



Routine Health Information Network

**Second International RHINO Workshop on:
Enhancing the Quality and Use of Routine
Health Information at District Level**

September 29 - October 4, 2003

Mpekweni Sun

Eastern Cape, South Africa

**In Conjunction With
MEASURE Evaluation, USAID,
JSI and The Equity Project**

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Acronyms

APHA	American Public Health Association
DHIS	District Health Information System
DIO	District Information Officer
DMO	District Medical Officer
DOH	Department of Health
FP	Family Planning
GHC	Global Health Council
GIS	Geographic Information System
HIS	Health Information System
HISP	Health Information Systems Programme
NHMIS	National Health Management Information System
HR	Human Resources
IT	Information Technology
JSI	John Snow Incorporated
KAP	Knowledge, Attitudes and Practices
M & E	Monitoring and Evaluation
MCH	Maternal and Child Health
MOH	Ministry of Health
MSH	Management Sciences for Health
OSS	Open Source Software
PHC	Primary Health Care
PHR	Partnership for Health Reform
PI	Performance Improvement
PMTCT	Prevention of Mother to Child Transmission
RHIS	Routine Health Information System
SA	South Africa
STD	Sexually Transmitted Disease
STI	Sexually Transmitted Infections
TALI	Tool for Assessing Level of Information Use
TB	Tuberculosis
UNFPA	United Nations Fund for Population Activities
USAID	United States Agency for International Development
WB	World Bank
WHO	World Health Organization

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Executive Summary

Background

From September 29 to October 4, 2003, The Routine Health Information Network (RHINO)¹ held its second international gathering in South Africa. Around 100 health and information professionals from over 24 countries (Annex A) came to South Africa to share experiences and define strategies for *Enhancing the Quality and Use of Health Information at the District Level*. Based on the Network's experience to date and feedback from network members, this workshop intentionally focused on practical field-based challenges to improving routine health information. The format and tenor of the workshop emphasized participant interaction and learning to encourage maximum exchange of field-based experience and lessons learned. This report summarizes the proceedings and results of the workshop, including lessons learned for strengthening routine health information systems at the district level.

Workshop Aims

The workshop sought to:

- Explore the elements of successful design, implementation, and management of district-level health information systems (DHISs).
- Examine the factors that influence the use of routine health information in district health settings.
- Share experiences and techniques for building capacity for information use.
- Outline guidelines and principles related to the design, implementation, and management of district-level health information systems that encourage production of high-quality data and consistent data use.

Workshop Host and Sponsors

The National Department of Health of South Africa and the Department of Health of Eastern Cape Province hosted workshop participants. Sponsors of the workshop included an impressive array of RHINO's institutional partners: Management Sciences for Health (MSH), John Snow Incorporated (JSI), and The United States Agency for International Development and its projects (The MEASURE Evaluation Project, The Equity Project, The Health Information Systems Project, Partnerships for Health Reform Plus, and The Change Project).

Summary of Proceedings

The workshop on *Enhancing the Quality and Use of Health Information at the District Level* offered participants a unique program that wedded field-based learning with a residential program that included presentations, discussions, and an informal exchange of experience (Annex B). Participants began the workshop with a two-day "RHINO Safari" to examine South Africa's public sector routine health information system (referred to as the District Health Information System or DHIS). Groups reviewed the information system at national, provincial, district and facility level; held discussions with creators and users of the system; and exchanged experiences with South African hosts. Field visits were followed by a three-day residential workshop at Mpekweni in Eastern Cape Province. The first day in Mpekweni focused on Reflections from the Field, highlighting lessons learned and observations from field visits. The final two days consisted of small-group work to explore six different themes related to district-level health information systems. Findings of both the field and residential portions of the program are summarized below and presented in detail later in this report. Participants concluded the workshop with discussions and recommendations for advancing the Routine Health Information Network (RHINO).

Keynote Address

¹ The Routine Health Information Network (RHINO) was established in 2001 following an international workshop for health and information professionals. This Network seeks to strengthen the role of evidence-based decision making in the health sector in less developed countries and improve overall planning and management of health activities through engaging in coordinated discussion and action on the collection and use of routine health information.

Bruce Campbell's paper, "Data to Decision Making: Delusion or Destiny?" reports that the design, implementation, and assessment of the action-led, integrated, and district-focused health information systems are a viable goal. Campbell recommends that maximizing investment in HIS requires planners to:

- build strategies around information needs of the district and below;
- ensure that every HIS activity links strategically and practically to a larger decision making process;
- include in-service and basic training components when reforming health information systems emphasizing the practical and strategic use of health data; and
- continuously monitor initiatives to strengthen health information systems using simple models (e.g., Prism, Figure 6) to ensure the links among data production, use, and action.

Workshop Program at a Glance	
Days 1–2	Field Visits to Review the Health Information System in South Africa
Day 3	Introducing an Analytical Framework for Understanding Performance of Routine Health Information Systems
	Reflection on field visits
	Presentation on District Health Information System Software
	Resource Fair
Days 4–5	Theme-based, small-group discussions, analysis, and peer review
	Theme 1: The Integration of Different Types of Routine Health Information Systems
	Theme 2: Assessing a Health Information System (HIS)
	Theme 3: Process of Selection and Development of Indicators for HIS
	Theme 4: Ensuring and Improving the Quality of Routine Information
	Theme 5: Making Routine Health Information Relevant to Action
	Theme 6: Communication of Information to Decision Makers in the District
	Actions for RHINO

Prism Concept

Workshop organizers introduced a simple analytical framework –The Prism – that maps the determinants of performance of routine health information systems. The premise of the paper, "The Prism: Introducing an Analytical Framework for Understanding Performance of Routine Health Information Systems in Developing Countries," is that sustainable production and use of good-quality health information requires strategies that take into account the three main determinants of health information system performance: the health system or organizational context, the behavior of data collectors and users, and the technical aspects of information systems. The authors encourage testing and application of the framework in designing HIS assessments and training programs, conducting stakeholder analysis, and in intervention planning.

South Africa District Health Information System (DHIS)

The report provides details of the structure and development strategy used in the South Africa DHIS, including the software designed for the system. The program is distinguished by its high degree of user definability that allows each organizational unit to select the data to be collected that it thinks is most useful in monitoring services. Control over the data collection design and choice of indicators is intended to encourage data use and a sense of ownership of the information system. The software is Open Source, so it is available for use in any other health information system. Based on two days of field visits to facility, district, and national levels, participants reported observations and recommendations relating to the following areas: data collection and quality; use of information for action; human resources; staff training; and the role of software in system development and performance.

Thematic Group Discussions

Small-group discussions were held on the following six themes:

Theme 1: The Integration of Different Types of Routine Health Information Systems

Theme 2: Assessing a Health Information System (HIS)

Theme 3: Process of Selection and Development of Indicators for HIS

Theme 4: Ensuring and Improving the Quality of Routine Information

Theme 5: Making Routine Health Information Relevant to Action

Theme 6: Communication of Information to Decision Makers in the District

Each group began by exploring the link between their theme and health information system performance. Through discussion, peer review, and ranking of conclusions, each team produced a series of strategies for addressing the issue, words of advice to health information system developers and managers, a list of outstanding research questions, and recommendations for action on the part of RHINO. The strategies and recommendations from each theme are presented below:

Lessons Learned for Strengthening Health Information Systems at District Level

- Campbell reports, “it is at the district level and below that health information systems may have their greatest utility” or ability to contribute to improvements in health status. At district level there are great opportunities to draw on the strengths of health staff and the community to turn health information into health action.
- Managing the process of change that leads to production and use of quality health data often requires a strategic master plan implemented incrementally. Major restructuring of health information (and the subsequent organizational and behavioral changes needed to sustain change) rarely produces desired results. The goal is to produce a system that values information for its role in guiding decision making. Such sea changes in practice and values take time and carefully guided efforts that tackle not only technical but also systemic and behavioral aspects of RHIS.
- Strategic use of integration that favors action at district level and below has proven successful in South Africa. Stakeholder views were included in the design of data collection, analysis, and reporting formats. Flexible software caters to specific needs at each level and accommodates variations in the health profile or strategic plans of different provinces.
- Districts benefit greatly from a well-defined (and widely accepted) essential data set that streamlines data collected and is guided primarily by the decision making needs of the district and below. The process of defining this data set should be based on the principles of stakeholder participation, strategic indicator selection, and linking data collection to health action.
- The South African experience of HIS development testifies to the benefits of creating a flexible approach to establishing district-level data sets. District teams in South Africa are able to add relevant indicators to their essential data set according to their health situation and current priorities. This approach contributes to increased frequency of data use by facilities and district-level staff and greater perceived value of health information system among health staff.
- The three determinants of health system performance outlined in the Prism paper were relevant to the analysis and strategy choices for five of the six themes: assessment of health information systems, indicator selection, quality of information, linking health data to action, and communicating

health information to non health decision makers and users at district-level. The most challenging area for future intervention is understanding and tackling the variables related to individual behavior. Enhancing the quality and use of health data is linked directly to behavioral factors such as the perceived value of health information and the motivation of data collectors and users.

- Attention to the selection and management of human resources is critical. The introduction and training of District Information Officers (DIOs) in South Africa was cited by most visiting groups as an innovation worthy of imitation. The DIO serves as teacher, mentor, data enthusiast, and technician at health facilities and health offices. Naming a single member of the district team to help advance a strategy to improve data quality and use raises the profile of health information and informed decision making among data users at all levels.
- The choice of health information system software is a critical factor in determining health information system performance. Software design is not simply a technical intervention; it directly affects behavior of information managers and users. The software used in South Africa was found to have contributed to change within the health system by providing flexible systems that encourage ownership and data use; reaching consensus on catchment populations; and emphasizing the need for a uniform minimum data set.
- There is a need to build communication processes and skills into the management and use of health information at all levels of the health system. Health information users must understand their audiences for health data, define the actions their audience should take based on their access to data, and the links between these actions and health system-related outcomes. Interpersonal communication skills play a key role in ensuring success in communicating health data.

Priority Strategies for Routine Health Information Systems at District Level ²

Theme 1: The Integration of Different Types of Routine Health Information Systems

- Draft a Master Plan for developing an integrated HIS that includes a clear vision, indicators/data-dictionaries, data flow procedures, open systems standards, roles and responsibilities, and at least a three-year time perspective.
 - Leadership must shepherd the plan with support and mechanisms for monitoring progress.
 - External partners should respect the plan.
- Design specifications for integrated HIS should:
 - include an essential data set from community to national levels;
 - focus on data needs specific to each level;
 - define the amount of data collected based only on data that can be used by the District Management Team; and
 - computerize in a way that supports integration.
- Integrate public sector and private sector HIS.
 - Regulate reporting requirements, e.g., link to licensing and accreditation and provide incentives.
 - Collect information via health insurance.
 - Define notifiable diseases by law.

Theme 2: Assessing a Health Information System (HIS)

- Assessment should be a participatory process employing a partnership between internal and external actors.
- Provide immediate feedback to assessment subjects at all levels and share results widely.
- In assessment design, include technical, systemic, and behavioral factors.

² Additional strategies are found in the full proceedings that follow.

Theme 3: Process of Selection and Development of Indicators for an HIS

- Districts need a strategic framework to guide indicator selection. The framework should be consistent with the national framework, relate to district health objectives and priorities, clearly define the purpose of the information system and the indicators collected, and maximize stakeholder participation. The framework can also be used to educate donors on RHIS capabilities so they use the information system more often and more effectively (reducing the need for special studies).
- Indicator development and use should be embedded in management planning and resource allocation. Districts should use this process to build capacity to define, collect, and use data. Indicators should be linked to action, and action linked to staff performance.
- Selection of indicators should build on best practices and local experience, be appropriate for each level, be simple and clear, and be linked to action.

Theme 4: Ensuring and Improving the Quality of Routine Information

- Human resource parameters should be clearly stated and well planned. These parameters include: the number of personnel required, skill needs, and specific roles and responsibilities. Promotion of quality links closely to human resource development and management, from basic education and orientation to health information ethics to effective supervision strategies. Motivation is key but not easy to inspire and sustain.
- Develop and implement clear policies and guidelines regarding resources, responsibilities, data flow, and feedback. Processes that promote quality include a participative approach to management, use of a problem-solving approach, and emphasis on the use of information for decision making.
- Quality depends on the information management process. Decisions relating to data collection tools, data flow, verification and validation, and feedback require careful attention to their effect on quality. Indicator selection, use of a data dictionary; and use of technology are likewise critical.

Theme 5: Making Routine Health Information Relevant to Action

- Supportive supervision should be well structured using efficient tools such as regular and prepared meetings and/or visits to review the information, provide objective regular feedback on progress, ensure evidence-based action, and address issues for collective problem solving.
- Formulate policy and regulations that specify the role of information in the health sector; assign resources for information collection, management, and use; and give the authority to take action with information at the appropriate level of the health system.
- Develop skills among health workers and managers to analyze, interpret, and take action (as individuals or in a team approach) through performance improvement skills development, root cause analysis, advocacy, and action planning.

Theme 6: Communication of Information to Decision Makers in the District

- To enhance the use of information, design and implement plans for strengthening skills in data interpretation and use (e.g., disaggregating data); and interpersonal communication at service provider and managerial levels to improve their ability to communicate health information effectively.
- District management should present health information regularly to, and solicit feedback from, communities using established venues and forums. This information should be of **immediate relevance** to communities and should be presented in **appropriate language/terminology** using **trusted local resources**.
- Advocate to donors, decision makers, and program managers to support work that improves the communication of health information. This will increase the likelihood that it will be understood, viewed as relevant, and used. Without such advocacy, it is unlikely that the need for improving effective communication of health information will be recognized.

Actions for RHINO by Theme

Integration

- Establish and disseminate “best practices” related to integrated health systems.
- Establish and disseminate tools, manuals, and policies related to integrated HIS.
- Create a “model data set” produced by an integrated district HIS.
- Create a repository of Open Source Software Applications.
- Promote donor collaboration toward integration.
- Organize study tours to best practice sites for integrated district HIS.

HIS Assessment

- Develop criteria for the most appropriate RHIS assessment approaches.
- Share examples of successful assessments and benefits gained.
- Conduct a RHINO forum on RHIS assessment.
- Develop guidelines on continuous RHIS self-assessment.
- Develop an RHIS costing framework.

Selection and Development of Indicators

- Document best practices and guidelines using reviews and research on defining an essential data set; the role of community-based data (e.g., vital events and morbidity); supplementing numeric indicators with qualitative indicators; sustainable mechanisms for **motivating** staff to measure performance; and the balance between RHIS indicators and survey indicators. If current knowledge and practices cannot answer the question, consider developing actionable guidelines that countries can use through review and research.
- Promote the idea of a “donor RHIS tax” to encourage donors to build RHIS capacity and eventually use it to monitor their investments.
- Develop a minimal indicator list and guidelines on manageable indicators.
- Draft a recommended indicators list (menu), together with a collection and analysis plan.

Ensuring and Improving the Quality of Routine Information

- Identify and disseminate “Best Practices Checklists” for data quality assessment and improvement.
- Develop and disseminate discussions on Health Ethics/Health Information Ethics.
- Develop and advocate for formal information management courses (and their inclusion in basic medical, nursing curricula).
- Advocate for defined/recognized career paths for data managers and others responsible for RHIS design and operation.

Making Routine Health Information Relevant to Action

- Capture and disseminate lessons learned and materials related to using information for action.
- Host an electronic forum on best practices for motivation.
- Host an electronic forum on experience with introducing and using computers.
- Share electronic forums more broadly and publish them.

Communication of Information to Decision Makers in the District

- Document and disseminate experiences, strategies, and interventions on communicating health information (e.g., on line forum)
- Set up recognition systems such as the “**RHINO horn**” (newsletter, magazine, bulletin) and the RHINO “*stomp of approval*” for projects with strong communication components .
- Design/share models of communication strategies and curricula for training on data interpretation/use and interpersonal communication.
- Advocate for resource support and increased prominence of communication in RHIS.

Keynote Address: Data to Decision Making: Delusion or Destiny?

Bruce Campbell



Keynote Address - Data to Decision Making: Delusion or Destiny?

Keynote address presented at a workshop on
Enhancing the Quality and Use of Health Information at the District Level
Eastern Cape Province, South Africa, September 30, 2003
Bruce Campbell, Harare, Zimbabwe

Introduction

We can now account for more than a century of evolution in the arena of Routine Health Information Systems (RHIS). And, as with the evolution of many public and private sector systems, the last decade has been perhaps the most dynamic with the application of a tremendous variety of technological interventions and a steadily growing body of literature in the field. All of us recognize that Routine Health Information Systems must be designed to support more effective managerial, clinical, individual, and community health-related decisions. We all believe that these decisions (if acted upon) will lead to improved health conditions and improved individual and public health status. Otherwise, I doubt if we would be here today.

However, we must ask ourselves as key stakeholders in this evolution:

- Are we on track?
- Has our support contributed to measurable cost-effective improvements in health-related decisions?
- Or, more critically, can we, as leaders in the field, now claim that Routine Health Information Systems can be directly (or indirectly) responsible for improvements in the health of individuals or communities in any measurable way?
- I believe it was with this vision of transparent and critical self-assessment that a number of us here had the pleasure of launching the Routine Health Information Network (RHINO) in Potomac, Maryland, in March of 2001. Now, more than two years later, can we ask ourselves, are we indeed on track?

Sadly, as disaggregated poverty indicators suggest, the last few years have marked a steadily increasing gap between those who have and those who have not.

Can we, as leaders in the field, now claim that Routine Health Information Systems can be directly (or indirectly) responsible for improvements in the health of individuals or communities in any measurable way?

From old vertical reporting systems...



Toward an integrated HIS



Simultaneously, we are living through several of the greatest recorded disease control and nutritional challenges in the history of mankind. Furthermore, these challenges are starkly exacerbated in a world where public health resources continue to shrink.

Even when there is political and policy support for public health,

in the words of Gill Walt,³ “there is all too often a major gap between policy formulation and implementation, with little focus on the realities of putting policy into practice.” Although many factors contribute to the gap between health policy and individual/public health, one of the most critical ones is the availability of timely and relevant information to support more rational and effective decision making. Consequently, a growing audience sees interventions in the arena of Health Information System (HIS) design and implementation as “a very cost effective technical and financial investment.”⁴

This brings us to the focus of our workshop:

We have gathered together to look at a number of strategies that may lead to improved HIS design and implementation. These include:

- more effective health *indicator* selection and use,
- ensuring and improving the *quality* of health information,
- *integration* of vertical information systems,
- *communication* of information to decision makers,
- structured *assessments* of HIS, design implementation and utilization, and
- making routine health information *more relevant to action*.

Given this context, let us assume for the moment, that investments in HIS, along the lines mentioned above, will both directly and indirectly contribute to improvements in the health status of individuals and populations. Let us also assume that, of all institutional levels, it is at the district level and below that HIS may have its greatest utility. As experience shows, almost regardless of national policy and information requirements from higher levels, district managers have taken tremendously innovative initiatives to address concerns that cannot be addressed by national-level policies. It is at the district level and below when the strength of individual staff and community members can truly be drawn upon and when numerators and denominators begin to have a human face.

It is at the district level and below where the strength of individual staff and community members can truly be drawn upon and when numerators and denominators begin to have a human face.

I feel the most essential strategy listed above is making routine health information more relevant to action. The more actively health information is used, the more likely it is that indicator selection and the quality of data will improve. At the same time, with more information use, the clear benefits of an integrated HIS will emerge. Furthermore, the issue of communication of information is a step toward making routine health information more relevant to action.

To understand the importance of the issue of information use, I believe it is useful to revisit the evolution of the definition of HIS as well as the essential elements of the HIS.

Definitions of a Health Information System

³ Walt, G. *Health Policy: An introduction to process and power*. London: Zed Books Ltd., 1994.

⁴ World Bank, *World Development Report 1993, Investing in Health*, Oxford: Oxford University Press, 1993, p.148.

I think we all believe that the more “informed” a decision is, the more likely it is that health resources will be used effectively. And more effectively used health resources will in turn lead to improvements in the coverage and quality of individual and public health care. However, despite the substantial improvements in the timeliness, quality, and presentation of information available to provide managerial support at the district level, the same problem continues to exist today as in 2001, and indeed throughout the history of HIS: **Availability of information (in any form, of any quality or in any frequency), has NOT guaranteed its utilization for improved health-related decisions.**

Availability of information (in any form, of any quality, or in any frequency), has NOT guaranteed its utilization for improved health-related decisions.

In 1971, WHO published a public health paper with the following definition of a management information system: **“A system designed to produce information to be presented to the management to assist in decision-making and to enable it to ascertain the progress made by the organization in the achievement of its major objectives.”**⁵ At that time the traditional practice of collecting data and reporting it *upward to management* was still heavily ingrained in most health systems. Twenty years later, in 1992, Peter Sandiford defined **an action-led information system as one where only the data that are required for actionable management decisions are collected.**⁶ An action-led system must begin its development with the same question at all levels: *In which areas does one have decision-making authority, and what specific information is required to make these decisions more effectively? Information that does not respond to this question should never be collected.* These two earlier definitions can be contrasted with work done during the first RHINO conference in 2001, when the following HIS definition was consolidated: **“information that is derived at regular intervals of a year or less through mechanisms designed to meet predictable information needs.”**⁷ Building on these three earlier definitions, and in relation to the theme of this workshop, I would like to propose yet a further expanded HIS description to capture the essence of information use for more effective health-related decisions. This description is as follows:

A Health Information System is an organized process of five elements that include 1) the individual/community interface, 2) data collection, 3) self-assessment and peer review, 4) informed decision making and follow-up of “actionable recommendations,” and 5) feedback and reporting. The system is designed to provide different levels of beneficiaries (individual clients, community members, service providers, managers, planners, and policy makers) with timely and relevant information necessary to formulate policy, plan, implement, monitor, supervise, and evaluate individual and public health program activities. The system should also be designed in an integrated manner based on the minimum information requirements for decision making. The Health Information System is based on routine data collection and is complemented by other sources of information, such as community surveys, clinical studies, health systems research, census, and other periodic or population based surveys. Health Information Systems must ultimately be comprehensive in nature, incorporating information on service performance as well as human resources, training, physical facilities, logistics,

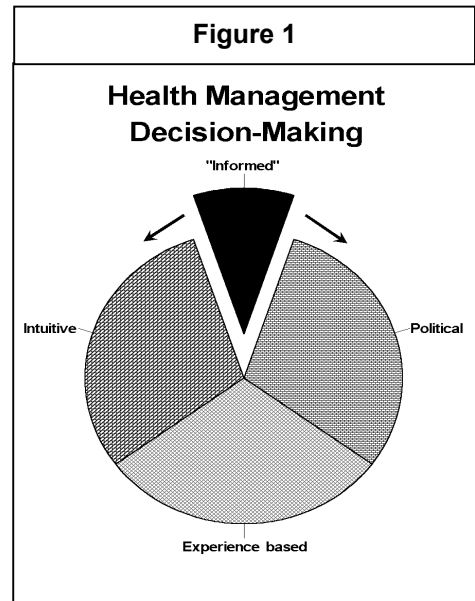
The HIS measures its ultimate success by informed decisions that lead to action and positive change in the health system or health status, rather than by the quantity or quality of data produced.

⁵ WHO, “Planning and programming for nursing services.” *WHO Public Health Papers*, no. 44 (1971), 105.

⁶ Sandiford, P. Information for action...does data mean decision? *Health Action*, 3, 1992a, AHRTAG.

⁷ RHINO: Routine Health Information Network, The RHINO workshop on Issues and innovation in routine Health Information in Developing Countries, March 14-16, 2001, Maryland.

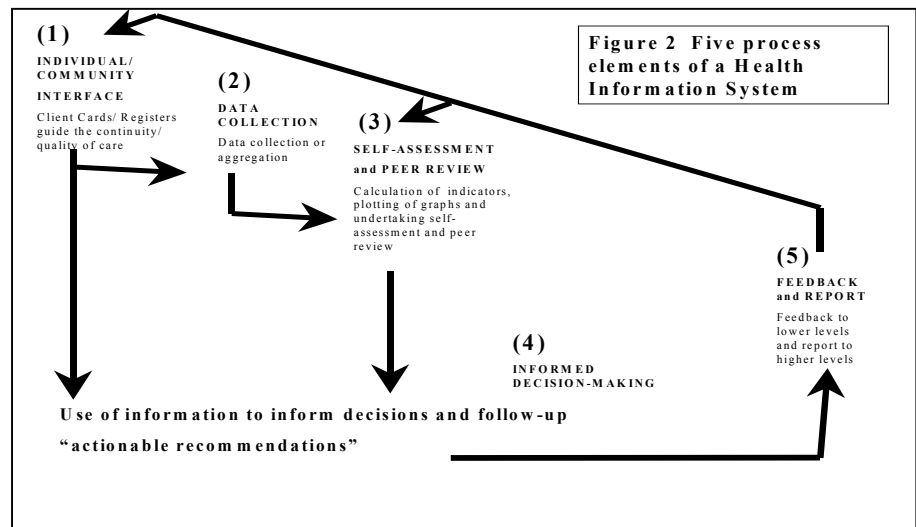
finance, and other resources. A Health Information System allows health managers and service providers to document, analyze, and use information to improve coverage, continuity, and quality of health care services at all levels by better planning, monitoring, and evaluation of health services. The HIS measures its ultimate success by informed decisions that lead to action and positive change in the health system or health status, rather than by the quantity or quality of data produced. This description implies that HIS will provide a stimulus for increasing the number of *informed* decisions as depicted in Figure 1. *Informed* decisions are those where there is evidence of HIS information being used to support the decision making process. Such *informed* decisions can be contrasted with those that are politically driven or that are based on intuition or experience. Furthermore, it is important that these informed decisions are put in the context of “actionable recommendations,” which include clear specification of the action to be taken, by whom, by when, and with what resources. Using this expanded definition as a base, I would now like to present five essential process elements of a functional HIS.



Process Elements of a Health Information System

*Much of the material remains unprocessed, or if processed, unanalyzed, or if analyzed, not written up, or if written up, not read, or if read, not used or acted upon. Only a minuscule proportion, if any, of the findings affect policy and they are usually a few simple totals.*⁸

As can be seen in Figure 2, the overall process of a functional Health Information System entails five essential steps. It is the fourth step that emphasizes the use of health information to make (and follow on), “actionable recommendations.”



⁸ Chambers, R. Rural Development: Putting the Last First. London: Longman, 1983.

Step one:**Individual client/community interface and continuity of care**

A Health Information System begins with the individual client/community interface. Client cards are not simply to be “filled in and forgotten” as is often the practice. Rather, each client card can provide a “continuity/quality of care checklist” if used properly. Similarly, HIS registers are designed to ensure the best possible *continuity and quality of care* and activate the process of tracing defaulters. Continuity of care can be used as a proxy for quality of care, as clients who perceive the service they receive to be high quality are more likely to continue to use that service.

Step two: Data collection

Collection of data is the most familiar process element in HIS reform. Staff at all levels are well versed in to collecting data from a lower level and reporting it to a higher level. The focus of HIS intervention is often to reduce the amount of data collected and to standardize data collection formats in such a way that they will stimulate self-assessment and peer review.

Step three: Self-assessment and peer review

An important element of HIS is to introduce the concepts of self-assessment and peer review. Self-assessment is defined as a regular practice of reviewing one’s individual performance or the overall performance of a particular service facility or management team. This requires aggregation of information in an appropriate format that can be used at every level in the system. These tools then become the basis of a process of performance and peer review.

Step four: HIS informed decision making

By developing the self-assessment tools and encouraging presentation, self-assessment, and peer review of objective and quantifiable data during routine team meetings, it is believed that the number of HIS *informed* decisions will increase. Decisions *informed* by HIS will then provide the rationale with which to counter political arguments and complement the intuitive and experiential base for more “actionable recommendations.”

Step five: Feedback and reporting

A critical aspect of the process is to provide feedback of relevant information and decisions to all agencies and individuals concerned. This element is often missing from traditional reporting systems. By providing regular feedback on data and decisions, service providers and managers pay more attention to the quality and consistency of their own data and analysis. Furthermore, the documentation used in the feedback process (e.g., annual reports) provides a readily accessible archive of information and decisions at all levels of the health system. As Neame and Boelen rightly state, “it is only when those providing the data begin to receive meaningful and useful feedback that they will begin to appreciate the value of data and will therefore take appropriate steps to improve the quality, timeliness and quantity of the data they provide.”⁹

It is when each of the above-mentioned elements of an integrated HIS become normative practice, and especially during step four, that a “**culture of information use**” begins to evolve.

⁹ Neame, R. and Boelen, C. *Information Management for Improving Relevance and Efficiency in the Health Sector: A Framework for the Development of Health Information Systems*. Geneva: World Health Organization, 1993.

The Culture of Information Use

"Minimum change, maximum participation, meaningful information and mandatory use."¹⁰

In this section, I wish to present examples from Ghana, Nepal, and South Africa of a process aimed at fostering of a culture of information use.

Ghana

It is interesting to examine a selection of results from a six-year prospective study of HIS design and implementation in all districts of three of Ghana's 10 regions. Prior to initiation of the integrated HIS, a 37-item questionnaire was administered to a sample of health staff at health facilities, and district hospitals and to District Health Management Teams, Regional Health Management Teams, and MOH HQ staff. The same questionnaire was administered again, wherever possible to the same individuals, but always in the same institutions 10 months after launching the HIS initiative. Once again, four years after launching the HIS, the same questionnaire was administered to the same sample.



At the national and regional levels, an additional methodology was used to assess each of the recommendations that came from the annual performance review in March 1991 and again in March 1993. The result of this regional/national assessment indicated that there was a 26 percent increase in the number of recommendations that specifically mentioned HIS-generated data or information over a period of two years.

From this study, quantifiable "evidence of information use" was examined for a variety of management functions and at all institutional levels. Details are not discussed here,¹¹ but overall results indicated that the greatest and most sustained increase of "evidence of information use" was among the District Health Management Team (Table 1).

