

EVALUATION OF THE HEALTH INFORMATION
SYSTEMS PROGRAMME (HISP) COMPUTER
SOFTWARE PROGRAMME IN SELECTED HEALTH
DISTRICTS OF THE CAPE METROPOLE REGION

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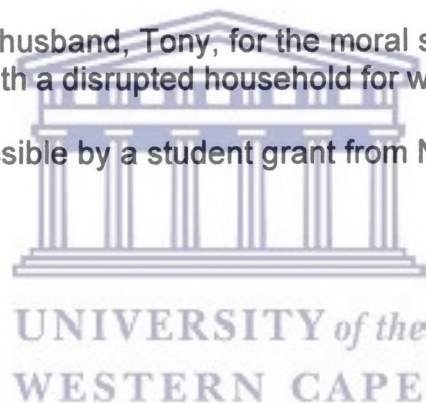
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ABBREVIATIONS AND ACRONYMS

HISP	Health Information Systems Programme
RMR	Routine Monthly Report
MS Office	Microsoft Office Professional Suite
PCs	Personal Computers
IT	Information Technology
STDs	Sexually Transmitted Diseases
TB	Tuberculosis
HIV	Human Immune Virus
DHIS	District Health Information System



ABSTRACT

A user-friendly computer software programme was introduced in the Western Cape in the latter half of 1998 for the purpose of capturing the Provincial Minimum Dataset. The programme, designed for use by ordinary health workers, uses a relational database for data entry, validation and indicator development and then 'pulls' the data through to Excel PivotTables for analysis, manipulation and graphing. Training, both formal and informal, concentrated on skills development in data entry and manipulation. On site and telephonic support was provided for all issues related to using the programme.

Anecdotal evidence has suggested that use of the tools available to adapt the software programme to local use as well as use of available data/information for informed decision-making was limited. The research investigated to what extent use was made of the software tools, local adaptation and of information arising from the software programme.

A cross-sectional descriptive study design using both qualitative and quantitative techniques was used. Data collection included direct observation, a checklist for identifying local adaptation and interviews. The study population was the eleven health districts of the Cape Metropole Region. A purposive sampling procedure was used to select five health districts.

The results indicated that while data entry clerks were adept at the monthly routine of data entry, manipulation and constructing monthly printouts of raw data, few adaptations of the available tools had been made for local use. Health managers demonstrated both a limited understanding of the concept information culture as well as the use of information for decision-making.

Recommendations incorporated strategies to facilitate both the use of the software programme tools and the access and use of analysed data as a basis for informed decision-making.

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1. INTRODUCTION

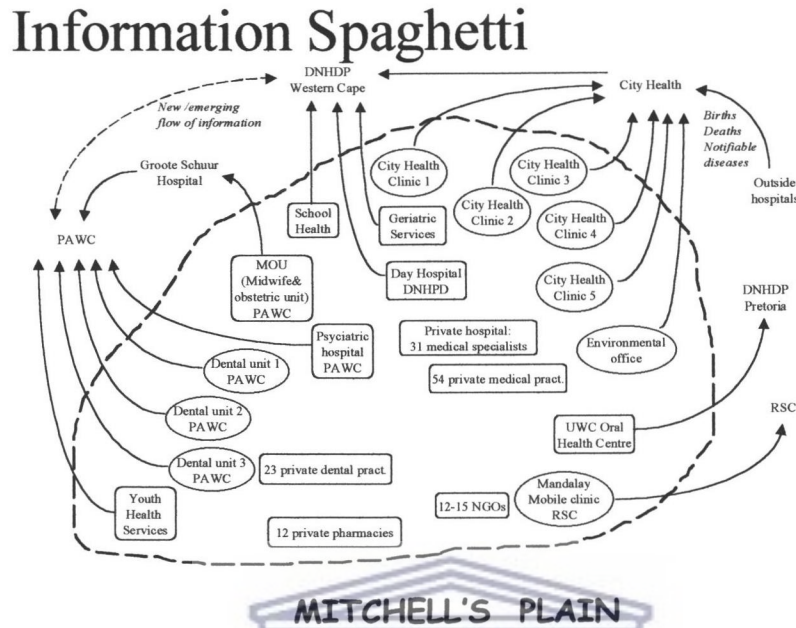
The stated aim of a district health information system (DHIS) is to enable facility and district level staff to use locally generated information to improve coverage and quality of primary health care services. Computers form a vital tool in providing easily accessible information for decision-making. The development of the Health Information System Programme (HISP) computer software programme has necessitated a review of existing mechanisms for the processing of collated data and the use of analysed data for informed decision-making. An evaluation of the computer software programme as a tool for data handling includes the components of data processing, analysis and output.

