, and programs.

Figure 1 shows the nine FMOH departments and agencies. The FMOH works with two departments and one agency to implement the NHMIS (depicted in boxes with broken lines).

Planning, Research, and Statistics (DPRS), which is responsible for the NHMIS development. The second, the Department of Community Development and Population Activities (DCDPA), is responsible for the provision of reproductive health services nationwide in both the public and private sectors, including the management and storage of all contraceptives and drugs. The third, the National Primary Health Care Development Agency (NPHCA), is responsible for the management of health facilities at the primary health care level, and controls commodities logistics and distribution.

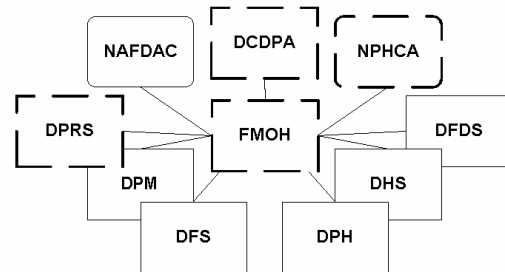


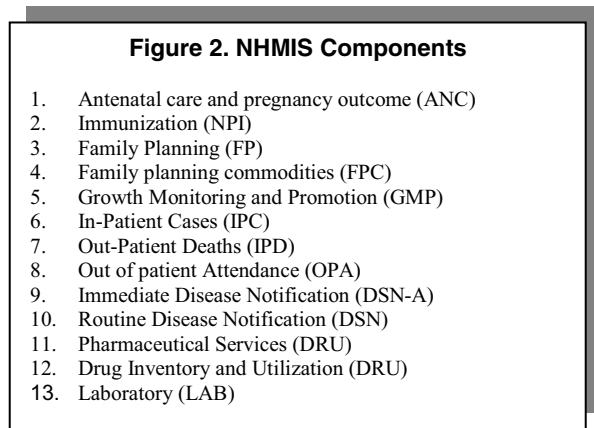
Figure 1. FMOH departments and agencies

3. NHMIS development

The FMOH developed the NHMIS in 1997 after two years of intensive planning among key stakeholders, and with the technical and financial support from the World Bank, the Carnegie Corporation, and the World Health Organization [10]. The NHMIS consists of a manual that contains forms and instructions for data collection and reporting [11]. The manual provides instructions on how to manually calculate indicators and provides protocols for data reporting at each level of the health system—FMOH, SMOH, LGA, and health facility. The NHMIS is the routine data component of Nigeria's health information system. Other components include a national population and household census, a vital events registry, a disease registry, epidemiological surveillance surveys, community surveys (e.g. project reports from donor assisted agencies), and a financial reporting system. The NHMIS contains the 13 components shown in Figure 2.

VISION is pilot testing the implementation of all NHMIS components in collaboration with the FMOH. Each of the 13 components contains four core summary forms that the health personnel use to record and report data. Although the data collection process differs slightly among the tertiary, secondary and primary care levels, the general process is similar and is shown in Figure 3. At

the facility level, the lowest entry point of the system, staff record patient data in logbooks on a daily basis, summarize it on a monthly basis in a facility level form (Form 000), duplicate it by hand (Form 001), and submit it to a designated M&E Staff at the LGA level. Upon receipt, the designated staff at the LGA level summarizes



all the health facility data from each of its facilities and enters the data into the companion NHMIS database (discussed below). The LGA staff then prints a summary form (Form 002) and sends the hard copy to the DPRS staff at the State Ministry of Health (SMOH) every quarter. Each SMOH then summarizes this data in a third form (Form 003) and sends a copy to the FMOH on a semi-annual basis.

Although the NHMIS covers a comprehensive list of components, it does not yet meet the current data management needs of the system. For example, it collects data on the number of clients accepting oral contraceptives—but not type of oral contraceptives. In fact, there are 5 types of oral contraceptives available in Nigeria and the facilities must report orals by type to the LGA so that they LGA can provide supplies to meet client demand. The current system cannot provide this information.

The FMOH developed the Health Information for Action (HIFA) for NHMIS automation. HIFA is a menu-driven software program designed to manage data generated by the NHMIS. HIFA is based mainly on EpiInfo 6 and Epimap 2 software that are available free of charge through the United States Center for Disease Control’s website. HIFA is network aware and Local Area Network (LAN) compatible. HIFA uses key program indicators to generate electronic summary tables, and simple charts (line, bar, pie, and histogram) and dot density and pattern maps. Data can be backed up, imported, exported, and printed. HIFA includes a built-in editor for copying, pasting, and finding and replacing functions. The system requirements are MS DOS 3.1, Windows 95, and a minimum of 8 megabyte RAM [11].