Table 1 Ghana: Percent Improvement in "Evidence of Information Use" Above Baseline

Institutional Level	Percent improvement above baseline after 10 months and again after four years
District Health Management Team	27% 10 months 38% four years
District Hospital Staff	11% 10 months - 6% four years
Health Facility Staff	31% 10 months 22% four years
District Aggregate	28% 10 months 24% four years

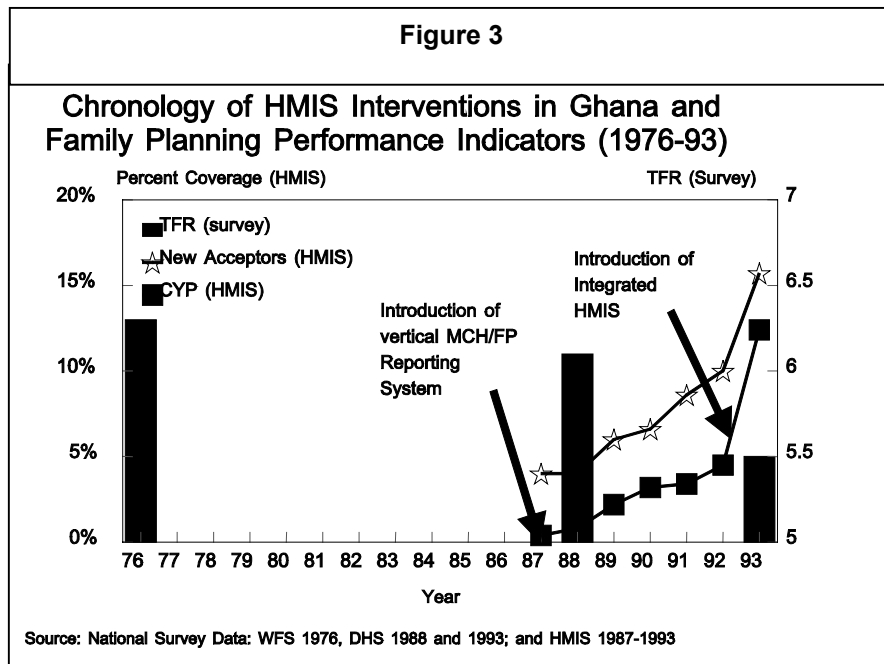
¹⁰ Introductory remarks by the chief of the MIS Section of the Planning and Foreign Aid Division during the national HIS design workshop in Nepal.

¹¹ More details can be found in Campbell, Bruce. "Health Management Information Systems in Lower Income Countries: An analysis of system design, implementation and utilization in Ghana and Nepal," Amsterdam: The Royal Tropical Institute, 1997.

Before initiating the HIS intervention in Ghana, the MCH/FP Division chief orchestrated regular quarterly meetings of all District Public Health Nurses to review their performance and revise plans for the upcoming quarter. During this time, a series of 13 MCH/FP related data sets were reviewed. These 13 single-page data sets summarized subdistrict, district, and regional information in terms of coverage, continuity, human resources, financial inputs, and logistics.

It is worthwhile noting that this effort was initially funded with modest inputs from the United Nations Fund for Population Activities (UNFPA) and the World Bank. Over the last decade the process has continued without disruption, and funding has been easy to secure from a variety of different partners.

Although the data that were collected, aggregated, analyzed, and used were vertical in nature, this same process formed the backbone of the design of an integrated HMIS. And, although we never managed to achieve nationwide integration between 1990 and 1993, it is intriguing that coverage of a selection of MCH/FP indicators improved dramatically during the same period. It is clear that no direct relationship can be drawn between the HIS intervention and the simultaneous increases in family planning coverage. However, it is suspected that the actual process of establishing a culture of self-assessment and peer performance review (based on routine data and periodic surveillance), encouraged managers at all levels to improve their performance. Figure 3 summarized progress in Ghana.

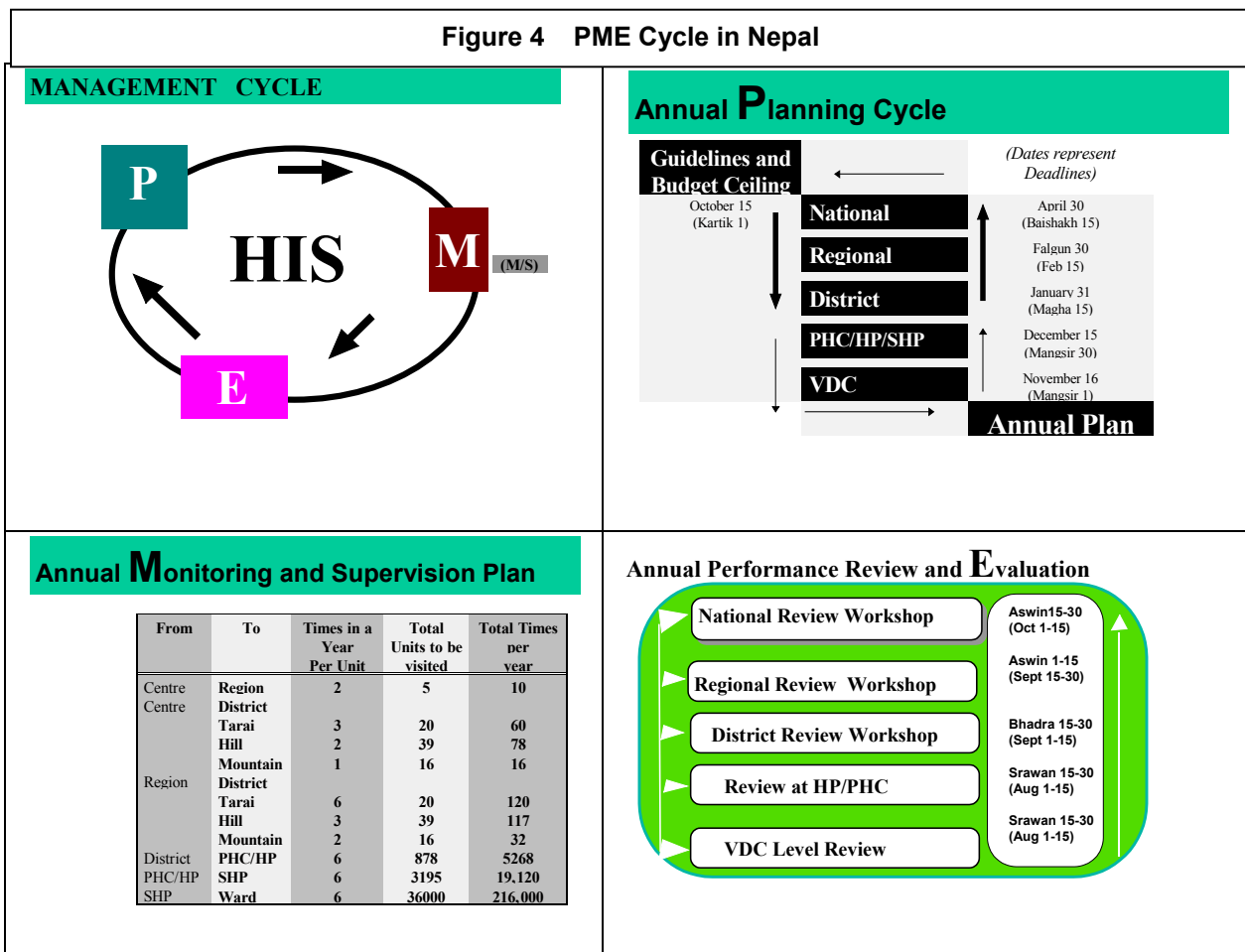


Nepal

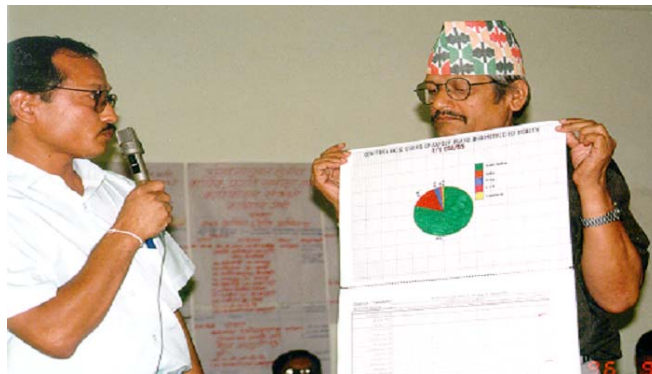
Based on this experience in Ghana, a similar process was established in Nepal between 1994 and 2000 that was also designed to foster (if not create) a culture of information use on a broader scale, both nationwide and for all health services. This process was based on the demonstrated principle that peer review was one of the strongest tools we had at our disposal to ensure that information was used.



More specifically, twice a year representatives of every District Health Management Team in Nepal met at their respective regional capitals. One of the workshops focused on performance review, and the second meeting focused on planning for the upcoming year. This cycle, which became fondly known as the “PME cycle,”¹² can be outlined in Figure 4.



As can be seen in the Figure 4, the process of annual planning was “bottom-up” in nature and began at the Village Development Committee level in November of each year, followed by health facility planning meetings in December, District meetings in January and Regional Meetings in February. There was then a National planning meeting in March of each year (Nepal has its own non-Western calendar). Similarly, the Annual Performance review process was to begin at the VDC level in August and culminate in another national performance review in October at the national level. This

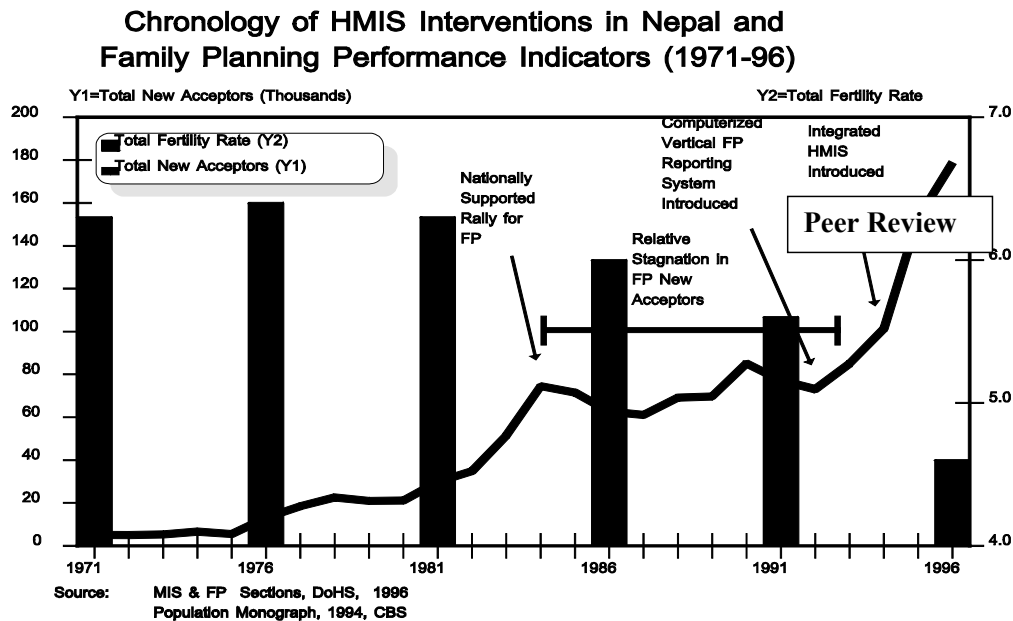


¹² P=Planning, M=Monitoring, E=Evaluation/Review, PHC=Primary Health Care Center, HP=Health Post, SHP=Sub-Health Post, and VDC=Village Development Committee.

process has been institutionalized with district participation in regional and national reviews but has been sporadic below the district level.

Once again, when a similar analysis of selected indicators was correlated with several nationwide HIS interventions in Nepal, the following interesting figure emerged:

Figure 5



South Africa

Although those of you who have just participated in the field trips will be in the best position to describe your impressions of the HIS work here in South Africa, I would like to refer to Arthur Heywood's comments during our RHINO discussion on the culture of information use. In that discussion, he described how the Health Information Systems Programme (HISP) in South Africa developed a rudimentary assessment framework that reflected one way to look at the evolution of the HIS. For each of the four levels outlined in the adjacent box, a number of sublevels qualify achievements and show differences between individual facilities and (sub)districts. Based on this informal assessment mechanism, Level 3 depicts the start of the "culture of information use" and the potential for further information use.

Discussion

Reflecting on earlier RHINO electronic forums on the subject, it has become clear that a routine HIS (or any information system) can provide information but cannot force managers to use it. However, when there is a culture of information-based decision making, managers at all levels will use the information provided by the routine HIS and look for additional information to fill the inevitable gaps.

HIS Assessment Framework Example from South Africa

Level 0 Chaos as usual, no significant changes in routine HIS

Level 1 Increasingly accurate data is collected in a timely and relevant way according to an essential data-set based on indicators and reported to "higher levels"

Level 2 Routine data are analyzed locally using indicators during self-assessment and program monitoring. These indicators are presented as routine reports with graphs and fed back to data gatherers and managers in writing, during supervision, and at meetings. Additional information is collected during surveys to "fill in gaps" and for more formal evaluation

Level 3 Information is routinely used for decision making in planning and managing finances and human resources.

An information culture is not an overnight sensation. Rather, it is a process that emerges at the end of a long period of often-painful evolution and depends on a multitude of factors, including quality of leadership, institutional culture, trust, quality of information, individual commitment, and myriad other issues. In Ghana, Nepal, and South Africa, after two to five years of intensive work of HIS design, implementation, and follow-up at district level, most districts have reasonably accurate data (95-100 percent data input coverage from health facilities 2001), and a good proportion are actively analyzing data and making routine reports for feedback to management and facilities. However, this is not yet achieving the culture of information use. There are enormous differences between and within districts, suggesting different management styles within the same organizational culture.

District and mid-level managers are crucial in the process of developing a culture of information. They need the security of an organization in which they are supported to analyze data locally and receive appropriate feedback from above. Only then will they trust the data enough to make informed decisions based on it, and to stand by those decisions. The development of a culture of information thus depends on an organization that ensures appropriate amounts of quality data throughout the system and supports individuals within it who are prepared to take the initiative (and risks) to use the information they have at hand. The result will be a mixture of "top-down" and "bottom-up" approaches. It also requires a team approach in which "data people" work with "health people" to create an environment in which data are appreciated, i.e., appropriately displayed and disseminated and used to describe both the achievements and constraints of the health services to managers, health workers, and the general public. At lower levels the degree of delegation of real authority — as opposed to token responsibility — is the major determinant of the degree to which information is used for management.

Summary and the Way Forward

If we are to seek the most appropriate way forward, we must now pay greater attention to our role in fostering a culture of demonstrable information use for more effective employment of human, material, and financial resources in the health sector. We must now shift our focus from purely technocratic approaches (bug-free software, brilliant GIS presentations, lightning-fast data transfer systems, wide area networks, etc). We must also look beyond thoughtful analysis of carefully selected indicators and documentation in comprehensive annual reports. Naturally, these are all very important foundations of a functional HIS, but by themselves they do not ensure that the data and information generated lead to improved decision making.

To increase the likelihood that HIS investments yield their maximum benefits, we can use the following approaches:

- 1) Build HIS strategies around the information needs of the district and below, where the strongest correlation can be drawn between information availability and information use.
- 2) Ensure that every HIS activity will fit within a larger (and fully resourced) decision making process. Those funding HIS initiatives should also finance related activities such as integrated annual planning and performance review workshops, routine monitoring, and other supportive supervisory mechanisms.
- 3) Incorporate structured in-service (and basic) training in the overall HIS reform process. Training should not only address the collection, aggregation, self-assessment, peer review, feedback, and reporting of information, but, more important, should include carefully designed adult-learning techniques to practice using data for the different types of decisions that are within the scope of each staff cadre's authority.
- 4) Design HIS initiatives so that they can be monitored from baseline, through annual and more rigorous periodic reviews. Such assessment must include a simple framework (e.g., Prism) to assess whether data generated are converted to useful information, and then identify whether this information is reflected in actionable recommendations.

In summary, design, implementation, and assessment of an action-led, integrated, and district-focused HIS is indeed a viable destiny. Although HIS will never be universally accepted (sharing information requires sharing power, control, and resources), the HIS is not a delusion. A Health Information System can provide the most powerful tool for ensuring that actionable recommendations are identified and implemented, which in turn will lead to our destiny of improved health system performance and improved individual and public health status.

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**The Prism: Introducing an Analytical Framework for
Understanding Performance of Routine Health Information
Systems in Developing Countries**

Anne LaFond and Rebecca Fields



The Prism: Introducing an Analytical Framework for Understanding Performance of Routine Health Information Systems in Developing Countries

(A Work in Progress)

This paper was prepared by Anne LaFond and Rebecca Fields with input from Theo Lippeveld, Randy Wilson, Stephanie Posner, Tim Williams, and Jim Setzer.

Health professionals, particularly those engaged in the Routine Health Information Network (RHINO), see great potential in the use of district-level routine health information in developing countries. Better collection and use of health information can improve the provision of health care and enable health services to reach the neediest. Used effectively, routine health information helps managers allocate resources based on sound evidence and real-time needs. Health information is particularly valuable at district level, where there are many demands on scarce resources. Despite the potential benefits of health information, in many developing countries, performance of routine health information systems falls consistently short of expectations. Why is that so? What is needed to ensure adequate performance of routine health information systems at district level? In this paper we propose an analytical framework that helps to improve our understanding of the performance of routine health information systems in developing countries. Used effectively, this framework can also help us to define strategies to address constraints on performance, especially at district level.

Definitions

We begin by defining routine health information as “information that is derived at regular intervals of a year or less through mechanisms designed to meet predictable information needs.”¹³ This definition includes systems for collecting and using health services statistics, administrative and financial data, epidemiological and surveillance data, data on community-based health actions, and vital events data.

It is also useful to define what is meant by performance of a routine health information system (RHIS). The clearer our expectations of performance, the easier it is to devise strategies for building the capacity of these systems. In many cases, performance of a RHIS is narrowly defined as the production of good-quality data. But the ultimate objective of an RHIS is to produce information for *taking action* in the health sector. Therefore, performance of a routine health information system should be measured not only on the basis of the quality of data produced but on evidence of the continued *use* of these data for improving health system operations and health status. Improving routine health information systems in terms of data availability, quality, and use often requires interventions that address a wide range of possible “determinants of performance.” These determinants are explained in the three-point framework depicted in the Figure 6 below.

The Prism framework

The Prism, or three-point framework, is predicated on the assumption that improving capacity in RHIS (and, subsequently, performance) requires interventions that address the environmental and behavioral determinants of performance as well as the technical determinants. It broadens analysis of routine health information systems to include the behavior of the collectors and users of data and the context in which these professionals work. We hypothesize that sustainable production and use of good-quality health information is more likely to result from a strategy that focuses on three fronts — improving technical quality of data processes and tools, building individual capacity for understanding and using data, and strengthening the system or organizational context in support of data collection and use — than a strategy focusing on one front alone. The three aspects of the analytical framework can be used to identify opportunities for and constraints to effective (and strategic) data collection, production, and use. Strategies to improve performance in this area can then be built along the same three parameters.

¹³ RHINO. The Potomac Statement on Investment in Routine Health Information in Developing Countries, 2001.

Technical determinants: The classic approach

In practice, information experts and public health professionals develop health information systems or tackle their problems with a technical mindset. In many cases, the chosen path to improving performance at district level focuses mainly on introducing or upgrading technical skills, changing the design of the system, or revamping the technology used to improve the availability and quality of data. Interventions tend to veer toward the nuts and bolts of the system (data collection, transfer, analysis, and presentation), where most health and information professionals are comfortable. While technical rigor is clearly needed in information systems, in practice technical interventions alone do not always result in appropriate action on the ground. There are many examples where indicators are sound, data collection forms are well designed, and people are well trained, but neither data tools nor information itself are used routinely to manage health services. Too often data collectors and users are not motivated to use the information system, or the organizational context undermines evidence-based health action. For example, in health systems that use normative rather than strategic planning, decision makers follow traditional patterns of resource allocation based on set formulas. Even the availability of accurate and timely health data cannot guarantee that evidence becomes the basis of decision making. The entire health system must be geared to the use of information and value information use for data to be used consistently.

Environmental and behavioral determinants

The two other dimensions of the framework — the environment (health system or organizational context) and the actions and behavior of data collectors and users — help us consider strategies to maximize the impact of technical interventions. The external context includes the wider health system that contains the information system as well as the organizations (the ministry, management unit, or health facility) where data collectors and users work. Environmental factors exert pressure and create or limit opportunities for performance of RHIS. At the macro level, structural constraints, such as poor roads, lack of telecommunications capacity, and insufficient quantities of appropriate human resources, present very real obstacles to timely and complete reporting of information. The internal organization and culture of the health system also matters. A health system structured around vertical disease control programs, for instance, is often at odds with an integrated district-level health information system. At the micro level, field assessments have shown that organizational factors such as lack of clarity about roles and responsibilities for information management at district level; failure to actively distribute or introduce policies, norms, and standards; and ambiguity surrounding the flow of information throughout the system, have a direct influence on performance. Many environmental or organizational factors, may appear to be outside the scope of RHIS strengthening. Yet, without an environment that supports and values data collection and use, it is nearly impossible to make that critical link between data and health action.

Finally, it is important to consider human behavior in RHIS. Health data are collected by people who play professional and personal roles in the health system. Although building the capacity of these people is at the center of RHIS strengthening, the behavioral aspects of performance are often the most difficult to identify and confront in a meaningful way. They involve intangible concepts such as motivation, attitudes, and the values that people hold related to health information, job performance, responsibilities, and hierarchy. Influencing many of these behavioral factors will require interventions that go beyond simple training that improves knowledge and skills in data collection and use.

Behavioral factors explain the way in which health workers collect and use data (or fail to do so). For example, the primary job of most data collectors revolves around their tasks as health workers or managers of health services. They see their other duties, such as disease surveillance, stock keeping, and evidence-based planning and budgeting, as secondary to providing health care. If expectations with respect to data collection and use are unclear to health professionals, their motivation and commitment to managing data can suffer. Failure to provide feedback on routine reporting is another common disincentive to health worker performance in data management, leading to inadequate recording and reporting, and use. Any intervention to strengthen the health information system that does not address behavioral factors such as attitudes toward the collection and use of health information, motivation, and incentives for making decisions based on data will result in poor quality data, underreporting, infrequent data use, and poor decision making.

The technical, environmental, and behavioral determinants of health information system performance rarely stand alone as the single cause of poor performance. They are often connected to one another by a continuum. For example, on the technical-behavioral continuum, if a trained health worker feels she has not really mastered the necessary skills (self-efficacy as defined by behavioral scientists), then the likelihood that she will carry out the required actions is reduced. On the environmental-behavioral continuum, achieving competency in an action such as collecting and using health information requires not just knowledge and skills but a supportive environment as well. In Tanzania, it has become necessary to clarify organizational roles and responsibilities to translate technical guidance on analysis of disease surveillance data into routine health worker behavior. Job descriptions, responsibilities, and consequences for failing to act should be clear to data collectors, and they must have the tools necessary to complete their work. Many health systems are not designed to offer such guidance and support to health workers. Hence, in many health information systems there is little appreciation of the value of health data, particularly on the part of the peripheral health worker who, ultimately, is the source of most health statistics.

Using the Prism

We present the Prism framework for review and discussion and suggest that it be used as an optic or a lens with which to gain understanding of factors influencing performance of a RHIS. Keeping in mind that we seek not only to improve the quality and quantity of routine health information, but to increase the perceived and real value and use of health information as well, the framework also helps us to identify how we might move forward on three fronts to eliminate constraints to better performance. Using the Prism we can take our extensive experience in improving the technical content and rigor of health information system design and strengthening and translate it into action by:

- Instilling values that indicate the critical role of health information in system performance and the need for technical rigor in health information systems among data collectors and users,
- Linking health information to roles, responsibilities, duties, job descriptions, job functions, and job performance. Actions related to data collection and use should be linked to consequences — and preferably benefits — for those who are responsible for collecting, reporting, and analyzing data. These requirements are likely to differ at different levels of the health system, within health teams, etc.
- Reducing or eliminating behavioral and environmental obstacles to data collection, analysis, and use, including aspects of physical infrastructure (roads, telecommunication, paper, pencils, computers) and the political, managerial, and human context (hierarchy, communication, rewards, and punishments; the overall culture or value attached to information).

Following are examples of where the analytical framework can be applied in practical RHIS strengthening. Table 2 illustrates the type of activities that might be included in a country-level plan to improve RHIS performance based on the Prism framework.

- To guide a needs assessment. In analyzing an RHIS the Prism guides analysts to examine levels of performance (as defined locally and/or internationally) and its relationship to the technical capacity and rigor of the information system, the health system environment, and behavioral factors. Specifically, it suggests a focus on the contextual and organizational obstacles and opportunities that must be considered if performance is to improve. At the system level structures, functions, culture, and relationships are important. Among data collectors and users, attitudes and values with regard to information-related functions are critical. Such an assessment can comprise tools from a mix of disciplines, including epidemiology, performance improvement and behavior change, and policy analysis. In a district-level assessment in Tanzania, tools included a mapping exercise to clarify job responsibilities and performance expectations; in-depth interviews with health workers, district health team members, and district planning officers; and a review of available epidemiological data. This assessment, conducted at the outset of the design of a multi district project, took a single four-person team about two weeks of data collection per district.
- In defining strategies and solutions to improve RHIS performance, in terms of both data quality as well as better use of information. The goal in using the Prism approach for analysis or intervention

design is to make the process of improving RHIS less mechanical. This approach places the RHIS in the context of a living health system and all its shortcomings and links it to the people who are responsible for managing, maintaining and exploiting its power for improving health system performance. Strategies should not simply focus on the perceived obstacles to RHIS performance, but also on the ways in which data collectors and users have found data to be useful. These kinds of motivating or enabling factors can serve as a platform for designing interventions. This means using techniques such as in-depth interviews, focus group discussions, or KAP studies in needs assessments.

- Bringing stakeholders together around a strategy. It is important to secure commitment to improving performance of the health information system at all levels, particularly among those who are responsible for allocating resources or changing system wide modes of operation. Use of the Prism framework can help to establish clear and agreed performance expectations and principles among all stakeholders for ensuring that performance improvements take place.
- The Prism also suggests that we would benefit from engaging a range of professionals with complementary and relevant skills when conducting needs assessments, defining strategies, and implementing interventions to improve performance. Behavioral change experts, professionals with experience in reforming health systems, and management gurus are as important to the equation as epidemiologists and information specialists. It also suggests that data users will provide critical inputs in the design and implementation of the proposed interventions.
- Training is another area that could benefit from application of the framework. If we consider the three aspects of performance relevant, then training health professionals for improving information system performance might (depending on the level) focus on developing skills in management, financial planning, information technology, supervision and mentoring, communication, and behavior change, in addition to epidemiology and statistics. Recent training of district-level professionals in Pakistan has focused on establishing an organizational culture that values information use and promoting practices that reflect these values (e.g., strategic planning, linking coverage statistics to concrete action). Human Performance Improvement (PI) strategies might also be used to encourage stakeholder analysis and shared commitment to improving performance. Training should reflect the broader approaches advocated by the Prism framework, taking into account the work environment.

Table 2 Illustrative Country Level Activities for Improving Performance of Routine Health Information Systems by Framework Elements

Determinants	Activity	Anticipated Information System Outcome (Capacity and Performance)	Anticipated Improvement in Health System Performance and Health Status
System/Environmental (incentives, stakeholder commitment; feedback systems; culture)	<ul style="list-style-type: none"> ● Widespread stakeholder consultation on assessing and improving performance of routine health information system in the health sector ● Facilitate improvement in timely feedback from central to district level on planning and reporting ● Promote adoption of context-appropriate incentive systems for timely and accurate reporting and evidence-based plans and budget proposals ● Coordinate donor reporting requirements 	<ul style="list-style-type: none"> ● Perceived value of data collection and use increases among staff at all levels ● Shared commitment to improving the collection and use of health information ● Less duplication of reporting 	<p><i>Health system</i></p> <ul style="list-style-type: none"> ● Improved resource allocation ● Improved coverage of preventive and promotive health services ● Improved quality of care ● Timely and coordinated response to disease outbreaks ● Reduced frequency of stockouts of essential supplies <p><i>Health status</i></p>
Technical (skills, appreciation of M & E methods, and use of different types of data)	<ul style="list-style-type: none"> ● Training selected national-; regional-; and district-level health staff in M & E planning, data collection methods, state-of-the art tools, and data use ● Technical assistance to design regional level facility survey ● Introduce decision support software to routine health information system at regional level ● Streamline quarterly report form to reflect key indicators 	<ul style="list-style-type: none"> ● Improved skills and practices in M & E design and execution among regional and district health staff ● Improved quality and frequency of data collection and use 	<ul style="list-style-type: none"> ● Decline in morbidity and mortality in priority health problems ● Decline in fertility rate
Behavioral (motivation, values, clarity of purpose)	<ul style="list-style-type: none"> ● Mentoring supervisors in in-service training and other techniques that support regional- and district-level staff in M & E tasks ● Clarify and communicate official expectations for performance of regional- and district-level health staff with respect to collection and use of data for planning and health service operations ● Introduce annual dissemination workshops for different levels of health system to provide peer support, share results examples of data use, and identify key focal areas for future programming 	<ul style="list-style-type: none"> ● Confidence in M & E and data use among health staff increases ● Regional and district health staff link data collection and use with job performance ● Increased motivation to produce good-quality health data and its usefulness in improving policy and practice 	

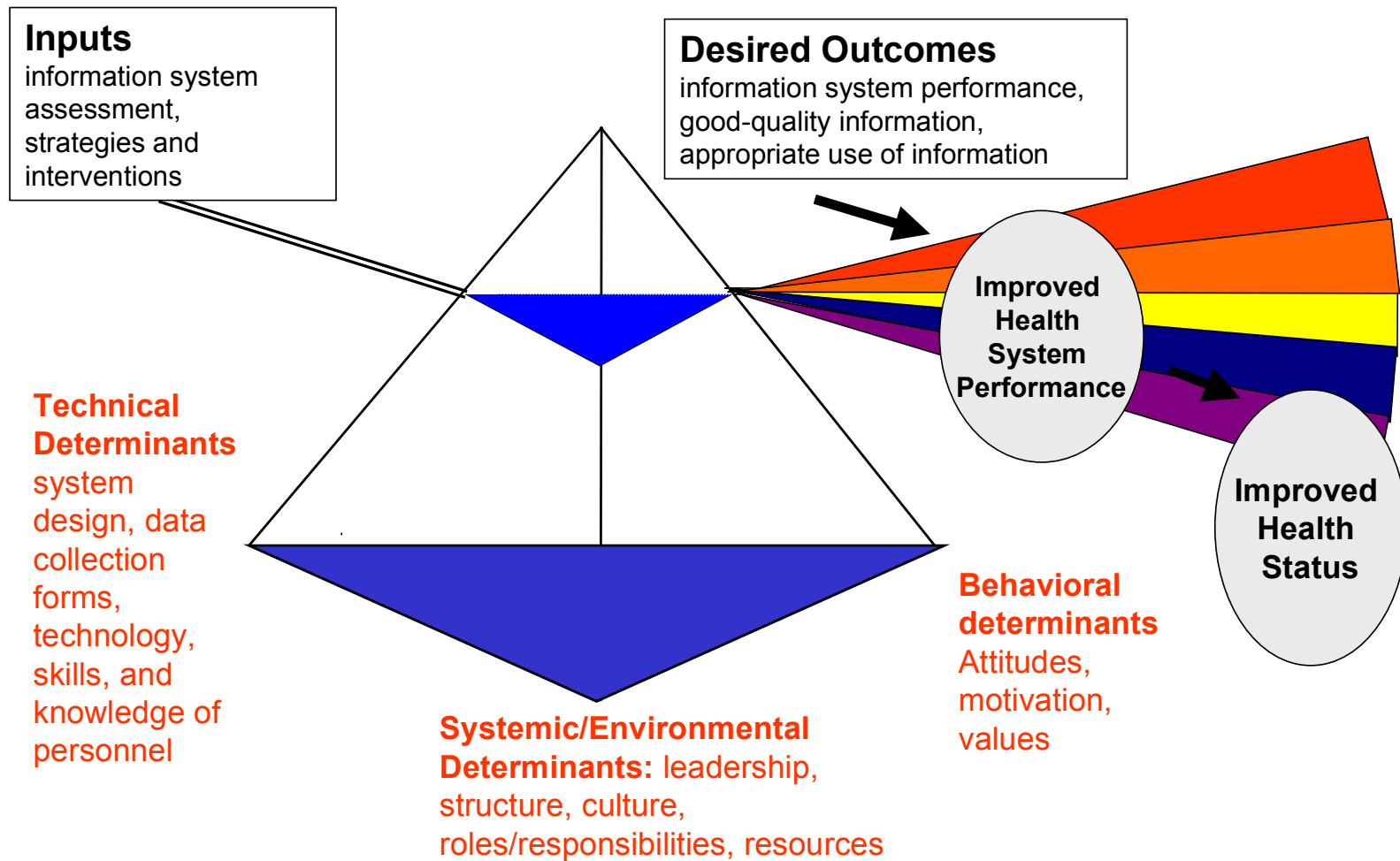
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Figure 6
“PRISM” Framework for Understanding Health Information System Performance



South Africa's District Health Information System: A Case Study

Randy Wilson, Calle Hedbert, Jon Rohde, and Rueben Puchert



South Africa's District Health Information System: A Case Study from Eastern Cape Province

HISP and Equity Project

This report was prepared by Randy Wilson, Calle Hedbert, Jon Rohde, and Rueben Puchert and updated with Vincent Shaw.

This case study describes efforts to support improvements to health services in South Africa through the development of a flexible yet comprehensive Health Information System. It describes the context of health systems reform in which these enhancements were made, key characteristics of the information system, and the process undertaken by many players at different levels of the health systems and identifies a variety of lessons learned that should prove useful for similar efforts in other countries.

This study illustrates the philosophy of the design of routine health information systems in South Africa, emphasizing a core standard of data with flexibility at each level to add both data elements and derived indicators, use of open software for processing, and open access to information throughout the country. The design of the District Health Information System (DHIS) has allowed incremental expansion to embrace many elements of managing the health care system. Expanding the system to include the entire country has involved a large effort in standardized training, on-site mentoring, and communication with hundreds of information officers, and more recently extending to the orientation of thousands of managers at all levels of the health system. The design and expansion lessons have relevance to many other countries currently adopting the DHIS to their health systems.

One of the most interesting aspects of the work highlighted in this case study is the fact that the system was introduced into a rapidly changing health care system, and the system's implementation has helped to monitor that change and to shape the change process. During discussions to gather information for this case study, many examples of this interrelationship were discovered. To cite just a few, district health workers have been using the system to help monitor priority health problem trends and the coverage of services such as EPI, TB, and STI contact tracing in specific geographic areas. This has increased resources to be allocated to those facilities lagging behind. Analysis of certain indicators, such as workload, has assisted in the reallocation of staff and the determination of new locales for introduction of health services. Monthly tracking of selected supplies/drug stockouts has resulted in dramatic improvement in essential drug availability at clinics, with the average proportion out of stock dropping from 13.2 percent in 1998 to 8.0 percent in 2000. At the same time, introduction of the system has led to the determination of new functions and staffing requirements to support data management at the district and regional levels. The system, initially designed for use by Primary Health Care facilities, has expanded to embrace information management in hospitals, environmental health services, ambulances, and personnel as well as to track notifiable diseases and other conditions requiring specific confidential patient records.

For public health professionals and multi disciplinary teams involved in developing health management information systems, the South African experience is rich in innovation and lessons learned.

Background

HIS in South Africa since the Apartheid Era

South Africa (SA) has seen significant change in its health system since the end of apartheid. During the apartheid era, there were stark inequities in access to public health services. Health services were fragmented, and there was a multitier public sector system for whites and three other "racial" groups. Although, this systematic discrimination has been abolished, there are still significant differences in public health services between historically advantaged and historically disadvantaged areas, both within and between provinces. Another major cause of continued inequities in access to health services is the large and technically advanced private health sector, which continues to account for around 60 percent of overall health expenditures. The private sector only caters to the 20 percent with medical insurance, largely those employed in the formal sector.

The SA health sector was, and to some extent still is, very hospital- and curative care-oriented. Eastern Cape Province, for example, was typical of this pattern, with 92 public sector hospitals and over 600 small and often specialized clinics. Much of the land was part of the Republic of South Africa, but a large proportion of the population (some six million in 1994) lived in two homelands (Transkei and Ciskei). Without a uniform national health service, health information systems varied greatly depending on the local initiative of the health authority providing the services. These systems generally focused on hospital/practice management and, to a lesser extent, epidemiological surveillance.

The economical and political focus on hospitals and hospital information systems, as opposed to primary health care, has made it difficult to (re)-direct funds and resources to district-based information system development. [It is estimated that], 90-95% of all development expenditure for new health care information systems today are spent on Hospital Information Systems (this excludes the cost of stationary, transport, and staff time used for existing data collection mechanisms).¹⁴

There were limited guidelines for what information should be collected and reported to the central level. Each province and homeland (14 such areas) and most vertical programs (including TB, EPI, STDs, FP, MCH, nutrition, chronic and mental illness) had developed and deployed their own information systems independently. Health workers at all levels were faced with multiple reporting formats in which massive amounts of data were recorded.

With the end of apartheid in 1994, this pattern began to change. The National Health Bill provided for the development of a district health system covering defined populations and responsible for all public health services in those areas. At the same time, the Ministry of Health became more conscious of the need to monitor health status and health service performance. This led to the publication of a document, "Year 2000 Health Indicators: Definitions and Data Sources," which mandated the collection of a more limited yet still large set of standardized data elements.

Definition of HIS

A health information system¹⁵ is a set of tools and procedures that a health program uses to collect, process, transmit, and use data for monitoring, evaluation, and control. The DHIS in South Africa is the acronym used to describe both the District Health Information System in the broad sense and the District Health Information Software (used to manage the data collected by this system). The emphasis on District in both terms was chosen to encourage the decentralized design and control of information management and use. Nevertheless, the data collected are also available and used at provincial and national levels. The system includes the procedures and formats used in all health facilities to collect and report the data as well as the roles and authority enabling health workers to use their data to improve health service performance.

Initiatives to enhance health information systems typically deal with several or all of the following data management steps:

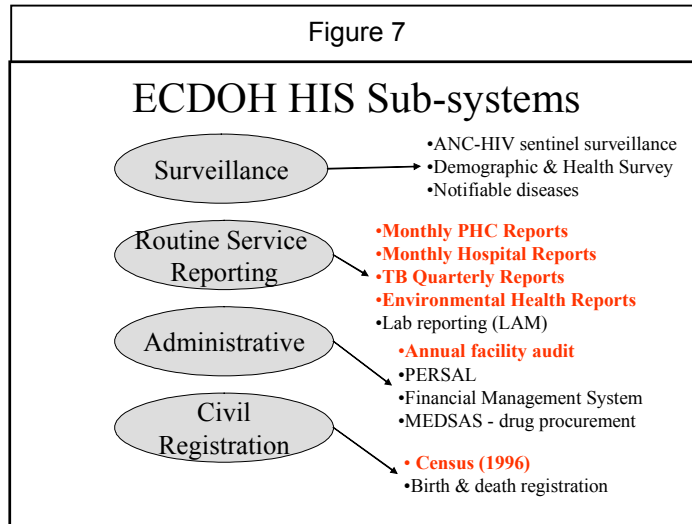
1. Collection: This typically includes rationalizing the amount and types of data that are collected, improving formats and procedures for data recording and reporting and improving quality in terms of the timeliness and accuracy of the figures.
2. Processing: Among the improvements in this area are computerization of data capture; various internal checks to improve validity of data, analysis, feedback reporting; and production of graphs for visual display of information.
3. Use: This step is often the most difficult to influence because it requires a change in attitudes and behavior in addition to new information and procedures. Efforts to introduce an "information culture" in which people base their decision making on evidence rather than intuition or habit) typically focus on:

¹⁴ Braa, Jorn. *Developing District-based Health Care Information Systems: The South African Experience*, Oslo: University of Oslo (jbraa@ifi.uio.no); Calle Hedberg, University of the Western Cape & University of Cape Town (chedberg@mweb.co.za).

¹⁵ This is also often referred to as a Health Management Information System (HMIS) when data are collected and used to improve health system management in addition to meeting conventional disease surveillance objectives.

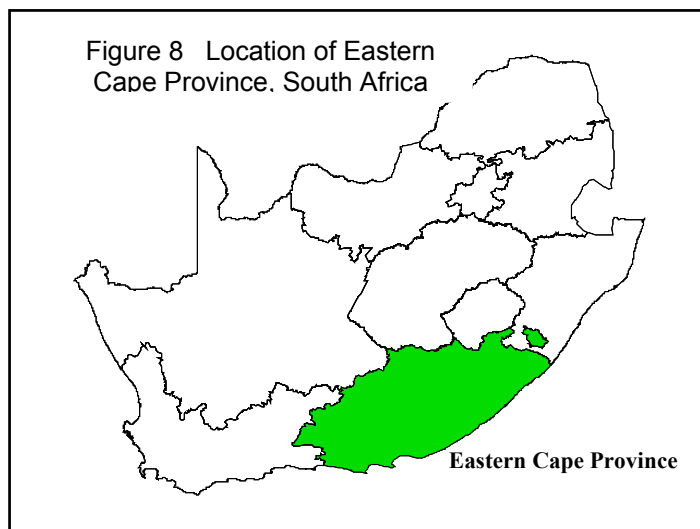
- establishing standard procedures for use of data and information at the level at which they are collected;
- training staff in data analysis and interpretation; and
- incorporating data/information use into routine activities such as supervision, planning, and management meetings.

A health information system typically includes a variety of subsystems. The illustration in Figure 7, below, provides an overview of the various components of the Health Information System in Eastern Cape Province. The elements highlighted in bold are currently included in the DHIS.



HIS Evolution in Eastern Cape Province

Eastern Cape Province (Figure 8), one of South Africa's nine provinces, has a population of around seven million, initially organized administratively into five Health Regions and 21 Health Districts and redemarcated in 2000 to seven Health Districts (municipalities) and 25 Health Sub-districts (called Local Service Areas or LSAs in some documents). The province has a network of 700 clinics, 130 mobile routes, and 64 district/community hospitals that also provide some primary health care services. It has another 28 regional and provincial tertiary hospitals, providing secondary and tertiary care.



Since 1994, a number of abortive top-down initiatives have been undertaken at the national level to improve primary health care-related information systems. But it wasn't until about 1999 that a number of bottom-up initiatives, carried out mostly on a pilot basis, began to gain wider acceptance. In the Drakensberg area nurses helped to define the data items they used most to measure their own work and performance, which were printed in standardized tick registers that simplified the recording and tallying of data on different types of patient visits. Patient-held records replaced clinic cards, which were often lost or misfiled. A major push to enhance the health information systems in Eastern Cape

Province began in 1997 with support from the USAID-funded EQUITY project. At least nine different information systems were in use in the province, with few if any providing useful or timely data. Initial

steps during that year included detailed discussion with all program managers to select a very small set of indicators that would be valid and sensitive to change in relation to key elements of each health service area. These indicators helped to define a minimum data set of 20 items (later increased to 25) with precise definitions to be captured at each of the approximately 900 PHC facilities. No data items were included unless they were required to calculate a defined indicator. Thus, the DHIS is in principle an “indicator driven” information system, even if some other provinces initially focused exclusively on defining data elements. Computers with 16MB of RAM were purchased in 1996–97 and installed in all 21 health district offices. A computer program was initially designed using Clipper (a DOS-based dBase compiler) to enable data capture of this data set, but this system lacked the flexibility needed for reporting and for enabling districts, and even individual health facilities, to capture additional data elements of their own choosing. Bugs resulting in incorrect calculations of indicators created problems. An effort to port this to a Windows environment using Delphi was later abandoned, since it became apparent that other open source software was already available.

Furthermore, as the provincial health team planned the system’s rollout, it became clear that human resources available locally were not adequate to support both software development and to meet the training needs of staff throughout all 21 districts. In October 1998, after nine months of data collection and capture but negligible output and feedback from the existing system, the team sought support from the Health Information Systems Programme (HISP) team based in Western Cape. This team had already developed a District Health Information Software (DHIS) application for use in Western Cape Province (see box), and its ties to the University of Western Cape provided a convenient environment for organizing many of the training activities required. The eight to nine months of data available were converted and imported into DHIS within two to three days, enabling analysis and reports through Excel pivot tables and graphs. The HISP team was also contracted to modify and further develop its software (developed in Microsoft Access) to cover Eastern Cape requirements, install the system in all districts, and train staff in its use.

Initial PHC Minimum data set indicators:

- Workload (1)
- Tracer drug availability (1)
- Maternal Health/Family Planning (7)
- Child Health (3)
- STD (2)
- Mental Health/Chronic Care (3)
- Referrals (1)
- Information system (2)

It should be noted here that the Health Information Systems Programme (HISP), a collaborative research and development effort currently involving four universities as well as the health administration in South Africa and Mozambique, already had established ties with several provincial administrations and with the national Department of Health through its National Health Information Systems/South Africa (NHIS/SA) committee. Expanding HISP activities into the Eastern Cape was thus relatively easy, and just a few months later the NHIS/SA committee adopted the DHIS software as a national standard.

In mid-1998 the Eastern Cape recruited a new cadre of personnel, called district information officers, posting one in each of the 21 health districts to oversee information generation and dissemination. These supplemented the five regional information officers, bringing a true district focus to the collection, analysis, and use of information. In addition to providing ongoing training and support to operational staff responsible for data capture and data management at the district

Data Element Category	No	Data Element	Min	Max	Entry	Check!	Comment
Attendance	2	PHC headcount 5 years and older	0	0	344		[Note: Total PHC headcount]
Attendance	3	DOTS visit - Facility	0	43	3		
Attendance	4	Nurse clinical work days (PHC)	9	49	10		
Maternity and neonatal servic	6	First antenatal visit	0	35	1		
Maternity and neonatal servic	7	Follow-up antenatal visit	2	39	5		
Reproductive Health	13	Oral pill cycle	9	150	24		
Reproductive Health	14	Nuisterate injection	0	0	10		[Note: split from Injcta]
Reproductive Health	15	Depo-provera/Platogen injection	0	0	15		[Note: split from Injcta]
Reproductive Health	17	Condoms distributed	60	1,950	500		
Child Health	19	Diarrhoea under 5 years - new	0	13	1		
Child Health	21	Child under 5 years weighed	12	477	30		
Immunisation	25	BCG at birth	0	19	19		
Immunisation	26	DTP-Hib 1st dose	0	4	1		
Immunisation	27	DTP-Hib 2nd dose	0	4	4		
Immunisation	28	DTP-Hib 3rd dose	0	3	2		
Immunisation	29	OPV 1st dose	0	4	1		
Immunisation	30	OPV 2nd dose	0	4	4		
Immunisation	31	OPV 3rd dose	0	3	2		
Immunisation	32	HepB 1st dose	0	4	1		
Immunisation	33	HepB 2nd dose	0	4	4		
Immunisation	34	HepB 3rd dose	0	3	2		
Immunisation	36	Mastex 1st dose at 9 months	0	2	1		

Figure 9 Sample Data Entry Screen from DHIS Monthly Data

level, the major focus in 1999 was on enhancing the computer system: adding new hardware in the districts, creating a more user-friendly report generator to develop standard reports for each major program, and developing a more systematic mechanism for feedback reporting. Members of the HISP team made repeated visits to each of the regions and most of the district offices to provide continuing training and to support efforts to enhance the use of data from the DHIS.

Efforts in 2000 focused on managers and improving their access to and use of information for decision making. This proved to be a far larger job than expected because health workers were not used to having reliable and timely data, let alone to using such information as the basis for resource allocation. Training and mentoring have continued through 2002 with district managers (most are professional nurses by training) receiving on-the-job support for hands-on work extracting information from pivot tables and making their own graphs, as well as through courses in various subjects of public health that emphasize the use of data. Today, discussion of information is a standing topic in all district meetings, and district-level personnel use monthly reports in routine supervision of clinics as well as for annual planning.

The evolution of the system has not gone without a hitch. There were heated discussions at times with national and provincial health authorities concerning the development approach, the purpose of the system, and even the software development environment. Staff at the central level had traditionally relied on their own rather simple EPI Info 6 (DOS) applications, whereas the DHIS software had been developed using Microsoft Access and Excel pivot tables. There was a strong tendency to demand huge amounts of data, little of which was ever analyzed or used, but which reflected the exhaustive statistics demanded by many vertical programs. The South Africa Enhanced Programme for Immunisation (SA-EPI) initially collected 44 data items monthly — DHIS proposed only five — and they compromised on 13 items enabling calculation of six useful immunization indicators. Recognizing that fewer data items led to better-quality data, the EPI program recently reduced the data requirements by dropping all second-dose reports (they are now calculated from first- and third-dose averages by the program).

By contrast, the WHO “requirements” for TB data have been viewed by many as an *obstacle* to use of data by nurses and district managers in the TB program because there are so many indicators and data elements that local users get lost. Brainstorming with TB nurses on their requirements, the Eastern Cape Department of Health developed a 12-item data list for TB to replace the 160 items that “WHO required,” but this was not acceptable due to WHO requirements. While many of these data may be useful for international comparisons (over half of the items had to do with race and age breakdowns and unusual types of TB) they confuse the user and obscure the important information on which management decisions at the clinic should be made. WHO does not clearly distinguish between its own needs and data that are recorded for local use and decision making. More recently, an electronic, computerized TB register has been introduced to capture all the information on each patient — some 40,000 new cases in Eastern Cape and 150,000 in South Africa annually. This will provide all the detailed information national and international managers could want, leaving space for a few simple indicators to drive case finding, sputum exams, and early identification of dropouts in the monthly routine data set.

Similarly, different provinces had different priorities for investing their information systems budgets; most preferred to focus on patient-centered hospital information systems of far greater complexity and cost, while others began by emphasizing district-level primary health care services. Ironically, the Health Information Systems Programme was considering winding up its activities in late 1998 due to limited funding when the Equity project stepped in to support extension of the system to Eastern Cape Province. The Western Cape Province had adopted the software, but its entire health information system budget had been allocated to a large Hospital Information System for three academic hospitals — a system that is still not functioning correctly. Large and complex systems often do not provide the basic data needed by managers. Provincial Health Department, HISP, and Equity Project staff have found it better to start small, especially with limited data requirements, and expand as and when demand for more information is demonstrated. Interestingly, while many managers complained at the outset that our data sets were too limited, those same managers often find that even this “limited” number of indicators is more than they can manage effectively.

In spite of these obstacles, others bought into the approach. The British NGO, TransAID, working with health transport managers in eight provinces, has developed software and made it available using the open source approach. That software is currently distributed, together with the DHIS, and the HISP team is working to ensure full compatibility (e.g., by use of the same facility coding system). Other similar linkages have begun to take shape, including (a) The National Health Laboratory Services is very positive about interfacing its laboratory information system (used in eight of the nine provinces) to the DHIS; (b) staff from the Cape Metropolitan Council developed a geographic information system (GIS) interface between DHIS and the free desktop GIS viewer ArcExplorer; and (c) the National Dept of Health and the Health Systems Trust (the largest health-oriented NGO in SA) decided to integrate their Client Satisfaction Survey tool with the DHIS.

The DHIS software was successfully rolled out in Malawi in 2002 (partially as a result of contacts established during the RHINO meeting in 2001) and is currently being piloted or tested in a range of other countries, including Mozambique, Nigeria, Ghana, Cuba, Mongolia, China, and India.

District Health Information Software: An Overview

The DHIS software has been under development since early 1998, as part of a larger effort to enhance use of data and information within the public health sector, by the Health Information Systems Programme (HISP). The HISP pilot phase 1 from mid-1996 to the end of 1998 was a collaborative research project among the University of Cape Town (UCT), the University of Western Cape (UWC), the Norwegian Computing Centre (NCC), and the Provincial Administration of the Western Cape (PAWC). Phase 1 was funded by the Norwegian Agency for Development Co-operation (NORAD) with around US\$0.4 million. The overall research objective was to find ways to empower and give a voice to the community of end users, local management structures, and deprived communities in the process of developing new health information systems to support the proposed new decentralized health structures. Phase 2 of HISP (1999–2001) had been funded until the end of 2000 by the Norwegian University Council (NUFU) with approximately US\$0.4 million and by EQUITY with approximately US\$0.2 million, in addition to financial and manpower resources provided by health authorities in South Africa and Mozambique. Since 2000, HISP has been under contract to EQUITY Project (USAID-funded) to further develop the software and to train information officers, supervisors and managers in all nine provinces of South Africa. Significant funding for research collaboration for 2002–2006 is also provided by NUFU and the Norway-South Africa Research Fund.

The software development approach is characterized by participation and cyclical prototyping — an iterative software development process, where initial specifications are developed quickly into a working model. This model is then implemented in live conditions where users play an active role in testing and defining what further enhancements are needed. This is an excellent approach for this type of software application, where information needs and uses evolve over time. It also promotes shared ownership and enables end users to provide a high degree of input into the design specification process. However, it has also led to unanticipated problems as the system grew in directions (and in size) that were not originally expected.

The DHIS software was developed using Microsoft Access 97.2000/XP database management software. This was an obvious choice, given the widespread use of that software in South Africa and its integration with other Microsoft Office products (Excel, Word, and PowerPoint) for use in reporting. The system's file structure is designed around two user-modifiable data dictionaries (one for data elements and another for indicators). These provide excellent control of data quality and considerable flexibility in defining which data are collected and how they are used to calculate indicators ("meta-data" in database parlance). As a result, districts can easily modify the system to collect the data they want and define their indicators (numerators, denominators, and method of calculations) as they please. In the Eastern Cape this capacity has enabled the system to evolve from storing only data on primary health care services to including data from the TB Control Programme, environmental health activities, annual health facility audit; semipermanent data on staffing, finance, and infrastructure, and monthly reports from all hospitals.

A key principle of the software development approach was that it should be free and open source. This means that the software is distributed free of charge, and that the source code (programming) and

database structure are open to modification by anyone. While this does involve an element of risk — in that users could make modifications to the system that could have unanticipated consequences — this philosophy has also made it extremely easy to promote use of the software. Not only do potential users incur no financial risk in trying out the software, but there is the potential for them to adapt it as they see fit and copy it onto as many computers as they wish. This had certainly not been the experience with most commercially marketed software that provincial health authorities have dealt with at the hospital level.

The software, as implemented in the Eastern Cape Province, consists of the following modules:

- Monthly Data — data entry for PHC monthly reports (now with 54 required data items) and annual audit (far more detailed information on services provided, quality measures, infrastructure, and staff) and production of standard reports (Figure 9)
- TB — Quarterly TB data entry and standard reports conforming to the WHO requirements
- Report Generator — This module uses temporary tables, referred to as a Data Mart, to store processed indicator data. Raw data are linked directly in from the other modules, which enables reports from any period and any raw data or indicators to be tailored to the user requirements. Data can be selected for a cluster of facilities (used by the supervisor), for one district or several, by one program area, or across different program areas for managers with a variety of interests. Figures can be averaged over periods, aggregated for a given period, and compared to a previous year. The data mart also helps put together “exception reports” for any indicator. These reports list outliers — values above or below a given value that users can easily change according to their own assumptions. This is a very powerful tool for managers to see who is “out of line” — for example, which facilities have immunization coverage above or below a certain value, or whose workload is above or below local norms.

In addition, the system features links to other tools, including:

- A very user-friendly set of Excel pivot tables that make it easy for users to cross-tabulate, filter, and graph data.
- Thematic maps displayed using ArcExplorer map display software.
- A web browser-based Data Dictionary that stores official names and precise definitions for all Data Elements included in national and provincial Minimum Data Sets. This Data Dictionary, as well as the Web Shell and other HTML/XML/Java tools under development, is all running on top of the HISP Application Server (a local Web server). A Data Dictionary version that covers concepts and indicators will be released and Web-enabled in the second quarter of 2003. It will be hosted on a website run by the National Department of Health, allowing general browsing as well as automatic downloading of updated versions (functionality similar to, e.g., Officeupdate.Microsoft.com).

A new module, called “Special Patient Data,” module is Web-enabled but aimed at providing a simple but flexible tool for collecting individualized patient data for certain important patient categories. Patient-identifiable data items can be encrypted using strong (128-bits) encryption to safeguard confidentiality. Minimum hardware requirements are 16 MB of RAM (32 MB if the HISP Application Server is running) and 200 MB of free space — the latter due to the installation of MDAC 2.5, Jet 4.0, DAO 3.6, and other system software as well as ArcExplorer 2.0, WinZip 8.0, and other applications together with the DHIS (the basic DHIS files with no data are approximately 20 MB). Indicator calculations are CPU-intensive, so performance is largely CPU-dependent as long as a user doesn’t run out of RAM. Windows 2000 and XP demand in practice 32–128MB of RAM, so all such systems can run the DHIS. *Note, however, that hardware requirements obviously grow with the amount of data captured/analyzed — the combined data file for South Africa is actually approaching the maximum database file size limit of 1GB for MS Access. Efforts are underway to make the DHIS Database Management System independent, so that DHIS data files can reside on any SQL-compliant system (e.g., ORACLE, MySQL, SQL Server, DB2, etc.).*

Recommended hardware is a “small business” PC for the district level (currently 1.8-2.0 GHz CPU, 256 MB RAM, 40 GB hard disk, 17-19” monitor, Windows 2000/XP) and a “technical workstation” for higher levels (2.2-2.6 GHz CPU, 256-1,024 MB RAM, 60-80 GB hard disk, 19-21” monitor, Windows 2000/XP). A

scanner and an A3 inkjet are recommended, bringing the total cost per “unit” to US\$ 2,000–US\$ 4,000. High RAM requirements with large data sets are largely attributable to Excel pivot tables, which need a lot of memory.

During the course of the software’s development, a variety of interesting and unusual features have been added to the system, usually based on requests from users. For example, there are options to print out the monthly reporting forms and even the tick registers used to record the data manually in health centers. Similarly, tally sheets can be printed out with the size of cells automatically adjusted based on data reported historically.

On the analysis side, the system has made innovative use of 1996 census data for calculating population denominators. This has included the development of an algorithm to impute catchment area populations based on the proportion of head counts to the entire head count per census district. This gives a reasonable estimate of the population actually served, from which denominators can be calculated for coverage of services for any age group.

Current Status

As a way to monitor the status of the DHIS, the HISP team developed a tool to evaluate the degree to which a health information system is being used effectively. This tool, called Tool for the Assessment of Levels of Information (TALI), uses a checklist approach with objectively verifiable observations to help managers rank the effectiveness of information use at different levels of the health system on a three-point scale.

Within Eastern Cape Province, the DHIS (including the software) has now been implemented in all 24 health subdistricts. Even if the districts reached activity level 1 (data captured, at least partially validated, and submitted upward) within three to four months, the whole process has taken four years. Some districts are still not stable at level 2 (routinely turning data into information and disseminating it to all relevant parties), and only a few districts have reached level 3 (using information for actual decision making). The software is also installed in a number of individual health facilities and is used at the Department of Health office in the provincial capital Bisho (as well as by EQUITY project).

As the amount of data captured into the DHIS kept growing, it soon became clear that the 16 MB PCs in the district offices were inadequate (Access 97 itself needs 16 MB to run). Notebooks with 32MB used by the regional and provincial information officers were also getting sluggish, in particular due to the extensive use of Excel pivot tables for analysis and reporting (MS Excel is a memory hog). The EQUITY project therefore decided in mid-1999 to purchase computer equipment for all district and regional offices as well as some equipment for the Department of Health. Each district received a “small business” PC (Pentium III 450, 128MB RAM), an A4 scanner, and an A3 inkjet printer. The five regional offices and the provincial office received a “workstation” PC (512MB RAM) to handle much larger amounts of data. Two notebooks and two digital projectors were included for training purposes.