The HIFA system supports the NHMIS by automating indicator calculations and reporting, and by decreasing the time lag in data transfer in the presence of interconnectivity. The data outputs can be exported to other relational software for further analysis and reporting. And it provides a data store that is more reliable than paper copies of forms as it can be backed up and transmitted on disk or as an email attachment via the

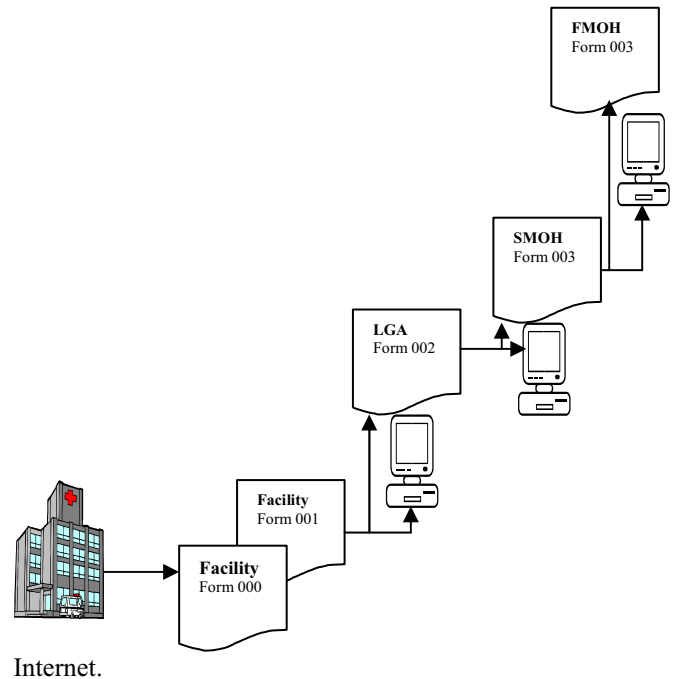


Figure 3: The NHMIS data collection process

HIFA’s major challenge is a lack of computers beyond the FMOH and SMOH levels and the system hardware. Although it runs on any operating system with 16 bits DOS application, it runs best on Pentium III 666 MHz and below. On higher systems, such as Pentium IV and Pentium III 866 MHz, HIFA’s multi-processing application software generates too many threads simultaneously, and therefore cannot generate and display the data entry screens. VISION overcame this challenge by building delay executable files and creating delay batch files for HIFA.

4. From development to implementation

Even after the NHMIS and HIFA were developed, the FMOH was only able to implement them at the federal level and in selected states--not at the LGA and health facility levels. The most important reason for this was the absence of financial support from the federal level. Other

reasons were the lack of a donor phase-out plan, and diminished donor interest following the completion of the system: “The seemingly collective enthusiasm shown [by donors] during the planning phase has not translated to significant and concerted efforts to support implementation of the programme, especially at the sub-national, local, and health facilities level”[10]. As a result, the FMOH lacked sufficient funds to train staff and provide the necessary logistics support for full NHMIS deployment.

Since 1997, one FMOH department and one FMOH-affiliated agency created two parallel MIS systems, in large part, to respond to donor reporting needs. The first was the Family Planning – Management Information System (FP-MIS), which the DCDPA originally created in collaboration with USAID, and then was later adopted for use by the United Nations Population Fund (UNFPA) during the period of a US government ban on the use of US funds in the public sector in Nigeria. The second parallel system was the Primary Health Care Management Information System (PHC-MIS) developed by the NPHCDA. The PHC-MIS system is a replica of the NHMIS, but adds a community level to the system (e.g. data from community based distribution workers and their referrals).

5. NHMIS link to VISION

In 2000, following the lifting of the ban on use of US government funds in Nigeria and the democratization of the country, USAID commissioned a qualitative, participatory needs assessment of the primary health care system [13]. Key findings related to the NHMIS included, a) a lack of a uniform data collection system and the capacity to use it for program planning and for management decision-making, and b) a lack of coordination in data management and reporting between the public and the private sectors. USAID used the study findings to develop a three-year health project proposal. EngenderHealth, an international non-governmental organization headquartered in New York City, and its partners (Johns Hopkins University / Center for Communications Programs, IntraHealth, and Population Services International / Society for Family Health) won the proposal and named the project “VISION” to illustrate a renewed sense of optimism that had emerged in the country under the newly democratic government.

VISION began in September 2001 and will end in September 2004. **Figure 4** shows that VISION is working in 3 states (Enugu, Oyo, and Bauchi) and 15 LGAs (5 per state). VISION and the FMOH work collaboratively to implement this three-year family planning and reproductive health program. VISION’s ultimate objective is to inform the FMOH and USAID about the

results and lessons learned from innovative service delivery models piloted in the three focus states. The NHMIS is one of the models that VISION is supporting the FMOH to implement. VISION’s purpose in testing the NHMIS is to support the institutionalization of a sustainable, federally endorsed national MIS.

During the program design process, the FMOH underscored a vital need for current and accurate data to plan health programs. To meet this need, and as part of the program, VISION agreed to assist the FMOH to pilot test full implementation of the NHMIS from the FMOH to the facility levels. The FMOH and VISION operate collaboratively in the NHMIS pilot test, each with its own distinct roles and responsibilities. VISION’s role is consultative to the FMOH. VISION’s main responsibilities are to: provide computers and software to the 15 project LGAs in the three project states, provide interconnectivity in one LGA per state, support training in NHMIS and HIFA, and document and evaluate the pilot test at the completion of the project period. A Knowledge Management Advisor manages all VISION monitoring and evaluation (M&E) activities, staff, and consultants.

The FMOH’s role is to provide the setting and personnel for NHMIS and HIFA implementation in VISION’s three states and 15 LGAs. The FMOH’s specific responsibilities are to: provide three SMOH MIS officers to each of the three project states who will return to their original posts once VISION has been completed, designate and support one project monitoring and evaluation (M&E) officer in each LGA to be the project link with the VISION MIS Officers, participate in trainings and NHMIS implementation, provide office space for the VISION-donated computers, and provide ongoing maintenance and upkeep on the computers following VISION departure in September 2004. To date, VISION and the FMOH have trained 311 persons in the NHMIS and 42 of these 311 in the HIFA system.

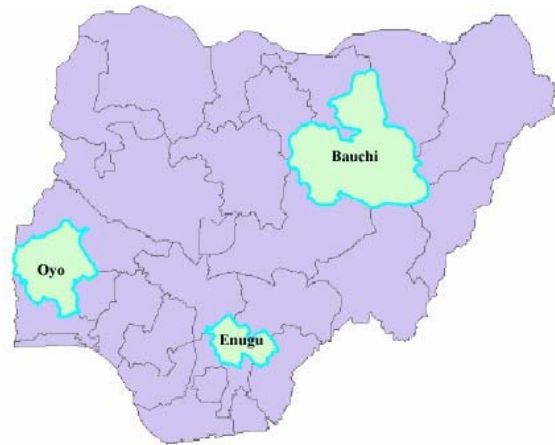


Figure 4. Map of Nigeria showing VISION States

6. Challenges and solutions

6.1. Routine supervision was not occurring at the facility level.

In early 2002, VISION conducted a series of workshops with the MOH and LGA authorities, and NGOs to develop work plans and budgets using “performance improvement” methodologies that help participants to collectively discuss and agree on desired and actual performance of a selected health problem, and design interventions to bridge the gap between the two. Among other issues, the participants identified a lack of regular supervisory visits at the facility level from the LGA and SMOH levels. Two LGA staff types are critical to supervision at the health facility level. One is the M&E officer, who is responsible for data quality checks and reporting. The other is the Family Planning (FP) Coordinator, a clinician, who is responsible for supervising the quality of services at the facility levels. Internal project discussions found that the lack of routine supervision was due mainly to a lack of funding for the supervisory visits and a lack of coordination among the service delivery levels. As a result, the LGA authorities in the workshop agreed to form joint supervisory teams at the state and LGA levels, composed one designated M&E officer and one FP coordinator.

The second activity where VISION addressed the challenge of routine supervision was during the NHMIS trainings. During these trainings, the LGA authorities and VISION agreed on a monthly plan for the M&E staff to visit each health facility. To assist the M&E staff to reach remote facilities, the VISION MIS officers in each state accompany the M&E staff on their visits two days a month using the VISION vehicle. During these visits the VISION MIS officer provides technical assistance to the LGA M&E officer to check his monthly records for data quality.