U.S. government-procurement regulations demanded that this equipment be purchased in the United States, with significant consequences. Firstly, whereas competitive bidding for this relatively standard equipment would have taken two to four weeks in South Africa, it took nearly eight months from specification of the tender to distribution to the recipients. Second, the people drawing up the tender specifications were told — rightly or wrongly — that the tender could not be limited to global suppliers that would be able to provide local support. The cheapest supplier that seemed to fulfil the specs would have to be chosen. Third, various other factors resulted in several changes in the actual components used after the tender was awarded, with final PCs that proved highly prone to hard disk crashes.

One year later, nearly all of the 28 PCs had broken down at some point. EQUITY project staff had to handle repairs and try to squeeze spares under warranty out of the U.S. supplier, resulting in turn around times of four to seven months. Some equipment, like a monitor that was defective on arrival, has never been repaired/replaced at all. Most districts have been forced to look for other PCs or parts to be able to cope. USAID purchasing regulations have thus turned out to be highly counterproductive, disempowering, and a considerable embarrassment to both EQUITY and USAID.

In 2002, the Eastern Cape Department of Health purchased new PCs according to the “small business PC” specs outlined in the box above for all district offices. The old computers still functioning have been used for less demanding functions in the districts or small hospitals. Hardware budgets continue to plague the rollout of the DHIS in many provinces as the demands of the software, both from Microsoft’s constantly growing software suite and from the increasingly large data sets in the provinces, call for ever faster and larger-capacity machines at least at provincial and national levels. This is not always easy to get, and HISP has developed various tools to make DHIS access easier, including the automatic extraction and aggregation to subdistrict level of all provincial data. This national, aggregated data file is only 5 percent of the equivalent national data file with facility-level data.

The HISP team continues to provide significant support, since local capacity for software development and design of specialized analytical reports is still not in place at the provincial level. This support has increasingly focused on using information for management and action in general, but also includes general computer troubleshooting and maintenance, configuration, and use of the DHIS software. In addition, the EQUITY project has provided support through the Department of Health to train district health supervisors in use of data for planning and service performance monitoring and evaluation. Eight training courses that have been organized by HISP team members at the University of Western Cape include:

- Certificate in District Information
- Introductory, Intermediate, and Advanced DHIS
- Using GIS for Health Data analysis and display
- Use of information for management
- Using DHIS for management
- Using information for hospital management

While this case study has largely focussed on experience in the Eastern Cape Province, it should be noted the DHIS has been introduced in all nine provinces of South Africa as well as at the National Department of Health. Initially, interested information managers attended courses at UWC lasting one to two weeks and offered once every six months. For those provinces with a larger number of interested staff, the UWC HISP team conducts tailored training on-site, including the installation of DHIS software on local computers and its initialization for the province’s chosen data set. Individual HISP facilitators have taken responsibility for one or two provinces and return periodically to help troubleshoot problems and extend the training to new users. It has been difficult however, to introduce the system rapidly everywhere because of the large number of staff who need training as well as requirement for computer hardware.

Transfer of data electronically to the National Department of Health in Pretoria is still irregular, despite a nationally agreed upon data flow policy. This erratic submission is partially fueled by lack of capacity at national level to provide rapid feedback to the provinces and districts — many provincial officers are quicker to provide data to HISP than to the National Department of Health because they want feedback and assistance in addressing issues of quality, cross-border flows, etc. Hence, the *full* power of DHIS to provide up-to-date and meaningful nationwide reports has yet to be fully realized, even if there is steady progress in most areas. During 2000, provincial and national authorities made the decision to extend DHIS to all health facilities in the country. This places heavy demands on the system, especially the HISP trainers.

The HISP team is now fielding about 10 people to roll the system out, and a Microsoft Project work plan is being used to track responsibility of HISP, EQUITY, and government staff and to provide support and systematic training. Nearly 100 people are involved in the rollout that should be essentially complete by the end of 2003. A major challenge is to see how the system will continue to evolve and be maintained after EQUITY funding ends, but most of the actual rollout is done by the provinces themselves without external funding, which is reserved for consultant trainers and training courses.

During the visit to prepare this case study, a great deal of anecdotal information was gathered about innovative uses of the system by health workers and managers alike. Some of the highlights are included in the box below. Such experiences need to be shared widely so that they become part of standard practice throughout South Africa.

Information to Action: Innovative Uses of DHIS Data

Nurses Warden and Hendry are health workers from different health facilities in Southern Peninsula municipality, just outside of Cape Town. They have been given the difficult task of agreeing on which of their two PHC centers should be closed — and how their patients and staff can be merged to provide services more efficiently — perhaps in a completely new location. In the past, Department of Health managers would have just made the decision at a high level, and the health workers would have had to live with it. Now they are gathered around the computer at the municipal office, pouring over various types of DHIS data they have printed out. They are comparing staffing patterns with head counts at each facility over time to determine workload and examining data on the catchment population for different services. This helps them see the case-mix of patients each facility sees and helps them to determine which facility already sees a larger part of the combined population. The sisters decide that this is still not enough information to make a recommendation. They live in a semiurban area, and they believe there is considerable crossover of patients who live in one catchment area to the other, perhaps because they work in the other area. They have decided to request a large-scale map of the two zones and conduct a brief survey of patients for a week or so to confirm their belief — plotting the residences of the patients with different-color dots on the map. This should help them decide on the best location for the combined facility.

Kevin is the district information officer for Aliwal North Health District, north of Queenstown. He has been trained to use the DHIS software to enter and analyze data coming from all the health facilities in his district. For the past several months he has printed out many pages of feedback reports covering all of the indicators in minimum data set and distributed it to each of the health program managers and supervisors during district meetings. This has seemed like a waste of paper. There is too much paper to wade through, and the program managers have many other logistics and resource-related issues they need to discuss. This month Kevin decided to use another approach: he works with the district health manager to identify one important theme and produces a comprehensive analysis of recent DHIS data related to that theme alone. Instead of just handing out the printouts, he prepares PowerPoint slides on the topic and works with the responsible program officer to present the tables, graphs, and key observations to the rest of the team. This takes a lot less time and elicits much more animated discussion. Members of the team decide on a list of themes they would like the information officer to research for future meetings.

Virginia is the Community Health Coordinator for Southern Peninsula Municipal Office. She is faced with the major dilemma of how to allocate reduced funding for tuberculosis services among the 18 clinics in the municipality. In the past funds were allocated strictly on the basis of the number of cases treated (around 4000 Rand per patient per year). This approach is no longer possible, because there are more cases than there is money to go around. During a meeting of all TB program nurses, the group decides to see if the data from the DHIS can help them. They ask Sylvia, the data entry clerk, to prepare a graph of the TB cure rates from the each facility. To their surprise they discover that these rates differ sharply between facilities. Most are quite high — around 80 or 90 percent — but there are four/five health centers with low cure rates. Because of the risk of developing more resistant strains of TB when the cure rate is low, everyone agrees that proportionally more funds should be directed to those facilities. Interestingly, data gathered the following year supports the effectiveness of their approach. Nearly all the facilities lagging behind have closed the gap, and most of the other facilities have maintained their cure rates. How much of the change is due to more resources, and how much is due to the heightened concern of the nurses who saw for the first time that they were lagging behind is a matter of speculation.

Ivan is the Director of PHC for the City of Cape Town. The availability of data from the DHIS has helped him to revolutionize the process of developing the provincial business plan for health services. The new planning process results in a work plan that includes quantified outcomes and outputs anticipated for each activity, in addition to the resources required. Not only do the DHIS tools empower staff — who must agree with their managers on reasonable targets for key indicators — but mid-level managers get a clear message that they must use the DHIS data to monitor the performance of their health facilities in more than just financial terms. To add further incentive, a new post of clinic manager has been created at the facility level. This individual is paid extra for being accountable for performance. Not everything works as well as Ivan would like, however. There is still no easy way to link the performance data generated in the

DHIS — which are based on health facilities — with the “cost centers” used in the financial management system, since these cost centers sometimes cover many facilities (e.g., drug supplies to clinics) and sometimes only part of a facility (e.g., staff salary per ward in larger hospitals). Also, the city needs to establish a more effective procedure to “unpack” the city business plan for each level of the health system. New challenges to use of data have also emerged with the transition of decision making authority from health managers to municipal councils with limited health or medical training. The data and information will have to be presented in simpler ways that are understandable and convincing to this broader audience.

Mandisa is the provincial pharmacist in Eastern Cape. Two depots provide drugs to nearly 1,000 public health facilities, expending over 300 million Rand per year. While most facilities have a reliable stock of essential drugs, some complain of persistent stockouts and irregular supply. The DHIS initiated a simple monthly report of drugs out of stock, tracing 30 (now 23) items chosen to represent key classes of drugs and supplies. Each month, only those that ran out of stock (for one day or more) are recorded with a tick on a standard one-page form. A monthly display of the clinics that ran out of more than 10 percent of the items, or consistently ran out of a given item (often broad-spectrum antibiotics), revealed a small subset of facilities. Site visits showed that many were not ordering on time, some were grossly overusing certain drugs, and in a few cases, the depot was not supplying the requested quantities. Remedial action in each case has improved drug availability in the clinics.

Lessons Learned

Implementing a system of this size and scope provides a wonderful natural laboratory for testing different approaches and, one hopes, for learning about what works and what doesn't. Below are some of the most significant lessons learned from the Eastern Cape experience.

- a) **District-level involvement in HIS development is not only possible, it is critical for the success of information systems** aimed at enhancing health services at the district level. There are many examples of how input from district and health facility-level staff led to new features and functionality in the system: choice of indicators from which data items were identified, design of registers, and report formats. The success of this participatory approach in Eastern Cape Province is reflected by a genuine feeling of ownership expressed by many district health staff while this case study was being prepared.
- b) Whatever level is the primary focus of HIS enhancement activities, even with a bottom-up development approach, **it is crucial to identify and involve all stakeholders or “actors” in the process**. This includes individuals at all levels of the health system (potential users) as well as significant events and changes that are likely to influence the development of the system. It was important to focus on high-level staff as well. Only when the information officers started making reports and putting them on managers' desks did anyone pay much attention to what the data were telling them. Then managers wanted to access the system themselves — to learn how to explore the data rather than having to wait for printed reports. Installing pivot table reports on all managers' PCs resulted in far more frequent use of the information.
- c) It is important to “walk before you try to run with information systems.” Considerable effort was focused on helping staff to use paper and pencil to master analytical skills before the system was computerized. This required a minimum data set that health workers could easily understand and analyze on the spot without a computer. Similarly, the use of hand-drawn catchment area maps and graphs was strongly encouraged as a key step in getting people to understand the populations they serve and to trust the data they collect. Later, the computer can help them do it faster and better.
- d) Several lessons were learned on the software development front:
 - i) **A system of this complexity requires good linkages between users and a professional software development team**. To this end, the prototyping approach has worked well in South Africa. It is also clear that the presence of extremely motivated and, in their own words “workaholic,” champions for the system within the department of health, the HISP team, and the EQUITY project have played a crucial role in the rapid extension of the system.
 - ii) **Efficient communication between the partners is crucial**. The good fixed and cellular telephone infrastructure in South Africa has been an asset. Telephone support from HISP

- team members and provincial DOH staff is available to users of the system almost any time of day. Bureaucratic rules and regulations and lack of infrastructure have actually been the major impediment to smooth communication: a manager in the provincial administration might wait months to get an email account or Internet connection, despite having a physical contact point one meter from his or her PC. The information officer in one health district in the Western Cape was initially only permitted to receive emails, not to send any since it would save around US\$1 per month. Getting permission to send emails took nearly six months and much paperwork. Despite strong government support for computerization and to “bridge the digital divide,” districts and information officers in some provinces and at the National Department of Health still do not have reasonably reliable Internet and email access. This has made distribution of data and software updates via the Internet or government Intranet very difficult in many areas, and distribution of files larger than a few MB is still done predominantly via CDs.
- iii) **Maximize data use by building links to off-the-shelf software** for analysis and reporting, such as Excel pivot tables. This lets managers use the analysis tools they are most comfortable with and reduces the software development work that would otherwise be required to reproduce this functionality in their application.
 - iv) **Don’t underestimate the potential appeal of a specialized software application.** Design database structures that can accommodate more records than you would have ever imagined. If database design is internally complex (e.g., highly normalized), establish mechanisms to provide users with simpler views of the data for their own ad hoc analysis. Many users expressed frustration at not being able to understand the manner in which data were stored in the system.
 - v) **Look to find a balance between precision and approximation.** This needs to take into account the expected quality of the data collected (including secondary data from census or other data sources, in addition to those controlled by the health sector itself) as well as the degree of precision required for decision making. This was expressed several times using the adage: “It is better to be approximately correct than precisely wrong.” In a similar vein, indicators that are too complicated to calculate are often too difficult for mere mortals to interpret and use as well.
 - vi) **Open source software that is distributed for free is easy to “sell”, but don’t underestimate the amount of training and technical support it requires.** Health Information Systems based on open source software are as prone to underestimating training and technical support as commercial systems. The database structure and many of the algorithms used for calculating indicators and generating reports are quite complex — even though they are well documented and, in theory, user-modifiable. In fact, it has been much more effective for users to request most modifications from HISP team members, rather than trying to implement them alone. About 70 percent of overall HISP effort has been spent on training, support, and institutional development in general — only 10–15 percent on software development. In addition, open source software may be somewhat more expensive to support over the long term, since different versions may evolve, making it much more complicated to introduce and test upgrades.
 - e) Health departments and the teams that help them implement new computerized systems need to negotiate carefully but forcefully with donors to ensure that any hardware purchased meets national standards and can be maintained and repaired locally. As the experience in South Africa showed, importing equipment from a far often results in long delays and inability to obtain warranty support. It can also make it very difficult for large organizations to manage their fleet of computers because parts may not be interchangeable.
 - f) The **implementation of new software can become a vehicle for change**, including standardization, integration, and more widespread dissemination of health data/information. This experience once again underlines the chicken/egg nature of technical innovation in a health system. Although this is somewhat the corollary of the “walk before you run” principle cited above, in this case it was also true that the process of computerization served as a catalyst for change, by requiring managers to prioritize what information was really necessary and to question standard operating procedures for data collection and use.

- g) The **indicator-based approach** to determining information **needs is an effective way to reduce the number of data elements collected** and to ensure that data collected are relevant. Managers often cited, “Pretoria requests it,” as justification for including extensive data items on reports. Such apparently “simple” requests as “age breakdown by five-year intervals of clients” have huge implications, not only for computer space, but more so for the poor data collector at the clinic or hospital level. Restricting data items to those required to calculate an indicator and requiring that the indicator use be defined in terms of the management decisions it will facilitate help to limit data items to those that are most relevant and useful. A simplified indicator framework, such as WHO’s health problem, service, and critical resource indicator categories, might have been useful to ensure a more even distribution of indicator types and to clarify the linkages among them.
- h) **Improvements in data recording procedures deserve as much attention as reporting and data processing.** In the Eastern Cape, facilities and districts were allowed to evolve various approaches to record keeping and register design. The tick register was designed in one district and spread slowly across the province over four years as nurses tried and liked it. Had it been imposed, it might never have been used properly. Problems of time spent recording data, poor data quality, poor continuity of individuals’ records, and limited use of the data at local level are likely to occur unless more emphasis is placed on this area to enable practical, affordable, and efficient recording procedures.
- i) It has been very **hard to get people to make timely reports** — many prefer annual reports, which some feel are history! The old system was stressed by even providing a report once a year, months after the year had ended. The DHIS is capable of reporting monthly, enabling timely action to rectify deficiencies. Indeed, for less dynamic measures of the system, the annual clinic audit has proven to provide good data on a range of useful measures: personnel levels, service provision schedules, infrastructure, equipment, and objective measures of quality. These supplement the monthly data on service provision, drug supplies, workloads, and disease patterns, which can change rapidly. The system is most useful if it can provide fast and up-to-date indicators of what the problems are and where they are localized.

Future Directions

In spite of the great progress already made, the DHIS can be further improved in a variety of areas. Below are some of the key areas being worked on or explored at this time:

- j) **Use more sophisticated tools to manage the implementation process.** The DHIS is currently being rolled out to the entire country; that means nine provinces, some 180 health districts, and 6000 health facilities in South Africa. The implementation team recently developed a Microsoft Project work plan that is guiding the rollout for this complex process, with a huge number of modifications to fit local needs. This tool ended up being too cumbersome to maintain, and HISP is currently looking at other ways to track progress.
- k) **Focus more attention on data interpretation and use.** This has begun with the development of some standard curricula for data for decision making training of supervisors. In addition, certain provincial and municipal authorities are linking DHIS data to specific procedures such as work planning. District health workers are required to project how much change they expect in key indicators when they put together their work plans — and are then held accountable for the results. Quarterly reviews of financial expenditures in each cost center are now using service data to justify many of the costs: drugs and supplies, patient loads, priority services conducted (TB, STIs, EPI etc.), and so on.
- l) **Further develop the capacity of Provincial Department of Health and national health authorities to maintain the system,** including receiving and aggregating data from all districts/provinces, providing systematic feedback, adapting the software as information needs change, and providing timely support for end-user software troubleshooting support. The National Department of Health should maintain the database on a central server making it available to authorized users at national level and in the provinces. Recently, a combined national data set was created from the nine provincial PHC and nine provincial hospital data sets, enabling users to view data and indicators down to the health subdistrict level from a single database or pivot table. This will facilitate ease of use at national level. National users who need to drill down to facility level must acquire a powerful PC to do so and possibly select a subset of the total data

available in the provincial data files, or they can access the data directly in the provincial data files.

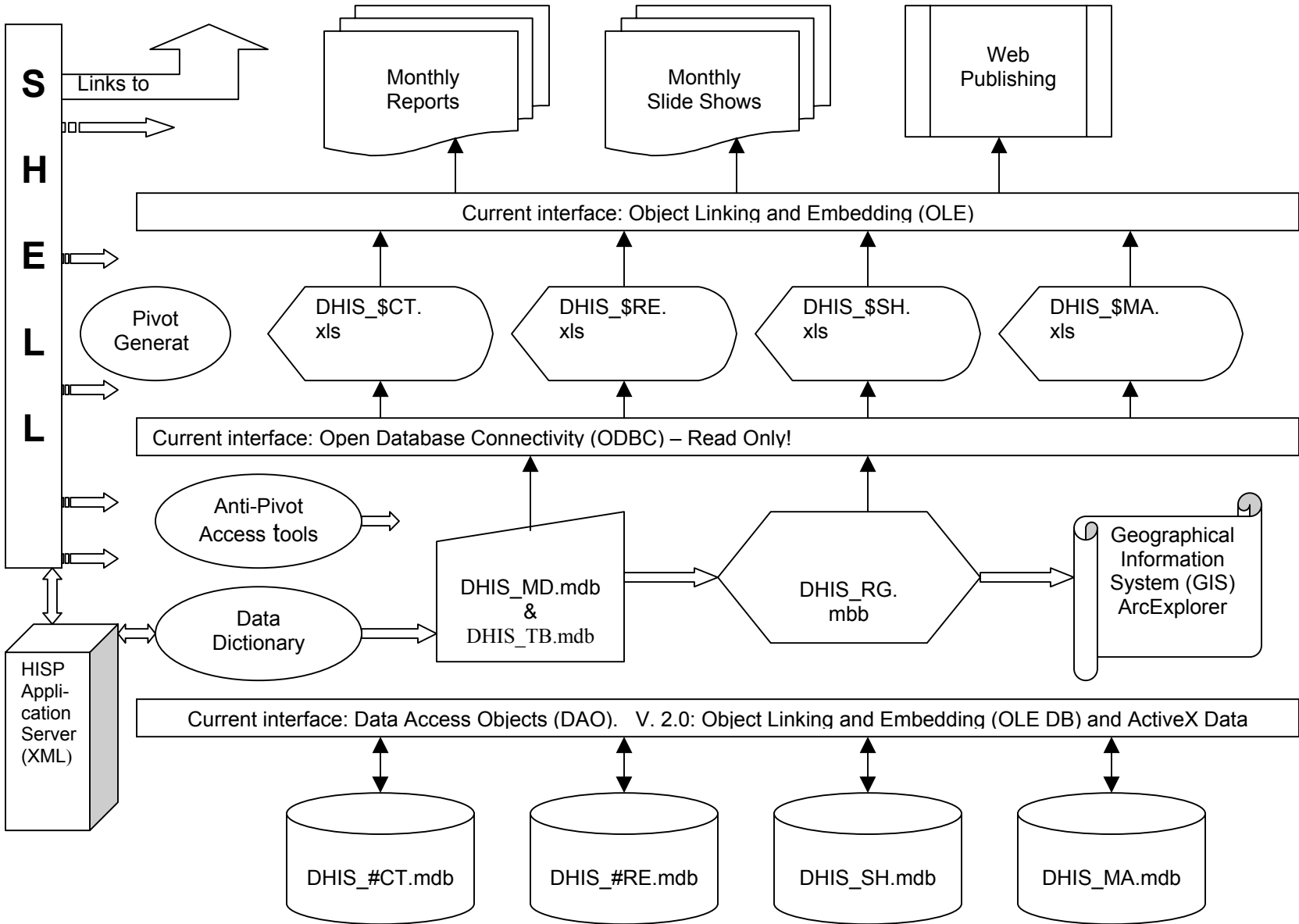
m) **Proceed with the development of a new version of the software.** Version 1.2 of the DHIS software was superseded by version 1.3 in late 2001, and Core modules have largely been kept stable to ensure that users become fully familiar and comfortable with its features. Its current database structure, originally designed to provide maximum transparency for district users with limited knowledge of MS Access, is not efficient for the large data sets gradually emerging at provincial and national levels. For example, the Eastern Cape data file, covering five years of PHC data, is over 400 MB in size and, with individual tables, reaches toward a million records or more. Even if Access formally has a maximum size of 1 GB, the practical limit is probably around 60–70 percent of that. Network installations are also on the increase, but it is not advisable to run the DHIS on Access (thick client) with more than around 10–15 concurrent users. Pivot tables, fully stored in memory when used, are also very RAM-hungry with such large data sets. The new features of the software currently under development include:

- The development of a “DHIS light”, client server or Web browser-based system that will not have the same high computer resource requirements for end users.
- Replace the current DAO¹⁶ interface between the application modules and the data files with OLE DB and ADO,¹⁷ thereby allowing users to store their DHIS data on any SQL-compliant data-base management system with an OLE DB driver (e.g., Oracle, DB2, SQL Server, Sybase, etc).
- Further improvements to the Report Generator and its temporary Datamart tables, to make it easier for end users to understand the file structure and use the data with other analysis tools and report writing tools (ArcExplorer, Crystal Reports, EpiInfo 2000, Excel, etc).
- Bringing the user interface more in line with common graphics Interface or internet browser standards. This includes revising the placement and use of menus and control buttons, changing the layout of data entry screens so that paper reporting formats can be organized in a more user-friendly manner.
- Introducing multilanguage support, so the system can easily be translated into different languages (Spanish, Russian, Chinese, and Mongolian have been done; several Indian languages, Swahili, and Norwegian are partially done).
- Implement a common coding system for health facilities and geographic areas that will enable linking of many more of the computerized subsystems — lab results, finance, personnel, and drug management, for example. The DHIS organizational unit structure has been used increasingly as the South African standard by other information systems, thereby allowing linking of the databases and direct importation of relevant data.

¹⁶ Data Access Objects — the “linked tables” in MS Access are using this technology, which is being phased out and replaced by OLE DB and ADO.

¹⁷ ActiveX Data Objects (ADO) enables one to write a client application to access and manipulate data in a data source through a provider like OLE DB. ADO's primary benefits are ease of use, high speed, low memory overhead, and small disk footprint.

Figure 10 DHIS Application Structure



A Brief Overview of the District Health Information Software

Calle Hedberg



A Brief Overview of the District Health Information Software

This report was prepared by Calle Hedberg.

Introduction

The District Health Information Software, developed by the HISP team in accordance with the principles espoused by the "Free and Open Source Software" philosophy, is freely available to anyone who wishes to use it, as long as it is not abused for commercial purposes. Furthermore, open software may be freely probed, customized, and modified. This is the cheapest way of generating software suited to the country's needs. Whether the software has been used in South Africa or other countries, anyone with programming skills who wishes to make changes is encouraged to do so. All such developers are encouraged to share their improvements in turn as Open Source.

A Brief Description of the Program

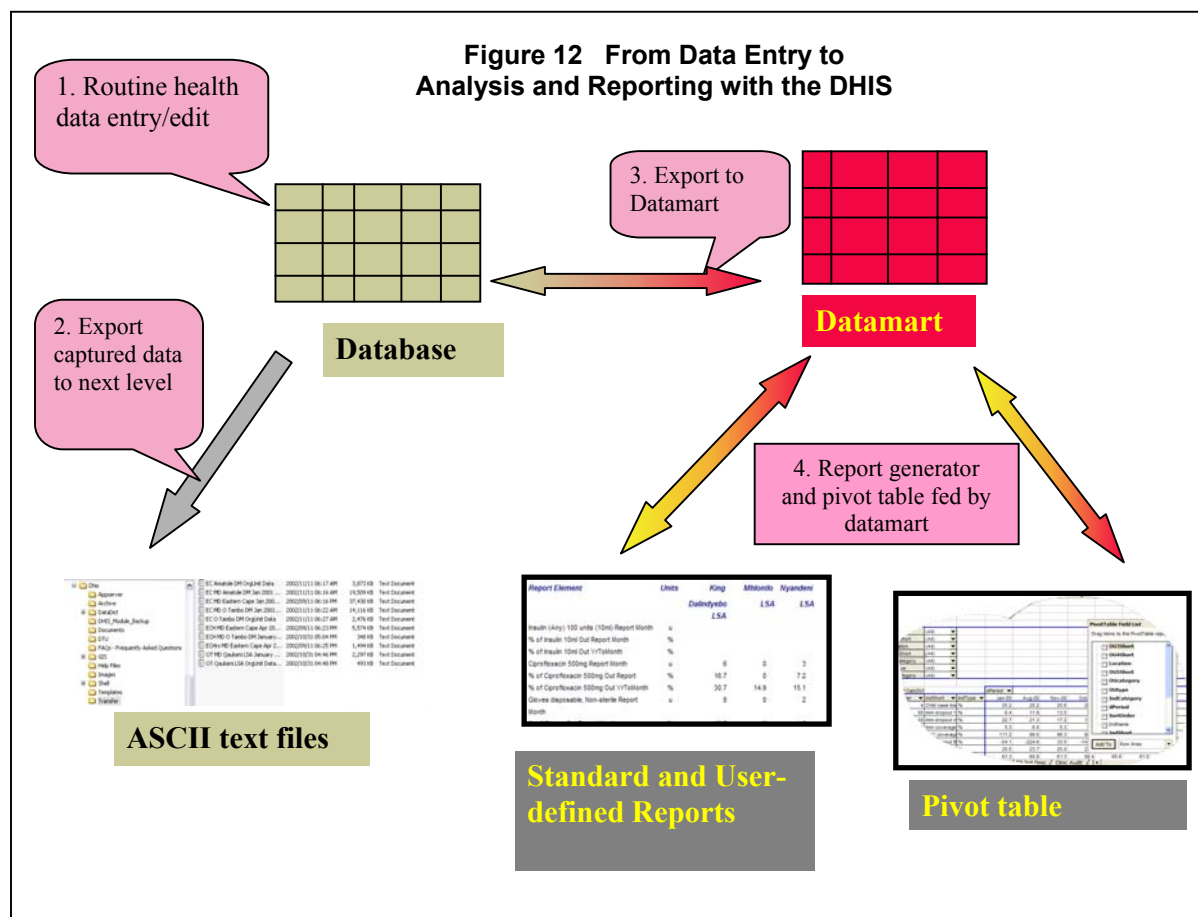
Its high degree of user definability (based on the premise that the information system must contain data relevant to the smallest organizational unit if the user is going to use the system to evaluate his or her services) has led to its being translated into other languages for use in those countries. Currently, supported languages include Spanish (Cuba), Portuguese (Mozambique and Angola), Mongolian, Russian, and Chinese. Efforts are underway to complete translation into Swahili (Tanzania), Telugu (Andra Pradesh, India), Kannada (Karnataka, India), and Norwegian. The screenshots below show the English, and Spanish versions of the routine/monthly data module (Figure 11). Versions are also available in Portuguese and Russian.



The software allows clinics and hospitals to enter data relating to their services if they have access to a computer. However, because not all facilities have a computer on site, the data are usually entered into a computer system in health district or subdistrict offices, then transmitted electronically to provincial and national departments. Principles used in the development of the software include:

1. Users at a local level should be able to adapt the software system to suite their needs. Hence, in addition to data entry (Step 1 of Figure 12 below), the system allows users to:
 - add new facilities (organisational units) and
 - define new data elements and indicators, define new validation rules, and set maximum and minimum limits for data entry.

Once data have been entered, they need to be exported to the next level in the health system (district, municipality, or province). When data are exported (step 2 in Figure 12) the system allows the user to determine which data elements and indicators need to be exported. Thus, the principle of the information pyramid (whereby not all information is needed or relevant to all levels) can be applied by the software. On the other hand, if facilities are added, these are included in the exports so that data integrity at higher levels of aggregation is maintained.