Secondly, the VISION MIS officers accompany the joint supervisory teams in each LGA on their semi-annual medical site visits using the VISION vehicle. During this visit, the FP Coordinator does a check of service delivery quality, and the M&E officer and VISION MIS officer together review NHMIS protocols and conduct data quality checks. Each quarter the VISION Knowledge Management Advisor and her MIS officers review all data by state and LGA and agree on follow up actions to address emergent data quality issues.

6.2 Competing MIS systems have caused confusion and have negatively affected staff motivation at the facility level.

During the first year of the project, the MIS officers worked with VISION’s Knowledge Management Advisor to conduct an MIS assessment. This assessment found three parallel MIS systems were operating within the VISION states and LGAs were causing staff confusion at the facility levels. Bauchi state provides an illustrative example of the deployment of competing systems in its 20 LGAs. In 2000, the FMOH introduced the NHMIS to all 20 LGAs, however, the system was never fully implemented due to lack of funding and trained staff. In 2001, the DCDPA introduced the FP-MIS to all the same LGAs to respond to UNFPA reporting requirements. In 2002, the NPHCDA introduced the PHC-MIS in five LGAs to respond to their own internal reporting requirements. And, in 2003, VISION and the FMOH re-introduced the NHMIS in five LGAs.

VISION discussed the findings of the MIS assessment report with the DPRS within the FMOH, and with the National Advisory Committee (a VISION body that provides oversight for the project). One of the key recommendations of this group was to follow-up with stakeholders in the government operating individual MIS systems to explore how and in what ways the systems could be harmonized. Following this, VISION invited the FMOH to discuss the NHMIS system and its forms with partners in the fall of 2002. During these meetings VISION was able to gain consensus from the participants to a) pilot test the NHMIS as the uniform system in the public and private sector facilities in the VISION focus LGAs and states, b) donate NHMIS forms to all VISION states, and c) assist VISION at the state-level to distribute the NHMIS forms. To encourage continued dialogue, VISION also agreed to coordinate sub-committee meetings on a semi-annual basis to periodically review NHMIS implementation and progress with all stakeholders

6.3 Interconnectivity issues have impeded full HIFA deployment.

Despite recent progress in Nigeria within the telecommunications industry, VISION was confronted with a lack of telephones and Internet Service Providers in 11 out of the 15 target LGAs. VISION responded by agreeing to provide computers to each M&E Officer in each LGA and is in the process of distributing computers to them. VISION does not have the funds to provide wireless Internet connectivity to each LGA. To pilot test the interconnectivity of the system, they provided one pilot LGA with an Internet connection per state. In these three LGAs, the NHMIS data is sent via a HIFA file in an email attachment to the SMOH on a quarterly basis, and to the FMOH on a semi-annual basis. In the other LGAs, the data is printed out using HIFA report functions and sent via hard copy to the SMOH and FMOH on the same

schedule as above. Part of the VISION evaluation of the NHMIS pilot test will be to test the hypothesis that the interconnectivity decreases reporting time lags and thus encourages quicker use of data for decision-making.

6.4. Sustainability of the NHMIS / HIFA in VISION states and expansion into other states is an ongoing challenge for the all levels of the health system.

The first challenge to future sustainability of NHMIS national deployment is a hesitance of the federal government to allocate funds for the NHMIS to the FMOH. Without buy-in from the federal government the FMOH will be unable to buy the necessary hardware to support HIFA implementation in the remaining LGAs and states. A second challenge to sustainability is the lack of infrastructure, including vehicles and trained staff, to provide the necessary supervision at the facility and LGA levels required to ensure valid and timely data entry into the system.

One activity that VISION has conducted with the FMOH that may help with the institutionalization of supervisory culture is the joint collaboration on the development of national standards of practices and protocols (SOP) for family planning and reproductive health services and guidelines. Through workshops and discussions, VISION helped the FMOH to produce two manuals that have been tested in the VISION LGAs. These SOPs contain a section on data monitoring for management decision-making. Secondly, VISION helped the states and LGAs develop work plans and conducted training workshops to assist managers to track their progress in work plan implementation. VISION hopes that this institutionalization of a “monitoring culture” will spark an interest among managers to track, report, and use other data for management decision-making (e.g. epidemiologic data and vital events).