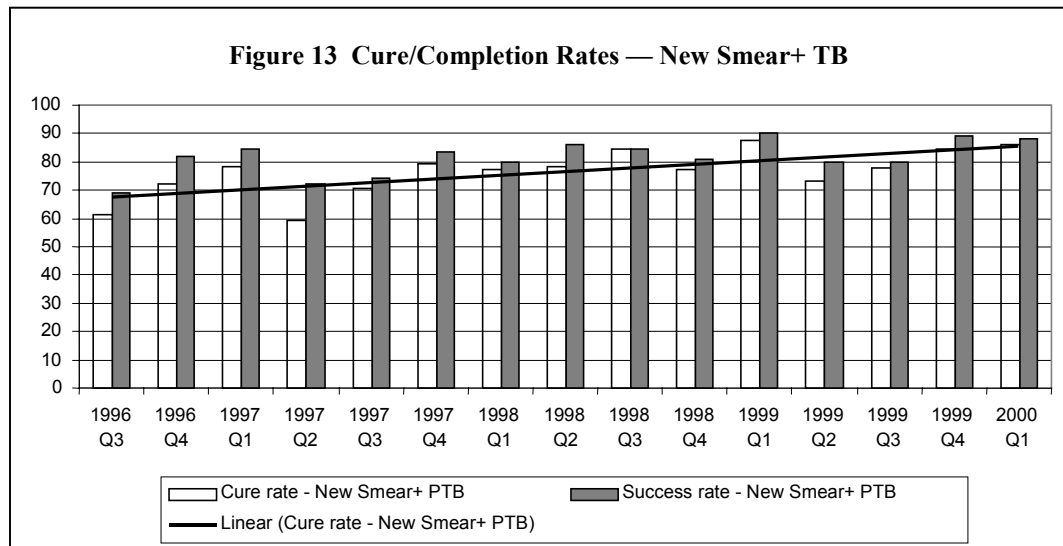


2. Users at all levels should be given feedback on the data that are entered into the system. To this end the system uses a transient database (datamart — step 3 of the diagram) from which users can generate reports (step 4 of the diagram). Reports can be tailored to include certain data elements or indicators, from various sources (monthly data or routine survey data). Health indicator sets can also be interfaced with the free ArcExplorer software that allows data to be presented as thematic maps or analyzed further in Geographical Information

System software. Generation of pivot tables is another tool that allows data to be presented in various ways.

3. The DHIS supports not only routine monthly or quarterly data, but also the capture and analysis of semipermanent data (population estimates, equipment, infrastructure, number of personnel, services provided per facility, etc.) and survey/audit data. This stems from the premise that not all information needs to be collected on a routine basis — some can be collected annually or every six months through regular surveys, and some semipermanent data can be updated whenever changes occur. It is important to recognize that surveys or research projects are often conducted in certain areas for limited periods, and our experience is that most of these data are later lost because they are not linked to existing data collection tools or an integrated HMIS. It is also our experience that, for instance, population mid-year estimates, which are crucial for population-based indicators and public health strategies in general, might exist, but they are often in a format and location to which health managers have no easy access.

One clear success story is from the South Peninsula Administration in Cape Town: SPA used the DHIS as a core tool for bringing its TB cure rates up from 61 percent in late 1995 to a stable 85 percent in 2001. This approach is spreading to other areas. See Figure 13.



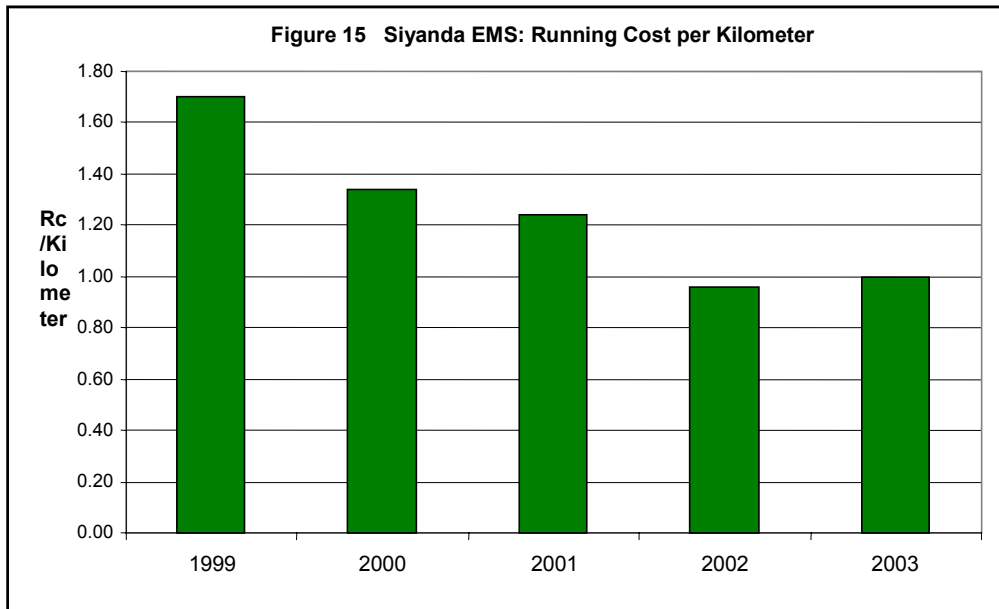
4. The system should incorporate patient data where appropriate, either by interfacing with other patient record systems or through a Web-based special patient (SP) module linked to the routine data module. Figure 14 below shows an integrated TB/HIV register based on the SP module, which is still under development.

TB/HIV Register : Table (VIEW DATA)		record 1 of 1	
Patient	Sputum Results	Culture Results	Outcome
Sub-District	SPM/Strfontein Sub	Facility	DP Marais SANTA Hosp
Registration No	1434	Registration Date	11 Aug 2002
Transfer/Moved In?	No		
Surname	Hedberg	First Name	Calle
Sex	Male	Date of Birth	10 Nov 1956 Age 45
Street Address	3 Pillans Road		
Postal Address	3 Pillans Road	Postal Area	Rosebank
Treatment started	11 Aug 2002	Treatment commencement time (days)	1
Regimen	2HRZE-4HR	Disease classification	Both
Disease site	Bones/Joints (A18.0)	Patient category	New patient

Buttons: Save, Delete, Add, Print Preview

Figure 14 Integrated TB/HIV register based on the SP module

- We view the DHIS as a Management Information System that will include financial and personnel data as well. This will provide managers with a user-friendly tool to access integrated management information. The financial and personnel modules are expected to be incorporated during 2003.
- Some provinces are using the DHIS to track their transport services. Figure 15 above indicates how, through tracking vehicle use and expenses, using the DHIS, the cost of services has been reduced over the years.



Conclusion

The brief outline of the DHIS software shows that we have an emerging global network aimed at fostering and sharing health information systems solutions on a free and open source basis. Our South African team consists of professionals with a great deal of experience and a proven record. This record includes considerable work related to developing and implementing information systems.

We regard our overarching vision of an integrated but modularized public health information system, based on free sharing of solutions and public access to all anonymous health data, as a crucial factor in combating HIV/AIDS, with its many opportunistic infections and widespread damage to the social fabric of society. Our public health approach is reflected in our efforts to also interface health information systems with financial/personnel systems, physical infrastructure (water, sanitation), standard of living (poverty, welfare), and disease mapping and analysis, oriented particularly toward cross-border flows of disease organisms and their hosts (patients).

**Field Visits and Reflections on the District Health Information
System in South Africa**

Vincent Shaw



Field Visits and Reflections on the District Health Information System in South Africa

This report was prepared by Vincent Shaw.

Introduction

On the first two days of the workshop, participants traveled throughout South Africa to review the District Health Information System (DHIS) and meet data collectors, users, and managers at all levels of the health system. Presented below is a summary of the approach taken during the field visits and key issues arising from the discussions that followed on the third day of the workshop. We conclude with a brief summary of the five themes that emerged from this phase of the workshop: data collection and quality, data utilization, human resources, training aspects, and the role played by the software.

Methodology

The first two days of the RHINO workshop were allocated to site visits. A total of 10 teams covered eight provinces in South Africa (from a total of nine) and the National Department of Health. In each case the national or provincial staff, assisted by Health Information System Programme (HISP) staff, determined which sites would be visited. Site selection sought to strike a balance between large and small facilities and urban and rural locations, keeping in mind travel distances and time considerations. Two teams visited Eastern Cape Province because many facility-based staff were interested in taking part in the field portion of the workshop. In addition to facility visits, teams visited district and provincial offices to get a sense of information use at these levels. Each team received a briefing on the development of the health information system in South Africa (see case study provided in this report) and a standard set of questions to guide their visits and to explore the use of information in the facility and at the district, provincial and national levels (Annex C).

Following the site visits, teams traveled to Mpekweni in the Eastern Cape. On day three of the workshop, participants reflected on the site visits and related this information to their own country experience. Workshop organizers established new small groups that included a representative from each visiting team. Two different sessions were held to consider facility-level issues and district/provincial-level issues. However, in the end, most groups found this distinction artificial and compared experiences in a more integrated manner. Following group presentations, Mr. Calle Hedberg of HISP provided a detailed presentation on the District Health Information Systems (DHIS) software. Workshop facilitators documented group discussions and presentations from the entire day. These findings are summarized below, followed by a summary of the DHIS software presentation.

Key observations from group discussions

1. Data collection and data quality

The South African case study provided a number of useful lessons and principles for improving data collection.

- The national-level Department of Health coordinated a process that resulted in widespread agreement on a minimum data set. This data set prioritizes the data to be collected by all facilities. In addition, the process resulted in an agreement that lower levels (province, district, and facility) could add additional data to their own data set if they considered them relevant for use at their level. These data are not necessarily reported to higher levels.

Group discussion focused on the difficulty of striking a balance between collecting detailed information on district health activities and ensuring the simplicity of the system. Some countries are required to collect data by age groups and sex, and there are implications for these requirements for the information systems. These types of systems tend to be more sophisticated but often lack integration because of the detail required. The larger the data set, the more difficult

it is to ensure data quality. Participants agreed that establishing a minimum data set contributes to improved data quality.

- In South Africa, significant strides have been made toward development of *integrated* data sets. In general, participants noted that the various vertical programs had been brought together under one integrated information system. As a result:
 - There were integrated data collection tools, which allowed for collection of core data from multiple services,
 - There was a single data flow policy for all data, including TB data, maternal data, and child health data,
 - There was an effort to ensure that different programs shared data collection tools and reporting mechanisms (with some exceptions, e.g., malaria and TB),
- Surveys complement routine data. It is important to have access to survey data through the same integrated information system used under the DHIS,
- Private sector data were not always included in the national data set. In South Africa, the role of the private sector was generally smaller and less relevant (in terms of public health issues) than it was in other countries,
- Participants observed that data quality was problematic in some areas of South Africa, particularly in relation to hospital data sets. It was recognized that this issue could be addressed through increased use of data and improved supervisory programs.

2. Using information for action

There was widespread recognition that, in the majority of facilities visited, information use in South Africa was at an advanced stage. One of the groups reported that “information use is becoming a feature of the health system in South Africa.” Another group reported that “information use is high on the agenda; there is a high degree of ownership of the information.” Eastern Cape visitors reported displays of indicator graphs that nurses used to determine health actions and address problems, although the relevance of some of these actions could be questioned. One group reported the high level of understanding that nurses displayed regarding the data they were collecting. Participants felt that this understanding resulted from the fact that the nurses themselves collected the data (rather than a clerk or other staff member, as occurred in other countries). Thus, they understood the meaning of data elements and their use.

It appeared that use of health information was less common at the district and provincial levels. The exception was in the Eastern Cape, where management had demonstrated diverse use of data to inform decision making. Participants felt that lack of information use at higher levels was explained in part by the complexity of the information. Health and information managers required additional skills in order to extract data, whereas at the facility level, the systems are paper-based, requiring only data interpretation and graphing/arithmetic skills. The national level was also criticized for not using routine health information in decision making. One group commented on the lack of coordination at the national level in collating information from provincial levels and the poor distribution of data to program managers. Lack of attention to these issues adversely affects managers’ access to data.

- There was some criticism that a few indicators were not actionable and should be changed. Many groups identified the need to integrate financial and human resource data with service delivery data to improve resource allocation.
- Making comparisons between different facilities at the district level (and at higher levels as well) was useful for motivating facility staff. However, participants concluded that feedback did not occur as frequently as it might and that, in general, feedback systems required strengthening. One of the groups recommended using “positive deviants” (i.e.,

those people who use information effectively) to help encourage poorly performing facilities to change their behavior. This strategy expanded the group of influential players and created opportunities for them to share their approaches and attitudes with their peers.

3. **Human resources**

A number of observations were made about the human resources component of an information system:

- To ensure stability the correct staff should be appointed. In South Africa, they found it more effective to train nurses as information officers than to train people with an information technology (IT) background. Nurses tend to stay in the health profession, while the IT people tend to move up the ladder in the IT world,
- Many provinces in South Africa appointed district information officers at an early stage. This decision enabled information to flow continuously between the facilities and the province and made information available to managers at the district level,
- The roles and responsibilities of various staff should be clarified. It appeared that this approach was well implemented because the DOH defined job descriptions at various levels. This approach is currently being strengthened by the introduction of performance agreements (that measure the achievements of the various players) and the TALI (Tool for Assessing Level of Information Use), which is used as a guide for assessing the use of information at facility, district, and provincial levels,
- Ongoing in-service training is important for keeping staff motivated and improving their skills,
- Supportive supervisory visits are an important component of any information system. Facilities demonstrated repeatedly what they had learned through supervisory visits and discussions between supervisors and facility staff. In many facilities, the visiting information officer taught staff to draw graphs correctly or helped to fill in TB returns. In other cases a supervisor discussed appropriate actions resulting from observations of data that appeared on a graph. Not only did supervisory visits provide opportunities for learning, they also provided opportunities for motivating staff.

4. **Training of staff on information systems**

Training and ongoing development was highlighted previously. However, field visitors suggested that targeted training should be held for different types of managers at different levels:

- At facility level, staff require skills in drawing graphs, analyzing data, and making appropriate decisions. Ongoing training in basic math skills was also required since many staff did not acquire these skills in school or during their undergraduate education,
- At district, provincial, and national levels, staff require skills to ensure computer literacy and information use.

5. **The role of the software**

The DHIS software developed in South Africa provides a great deal of flexibility in terms of:

- the ease of adding data elements and indicators, and
- the addition or removal of facilities as they were opened, incorporated in to other facilities, or closed.

In addition, it was acknowledged that the software had contributed to change within the health system by:

- providing flexible systems that could accommodate the needs of facility and district level staff related to their role in using information for action. These systems also addressed the information needs of national managers,
- providing a basis for determining catchment populations to calculate selected indicators. Many groups debated this issue at length, and many countries reported similar difficulties in determining catchment populations. The groups accepted, in general, that, although

the basis for determining catchment populations in the DHIS was not perfect (especially in urban areas where the denominator problem is always problematic), it provided sufficient accuracy;

- emphasizing the need for a uniform minimum data set that rested within a larger data dictionary of data elements and indicators.

The participants acknowledged the strong relationship between organizational factors and the smooth functioning of the information system. For example, in the Western Cape, unlike the rest of the country, the health system is still not integrated. Consequently, the information system is fragmented, data collection systems are not aligned or integrated, and collation of data is complicated by diverse lines for reporting and accountability.

Conclusions

Most participants described the field visits as an extremely valuable experience. As noted by one participant, the field visits “really gave us a flavor for the rest of the workshop.” The shared field experience set the tone for the discussions that ensued, not only on day three, but on the final two days as well. Participants found themselves exploring their own country experiences and comparing them with their observations during the site visits. In addition, the South African system benefited from a peer review, received a number of useful suggestions for improvement, and offered strategies for improving the performance of health information systems in other countries.

Thematic Group Discussion Reports



Theme 1: The Integration of Different Types of Routine Health Information Systems

Theme 2: Assessing a Health Information System (HIS)

Theme 3: Process of Selection and Development of Indicators for an HIS

Theme 4: Ensuring and Improving the Quality of Routine Health Information

Theme 5: Making Routine Health Information Relevant to Action

Theme 6: Communication of Information to Decision Makers in the District

Thematic Group Discussion Reports

Introduction to Thematic Group Discussions

During the fourth and fifth days of the workshop, participants split into six groups according to participant-selected themes. Each group spent a day and a half focusing on its particular theme, beginning by defining the link between the theme and health information system performance. They applied the PRISM concept if it seemed useful and informative. Through discussion, peer review, and ranking of conclusions, each group produced a series of strategies for addressing the thematic issue, defined words of advice for health information system developers and managers, posed a list of outstanding research questions, and made recommendations for action on the part of the Routine Health Information Network (RHINO). Summaries of these group discussions and their strategies and recommendations are found below.

Theme 1: The Integration of Different Types of Routine Health Information Systems

Facilitator: Theo Lippeveld (Principal Investigator Measure/JSI, Boston, USA)

Co-facilitator: Vincent Shaw (Program manager, HISP/University Western Cape, South Africa)

Participants

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Presentations

Syed Mursalin (Pakistan)

Jorn Braa (India)

JVG Krishna Murthy (India)

Defining the Issue

Routine health information systems (RHIS) in most countries have been centrally planned and managed. Indicators, data collection instruments, and reporting forms usually have been designed by centrally located epidemiologists, statisticians, and program administrators, with minimal involvement of lower-level line managers and providers of health services. Due to the “stovepipe” setup of most MOH central departments, separate “program information systems” were created, focusing on one specific disease (e.g., diarrheal diseases), a specialized service (e.g., “family planning information systems”), or a management subsystem (e.g., “drug management information system”), instead of addressing management functions in a comprehensive way. These “vertical” information systems mostly exist side-by-side with the “general” routine health information system, which is considered insufficient and incapable of delivering the data needed for program management. Centralized planning and lack of integrated HIS management, as well as donor pressure, compound the fragmentation (between central and district, between primary care and hospital information) that is the hallmark of systems with numerous vertical programs.

The issue of integrated or fragmented information systems is particularly important at district level. Recent acceleration in the decentralization of district health systems in many countries compels information designers and managers to focus on district-level RHIS development. In decentralized systems, the central level often delegates strategic planning and resource allocation functions to the district. To assume their new functions, district management teams require adequate comprehensive information support. Clearly, Health Information System subsystems that are managed separately (“vertically”) can provide real information support for central programmatic decisions, and the quality of information generated is often better than that of a generally managed information system. However, the net result of HIS fragmentation on the district health systems has been catastrophic:

- Routine health information systems have become chaotic and bothersome, due to redundant data collection and multiple report forms and data transmission problems. Data collection takes an unacceptable amount of care providers time, resulting in poor data quality and availability.
- District managers lack a comprehensive picture of the health situation, resulting in poor use of information for planning, implementing, and monitoring health interventions.
- Most of all, vertical program information systems, by their disease-oriented approach, have endangered the holistic perspective of basic health services, where integrated information support can be the connection (or glue) that links individual and community health interventions.

Summary of Group Discussion

Initial group discussions focused on the definition of integration and on frameworks to explore factors that enable and disable integration.

Definitional issues

Integration is a difficult concept and has been defined in various ways. All participants agreed that integration is NOT the same as unification. We provide below the definition proposed by a WHO Study Group in 1996¹⁸:

Integration is “the process of bringing together common functions within and between organizations to solve common problems, developing a commitment to shared vision and goals, and using common technologies and resources to achieve these goals.”

But, integration is a multidimensional concept. While the former definition is logical, integration can also be defined functionally (bringing together functions) and organizationally (integrated district health systems).

The objective of integrated HIS is to provide easy and equal access to relevant information for all stakeholders. Integrated HIS is only one dimension of integrated health systems, but it could ultimately drive functional integration of services.

Analytical Frameworks

The multidimensional nature of integration also led to the group to consider various frameworks to study the strengths and weaknesses of integrated RHIS.

1. Using the “Prism Model”

The group agreed that the issues related to integration are much more linked to the behavioral and organizational aspects of the prism model than to the technical one. For example, it is quite feasible to integrate data sets from a technical point of view. Integration is also not necessarily the collapse of various systems into a single system. Sometimes it is important to maintain separate systems. Due to lack of time, the group focused mostly on the organizational factors linked to integration, while acknowledging that further study of the behavioral aspects is necessary.

2. The functional perspective

From a functional perspective, integration can be examined in terms of coordination among various routine subsystems that are in use:

- Health services information systems (e.g., number of visits, vaccines administered, quality of care information)
- Special program reporting
- Epidemiological surveillance, which can be part of RHIS, but can also be part of survey data sets
- Administrative and resource information systems, including financial, personnel, infrastructure
- Vital event registration, which exists mainly outside the health services
- Community-based information systems

3. The organizational perspective

Finally, from an organizational perspective, integration can be studied by level of intervention: community and patient/client level, facility level, district level, intermediate/national levels, and international level. It can also be studied at each of these levels (horizontal integration) and between levels (vertical integration).

The group decided to focus on the organizational perspective of integration.

Major Principles and Issues Related to Integration

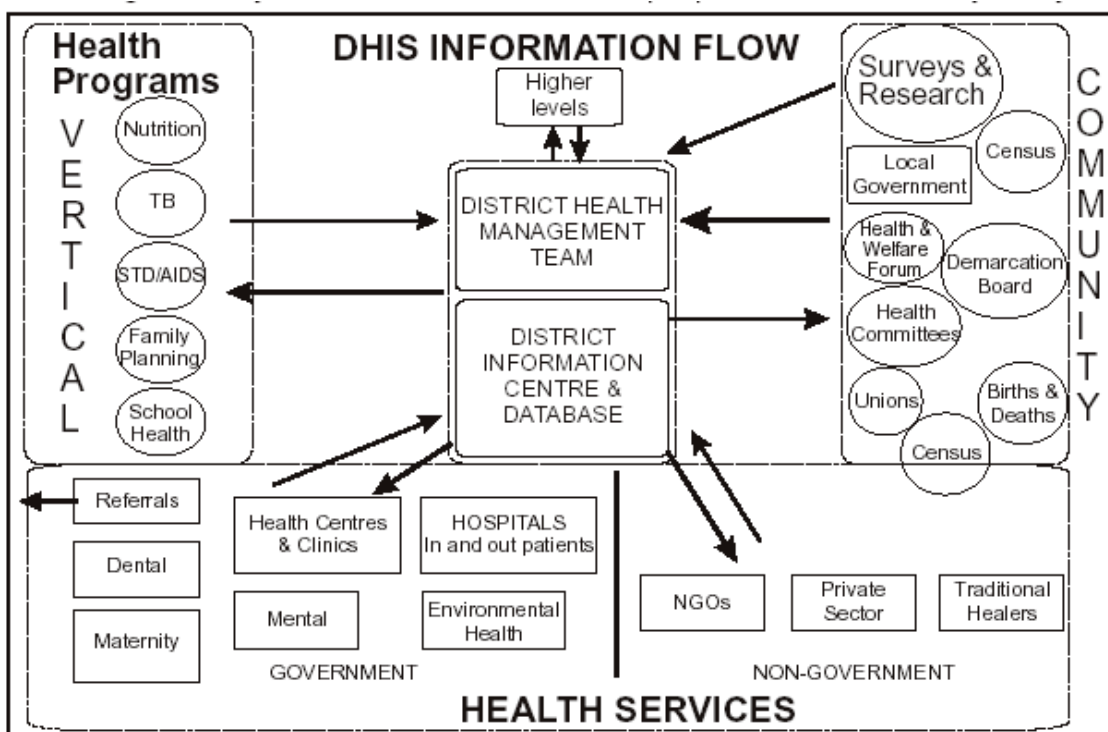
Horizontal Integration

1. Patient/client and community level

¹⁸ WHO. Integration of Health Care Delivery. Report of a WHO Study Group. WHO Technical Report Series No 861. WHO, 1996.

- Integrated information at this level is very important for maintaining a holistic perspective toward health. It focuses on the individual's continuous lifelong contact with health care services, from the cradle to the grave, as well as his or her contact with other social aspects of life (welfare, sports, education, etc.).
2. Facility level
 - At the primary level, integration, translated into a one-stop-shopping approach, can greatly enhance quality and continuity of the services provided.
 - This can be achieved by integrated exchange of information among the various programs (TB, HIV, STI's) and among types of services (e.g., clinic and lab, transport, PHC and hospitals).
 - Currently, in many countries, major fragmentation exists in data collection and reporting systems at facility level.
 3. District level
 - The district is the central information hub. Ideally all data (from both routine and nonroutine data collection methods) pass through it and should be integrated into one functional database.
 - Major challenges are:
 - Information from private health services
 - Access to resources
 - Access to knowledge databases

Figure 16 DHIS Information Flow in the South African HIS Is a Good Example

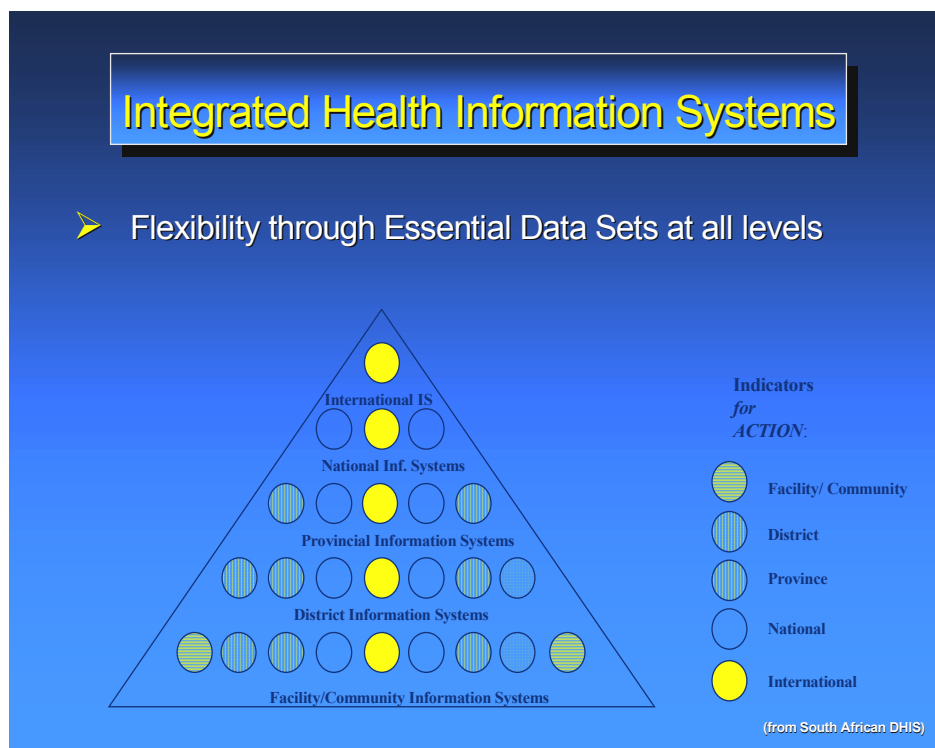


4. National/International levels
 - Integration at these levels is less important.
 - The national/international levels can play a major role in regulating and establishing policies to foster integration at lower levels and in controlling the vertical programs.

Vertical Integration

From a vertical perspective, integration requires the use of an essential data set that links various levels. In this instance, information is collected at the facility level and transmitted up to the national level, via the district level. Figures 16 and 17 depict this flow.

Figure 17 Essential Data Sets Flow Throughout the Health System



The group defined two principles for vertical data transmission:

- Always maintain the ability to disaggregate data (which is easy enough if computerization is possible).
- Additional data at each level should be collected and transmitted to the next level only if they are used at that level.

Other Issues

- When new and/or innovative interventions are introduced in the health services, initially they can be supported by a vertical information system. Integration of these information systems can be considered as soon as the interventions are well established and brought up to scale.
- Teams working on integration must identify ways to deal with conflict and reach consensus when building integrated HIS (e.g., strong opposition from vertical program managers).
- Integration should not be assumed to be an all-encompassing solution. In certain circumstances, well-functioning vertical HIS should be allowed to continue.

Strategies for Building Integrated HIS

The group proposed the following design strategies to build integrated HIS (Table 3). The three priority strategies are in bold print. The group felt that these three strategies represent the fundamental building blocks of an integrated information system. An example of these strategies can be found in the South Africa case study. The first column indicates whether strategies address technical, organizational, or behavioral as presented in the Prism diagram (Figure 6).

Table 3 Design Strategies to Build Integrated HIS

Prism	Strategy
Organizational Behavioral	<ul style="list-style-type: none"> • Undertake stakeholder analysis followed by consensus-building meetings (donors-national-district-community)
Organizational Behavioral	<ul style="list-style-type: none"> • Set up demonstration projects to promote integrated models
Organizational	<ul style="list-style-type: none"> • Draft a master plan for developing of integrated HIS, including <ul style="list-style-type: none"> ○ vision ○ indicators/data-dictionaries ○ data flow procedures ○ open systems standards ○ roles and responsibilities ○ three-year rolling plan • Create a structure at a national level to monitor implementation of the plan • Ensure solid leadership to back the plan • Donors should respect the plans of the country
Technical	<p>Design specifications for integrated HIS:</p> <ul style="list-style-type: none"> • Create an essential data set from community to national levels • Identify specific data needs related to each level, with the understanding that only data that can be used by the District Management Team can be collected at each level • Computerization in support of integration: <ul style="list-style-type: none"> ○ standard data dictionaries ○ keep raw data accessible ○ flexibility of applications to add indicators/data elements ○ hardware agnostic ○ move toward platform independence ○ use GIS for data presentation ○ develop functional database at district level that incorporates information from surveys, routine, and other sources of information (see DHIS information flow diagram above)
Technical	<p>Human resources and capacity building:</p> <ul style="list-style-type: none"> • Appoint District Information Officer (DIO) with required skills. A health background is preferable. Ensure career development and alignment with the District Management Team • Ensure training of all staff (District Management Team as well as facility level) in using information for action
Organizational	<p>Integration of public-private HIS:</p> <ul style="list-style-type: none"> • Regulate reporting requirements, e.g., link to licensing and accreditation • Collect information via health insurance • Define notifiable diseases by law • Provide incentives e.g., FP/STI/Immunization provided free if reporting

Advice (Words of Wisdom)

- Do not overhaul existing health information systems; use an incremental approach.
- New information needs should be introduced with respect to the master plan.
- Maintain transparency, openness, and access to data.
- Develop “change management” guidelines.

- Develop guidelines on how to “horizontalize” vertical program HIS, and on how to resolve conflicting stakes that work against integration.