6.5. The NHMIS / HIFA was designed before 1997, but diseases and health information needs, and staff have changed since that time.

This challenge is particularly important in the era of HIV and AIDS. For example, new tests and drugs now make counseling, testing and treatment more accessible. However, the NHMIS system does not account for these changes. Although VISION realized this fact at the beginning of the project, the FMOH refused to consider supporting revisions without a full-scale pilot test of the current system. Therefore, VISION’s response was to test the system in its current form and make recommendations on how to revise it in the future. Part of the test is to document the process and challenges, and encourage an

objective evaluation of the system after a period of one to two years of continuous implementation.

7. Evaluating our work

VISION is planning an evaluation of the NHMIS model and pilot test in the summer of 2004. The tools and type of evaluation are yet to be determined. However, this evaluation will likely examine: a) reporting rates in the VISION-supported states, LGAs, and facilities compared to non-VISION area, b) the impact of interconnectivity on reporting rates and reporting schedules, c) changes in client load at the VISION-supported facilities compared to non-VISION facilities, and d) the adequacy of NHMIS components to meet program and management needs. Currently, the NHMIS has the capacity to calculate reporting rates at the LGA level (% of facilities reporting to LGA). These reporting rates vary by LGA. For example, in Oyo State where parallel systems were being used, a systematic collection of reporting rates was not done. However, since NHMIS deployment, Ibarapa East LGA has gone from 0% to 83%. On the other hand, Ogbomoshoh South LGA current reporting is 12%.

In addition, other VISION-supported and VISION-related evaluations and assessments that were done during the project period will be examined for relevant data in explaining the environment in which the NHMIS operates. The outputs of this evaluation will be a) a final report to stakeholders describing the pilot test and providing recommendations for that scale up, and b) a short summary report and/or presentations for the FMOH to use to advocate for funds at the federal level.

8. Lessons Learned

Although VISION is at its mid-point, we have already garnered knowledge in implementation that may be of use to others. These lessons are important milestones on the road to progress, and we hope towards full implementation of ISD within the Nigerian context.

8.1. Work within existing information systems, instead of creating parallel ones.

This lesson has come through strongly during every stage of the VISION project and has been the guiding principal in NHMIS implementation. At the beginning of the program we discovered that implementing the existing national system without addressing parallel systems and the organizational needs of those who had created them would hamper our efforts to pilot test the system. Without the cooperation of the varying arms of the FMOH, we would have been unable to have full cooperation of the health care facilities. Secondly, VISION came into the

process as a technical expert, but also as a student. Instead of continuously teaching, we also requested that the FMOH and its partners teach us about their systems so that we could help them to implement them. Their orientation was invaluable to assisting us to help them to determine the basic needs for implementation and to address technical and IT issues as they arose.

Perhaps the most relevant indicator of our success has been non-scripted requests from LGA authorities and SMOH departments not involved in the pilot test for study tours at pilot sites. VISION has responded to these requests enthusiastically and hopes that they will continue to strengthen the possibility of a sustainable national system.

8.2. Develop joint activities among different levels of the health care system to encourage cooperation within the sector.

VISION's success in encouraging more cooperation among the federal, state, LGA and health facility levels is grounded in the development of joint work plans at the LGA and state levels. These joint work plans provided participants with a platform on which to explore common challenges and design practical solutions within the Nigerian context. Furthermore, they have sparked an interest within all levels to monitor both activity implementation and data collection and quality. It is hoped that this interest will continue to grow among all managers and providers, encouraging them to expand their use of data for management decision-making into other areas, such as the identification and control of epidemics.

8.3. Federal funding for data management and information systems is essential and should be discussed at the beginning of ISD.

VISION learned at the beginning of the project period what will happen if donors and the FMOH do not plan for a sustainable phase-out of donor support. The problem may be one of differing expectations and unclear roles and responsibilities. Whatever the reasons for the donor pullout, the current situation is non-negotiable. Currently the FMOH says that it has "zero budget" to support NHMIS implementation activities. To date, VISION has spent approximately \$75,000 (excludes all staff salaries) on in training and hardware. Without addressing the fundamental issue of what will happen to the NHMIS pilot test when VISION ends, the FMOH will be in no better a position when the project ends than it was in 1997. In fact, they may be in a worse position if yet another rollout of a system occurs and is dropped. VISION has already found provider mistrust and confusion due to diffusion of parallel MIS systems. These

attitudes will only be compounded without appropriate follow-through and maintenance.