Research Topics: Unanswered Questions

- What should be integrated and what should not, and at what level (highest priority)?
- Conduct health impact studies to document evidence of the benefits of integration.
- Research and assess existing open source software (OSS) applications for integrated DHIS for source copying.
- Develop case studies on integrated HIS .
- Is it possible to integrate HIS under vertically managed health systems?
- How can public and private sector data be best integrated?
- How do you integrate service delivery data with surveys and vital statistics data?

Actions for RHINO

The group proposed the following actions to be undertaken by RHINO.

- Establish and disseminate documentation on “best practices” related to integrated health systems.
- Establish and disseminate documentation and training manuals on tools, manuals, and policies related to integrated HIS.
- Create a “model data set” produced by an integrated district HIS.
- Create a repository of open source software applications.
- Promote donor collaboration toward integration.
- Organize study tours to best-practice sites for integrated district HIS.

Theme 2: Assessing a Health Information System (HIS)

Facilitator: Randy Wilson, MSH

Co-facilitator: Marius Gouws, HISP

Participants

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Presentations

Dr. Yadollah Mehrabi (Iran)

Juma Hemed Lungo (Tanzania)

Defining the Issue

Whenever you embark on a project to develop a Routine Health Information System (RHIS) some aspect of the system already exists. The idea is not to overhaul systems completely unless absolutely necessary. In other words: "If it ain't broken, don't fix it." The main reason for conducting an assessment is to identify particular components that need additional strengthening to make the effort more need-based, manageable, and affordable.

Through the Assessment, an effort is made to find out how well the current system works and to describe the various components of the system and the organizational environment. The Assessment confirms (or helps to define) health program and service functions at different levels and the extent to which they are (or are not) supported by information systems already in place. These functions normally include health surveillance, planning, information for managing programs, services and institutions, human resources, quality assurance, supervision, performance monitoring, coordination/communication, financial management, and logistics.

The purpose of an RHIS assessment is to provide quantitative and qualitative measures of the current performance of a health management information system to identify functional problems that can then be used to guide the design of improvements to procedures for:

- recording and reporting;
- data analysis, presentation, and communications; and
- using health data for decision making and action.

Depending on the perceived problems within a given country or organization, assessments may focus on a variety of topics, including data management processes, availability of resources, information needs, health worker attitudes and behavior, availability and use of information technology, data flows, organizational culture/behavior with respect to collection and use of data, etc. Similarly, the local situation should determine whether the scope of the assessment is limited to a single information subsystem or takes a broad look at multiple information subsystems.

How Does Assessment Affect Performance?

A well-designed RHIS Assessment can affect performance in several ways:

- A participative assessment process helps national staff to develop skills in data collection and use that they can apply to future assessment work and strengthens their resolve to use RHIS data as a basis for action.
- An RHIS assessment that focuses on health system functions (and the data management procedures that support them), as well as on behavioral aspects related to data use, can help to identify performance-related issues that need to be addressed and to ensure that the data collected are relevant.
- Stakeholders who are actively involved throughout the assessment process are more likely to shape the conclusions and support implementation of recommendations for system enhancement.

Summary of Group Discussion

Key Components of Assessment

Following a brief introduction on the theme, participants shared their own experience in assessing information systems. Approximately 40 percent of participants had conducted or participated in assessments before. A group brainstorming followed to use the group's collective experience to identify key issues to consider when designing an assessment (based on the experiences of members in the group):

1. *Scope of Assessment*

The group felt that assessments should consider the whole information system, including the community component and other health services.

- Type of systems
 - PHC, hospital, civil registration, etc.
- Computerization and/or manual processes
- Levels of the health system on which the assessment focuses — service delivery, referral, district/provincial administration, national — or a mix of levels

2. *Topics Covered by Assessment*

The following wide-ranging list requires prioritization. Typically, stakeholders can help by identifying “perceived problems” with the existing system that the assessment can then confirm or reject.

- **Data flows:** Are there bottlenecks? Do the right data get to the right people at the right time?
- **Implementation process:** How was the current system introduced? Could this explain why users are or are not using the system effectively?
- **Purpose:** Does the current system have a clear purpose, and does it meet needs at different levels of the health system?
- **Human interaction:**
 - What training have system users received?
 - Is the interface of the computer system user-friendly? Is the paper system easy to use?
 - What are staff attitudes toward the system?
- **Data set:**
 - Design: Was it built around carefully selected indicators or just an accumulation of data elements?
 - Quality: Are indicators and data element clearly defined and useful?
 - Size: Is the data set too big to manage effectively?
- **Design of recording and reporting formats:**

Are these instruments appropriate and easy to use? Do they assist health workers with case management? Do they facilitate data aggregation? Are instructions available and understandable?
- **Level of integration**

To what extent does the system facilitate comparison of data from different health services, with population statistics, drug and facilities management, etc.? If health service delivery is integrated at the facility level, are the reporting procedures also integrated? If there are specialized departments or staff functions (e.g., TB control officer, District Pharmacist), does the system provide them with a subset of data that meet their specialized requirements?
- **Use of the system**
 - Should not be limited in how they use the system to collect data and report them
 - The assessment should include data analysis, interpretation, and action

- **Indicator selection:**

To what degree do the selected indicators truly reflect current and foreseeable information needs? In particular, they should support monitoring of community, district, and national priority programs, some of which change over time.

- **Resource availability:**

Do staff have registers, calculators, paper for graphs, forms, manual document storage/retrieval, trained staff necessary for proper use of the system? This sometimes includes a cost analysis to estimate the true resource costs of running the system. There may be cost savings to gain or new resource requirements.

- **Environmental factors:**

What support exists for information technology (IT) within the health sector and from other public/private sector entities? How reliable is the infrastructure such as electricity and security? Are there appropriate policies about data management and privacy and enforcement of policy guidelines? How does the organization value data and proper execution of IT functions?

- **Workload of health workers spent on HIS:**

Understanding the workload helps determine whether the current system is overburdening health workers. It can be used as a baseline for measuring the impact of changes in data management procedures in the future.

3. *Assessing Data Requirements*

The group discussed the importance of conducting an indicator selection and/or tracer selection exercise in close coordination with any assessment (see Theme Three). Participants were advised to consider data requirements during an assessment. Excessive effort may be expended assessing a system that is collecting the wrong type of information.

4. *Selecting the Assessment Team*

Participants gave examples of the composition of assessment teams they have been involved with:

Example 1 (Iran)

Health workers from each level
Program managers (district and province)
Technical information officers

Example 2 (KwaZulu/Natal, South Africa)

District managers
District information officers
District health workers

Example 3 (Tanzania)

Computer systems administrator
Public health staff from the university

The use of external evaluators was also mentioned. An example was shared of an information officer from one country conducting an assessment in another country (by WHO). Participants reported that external assessors were crucial to ensuring independence and objectivity. Broad-based participation was seen as the best implementation strategy of performing an assessment. This ensures:

- better information
- buy-in
- clearer understanding of causes and solutions

5. *Assessment Methodologies Used*

The group brainstormed about the different ways in which data could be collected for an RHIS assessment:

- Questionnaires or assessment checklists are important for ensuring that different assessment teams cover the same ground and that responses can be aggregated and compared easily.
 - Interviews focus on attitudes, understanding of policies and procedures, definitions of indicators, anecdotes about uses of information
 - Observations of tasks and to assess actual practice (samples of graphs and charts produced, observation of effort required, efficiency of document storage and retrieval)
- Group process/meetings
- Data audits are included in RHIS assessments more frequently to overcome the perception of poor data quality associated with the routine data collection system (completeness and consistency). Techniques for conducting audits were discussed for both computer systems and manual systems.
- Flow charting
- Document review
 - Work plans
 - Training reports, minutes of meetings, policy
 - Instruction manuals and system documentation
 - Other assessment reports and program evaluations

The need for a combination of techniques was noted. This is particularly relevant when sensitive issues such as attitudes are investigated.

Assessment of information use is also difficult since the term, “use” is not easily defined. Ideas relating to observation, role-play, feedback, reviewing minutes, etc., were explored.

6. *Immediate Feedback*

It is advisable to provide immediate feedback to interviewees. Too frequently, the subjects of an assessment (health workers, district medical officers, and health facilities in general) receive no tangible benefit from their participation. Examples of how this feedback can be done include:

- Upon identifying errors in data tabulation or aggregation, assessment team members can demonstrate how the procedure can be done correctly.
- Use a simple checklist grid covering each of the major topics in the assessment to provide an overview of the results to all staff at the conclusion of the site visit. A copy of this grid can then be left with the facility director to enable him or her to develop immediate solutions for local issues.
- Ensure that all health facilities and district offices visited during the assessment receive a copy of the assessment report.

7. *Sampling Considerations*

Generally speaking, cost factors, the wide range of issues to be considered, and the desire to produce rapid results for programmatic action preclude the possibility of using sophisticated statistical sampling techniques to select the health facilities to be visited. Participants did note the need to observe functional links between the tiers of the administrative hierarchy, i.e., if a particular health facility is selected, then the district and provincial offices that the facility reports to should also be included. This makes it easier to observe the use of data through the reporting hierarchy and to identify factors at each level that influence health information system performance. To simplify logistics, convenience sampling is usually appropriate. This could mean randomly selecting a number of districts and then developing a stratified sample of different types of health facilities (urban/rural, health post/health center/referral, well performing/poorly performing, etc.) within those districts to visit.

Relevance of the Prism Framework to the Assessment Theme

The group experienced problems regrouping the elements of an RHIS assessment into the Prism mode. Technical and behavioral factors were more easily identified than the macro, system-level issues. The

group suggested that the three points of the Prism should be used as a checklist for helping to determine the root causes of perceived problems with the RHIS. When the assessment team investigates each of these problems, it should consider to what extent each one was influenced by behavioral, systemic, and/or technical factors. This approach will help broaden the largely technical focus that has characterized many past RHIS assessments.

Strategies

- Assessment should be a participatory process using a partnership between internal and external actors.
- The assessment team should provide immediate feedback to assessment subjects at all levels, and results should be shared widely.
- When conducting an assessment, consider technical, systemic, and behavioral factors that influence RHIS performance.

Advice (Words of Wisdom)

- State clearly the purpose/objectives of the assessment (scope).
- Use the correct mix of assessment approaches (observation, interview, group process).
- Include those actors in the assessment team you want to influence.
- The sample should reflect the context adequately, e.g., a mix of well-performing and poorly performing facilities, a mix of different types of facilities.
- Focus on the positive aspects as well as the problems.

Research Topics: Unanswered Questions

- How to efficiently measure the use of information. The TALI in Annex E is a start, but measurement challenges remain.
- What is the impact of RHIS assessment on improving data quality and the use of information for action?

Actions for RHINO

- Develop criteria for the most appropriate RHIS assessment approaches.
- Share examples of successful assessments and benefits gained.
- Conduct a RHINO forum on RHIS assessment.
- Develop guidelines on continuous RHIS self-assessment.
- Develop an RHIS costing framework.

Theme 3: Process of Selection and Development of Indicators for an HIS

Facilitator: Tim Williams, JSI, USA

Co-facilitator: Ronel Visser, South Africa

Participants

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Presentation

Jens Byskov (Denmark)

Defining the Issue

Indicators are central to effective RHIS systems. The *data* collected by RHIS become *information* when they are compiled and presented in the form of *indicators* that program managers can use for decision making. As such, one could argue that the collection and compilation of useful indicators is the driving purpose of good RHIS. Deciding which indicators to include, and how to measure, compile, and report them, is therefore a vital task in RHIS development and is often a key determinant of whether RHIS succeeds or fails.

Many issues associated with indicators are related to one large, complex challenge. That is, with so many important (sometimes conflicting) purposes, how can we strike a balance between completeness and comprehensiveness on the one hand and simplicity and efficiency on the other. A system that potentially “meets the needs of all” may not meet the needs of anyone if an too many indicators overwhelm the system and result in underreporting and poor data quality. This is further complicated by the fact that needs vary by system level, (facility, district, region, national), requiring different indicators by level, or the same indicators reported in different ways. Managers and evaluators developing indicators must deal with the following issues and desires:

- The desire to simplify management, monitoring, and control of health services through the selection of a few important data elements that can be the focus of data collection, reporting, analysis, and comparison at all levels of the health system.
- The desire to reduce the amount of data to be recorded in services and the number of reports to be sent from one level to another.
- The desire to come up with indicators that all vested interests agree with and honestly wish to report well and have their performance judged by.
- The desire to select indicators that are equally valuable in managing individual cases and facilities as well as monitoring health and service and program performance across the country.
- The desire to define indicators that are effective in monitoring equity in health and access to health services across the population.
- The desire to find indicators of health service quality that can be monitored easily and routinely.
- The desire to keep management, politicians, and the public informed of the core problems and issues, in ways that are easily understandable.
- The desire by international agencies and funding and donor organizations to monitor the extent to which their respective goals and strategies are being implemented by the countries they are supporting.
- The desire by the recipient countries to improve their monitoring in ways that show progress and reduce expenditures and efforts spent recording.
- The desire to develop and apply the best indicators to help managers improve performance, at the facility, district, and national levels.

The above purposes are all justified, though accomplishing them all simultaneously is likely to prove impossible. Trying to meet all needs often results in an excessive number of indicators, many of which are irrelevant to the real purpose of developing health services and improving their performance. Within countries, it is very common to find individual health service departments or programs competing to produce the most indicators appearing in the set of national health indicators as a reflection of the relative importance of their health problem or program. This is often done without considering the implications of the large number of indicators on the workload of health workers who are responsible for data recording and reporting within the health system. Even when good indicators emerge, they may work well in all settings and very few, if any, can be used to reliably measure and compare the same condition across different countries. Further, they are often more targeted to national-level monitoring and do not adequately consider district-level needs.

Summary of Group Discussion

To guide discussion, the group clarified definitions for indicators and frameworks as follows:

Indicators

- Yardsticks to measure progress/achievements
- Variables to measure single aspects of a program
- Used to define a situation or condition
- Used to help to measure change
- Can be used to measure outputs, outcomes, impact, effectiveness, efficiency, quality, etc.

Frameworks

- Should be used to relate objectives, problems, needs, with indicators and data sources. Frameworks define how program results and achievement of objectives will be measured

The main discussion focused on major issues in selecting indicators, strategies to address the issues, advice on solving issues, unanswered questions, and potential actions for RHINO related to the indicators theme. Not surprisingly, much of the discussion referred back to the main issue described earlier: how to strike an appropriate balance between the need for information to meet all stakeholder needs and the need to limit the number of indicators measured to a manageable level so that the system is not overburdened. The full list of issues identified is shown below. As we used the Prism model to guide our discussion, we were able to separate issues into technical, systemic, and behavioral categories. Many country examples were provided in support of most of the issues mentioned.

Technical

- There is a need for a common understanding or definitions of an indicator and a framework. This issue also falls under system.
- Capacity building in M & E is needed at all levels. Indicators should contribute to an overall M&E strategy. In many countries, the overall M&E plan and strategy are not clear (e.g., objectives are not SMART), so indicators are not well designed and do not serve clear purpose. Sometimes M&E is not effectively linked to the RHIS. For example, indicators may be adequate, but the data sources are not defined, or the information system collects the indicator in a format that is not readily useful to managers. The last point can be considered a systemic issue as well, as it may reflect a lack of communication among HIS, M&E, and management functions.
- Policies and guidelines are needed on indicators for selection, collection, analysis, and use, including:
 - criteria for selecting indicators and
 - the need to relate indicators to problems, objectives, priorities, and goals.
- Every country requires good indicators that meet multiple needs, but should maintain a manageable number. Participants noted the frustration of working with dysfunctional systems with too many indicators to manage. Multiple country examples were given where managers initially wanted hundreds of indicators, and “success” was cited as reducing the number of indicators to a manageable level. The benefit of establishing a “minimum” list of essential indicators was noted (information that is “nice to have” versus information that one “needs to know”).
- Every country needs a common framework for M&E so indicators are managed and used well. It should:

- include different types of indicators (e.g., qualitative and quantitative);
- define different needs at different levels and different needs of different programs;
- apply the pyramid concept: more indicators and data points are needed at facility level; fewer at central level; and
- make a distinction between RHIS indicators and others (e.g., those collected through surveys or other means, so they complement each other).
- Lack of knowledge and skills in selecting and using indicators (e.g., wording, structure) often inhibits successful RHIS development.

Systemic

- All stakeholders should be involved in indicator development. This issue also falls under the behavioral category.
- Lack of coordination and poor system design can lead to inefficiencies or non use of information.
- Donors may have different agendas or needs that work against program needs and an efficient RHIS.
- Donor needs often result in special studies that bypass RHIS and further burden the health system.
- Donor interest in special studies often results from lack of trust of the quality of RHIS data. Often they don't know RHIS capabilities, or they have their own systems, regardless of the fact that RHIS could provide the information more efficiently and effectively.
- Clear policies and guidelines are needed on indicator selection and use down to the district level.
- Including the private sector may be challenging, but in some countries it is necessary because the private sector plays a major role.
- RHIS and indicator selection require adequate budgetary resources.

Behavioral

- Constraints include:
 - lack of motivation on the part of service providers to report data and managers to use it;
 - lack of management support;
 - negative attitudes toward indicators and information;
 - lack of understanding of the value of indicators or M&E; indicators were not ingrained in people's minds; and
 - some managers insist on too many indicators that are not used. This practice prevents the system from functioning.

As seen above, most of the issues discussed were technical in nature, but the group noted many systemic and behavioral factors as well. The group concluded that unless the systemic and behavioral environment is supportive, many technical issues cannot be addressed. Thus, the Prism model clearly applies to indicators. Addressing issues in all areas—not just technical—is essential to effective indicator selection and use.

Strategies

- Districts need a strategic framework. The framework should
 - be developed *before* developing or selecting indicators;
 - be consistent with the national framework;
 - be related to district health objectives and priorities;
 - clearly define the purpose of the information system and the indicators collected so they are well understood by all;
 - clearly define RHIS indicators versus other indicators collected through surveys or other means; and
 - provide for review and revision of indicators by all stakeholders as objectives change. Indicators should not be static; they should change over time as needs and objectives change.
- Maximize stakeholder participation in development and use of indicators.
 - Both vertical (facility and province) and horizontal (country programs, NGOs, donor programs) integration should be applied in indicator selection.

- Include the private sector.
- Educate donors on RHIS capabilities so they use RHIS more often and more effectively (reducing the need for special studies).
- Indicator development and use should be embedded in management planning and resource allocation.
 - Build capacity in key areas (hiring, training, supervision).
 - Strengthen facility staff skills; knowledge of data definitions affects quality of data.
 - Information should be part of everyone’s job description.
 - Ensure sufficient supplies and equipment.
 - Indicators should be linked to action (as in action plans or defined actions designed to improve health). Action, action, action! Indicators and action should link to staff performance. Staff should be able to see the results of their work. Feedback is essential.
 - Supervisors should not only focus on negative issues, but should emphasize positive observations and use indicators as a way to motivate staff
- Each level should have trained people who are responsible for health information.
 - The information officer should play a leadership role and be part of the district health management team. The information officers skills should include both technical and managerial functions.
 - The information officer should coordinate indicator work with program managers and district health leaders (including other districts).
 - Ideas should be disseminated and shared at the regional level with other agencies working on the same indicator (to share what works and reduce duplication of effort).
- Selection of indicators should
 - build on best practices and local experience;
 - be appropriate for the level (facility/district);
 - be simple and clear;
 - focus on getting the most information from a limited number of *good* indicators;
 - be linked to an *action* plan;
 - be sensitive to staff action; and
 - include both quantitative and qualitative indicators.
- Policies and guidelines
 - are needed by level;
 - should be operational (with clear definitions of numerators and denominators, calculations, collection and *use* strategies); and
 - should be clear and made known to all stakeholders instead of just developing them and then keeping them in a drawer

Advice (Words of Wisdom)

- Criteria—Indicators must be
 - reliable,
 - appropriate (define this well; some commented that “appropriateness” is vague and hard to define),
 - simple,
 - specific,
 - valid, and
 - feasible/realistic.

- There is a trade off among all these criteria and it may be impossible to meet all of them with any single indicator.
- Realism of indicator values must be tested against other sound data sources periodically.
- In the process of developing indicators, the following steps should be followed:
 - Identify priorities and problems.
 - Develop specific objectives for the problems identified.
 - Decide on indicators to measure objectives and rationale.
 - Decide on data elements to be collected and denominators to be used .
 - Decide the frequency for measuring indicators and how they will be measured.
 - Specify a clear definition for each indicator.
 - Build capacity in all stakeholders. (Specify the role of information in each job description; emphasize knowledge of data definitions at lowest levels. It all starts here.)
 - Revise and update indicators periodically engaging all stakeholders. Indicators should not be cast in stone.
 - Use a team approach, depending on the different specialties available: district managers, information officer, representatives from service delivery areas, NGOs, higher-level officials, as needed.
- Donors should contribute to development of RHIS and use routine system data wherever possible. When they ask for more data than the routine system can provide, they must fund any special studies needed to minimize burdens on the health system. It is possible to consider a “donor RHIS tax” whenever donors need health program data. Donors must support RHIS as part of their data collection process.

Research Topics: Unanswered Questions

- How can numeric indicators be supplemented with qualitative ones?
- What is the essential data set for district-level indicators? What is the minimum number of good indicators?
- Do we need to include community-based data (e.g., vital events and morbidity) in the indicator set and/or data from community-level workers and organizations?
- Is managerial and financial support to district health management and health information systems HIS sustainable?
- Are there sustainable mechanisms for *motivating* staff to measure performance?
- What is best balance between RHIS indicators and survey indicators?
- How can we ensure that guidelines become operational and are not just kept in a desk drawer?
- Who should drive the decision process on indicator selection, the center or the district? The answer is surely that both have key roles to play, but it was not clear how the process can be best managed. Most felt it should be driven and managed centrally with heavy district representation for the most effective and realistic choice of indicators.

Actions for RHINO

- For the bolded topics above, RHINO could document whether current knowledge and practices already answer the question and if not, consider developing actionable guidelines that countries could use through review and research. It was also felt that RHINO could provide the expertise needed to develop and disseminate guidelines.
- RHINO should promote the idea of a “donor RHIS tax” to encourage donors to build RHIS capacity and eventually use it to monitor their investments.
- Develop a minimal indicator list and guidelines on manageable indicators.
- Draft a recommended indicators list (menu), together with a collection and analysis plan.

Theme 4: Ensuring and Improving the Quality of Routine Health Information

Facilitator: James Setzer, PHR*plus*

Co-facilitator: Norah Stoops, HISP

Participants

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Presentation

Lameck Nyirenda (Zambia)

Defining the Issue

While perhaps obvious, it is important to remember that a routine health information system supports decision making by attempting to provide high-quality data. Good-quality data are used to inform managers and service providers about health risks to the community, the effectiveness of the health services, and how resources are being used. Data quality is not only important for securing an accurate description of health status, service coverage, and performance, it also inspires faith in the routine health information system among data users. The better the quality of data, the more people will come to rely on it, value it, and use it as a tool in decision making and, ultimately, to improve the health of the community.

Data quality has to do with the degree to which data measure what they were intended to measure when the data collection system was designed. High-quality data are meant to be unbiased and complete and capable of providing decision makers with high-quality information. Yet, at every step of the information system, from collection to decision making, quality can be affected. System design alone is not sufficient to guarantee the quality of the data the system produces. For example, a routine health information system can be technically superior, but without relevance to or ownership by the people meant to run and use it, and quality can suffer. Consequently, low quality and low confidence in the system will have a negative impact on the use of information. Data quality must therefore be seen as both a supply and a demand side issue. Recognition of this fact is key to the discussion and development of strategies and approaches to improve the quality of data in our information systems.

Before arriving at such strategies and approaches it is helpful and instructive first to discuss briefly what is meant by data quality within the context of routine health information systems (with a special emphasis on their role and impact at the district level). Rather than seek to draft a definition of data quality, the group chose to list characteristics of this elusive but necessary aspect of all health information systems.

Summary of Group Discussion

Defining Quality

Quality health data should be verifiable, accurate (using correct calculations and measuring the right things), complete (i.e., from all data sources and available to users), timely, and standardized (meet agreed standards as determined by client/user), relevant, true (reflect reality), and context specific. They also should allow for decision making with minimal risk and be unbiased, interpretable by all users, organized in such a way as to be manageable, objective and not subjective, comprehensive, feasible to collect, meaningful (reflecting what it wants to measure), specific, sharable, accessible, simple and easy to use, consistent with explanation for unexpected changes, and sensitive to changes.

Applying the Prism Model

The Prism model provided a convenient and useful framework to organize discussions around the determinants and threats to data quality within the context of RHIS. The group quickly recognized the underlying premise of the prism: that the threats to and determinants of data quality are not solely technical in nature, and that it is important to expand the discussion to include both the

structural/organizational and individual behavioral determinants and threats. All too often past efforts to improve data quality have focused largely on technical “fixes” that have proven to be mostly unsuccessful. The group felt that the Prism provided a way to reorient efforts to go beyond sole use of technical solutions.

The group developed a list of the “threats/determinants” to data quality. Once listed, these threats/determinants were then regrouped along the three axes of the prism model: technical, system/environmental, and individual (Table 4). The group concluded that these three axes are not mutually exclusive, and that certain threats/determinants actually contain elements of two (or even all three) of the axes. Identification of threats and determinants of data quality led to a discussion of the policies and approaches that might be best suited to addressing them. The group used the same “prism” grouping as an organizational tool (Table 5).

Table 4 Threats to Data Quality Using the Prism Framework

<p>System/Environmental Threats/Determinants to Data Quality</p> <ul style="list-style-type: none"> ▪ Pressure from higher up to ensure data get to next level — leads to manipulation, and “cooking of data” can lead to perverse incentives ▪ Inadequate facilitation — support and resources ▪ Expectation of/pressure for good results ▪ Ethical component ▪ Poor communication — electronic and human ▪ Poor feedback ▪ Human resources — overburdened/inadequate training <p style="text-align: center;">Behavioral Threats/Determinants to Data Quality</p> <ul style="list-style-type: none"> ▪ Expectation of good results ▪ Ethical considerations ▪ Negative use of data, i.e., for sanctions ▪ Human error ▪ Poor use of data and no buy-in from management ▪ Poor/no data verification ▪ Community incentives to worsen health status to obtain services, funding etc. <p>Technical Threats/Determinants to Data Quality</p> <ul style="list-style-type: none"> ▪ Inadequate computer literacy and inappropriate training ▪ Inappropriate technology ▪ System design with no error traps

A slight deviation from the Prism was discussed. It was argued that when one identifies strategies to improve data quality, the best approach to the systems/environment vertex of the Prism is through increased demand for information. Addressing behavioral and technical aspects is seen largely as a supply side approach. The need to address both supply AND demand for information as a strategic approach to improving data quality was clear throughout the discussion. The group sought to prioritize these strategies. Those priorities are highlighted among those listed below.

Table 5 Strategies to Improve Data Quality Using the Prism Framework

<p>Behavioral strategies to improve data quality</p> <ul style="list-style-type: none"> ▪ Behavioral analysis to determine why staff behave the way they do ▪ Improve skills and knowledge in both basic and post-graduate training ▪ Shake things up with change management processes ▪ Promote good behavior ▪ Create positive incentives ▪ Performance management approach with structures that promote a career path ▪ Participative management and encouragement ▪ The use of sanctions with a carrot-and-stick approach with accountability ▪ Enforce/reinforce ethics ▪ Appropriate leadership/role models and mentoring <p>Technical strategies to improve data quality</p> <ul style="list-style-type: none"> ▪ Standardization of definitions and methods ▪ Ongoing support ▪ Validation rules and checks as part of system design ▪ Mechanism/methods for data dissemination <p>“Demand side” strategies to promote use of information AND improve data quality</p> <ul style="list-style-type: none"> ▪ Ensure relevance of data/information collected ▪ Collect minimum data necessary ▪ Require feedback from higher levels ▪ Demonstrate use of information at higher levels ▪ Need for decentralized responsibility/authority ▪ Promote management using targets and monitoring and evaluation

The means/methods to address these policy approaches were grouped into two categories: inputs and processes. Again, it was clear that **a balanced approach to improving data quality was called for and that efforts had to include of some combination of the methods/means listed below:**

Strategies to Improve Quality

(see Table 5)

Inputs

- **Human Resources**
Numbers of personnel required; skill levels; roles, responsibilities, and job descriptions must be clearly articulated; and evaluation criteria for personnel and the system must be defined and monitored.
- **Equipment** minimum needs to be defined and met.
- **Procedures**
 - Minimum data sets must be agreed upon to cover health status, health care needs, health care services, finance, HR, stock and equipment, and outcomes and impact. Data sets must be able to inform international, national, provincial and local health policy,
 - Data flow policy with responsibilities at different levels clearly defined and monitoring framework in place.

- **Technology**
Appropriate software designed to facilitate/improve quality.

Process(es)

- **Management and Leadership**
A participative approach; situational support and approach; transformational approach
- **Management Development**
Problem solving; using information for decision making (including extraction)
- **Human Resource Development and HR Management (Recruit and Retain)**
Basic education curricula; health ethics/health information ethics; formal information management courses and career paths; role models and mentors; managers need basic concepts and to use information for management/action; life skills development, motivation, change management
- **Support and Supervision / Performance Management**
Formalized, criteria, and checklists; developmental NOT threatening; motivation, incentives and sanctions to foster accountability
- **Information Management Process** — collection tools, data flow, verification and validation, feedback. Formal processes and procedures; definitions/data dictionary; norms and standards (minimum components at different levels, levels of precision needed, dealing with differences, etc.); technology and technical aspects to support information management and the above processes (separately specified); use of an Information–Demand approach, including
 - targets, M&E
 - decentralized responsibility and authority
 - demonstrate use at higher level
 - feedback; use at all levels will minimize crisis requests
 - essential and relevant

Research Topics: Unanswered Questions

From the discussions, several research topic were identified. They were seen as operations research topics that if carried out, documented, and shared, would contribute greatly to efforts everywhere to define strategies capable of improving data quality and, therefore, RHIS performance and impact.

- What is the potential role/application of a “change management approach” as a methodology for improving data quality and, therefore, the impact of RHIS?
- Could quality assurance methodologies be adapted and used within the context of RHIS?
- What are true cost requirements of RHIS?
- How do we promote use of information by the community and assess the impact of data use on the information and on health systems?
- What are criteria and standards to assess quality in HIS (quality assurance and impact)?
- What is the impact of information use on quality of data/information? Does the demand side approach work?

Action for RHINO

- Identify and disseminate “Best Practices Checklists” for data quality assessment and improvement,
- Develop and disseminate discussions on health ethics/health information ethics,
- Develop and advocate for formal information management courses (and their inclusion in basic medical, nursing curricula), and
- Advocate for defined/recognized career paths for data managers and others responsible for RHIS design and operation.

Theme 5: Making Routine Health Information Relevant to Action

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Participants

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Presentations

Tariq Azim (Pakistan)

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Defining the Issue

In developing countries, health workers at the district level and below are often responsible for the initial collection, recording, and reporting of health data. In several countries, some degree of analysis and use of information is expected at the district level. Yet, even when health workers are properly trained and have access to the tools needed to record, report, analyze, and use data, evidence points to low health worker motivation to provide quality data in a timely way and to use that information for evidence-based decision making. To these health workers, the information collected usually serves an unclear purpose and provides little benefit to them; its collection and use is perceived as a waste of time and resources, even when the data are available.

This theme-based group explored the issues with regard to making routine health information relevant to action. For this theme, we explored concrete strategies (targeting not only health workers but also other cadres beyond health workers) for increasing the motivation for information use, incentives for data use and action, demand for information, and appreciation of information for local, relevant, and evidence-based actions, particularly at the district level and below.

Summary of Group Discussion

Support and Follow-up for Information Use

Managers need training and motivation to interpret data and respond accordingly. This training and motivation creates a culture of information in which the managers understand their own database and are able to use information to identify and address the root problems. Facilitation by someone external to the process is important in bringing about attitudinal and behavior change toward using data. As evidenced by both the Bangladesh success and Pakistan failure, ongoing support and follow-up is extremely important.

Designation of Information Officers

The field visits in South Africa demonstrated how important the designation of district information officers (DIOs) could be for facilitating and supporting the collection, analysis, and use of information at the district and facility levels. Such information officers should be dedicated to information quality and use and be permitted broad responsibility, including monitoring of the use of information. The presence of such a position in South Africa demonstrated the value placed on information by the district. Discussion revolved around the importance of not only assigning persons whose primary responsibility is ensuring the availability and use of information, but also ensuring that information-related tasks and responsibilities are clearly spelled out in the job descriptions of health workers in general. The roles and responsibilities that relate to information should be explained clearly in teams as well as in job descriptions at all levels.

Size of Data Sets and Indicators

Much emphasis was placed on the importance of starting with a minimum set of key indicators. In the example from Bangladesh, selection of a small number of indicators was key to helping the managers to

focus. The selection of indicators was also directly relevant to managers' authority to act. As demonstrated in South Africa, emphasizing the analysis and use of indicators rather than specific data elements also helped to focus the health workers. The presence of too many indicators or data elements in an information system detracts focus from new users of information and can result in a poor grasp of the key indicators and their purpose, limited analysis, and limited evidence-based actions. In general, all agreed that when introducing a new HIS or changing parts of an existing HIS, it was beneficial to start with a small, feasible, and actionable set of data, regardless of whether the HIS was being redesigned or strengthened.

Perceived Value of Information for Health Workers

Health workers often perceive that the information they collect responds to demands made by those at higher levels, or even by donors, but is of little value to them. These health workers feel they collect too many data and are overworked, particularly if the health workers perceive their role as clinical only, with no defined role or responsibility in information and its use. Problems were encountered when managers just added data elements to the minimum data set and demanded they be collected. The information does not become valuable to health workers if they do not understand the reason for collecting it. The additional collection can also be costly in terms of financial and human resources and can result in limited data quality.

There was much discussion about whether the choice of routinely collected data elements should be based solely on its immediate relevance to those collecting the data. The group concluded that although data should be relevant to those collecting the data and preferably used to the fullest extent at the point of collection, not all data elements are captured solely for their own use. The information needs of many players at levels above the health workers should also be considered. A balance needs to be struck between the needs of the two levels.

Motivating Health Workers

Even if health workers are trained to use information, how can we increase their motivation and comfort level to apply what they have learned? Strategies discussed included quality supportive supervision that addresses evidence-based actions (for example, rather than only checking to see if graphs are drawn, managers should ask, "now that you have drawn these graphs, what are you going to do about it?"); support by supervisors and information officers (not just once or twice but continuously to ensure sustainability); comparative analyses as a responsibility of all supervisors; indicator-driven planning and monitoring; combining information on inputs (human resource/finance) with outcomes; implementation of an award system (such as the award system implemented in Cape Town to increase TB cure rates); and involvement of the facility level staff in various decisions. Positive feedback is important! Facility information officers and health workers must be recognized and appreciated by supervisors and politicians for their contribution to the RHIS. Examples were given of the effectiveness of peer discussions (e.g., in a half-day meeting of managers to discuss their performance indicators). When the managers know they will be observed and evaluated by their peers, they feel under more pressure to improve their performance.

Dissemination of and Accessibility to Data and Information

Health information systems should be developed in such a way that all kinds of stakeholders can access and use the information, not just the technical professionals. Although the information might be available, access by all stakeholders might still be limited by the physical location of the data, technical knowledge to access data, analysis, and interpretation skills (and in some cases, may be detrimental if used incorrectly or improperly). Sharing information from or across vertical programs has been an issue in several locations. Sometimes the information bypasses the district level to reach centrally funded programs. In addition, the relevant goals and objectives of the vertical program managers are often not shared with others. In Uganda, some NGOs used print media and other publications to disseminate RHIS information; these publications are used by the NGOs to advocate for additional funding.

Communication

One of the key steps in moving from information to evidence-based action is the communicating the information to relevant stakeholders. When communicating health information, one needs to present the

information in a package that is understood by the target audience, whether it is the community or politicians. Many health workers and health information specialists (including district information officers) are not trained in communication. Sometimes the reverse occurs: communication has been a problem in some places because of the requirement to communicate information through a communication official who is not trained in health information.

Making Facilities/Health Systems Accountable to the Community

In Uganda, data were collected weekly, summarized in a single table representing the disease profile, and published in the local paper. This allowed dissemination to the community and resulted in some public outcry; people began to demand explanations for poor indicators from health workers, forcing health managers to become accountable to the community. With information, the community can see the big picture and be involved in health facility planning and decisions. As the community starts to take an interest in its own health facilities, it will increasingly pressure health management to make decisions that are important to the community. Involving the communities in such a forum would be an ad hoc approach; more regular forums also exist in which community members can be involved in decision making, such as facility committees.

Strategies

Recommended strategies to increase the use of information for action are presented below. The strategies were prioritized based on their impact on information use and action, the importance given the strategies and interventions currently being implemented to strengthen information use and action.

- Supportive supervision should be structured using efficient tools with all (not only under-performers) through regular and prepared meetings and/or visits to review the information, provide objective regular feedback on progress, ensure evidence-based action, and address issues for cooperative problem solving.
- Formulate policy and regulations that specify the role of information in the health sector; assign resources for information collection, management, and use; and confer authority to take action with information at the appropriate level of the health system.
- Encourage accountability and ownership of the district health information system in the community and among local politicians/authorities by sharing information, action planning, and implementing with the community representatives or groups at appropriate levels.
- Develop skills among health workers and managers to analyze, interpret, and take action (as individuals or in a team approach) through performance improvement skills development, root cause analysis, advocacy, and action planning.
- Provide incentives for using data for management decisions and actions.
- All positions at all levels should have an information role clearly defined in the job descriptions.
- Use peer review for sharing and observing each other's successes and challenges and providing critiques and perspectives across peer groups.
- Provide comparative feedback (allow comparison of data) with neighboring facilities or districts and provide resources to facilitate their review through peer discussions.
- Designate a person or team who will be responsible for information at the district level.
- Make information (including raw data) available to all users who have an appropriate strategy.
- Use appropriate communication strategies and messages relevant to the intended target groups, e.g., political, community, etc.

Advice (Words of Wisdom)

- Obtain and share evidence to demonstrate situations in which the use of information led to evidence-based action.
- Look for quick wins.
- Look for mechanisms to increase local demand for information.
- Keep it simple.

Research Topics: Unanswered Questions

- What are the strongest motivators for using information for action?
- What does it take to make information use sustainable?
- When is it appropriate, cost effective, and time efficient to “sample” routine health information (such as routine sampling rather than routine collection of all information) for addressing information needs?
- What mechanisms increase demand for information and information use in communities, facilities, districts and with policy makers?
- Is having an information person or team defined in the district (e.g., a district information office) a best practice, and what are this person or team’s responsibilities?
- What is the cost of sustaining information use across various routine health information systems, including the South African DHIS?
- What are the experiences, technologies, and perceptions regarding implementation of computers in a district?

Actions for RHINO

- Capture and disseminate lessons learned and materials related to using information for action.
- Discuss best practices for motivation.
- Discuss on experience with implementing computers.
- Share discussion (e.g., forums) more widely and publish them.

Theme 6: Communication of Information to Decision Makers in the District

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Participants

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Presentation

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Defining the Issue

This group addressed how to communicate health information effectively to decision makers who may lack a health background or understanding of health data. Inadequate communication or misunderstanding of information may lead to its nonuse or even to inappropriate actions. Common health indicators may not be meaningful, priorities may differ between policy makers and health experts, and information use may be low. Despite the challenges, participants realized the importance of addressing this issue and could share specific approaches they had found useful.

Summary of Group Discussion

The group opened by brainstorming about to whom one communicates health information. These are the target audiences; each has its own unique role to play regarding how it can use information to improve health status. A lengthy list was generated, indicating that there are many people (audiences) who can potentially use health information, including:

Politicians	Private practitioners
Policy makers	NGOs
Service providers	Hospital boards, clinic committees
Program managers	Donors (patronage partners)
Heads of departments	“Influentials” at all levels
The community	

This list was subsequently grouped into three broad categories: (a) policy makers/politicians; (b) health service providers and managers; and (c) the community. This is not an exhaustive list of categories, and the precise composition of each would be expected to vary from place to place, particularly in the case of “the community.” The group then discussed the barriers to reaching these target audiences—what makes it hard either to communicate with them or to ensure that they make appropriate use of health information? Following is a summary of this discussion:

Difficulties in conveying technical information effectively: Low numeracy skills limit the extent to which percentages, rates, and ratios can be used; low literacy levels may limit acceptance, understanding, and use of information; messages are misunderstood if they are not adapted to appropriate culture and language; they are ineffective if they stop short of suggesting an action; it is difficult to craft compelling messages on routine, “boring” subjects.

Institutional constraints, hierarchy, and red tape block the collection, sharing, and use of information: The organizational culture of expecting information from subordinates without providing feedback limits the provision of good-quality data (there is a tendency to punish poor reporting but not reward good reporting); red tape may block where information flows and if it flows at all (e.g., if important information is published on the Internet, “heads will roll”); political influence is often antitechnical, e.g., technical data on staffing needs may be overlooked and inappropriate persons appointed instead.

Complexities in sharing information with the media and the public: Fear of the misuse of information may impede its being communicated at all or may require that a spokesperson communicates only distilled information to the media; journalists may be “bloodhounds” who search for bad or sensational news; information is powerful and may be deliberately misused by the media to send the wrong message (e.g., cholera epidemic used as a weapon to criticize entire department of health).

Applying the Prism Model

The Prism model was used to denote whether each barrier was more of a technical, systemic/environmental, or behavioral determinant/issue; some barriers fell into multiple categories. The majority of barriers to effective communication and, ultimately, information use, fell under systemic/environmental factors. The implication is that it is probably insufficient to communicate technical information by itself; rather, it needs to be accompanied by other information or justification that recognizes and addresses the nontechnical determinants.

Ultimately, it is the **specific, desired actions** that each target audience can take in support of reaching health objectives and improving health status that determine what information they require as well as the other elements of a communication strategy. The actions are a means toward an end (the health objective), rather than the end itself. The dyad of target audience and corresponding desired action(s) is the critical basis on which a communication strategy is built. To be useful for designing and evaluating communication interventions, specific desired actions must satisfy two conditions:

- (1) Actions must describe, in as active and particular a way as possible, the things that the members of the target audience can do (i.e., “district council member endorses increase in allocations for disadvantaged areas”), rather than expressing the action in the passive voice (avoid, e.g., “communities are active participants in health”).
- (2) Actions should be stated in the affirmative (avoid, e.g., “health workers do not yell at mothers”). In some cases, the specific desired actions may already be understood by those providing the health information. However, there may be a need for inquiry to better define the potential specific actions that some target groups can take to use health information effectively to improve health.

The group explored the concept of specific, desired actions in broad terms by brainstorming on actions that policy makers/politicians and “the community” could take. In real-life communication planning, this exercise would begin with the health objective(s) itself. In the interests of time and focus on the concept of specific, desired actions, the group brainstormed on such actions, based on their own experience and challenges. Suggested specific actions by policy makers and politicians to improve health included:

- increasing funding for specific health activities;
- making more equitable resource allocations to favor disadvantaged areas;
- reallocations and appointments of staff to improve gender balance;
- invoking bylaws when necessary to ensure implementation of outbreak response measures; and
- making budgeting decisions necessary to ensure an uninterrupted supply of essential drugs.

Defining Strategies to Address Communication of Health Information

With a firm understanding of **who** needs to do **what** to achieve a stated health goal, it is possible to identify the barriers to and enablers of that action. In communication planning, qualitative research (interviews or focus group discussions) is usually required to identify barriers and enablers from the point of view of the target audience.

A firm understanding of the target audience and specific, desired actions, barriers, and enabling factors serves as the basis for determining the elements of the communication strategy, including:

- Critical information to convey (specific health data—plus what else?)
- Key messages (concise “packaging” of information to address the target audience’s concerns)
- Format for presenting information (e.g., technical document, brief summary)
- Timeliness (when is it most compelling to provide such information)
- Communication channel (e.g., interpersonal communication, mass media)

Throughout the group's discussion, the importance of interpersonal, face-to-face communication was raised repeatedly. Group members felt that the data do not speak for themselves. It is not enough for key information to be available for appropriate decisions and actions to be taken. Information is usually introduced and justified in situations where health managers must explain its meaning and demonstrate its relevance to a wide range of concerns faced by policy makers and communities alike. Group members raised the concern that even capturing the attention of policy makers in the first place is a real difficulty.

To exemplify how the various elements of a communication strategy could fit together, the group explored one example of communicating health information to policy makers to bring about a specific action (Table 6) The input and perspective of a district medical officer in the group served to guide the discussion.

Table 6 Example of How to Communicate Health Information to Policy Makers

<p><u>Target audience:</u> District level policy makers</p> <p><u>Specific, desired action:</u> Increase the number of health personnel in the district</p> <p><u>Process:</u> The district health team conducts an annual audit of health facility staff and facility use patterns to identify the gaps, and data are compared against government staffing norms and standards. Information on staffing needs is included in the annual district health plan. The plan, including the request for staffing, is presented to the social development committee of the district council (this requires a question-and-answer session with the DMO); the committee then submits it to the full district council. If the district council endorses the request, it is sent to the national level for approval.</p> <p><u>Presentation of information:</u> District health plan</p> <p><u>Communication channels:</u> Interpersonal communication</p> <p><u>Problems encountered:</u></p> <ol style="list-style-type: none">(1) National level may not approve the request because of lack of funds(2) Official channels at district level may be constraining so that request to national level is not made. <p><i>Note: These obstacles represent systemic/environmental determinants of data use, suggesting that the approaches to change the situation must address them as well as present standard data.</i></p> <p><u>Potential alternative strategy:</u> When frustrated by official channels, the DMO has found it effective to speak directly with the local M.P. This represents a shift in target audience and means rethinking the kind of supporting arguments that must accompany the key data on requested number and type of personnel.</p> <p><u>Strategies proposed by, and other comments from, working group:</u> Secure the attention of policy makers by making the request for personnel easy to see (not buried in annexes); explore ways to increase access to policy makers and to those who are important to them; strengthen interpersonal skills to get messages across persuasively by placing key data in context of broader district goals; identify how request for personnel links with other data that concern the target audience, i.e., put health in larger context of district development; share this DMO's experience more broadly with his peers (other DMOs) to make them aware of his successful alternative strategy.</p>
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Recognizing the need for a framework to coherently tie together the issues discussed so far, the group broke into three subgroups and used an abbreviated form of a **standard communication strategy** framework to sketch out communication approaches with the target audiences of policy makers, service providers, and community members. An example of the work resulting from the service provider subgroup is shown below (Table 7).

Table 7 Communication Approaches with Service Providers and Managers in the Health System

Who (target groups)	Desired actions	Barriers	Enablers	Possible communication strategies
Service providers	Use data to identify priority activities, act, and monitor progress; respond to felt needs	Lack of interpretation and feedback on own data	Staff interest in learning more about info	Training and continued supervision in information analysis and use
Program managers	Make allocations based on good info; assist those facilities serving the most deprived; recognize good use of information in facilities	Lack of appreciation for and use of data for decisions; existence and history of "norms" undermine current data	Demand from above for objective reasons in support of actions	Teach use of data in reports and requests for program support; ensure data collected reflects needs of poor; recognize regular feedback reports
NGOs	Join govt. in health minimum package; see selves as part of the district system; reach out to the poorest; fill gaps that govt. cannot	Not included in info system; see selves apart from govt. services	Have own budgets, often more than govt.; attention to poor; concern for quality	Share data showing greatest health needs and groups
Private practice	Follow govt. norms of health delivery; support the most needy facilities technically; provide occasional help in support of govt. facilities; submit returns on services provided	Feel above using govt. norms, often not informed; not really aware of conditions of the poor; not in the info system	Social concern; acceptance in public eye	Include in meetings and when sharing explanation of govt. norms; suggesting where they can make a difference — using data; recognition for contribution made
Other departments of government	Contribute to health — e.g. identify and act on basis of health needs	Concerned with own priorities; don't understand role in health, or health info; guard own budget	Mandate to work in same population as health	Joint forums to solve problems, joint public info release; recognize interdepartmental and collaborating — good PR
Influential people in health	Improve allocations to health and involve constituency in health actions	See selves as not health people	Concern for community	Involve in info sharing meetings

Strategies to Address Communication of Health Information

- To enhance the use of information, design and implement plans for strengthening skills in:
 - data interpretation and use (e.g., disaggregating data) and
 - interpersonal communication at service provider and managerial levels to improve their ability to communicate health information effectively.
- District management should present health information regularly to, and solicit feedback from, communities using established venues and forums. This information should be of **immediate relevance** to communities and presented in **appropriate language/ terminology** using **trusted local resources**.
- Advocate to donors, decision makers, and program managers to support work that improves the communication of health information, to increase the likelihood that it will be understood, viewed as relevant, and therefore used. These efforts to enhance the use of data can be seen as a return on the considerable investment in setting up the DHIS in the first place. Without such advocacy, it is unlikely that the need for improving effective communication of health information will be recognized.
- Set up procedures or approaches to recognize good reporting and communication of health information.
- Conduct data review meetings that are inclusive of the private sector (NGOs, private practitioners) to engage them more fully in providing information to the public health sector.
- Conduct similar, but separate, data review meetings with informal providers (e.g., traditional birth attendants) who may require specific data and messages presented in simplified language.
- Present disaggregated data to decision makers, highlighting disadvantaged areas. This is important.
- To stimulate interdepartmental cooperation to support health activities, ensure public recognition when it does occur.

Advice (Words of Wisdom)

- Communication strategies should address not just district level but levels above and below as well (community and provincial/regional).

Research Topics: Unanswered Questions

- What are effective ways for capturing the attention of high-level decision makers?
- How interested is the community in its health status, anyway? (Before detailed strategies for sharing information with the community are developed, the extent and nature of its interest needs to be gauged.)

Actions for RHINO

- Document and disseminate experiences, strategies, and interventions on communicating health information (e.g., online forum).
- Set up recognition systems such as the “**RHINO horn**” (newsletter, magazine, bulletin) and the RHINO “*stomp of approval*” for projects with strong communication components.
- Design/share models of communication strategies and curricula for training on data interpretation/use and interpersonal communication.
- Advocate for resource support and increased prominence of communication in RHIS.

Notes from a Planning Meeting for RHINO



Notes from a Planning Meeting for the Routine Health Information Network, October 4, 2003

On October 4, 2003, the Routine Health Information Network held a planning meeting in Eastern Cape Province, South Africa, following the Second International RHINO workshop. The purpose of the meeting was to reflect on the work of the RHINO network in the past two years and begin to develop strategies for taking the network forward. As the network matures, we feel it would benefit from a broad-based steering group. This meeting is the first step in identifying the role for this steering group and a strategic direction for RHINO in the next five years. A list of participants appears at the end of this section.

Meeting Objectives

1. Review current activities and services offered by RHINO.
2. Discuss current RHINO goals/objectives.
3. Outline strategies for improving the future related to leadership, membership, and funding.
4. Set an agenda for RHINO for the next two to five years.

Summary of Discussion

RHINO to date has functioned on a limited budget. In addition to in-kind contributions from various donors, USAID under MEASURE Evaluation has provided approximately US\$250,000 over 2.5 years. These funds covered the time of the Network Administrator (50 percent time) and Coordinator (20 percent time).

Core functions of RHINO as defined at the first workshop (2001)

- Promote analysis of experience related to collection and use of routine health information.
- Increase access to information on best practices, innovation, and lessons learned.
- Forge networks and linkages among professionals working in RHI collection and use.
- Define mechanisms for coordinating investment in the collection and use of routine health information.
- Assess the role of routine health information in health system performance.

Since its inception, RHINO had placed more emphasis on the first three functions — analysis of experience, access to information, networks and linkages — than on coordinating investment in RHIS or assessing the contribution of routine health in health system performance.

Action Agenda for RHINO in the Next Two to Five years

Planning meeting participants recommended that RHINO should focus its future work in the following five areas. Detailed suggestions on each topic are found under the headings below.

1. *Communication and networking*

- Hold the international RHINO workshop annually, possibly alternating the venue between northern and southern locations. Southern-based workshops might focus on learning from the field and include field visits where possible. Northern-based workshops might focus on advocacy and dialogue related to investing in routine health information systems. Latin America (Chile) or Asia (Nepal or Pakistan) were suggested as future southern locations. Geneva was suggested for the next northern-based workshop.
- Possible topics for a future workshop: get the “H” back in HIS (linking RHIS to performance in the health sector and improved health outcomes).
- Continue to promote routine health information and RHINO at international and national professional meetings (such as Global Health Council, APHA).
- Maintain and improve the RHINO Listserv and RHINO Forum.
- Establish the Web-based bibliography and Professional Register.

- Continue to produce publications and documentation.
- Other possible communication activities: develop a clearinghouse for HIS software that allows for informal user feedback; clarify resources that are available to members; promote the RHINO Forum more widely.
- It was suggested that the website become more interactive and collaborative using a wiki, a website where all participants can add pages and edit/update existing pages.

2. *Research*

- RHINO should coordinate a research agenda on important topics related to routine health information collection and use. RHINO's role might include (with the contribution of network members) setting out the research agenda, developing the research protocol, monitoring the research program, and disseminating results. The Partnerships for Health Reform Plus project is an example. It is currently coordinating research on the impact of the Global Fund. A number of donors are providing funding, and various groups have been identified to conduct studies.
- Proposed global research topic for RHINO: study the impact of routine health information systems on health outcomes.
- Questions: does RHINO then seek to raise the funding for the research; does it then offer grants to others to conduct the research?

3. *Best practices*

- The groups suggested that RHINO should continue to collect and analyze best practices (or "good ideas") in routine health information systems and disseminate findings to appropriate audiences. This work could be conducted through a formal work program or informally, through discussion groups, self-selected presentations, or providing informal opportunities to share experience.
- The challenges include: the need for experts to determine what constitutes a "good idea"; the reluctance of some to share their good ideas; the reluctance to share lessons learned (not-so-good ideas); keeping the discussion on best practices alive by finding adequate examples, updating Web pages or archives, following interventions over time.
- MSH is experimenting with Web-based "knowledge folders" on different topics that are hyperlinked to case materials. MSH has suggested that RHINO members might be invited to provide a peer review of the knowledge folder on HIS assessment due to be released shortly.
- Suggested areas for presentation of best practices or successful models: a "model" data set for RHIS; a "model" set of universal indicators; "model" strategies for communicating routine health information to different audiences; manuals on routine health information development.
- A RHINO best practices page could be organized along the themes included in different RHINO workshops.

4. *Organizational development of RHINO*

- RHINO should explore options for expanding and diversifying its funding base and the possibility of establishing RHINO as an independent, nonprofit entity.
- RHINO should explore the development and configuration of other similar networks, such as the Safe Injection Network; the CORE group (a consortium of child survival NGOs); Helena; the International Epidemiological Network.
- RHINO and the Health Metrics Network (HMN) are potentially strong partners. RHINO serves a population that HMN is unlikely to cover. RHINO should continue to liaise with HMN and contribute to discussions guiding its development.
- RHINO should maintain its focus as a knowledge management and advocacy group and not become a technical assistance organization.
- RHINO should define one or two niche areas that can attract investors. For example, district-level health information systems is one area where RHINO could play an active role. Few if any worldwide organizations represent the needs and accomplishments of district-level health systems.
- RHINO might institute dues for organizational members (not individual members) to strengthen its funding base.
- RHINO should also explore the many possibilities for in-kind contributions and collaboration with member organizations.
- RHINO should explore funding opportunities from companies such as Oracle and from foundations.

5. *Advocacy*

- Participants suggested that RHINO take on a greater role in advocacy by sending representation to various international forums to promote appropriate investment in routine health information systems

Leadership and Governance

1. MEASURE Evaluation at JSI should continue to serve as the RHINO Secretariat.
2. RHINO should develop a formal Steering Committee to guide its development over time.
3. The Secretariat should propose a model for the RHINO Steering Committee and criteria for selecting Steering Committee members and share them with the network.
4. Suggested criteria for selecting steering committee members: regional representation; mix of expertise; look beyond the USAID community of organizations; look for future funding links; reliability and interest; email response rate.

Annexes



- Annex A: Workshop Participants
- Annex B: Workshop Program
- Annex C: Suggested Questions for Discussion during Field Visits of International Participants to Provinces, Districts and Facilities in South Africa
- Annex D: The Health Information System Programme (HISP)
- Annex E: Tools for Assessment of Levels of Information (TALI)
- Annex F: Facilitators
- Annex G: RHINO Resource Fair Presenters

Annex A: Workshop Participants

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Annex B: Workshop Program

Second International RHINO Workshop
Enhancing the Quality and Use of Health Information
at the District Level

September 28 – October 4, 2003
Eastern Cape Province, South Africa

WORKSHOP PROGRAM

Day 1 DISTRICT FIELD VISITS

Monday

September 29 Field visits

Day 2 DISTRICT FIELD VISITS CONTINUE

Tuesday

September 30

Morning Field visits

Afternoon Travel to Mpekweni

Registration opens in Mpekweni

RESIDENTIAL WORKSHOP BEGINS

19:30 Welcome reception and buffet dinner

Opening ceremony

*Mrs. M. Nthari Matsau, Acting Director General, Department of Health, South Africa
Dr. Bevan Goqwana, MEC for Health, Province of the Eastern Cape
Theo Lippeveld, RHINO/JSI*

Keynote address

Data to Decision making: Delusion or Destiny?
Bruce Campbell, UNFPA Zimbabwe

Day 3 LESSONS FROM THE FIELD

Wednesday

October 1

8:30 **Workshop Aims and Introduction to the Program** (Plenary)

What is RHINO?

Workshop aims

Introductions to facilitators, organizers, and materials

Anne LaFond, Lead Facilitator Technical Program

The Prism: Introducing an Analytical Framework for Understanding Performance of Routine Health Information Systems in Developing Countries (a Work in Progress)

Anne LaFond, Lead Facilitator Technical Program

9:30 **Routine Health Information in South Africa — Reflections on Field Visits**

Orientation to small-group work (Plenary)

Vincent Shaw, Lead Facilitator Technical Program

Facility-level routine health information systems (move to small groups: see room assignment sheet in folder)

- 12:00 LUNCH
- 13:15 Reflections on field visits (continued)
Information use by management above the facility level (small groups reconvene)
- 15:30 BREAK
- 15:45 Exploring DHIS and other software (Plenary)
Calle Hedberg, HISP
- 16:45 Feedback of salient issues of the day (Plenary)
Jon Rohde, Management Sciences for Health (MSH)
- 18:30 Buffet dinner and **RHINO Resource Fair** (concurrent)

Day 4
Thursday
October 2

FOCUS ON DISTRICT RHIS PERFORMANCE IMPROVEMENT

- 8:30 ***Improving Performance of District Routine Health Information Systems***
Overview of the day and introduction to small-group work (Plenary)
Marsha Slater, Lead Process Facilitator
Anne LaFond, Lead Facilitator Technical Program
- 9:00 District RHIS themes: exploration and analysis (small groups; see small-group assignment sheet)
- 11:30 Mid-day peer consultation: Small groups share progress to date
- 12:15 LUNCH
- 13:30 Mid-day peer consultation (continued from morning)
- 14:15 District RHIS themes: strategies and solutions (thematic groups reconvene)
- 17:30 Day 4 adjournment
- Evening Evening free
Auxiliary sessions TBD

Day 5
Friday
October 3

PRIORITIES AND ACTIONS FOR DISTRICT RHIS

- 8:30 Overview of the day and introduction to the RHINO “safari” activity (Plenary)
Marsha Slater, Lead Process Facilitator
- 8:45 RHINO “safari” activity: review of small group products (Break-out rooms)
- 10:20 BREAK

- 10:40 District-level RHIS: priority setting (Thematic groups reconvene)
- 12:00 LUNCH
- 13:30 **Workshop Results**
 Presentation of thematic priorities (Plenary)
Marsha Slater, Lead Process Facilitator
Thematic Group Representatives
- 15:00 Common threads and cross-cutting issues (Plenary)
Coordinated by Marsha Slater and Anne LaFond, Workshop Facilitators
- 15:45 BREAK
- 16:00 Advancing RHINO: action, process, leadership, and funding
Theo Lippeveld, JSI/RHINO
Marsha Slater, Lead Process Facilitator
- 17:15 Conference evaluation and closing remarks
Anne LaFond, Lead Facilitator Technical Content
Vincent Shaw, HISP
Dr. Shaheen Khotu, Director, National Health Information System, South Africa
- 18:00 Conference adjourns
- Evening Traditional South African Braai

Day 6
Saturday
October 4

- Morning Participants check out and depart for airport
- 9:00 Post-workshop RHINO planning meeting (Board Room)
- LUNCH
- 14:00 Planning meeting adjourns**

Annex C: Suggested Questions for Discussion during Field Visits of International Participants to Provinces, Districts, and Facilities in South Africa

AT FACILITY LEVEL (clinics, health centers, district hospitals)

Data collection and collation:

- What health information is collected? Do workers understand why they are collecting each item?
- What data-capturing tools are used? Registers, patient records (facility or patient retained?) How easy is it to use these tools? Is continuity of information assured?
- How are these data collated routinely? How are similar data items from different sites in the facility brought together? Is the monthly report easy to use? Accurate?