8.4. Information systems must be periodically evaluated and revised to keep pace with the changing health and data needs of clients and providers.

The FMOH, through personal communication with VISION staff, has refused to even consider any NHMIS revisions until a full-scale implementation has been completed. While VISION can appreciate this reluctance given the initial FMOH investment, emergent health issues question this logic. Furthermore, it is apparent that the NHMIS collects too many variables and anecdotally providers have informed us that it is too cumbersome and time consuming to complete. Nevertheless, the FMOH is our ultimate customer and we must be able to document and provide scientific data to justify our assertion that revisions are needed. We hope that the evaluation of the pilot test will assist us in convincing policy makers to both simplify the existing system and provide funds to expand it across the entire country.

8.5. NHMIS training and implementation must occur simultaneously to enable end users to effectively use the system.

Through informal discussion, VISION and the FMOH discovered that many of the NHMIS trainees had previously received NHMIS training in the late 1990s from the FMOH, but were never given the appropriate forms to utilize. Alternatively, they were given forms but no training. Thus our final recommendation is simple: train staff at all levels in MIS processes, protocols and tools. And, immediately follow the training up with the appropriate tools.

8.6. NHMIS deployment requires a full set of components.

Beyond the hardware requirement, VISION has found the components in **Table 1** essential to full NHMIS implementation. Prior to VISION, the infrastructure to support the deployment of NHMIS existed only at the FMOH. However, over the last year VISION has successfully been able to expand the provision of the infrastructure to the LGA levels. In terms of staff, all the levels have staff available with varying degrees of competencies and capabilities. The implementation has provided training to all the staff to enhance these capabilities.

Table 1: NHMIS requirements

	Pre-VISION	Post-VISION
Infrastructure		
HMIS operational manual	FMOH	FMOH SMOH LGA
Adequate office space	FMOH	FMOH LGA
Computers and printers	FMOH	FMOH 15 LGAs
Staffing		
HMIS specialist	FMOH SMOH LGA	FMOH SMOH LGA
System manager	-	-

[11] FMOH, National Health Management Information System: Forms, Instructions, and Operational Reference Manual. Department of Planning, Research and Statistics: National Health Management Information System (NHMIS) Abuja. November 1997.

[12] FMOH, Health Information for Action: Integrated Database System for The National Health Management Information System (NHMIS): User's Guide Installation Manual.

[13] Assessing the Performance of Family Planning Service at the Primary Care Level in Nigerian Local Government Area Health Centers and NGO Clinics, January 2001.

[14] Johns Hopkins University / Center for Communications Programs, IntraHealth, and Population Services International / Society for Family Health

9. References

[1] H.A. Soriyan, K. Olufokunbi, A. Mursu, and M. Korpela, "Information Systems Development in a Developing Country: Theoretical Analysis of Special Requirements in Nigeria and Africa", Proceedings of the 33rd Hawaii International Conference on System Sciences, 2000, pp.1-10.

[2] Management Sciences for Health: Information for Management (INFORM) case studies (2000). Planning and Managing Information System Course book.

[3] M. Church and C. Olson, "Egypt: Management Information Systems for Population and Health", June 2001. Submitted to USAID by LTG Associates, Inc and TvT Associates, Inc.

[4] R.L. Kolehmainen-Aitken, P. Auxila, S.C. Huber, P. Levitt, W. Mertens, G. Price, R. Timmons, "Lessons from FPMD: Developing Information Systems for Managing Family Planning Programs", 1996. Submitted to USAID by MSH.

[5] Bureau of the Census, International Database, (<http://www.census.gov/ipc/www/idbnew.html>), May 20, 2003.

[6] Data for 1999; DHS Statcompiler (<http://www.measuredhs.com/>), May 20, 2003

[7] UNAIDS Nigeria Epidemiological Fact Sheets on HIV and STI http://www.unaids.org/hivaidsinfo/statistics/fact_sheets/index_e_n.htm), 2002 Update

[8] Nigerian Demographic Health Survey, 1999

[9] JHU/CCP: IEC Field Report Number 1: The Nigeria Family Planning Facility Census, December 1995

[10] Dr. M. Lecky, "Nigeria Health Information System". *Health Matters*. November 2001, Volumes 2-5, pp 1-6.