Use of data for management:

- Has the introduction of the information system changed the behavior of health workers with respect to data use and management?
- Does the facility have a map providing a visual display of where its clients live?
- Are the routine data portrayed and displayed locally? Graphs posted? Up to date?
- Do service providers understand the information? How do they explain it? Use it?
- Do the facility and its staff have a feel for the denominators, i.e., population and various target groups?
- How are the data used in the facility itself? Are they used for:
 - Planning?
 - For day to day management?
 - For monitoring performance?
 - To share with the community — a committee or citizens group?

External context of facility-based health information systems:

- What support (training, materials, supervision) do the health facility staff receive that promotes performance of the information system?
- What motivates facility staff to collect and use health information?
- What other support, incentives, or improvements do facility staff suggest?
- What similar circumstances in your home country provide lessons that you might share with the facilities you visit?

AT DISTRICT LEVEL

Data collection and collation:

- How do data arrive in the district office?
- What type of quality control have the data passed through?
- How are the data captured on computer?
- How is the computer used to improve data quality?
- What reports are generated routinely when data are received? Who receives those reports?
- Is there any routine feedback to facilities based on their monthly reports? Who provides this?

Use of data for management:

- Has the introduction of the DHIS system changed the behavior of district staff with respect to data use and management?
- Is there any periodic information review derived from the routine system from each facility? From groups of facilities, such as those under one supervisor?
- Is the information used to:
 - Evaluate the overall health system?
 - Monitor services?
 - In the planning process?
 - Produce reports — monthly? Quarterly? Annually?
 - Are graphs or other display posted publicly? Up to date? Understood?

External context of the district-level health information system:

- What support (training, materials, supervision, etc.) does the district level staff receive that promotes performance of the health information system?
- What motivates district staff to manage and use health information?
- What other support, incentives, or improvements do district staff suggest?
- What lessons from your home country could you share with the district regarding information use for district management?

AT PROVINCIAL LEVEL

Data collection and collation:

- How does information arrive at the provincial office?
- What is the quality of information received? Is it timely?
- What actions have been taken to improve timeliness and quality?

Use of data for management:

- Has the introduction of the DHIS system changed the behavior of provincial staff with respect to data use and management?
- What reports are provided routinely to provincial managers? Do they find them useful? Can they give examples of how they have been used?
- What actions have provincial managers taken based on findings from routine information systems? Are these monitored regularly to note progress?

External context of provincial-level health information systems:

- What support (training, materials, supervision, etc.) do provincial level staff receive that promotes performance of the health system?
- What other support, incentives, or improvements do provincial staff suggest?
- What experience from your country can you share with provincial managers and information staff relating to development and use of information systems?

Annex D: The Health Information System Program



The Health Information Systems Program:

The Health Information Systems Programme (HISP) started as a local pilot project in three health districts in the Western Cape in 1994–98. It was a collaborative research and development effort among the University of the Western Cape, the University of Cape Town, the Norwegian Computing Centre University of Oslo, and the Western Cape Department of Health. The Reconstruction and Development Program, the National Health Information Systems of South Africa Committee, and previous relations between Norway and South Africa during the antiapartheid struggle played a role in initiating the project.

NORAD provided funding for part of the first phase (1996–98), which saw the development of a range of successful processes and products related to *routine* health information systems in the pilot districts. These lessons and systems were later rolled out to the whole of the Western Cape in the middle of 1998. Key components were:

- The development of a Minimum (Essential) Data Set for Primary Health Care linked to core indicators.
- The development of a very flexible software package that allows data entry, validation, and analysis at local level *at the same time* as it provides provincial and national departments with some of the data they need. The software allows data to be transmitted to other users, whether horizontally to other districts, or vertically up the hierarchy. Filters can be applied to determine which data get transmitted to the recipient. The software is called the **District Health Information Software (DHIS)**.
- Systematic training of managers at all levels, from the facility and up to national, in how to turn data into information and then use it for *action* (interventions) and *monitoring* (societal trends as well as impact of past interventions). About 70 percent of overall HISP effort during the last six years has been human resource development and institutional capacity building — a prioritization radically different from technology-driven health information systems programs.

HISP's focus of activity is in the use of information in the health sector to improve service delivery. While the DHIS is seen as a tool to enable managers to access information for managing health services, our team has expertise in analyzing and developing systems to improve access to information in PHC and hospital settings, and has convened a number of courses at the University of Western Cape on Information Systems, many of which have contributed to establishing a cadre of people in the health sector in South (and Southern) Africa who work in management and use of information.

The results from the pilot project were regarded as highly successful, and the National Health Information Systems Committee for South Africa (NHIS/SA) adopted HISP processes and the DHIS software as a national standard in early 1999. It was rolled out to the other eight provinces during 1999 and 2000, partially funded by the government and partially by the USAID-funded EQUITY project. It was again expanded in 2000 to cover all public and most private hospitals. Additional data sets and modules were added in 2001 and 2002, as is clear from this timeline (MDS = Minimum Data Set):

- 1997–2000: Routine MDS for Primary Health Care (public sector)
- 2000: Routine MDS for Hospitals (public and private sectors)
- 2001: Inclusion of semipermanent data (infrastructure, personnel)

- 2001: Emergency Medical Services (pilot in the Northern Cape)
- 2002: Facility Survey/Audits, Environmental Health (mainly 2003)
- 2002: PMTCT research sites data included
- 2002: National Tertiary Services Grant data included (R 4 bill / year!)
- 2002: Hospital Revitalisation Programme included
- 2002: Client Satisfaction Survey Tool included
- 2000–02: Mozambique (two pilot districts) and India (two pilots in two states)
- 2002: Full DHIS rollout to all 25 districts in Malawi
- 2002: Tanzania (one pilot district), Cuba (two pilots), Ghana (work on four pilots)
- 2002: Mongolia (adopted for country, work on DHIS translation)
- 2003: Revised Routine MDS for SA that includes PMTCT, VCT, TB, etc.
- 2003: Integration of PHC MDS, Hospital MDS, survey data

Support from USAID-funded EQUITY project from 1999–2003, about R10 million, assisted HISP-SA in:

- Appointing and training consultants (full-time staff currently includes six facilitators and a manager, and part-time staff includes administrative and financial support staff),
- Establishing a core team of information systems designers and programmers that is viewed as the nucleus of a global network dedicated to free and open source software for developing countries.
- Expanding its activities to work in all nine provinces in South Africa and with the National Department of Health. HISP operates in all 240 health subdistricts and the majority of public and private hospitals in South Africa. Despite numerous remaining challenges and problems with management capacity to use information effectively, with gaps and errors in the data, and with the legacy of massive fragmentation in health information systems, *routine monthly data from the whole country are now available at facility, district, regional, provincial and national levels in a standardized manner.*
- Collating and disseminating all available health information from the whole country, together with the DHIS software, while simultaneously supporting the drive toward disseminating all such data through provincial and national DOH websites. This has made the DHIS a crucial resource for many research and survey projects, including many related to HIV/AIDS.

Together with the Health Systems Trust (HST) and the Centre for Health and Social Studies (CHESS), HISP also won the European Union contract for support on information systems to 13 rural district municipalities in South Africa (about R 3.4 mill over two years for the information system component). The outcome of the recent EU review of this program is not yet available, but a recent review of Norwegian assistance to South Africa by the Norwegian and South African governments¹⁹ states,

“HISP was launched with Norwegian funding in 1995 as a joint effort between the Norwegian Computer Centre and UCT’s Department of Community Health and UWC’s School of Public Health. It seeks to gather, analyse and use routine health data to accelerate primary health care and to use the data to monitor and evaluate the impact of primary health care delivery on the status of health in South Africa. Norway ended its funding in 1998 but the project survived with separate research funding from the Norwegian university programme (NUFU) in South Africa. The project then attracted funding in a big way from USAID and the Department of Health (using EU-funding) for the national roll out in 1999-2003.

The software and approach developed by this project and piloted in the Western Cape is now adopted as the standard for monitoring primary health care and hospital services in all nine provinces. It has also been adopted for *inter alia* the monitoring of the National Tertiary Services

¹⁹ “From Aid to Partnership. A Joint Review of Norwegian — South African Development Co-operation 1995–2001,” February 2003.

Grant (R 4 billion per annum), the Hospital Revitalisation Project (approx. R 1 billion per annum), and HIV/AIDS data, and it is used as a basis for most health sector surveys.

With support from the National Department of Health and other donors it is currently being exported to a number of other countries in the region (Malawi, Mozambique and others) and beyond (Ghana, India, Cuba, Mongolia). There is still some funding from Norwegian sources (including the new research programme implemented through the National Research Foundation) for a small research component. The South Africa component of the project is implemented by UWC's School of Public Health and the National Department of Health with support from the University of Oslo's Department of Informatics"

HISP operates as a not-for-profit organization and has established itself as a Section 21 Company (not-for-profit), while still maintaining its links with the University of the Western Cape. HISP is part of a collaborating network of health workers who use the DHIS in other parts of Africa (Mozambique, Malawi, Tanzania), India, Cuba, Mongolia, and the universities of Oslo (Norway), Western Cape (South Africa), Eduardo Mondlane (Mozambique), Malawi, and Dar es Salaam (Tanzania).

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Annex E: Tools for Assessment of Levels of Information (TALI)

Basis for Determining Levels of Information Usage for the PHC Data Set

Level 1	Level 2	Level 3
Facility:		
<p>Facility has an Essential Data Set defined (or uses that for the district).</p> <p>Has submitted all of the expected reports in the last year within the period set for submission of reports (this period may vary from district to district).</p> <p>Feedback reports (at a minimum, a printout of the data entered into DHIS for this facility for the last few months — standard report) are received by the facility once data are entered into DHIS within the time frames set for feedback reports.</p> <p>The facility manager has validated 80% of the feedback reports (checked, signed, and sent back to DIO if any errors were noted).</p>	<p>At least four indicators are graphed for the year and are up to date for the year and up to last reported month.</p> <p>At least three meetings were held in the last six months to evaluate the data elements/indicators.</p>	<p>At least one problem has been identified and addressed through an action plan.</p> <p>The effect of the action has been monitored and can be shown.</p> <p>The actions are documented in a written report to the district, the clinic committee, or in the annual report.</p>
District:		
<p>District has an Essential Data Set defined</p> <p>District has received 95% of expected reports²⁰ from facilities for the last reporting month within the period set for submission of reports.</p> <p>100% of expected feedback reports have been issued within the time frames set for feedback reports.</p> <p>Validation checks (data integrity checker, identify duplicate records, absolute and expert rule violations run on each monthly submission as entered²¹) have been run for each facility/district at least quarterly.</p> <p>Data range levels have been set for the district at least once in the last six months.</p>	<p>District has determined which reports (detailing indicators with targets for their area of responsibility for the last reported month) are required for each manager.</p> <p>At least 80% of expected reports are made available within the expected time frame.</p> <p>At least four indicators with targets are graphed in the district office for the year and up to the last reported month.</p> <p>The District office has held at least three meetings in the last six months to evaluate the indicators.</p>	<p>At least three problems have been identified and addressed through an action plan.</p> <p>The effect of the action has been monitored and can be shown.</p> <p>The actions are documented in the annual report or other written report.</p>

²⁰ This is not data coverage, which is a different indicator.

²¹ Evaluation of the data from a district will thus reveal that there are no absolute rule violations, and all expert validation rules have been commented on.

<p>Province:</p> <p>Province has a Minimum Essential Data Set defined.²²</p> <p>Province has received reports from 95% of districts for the last reporting month within the period set for submission of reports.</p> <p>100% of expected feedback reports to districts have been issued within the time frames set for feedback reports.</p>	<p>Province has determined which reports (detailing data/indicators and targets for their area of responsibility for the last reported month) are required for each manager.</p> <p>At least 80% of expected reports are made available within the expected time frame.</p> <p>At least eight indicators are graphed in the provincial office for the year and last reported month.</p> <p>The provincial office has held at least three meetings in the last six months to evaluate the indicators.</p>	<p>At least five problems have been identified and addressed through an action plan.</p> <p>The effect of the action has been monitored and can be shown.</p> <p>The actions are documented in the annual report or other written report.</p>
<p>National:</p>		
<p>National has a Minimum Essential Data Set defined</p> <p>National has received reports from 95% of provinces for the last reporting month within the period set for the submission of reports.</p> <p>100% of expected feedback reports to provinces have been issued within the timeframes set for feedback reports.</p>	<p>National has determined which reports (detailing data / indicators and targets for their area of responsibility for the last reported month) are required for each manager.</p> <p>At least 80% of expected reports are received within the expected timeframe.</p> <p>At least 10 indicators are graphed in the national office for the year and last reported month.</p> <p>The National office has held at least three meetings in the last six months to evaluate the indicators.</p>	<p>At least five problems have been addressed through an action plan.</p> <p>The effect of the action has been monitored and can be shown.</p> <p>The actions are documented in the annual report or other written report.</p>

These parameters are tracked and summarized on the Tool for Assessing Levels of Information — TALI enabling assessment of the levels of function of the DHIS.

²² As determined by its having its own additional indicators, the data elements to determine these indicators, and validation rules to ensure data quality.

Annex F: Facilitators

Stiaan Byleveld (Facilitator: District Field Visit Group 6), byleveld@lantic.net, is a consultant for the Health Information Systems Programme (HISP) in South Africa. Specializing in using GIS for mapping health care, Stiaan is the principle author of the *“Using Geographical Information Systems for Analyzing and Mapping Health Care”* manual and trainer’s guide. He developed an Emergency Medical/Transport database by piggybacking the existing DHIS software. For the past 14 months, he has focused on training managers at all levels in the Northern Cape Province, South Africa, on how to use their own data/information for local action, with support from the USAID-funded EQUITY project. Together with the Health Systems Trust (HST), he is also responsible for support on information systems to two of the 13 rural district municipalities in South Africa (Ukhahlamba DC, EC Province and Kgalagadi DC, cross-border NC and NW provinces). At the request of DFID: PATHS Nigeria, he provided support to implementation of the National Health Management Information System (NHMIS) in Nigeria, Benue State, and Jigawa State.

Bruce Campbell (Keynote Speaker), campbell@unfpa.org, has just taken up a new assignment as Resident Representative for the United Nations Population Fund in Zimbabwe after three years in a similar post in Eritrea. Prior to working for the United Nations, he was Chief Technical Advisor/Team Leader in the Ministries of Health in Nepal and Ghana. During those 11 years, he worked in health sector reform, with special emphasis on policy development, strengthening district health systems, reproductive health, and health information systems. He has also served as Medical Director and Primary Health Care Coordinator working with Afghan refugees in Pakistan and Palestinian refugees in Lebanon. Bruce holds master’s degrees in public health and business administration, and a Ph.D. in public health. He has published extensively on health information system design, implementation, and use.

Ileana Fajardo (Lead Workshop Organizer, South Africa), ifajardo@compuserve.com, currently Senior Technical Advisor on the EQUITY Project, and Deputy Director for Operations and Training from 1997 to 2001, has over 19 years’ experience in international public health. Before joining the EQUITY Project, she was Project Director for the Inter-American Development Bank (IDB) project, “Strengthening Health Services and Institutions,” in Nicaragua for MSH. She was responsible for the technical and administrative aspects of the project’s three components: strategic planning, alternative financing, and demand for health services. Simultaneously, Ileana provided technical assistance on a 14-member team, funded by the Japanese International Cooperation Agency (JICA), to develop a master health plan for the Ministry of Health in Honduras. Her scope of work focused on institutional development and included assignments in both Honduras and Japan. Prior to those projects, Ileana spent eight years in Honduras where she served as Chief of Party and Deputy Chief of Party of another USAID-funded project. Before joining MSH, Ileana worked for the Aga Khan Foundation, providing technical assistance in Bangladesh, Kenya, and Pakistan in health facilities needs assessment, analysis of potential revenue generation, and strategic planning.

Rebecca Fields (Facilitator: Theme Group Communication), rfields@aed.org, is Technical Director for Systems and Advocacy for the USAID-funded CHANGE Project, managed by the Academy for Educational Development (AED) and the Manoff Group. At CHANGE, which is mandated to provide leadership for behavior change innovation, she works on the design and application of behavior change approaches to immunization, infectious disease surveillance, and injection safety. Previously, she worked for seven years as a senior technical officer in immunization with the BASICS project, as EPI coordinator for the REACH II Project, and as a program officer with the Program for Appropriate Technology in Health (PATH), working on the design and field testing of primary health technologies. She holds a B.A. in microbiology and an M.P.H. in environmental health.

Marius Gouws (Facilitator: District Field Visit Group 4), mkgouws@mweb.co.za, is a member of the faculty at the University of the Western Cape in Cape Town, where he supervises theses and trains students of the Master’s Degree in Public Health program. Marius acts as consultant to the Health Information Systems Programme, and he coordinates and trains the district health information system

rollout project in Mpumalanga and the Free State Provinces of South Africa. In addition to his other responsibilities, he is charged with producing educational and scientific materials.

Anne K. LaFond (Lead Facilitator Technical Program), Anne_LaFond@jsi.com, has 17+ years' experience in international public health, relief, and development. She has served as an evaluation specialist and technical advisor at the MEASURE Evaluation/JSI project since 1998, where she focuses on developing approaches to applied monitoring and evaluation and wrote a *Guide to Monitoring and Evaluation of Capacity Building in the Health Sector*. Prior to joining JSI, she was Principal Investigator for a five- country study on sustainability in the health sector in developing countries and published *Sustaining Primary Health Care*. She has held research and technical positions with both Save the Children Fund (UK) and the Aga Khan Foundation, in addition to acting as a consultant in research and evaluation for USAID and UNICEF.

Theo Lippeveld (Facilitator: Theme Group Integration), Theo_Lippeveld@jsi.com, has been the Principal Investigator for the JSI team of the MEASURE/Evaluation project since 2002. For more than 15 years, he has assisted Ministries of Health at national and district levels to develop routine health information systems (HIS) focused on priority child and reproductive health problems. He was resident HIS advisor in Chad, Pakistan, and Morocco, and provided short-term HIS technical assistance to the Ministries of Health of Eritrea, Madagascar, Niger, Palestine, and Uzbekistan. He was the main author/publisher of a comprehensive overview of design and implementation principles for health information systems in developing countries published by WHO. Theo taught a master's degree course on health information systems as visiting lecturer at the Harvard School of Public Health between 1986 and 1997. He facilitated workshops and presented at numerous events on the importance of routine health information for building integrated health systems. He has also been Vice President of the International Division of JSI since 2000.

Sarah Martin (Lead Workshop Organizer, USA), the_rhino@jsi.com, is an evaluation associate at MEASURE Evaluation at JSI Research and Training Institute. She has conducted research on gender, women's health, and health information systems for five years. Her technical areas of expertise are qualitative analysis, training in gender and development, monitoring and evaluation of gender-based violence projects, and health information systems. She currently works with MEASURE Evaluation to implement health information systems for the Ministry of Health in Haiti and in developing and organizing the Routine Health Information Network (RHINO). She also provides technical assistance for gender-based violence training for the Reproductive Health for Refugees Consortium in countries such as Sierra Leone and Nepal.

Stephanie Posner (Facilitator: Theme Group Action), sposner@abtassoc.com, is a faculty member in the Department of International Health and Development at Tulane University. Trained as an epidemiologist, and with field experience in HIV and STIs, she currently works under the USAID Partners for Health Reform Plus project as a Disease Surveillance Technical Officer, working at both global and country levels. Stephanie is currently team leader for strengthening the infectious disease surveillance system in Tanzania.

Jon Rohde (Lead Facilitator District Level Program), jrohde@msh.org, a Harvard-trained Public Health Specialist and Pediatrician, recently served as Senior Health Advisor for the South African EQUITY Project. He was involved in the concept, design, development, and expansion of DHIS, the system of information that RHINO will explore in South Africa. The first Director of the EQUITY Project, he came to South Africa from 12 years in India, where he was the Representative of UNICEF and the Global Advisor to Mr. James Grant. For the past 35 years he has lived and worked in developing countries conducting research on diarrheal disease and nutrition in Bangladesh, representing the Rockefeller Foundation in Indonesia, and directing the Rural Health Delivery System for Haiti. A pediatrician, he has published widely in the area of infectious disease and nutrition and various aspects of public health. His books are used in schools of public health worldwide; his most recent one is *Community-based Primary Health Care*.

Meta Scott (Workshop Concierge), meta@creativepr.co.za, is a Public Relations Consultant, having worked for Creative Public Relations for the past 15 years. During her time at Creative PR, Meta has been responsible for numerous national and international conferences including CEMSA (Conference for Environmental Management in South Africa), IHSA (Institute of Housing for South Africa), and the East Cape Investors Initiatives Conference. Meta is an executive committee member of the Businesswomen's Association and is chairperson of the Hams-Tech Athletics Club. She was actively involved in setting up the local branch of the Public Relations Institute of S.A.

James Setzer (Facilitator: Theme Group Quality), jim_setzer@abtassoc.com, is an epidemiologist with over 20 years' experience in improving health services and policies through improved information availability and use. He currently works as senior technical officer for PHRplus project. He has worked to develop and improve health information and disease surveillance systems in a number of countries in Africa, including DRC, Niger, and Ghana. He has promoted the use of information in program management as well as policy analysis and formulation.

Vincent Shaw (Facilitator Technical Content and District Field Visit Group 3), VShaw@wol.co.za, spent a number of years in Namibia in both the public and private sectors. It was here that his interest in PHC developed, in particular, the role the doctor plays as a member of the PHC team. In 1988 he and his family moved to Queenstown, in the Eastern Cape Province of South Africa, where he worked in private practice, at Hewu Hospital in the then Ciskei Homeland and, later, in clinics in and around Queenstown. From 1992 on, during the restructuring of the health services in South Africa, he worked in numerous positions in regional and district offices before taking up a position as Acting Director for District Hospitals in the provincial office of the Department of Health. He occupied this position for five years, during which time he became involved in the development of an information system for the district hospitals in the Eastern Cape Province. He is currently Manager of Health Information Systems Programme South Africa, a not-for-profit, nongovernmental organization working in the health information systems arena in South Africa and other African countries. He also holds a position at the University of Western Cape, School of Public Health.

Marsha Slater (Lead Process Facilitator), mwslater@erols.com, is a facilitator, trainer, and organizational development specialist who provides consultation to public and private sector groups. She specializes in participatory planning and decision making processes, team strengthening, strategic and operational planning, leadership development, transition and change management, interpersonal and intergroup conflict management, partnership development, and internal organizational capacity building. She has designed and facilitated conferences and retreats for a variety of organizations and purposes, including multidisciplinary team development, network building, stakeholder analysis and involvement, mergers, organizational performance assessments, restructuring, program reviews, and new program startup. Recent projects include serving as lead facilitator and participatory training specialist on the World Bank Institutes core course, Population, Reproductive Health, and Health Sector Reform (global and Latin America/Caribbean courses) and facilitating interagency network development for UN Staff Counselors.

Norah Stoops (Facilitator: District Field Visit Group 2), norah@mweb.co.za, is a member of the Health Information Systems Programme (HISP) based at the School of Public Health, University of Western Cape, South Africa. Norah has extensive skills in DHIS training and support as well as training in Using Information for Local Action. She has been associated with HISP since 1999 and is responsible for implementation and support of the DHIS in Limpopo Province in South Africa. Norah gained experience in the development of a routine PMTCT Information system for a pilot project implemented in South Africa, and her background is nursing with an M.P.H. specializing in District Health Information Systems.

Ronel Visser (Facilitator: District Field Visit Group 5), ronel@hst.org.za, works for the Health Information Systems Programme (HISP) in the North West Province of South Africa.

Louisa Williamson (Facilitator: District Field Visit Group 1), louisa@williamson.co.za, is a public health practitioner who has been involved in the implementation of Health Information Systems in South Africa for the past five years, with a strong focus on the development of action research models for information management within the context of organizational change. Her key responsibilities include strengthening of data handling processes and development of training strategies and interventions. During the past few years, she has worked on HMIS projects in South Africa (PMTCT: HIV/AIDS Prevention of Mother to Child Transmission), India, and Nigeria.

Timothy (Tim) Williams (Facilitator: Theme Group Indicators), Tim_Williams@jsi.com, is a monitoring and evaluation specialist with 18+ years' experience in research, evaluation, and management of international health programs, focusing on family planning and reproductive health. His areas of expertise include design and application of state-of-the-art M&E systems, routine health information systems, facility survey design and application, capacity building in M&E, and applications of M&E data and research findings. His program experience includes quality of care in FP/RH and nursing programs, logistics, sustainability, cost-effectiveness, HIV/AIDS prevention, and programs for youth and men. With the DELIVER project since 2000, Tim has developed and overseen a strategy for logistics M&E, including development of tools and methods for logistics system assessments carried out in approximately 20 countries worldwide. He was co-chair of a subcommittee of MAQ that helped to develop MEASURE-Evaluation's Quick Investigation of Quality (QIQ) methodology and oversaw the field testing of QIQ in Zimbabwe. From 1990 to 1997, Tim directed M&E activities for the Transition Project of the International Planned Parenthood Federation/Western Hemisphere Region, including methodologies to monitor and evaluate NGO sustainability and quality. He developed an innovative client exit interview tool to measure and improve client satisfaction in Latin American family planning associations. Prior to IPPF/WHR, he was Research Associate with AVSC (now EngenderHealth) and served as Michigan Fellow to PROFAMILIA-Colombia. A common thread of Tim's work has been the collaborative development of quality M&E systems, tailored to stakeholder needs, that lead to enhanced information use and improved program performance.

David Randolph (Randy) Wilson (Facilitator: Theme Group Assessment), rwilson@msh.org, has over 20 years of experience in international public health, with a strong focus on the design and implementation of management information systems over the past 10 years. He has extensive experience as a trainer, information systems analyst, database designer/programmer, project manager, logistics advisor, program evaluator and health planner. Randy has 10 years of long-term overseas work experience (six years in the Congo and four years in Madagascar) and lived for 17 years in the Asian subcontinent. Some of his short-term assignments have included serving as the principal MIS advisor for MSH Projects in Afghanistan (Health Sector Support Project 1991–1993 and REACH 2003) and the Pakistan Child Survival Project (in Islamabad) between 1991 and 1994. While in Madagascar, he worked with the Ministry of Health to enhance the national family planning management information system and to strengthen the contraceptive logistics system. He has contributed chapters related to information systems and computerization to two recent WHO publications and has presented papers on geographic information systems and HMIS assessment at international conferences. In 1999 and 2000, Randy was director of MSH's popular management training course, "Planning and Managing Information Systems." More recently he coordinated assessments of health-related management information systems in India, Guinea, South Africa, and Bhutan. Between 2000 and 2002 Randy served jointly as MSH's Deputy Chief Information Officer and project director of a Health Information Systems Enhancement project in Bhutan. He is currently the Chief Information Officer for MSH, based in Boston, where he oversees corporate systems development and information technology infrastructure.

Annex G: RHINO Resource Fair Presenters

Resource Fair for RHINO Workshop In South Africa	
Information Tables	
1. RHINO	RHINO Products Poster RHINO Register of health information professionals Interactive bibliography of health information literature
2. Evas Atwine, Uganda	AIM Program Information Flow Chart
3. Jorn Braa, Norway	Appropriate Strategies for HIS Development
4. Daniel Ndyanabu, Tanzania	Health Information System in Bukombe District, Tanzania: Tanzania health care information system - Background - Institutional setup - Structural Adjustment Program in health - District Health Information System case studies
5. Randy Wilson, MSH	Assessments and MSH
6. PHR Plus	Information on Partners for Health Reform Plus
7. World Health Organization	Health Metrics Network
8. Jens Byskov, Denmark	HMIS, Danida, Mombassa workshop
9. The EQUITY Project, South Africa	Information on the EQUITY Project
10. Eastern Cape Xhosa Crafts	Iza Crafts: Xhosa Crafts from the Eastern Cape, Thembeka Florida Metele
11. HISP	Health Information System Program information
12. Syed Mursalin, Pakistan	Pakistan District Health Information Training curriculum
Computer Application Demonstrations	
13. Tariq Azim, Pakistan	Using health information for action: Computer program developed by UFHP/JSI In Bangladesh
14. Gerald Lerebours and Nobert Courtois, Haiti	Computerized health information system developed for MOH Haiti by JSI/MEASURE Evaluation
15. Mounkaila Abdou, Niger	Computerized health information system developed for MOH Niger by JSI
16. Juma Lungo, Tanzania	Data extraction transformation and loading software tool: bridging the old and new database systems: A computerized application software for extracting, formatting, and importing data from legacy database systems to district health information software (DHIS)
17. Health Information Systems Programme, South Africa	Demonstration of different software applications 1. DHIS 1 2. DHIS 2 3. Advanced Databases 4. GIS 5. Pivot Tables

In Conjunction With