1.1. Background



The situational analysis for Mitchells Plain done in 1995, revealed a 'spaghetti' relationship between the health service providers as it pertained to information data flow (Braa, Heywood & King 1997). See Figure 1. This also characterised the authority and management structures. The 'spaghetti' model demonstrates an unstructured and unsystematic multi-user organisational information system resulting in a lack of relevant and current information necessary for co-ordinated district health management. The shift to a district based health management system required that the data-flow process be modified in order to provide appropriate data/information for district level management.

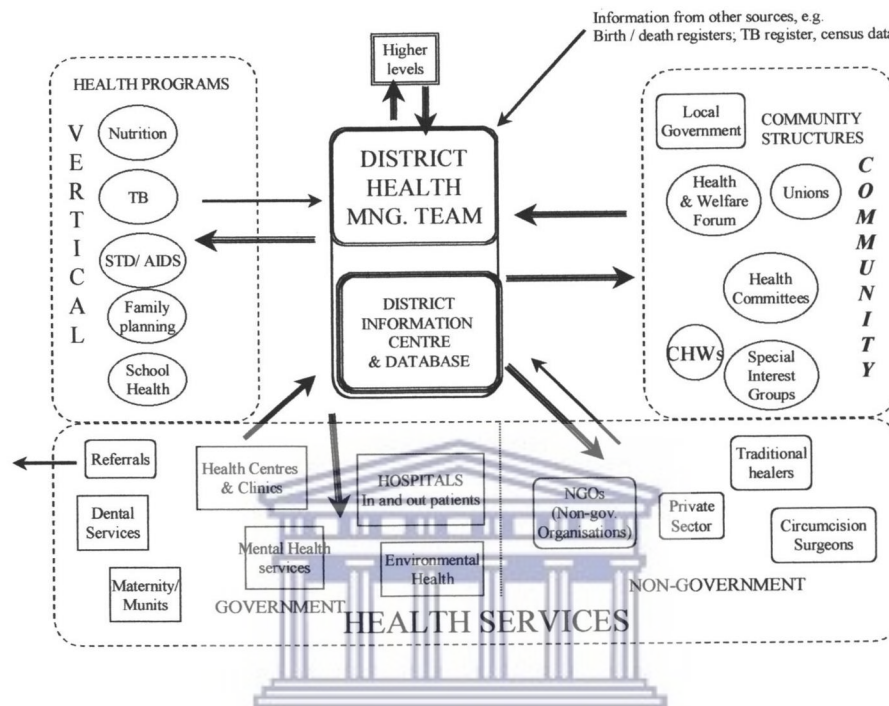
Figure 1: Spaghetti model showing data flow and organisational links in Mitchells Plain.



HISP proposed a **six-step model** for the development of a district based health information system (DHIS). The process model provides the transition from a 'spaghetti' situation towards an action-led health information system that requires that data collected be used in the decision-making process. The formation of an **information team**, led by a district information officer, which functions under the auspices of the district management team, is the first step. This information team **audits** all the data being collected and used and analyses the data-flow process. There follows a process of setting **goals, targets and indicators** that define what data items should be collected in order to construct the **district minimum data set**. This sets the scene for creating district based **information system and structures**. In order to utilise these processes, there needs to be ongoing **staff development**, skills training and understanding of information management. This leads to the creation of an **information culture** where information is sought, discussed and used to improve the health of the community. The information team serves the district management team in the same way that the nervous system serves the

human body i.e. as both a relayer of information and as the initiator of action. See Figure 2.

Figure 2: Proposed model of District Information Flow.



The aim of district development is to act as the vehicle for delivery of Primary Health Care in order to **improve the health status** of the community. This requires that health management be based on sound **public health principles and epidemiological concepts**, using target population as denominators. In order to manage these districts, appropriate information is required. The restructuring of the public health service sector, post 1994 elections, provided impetus for the creation a health information system within the framework of a district health model.

As can be seen from the 'spaghetti' model, it is obvious that the various local authority health-rendering organisations each had their own mechanisms of reporting on the routine monthly health data they provided. This data was either collated by hand or inputted into computers using either DOS based databases or various types of spreadsheets.

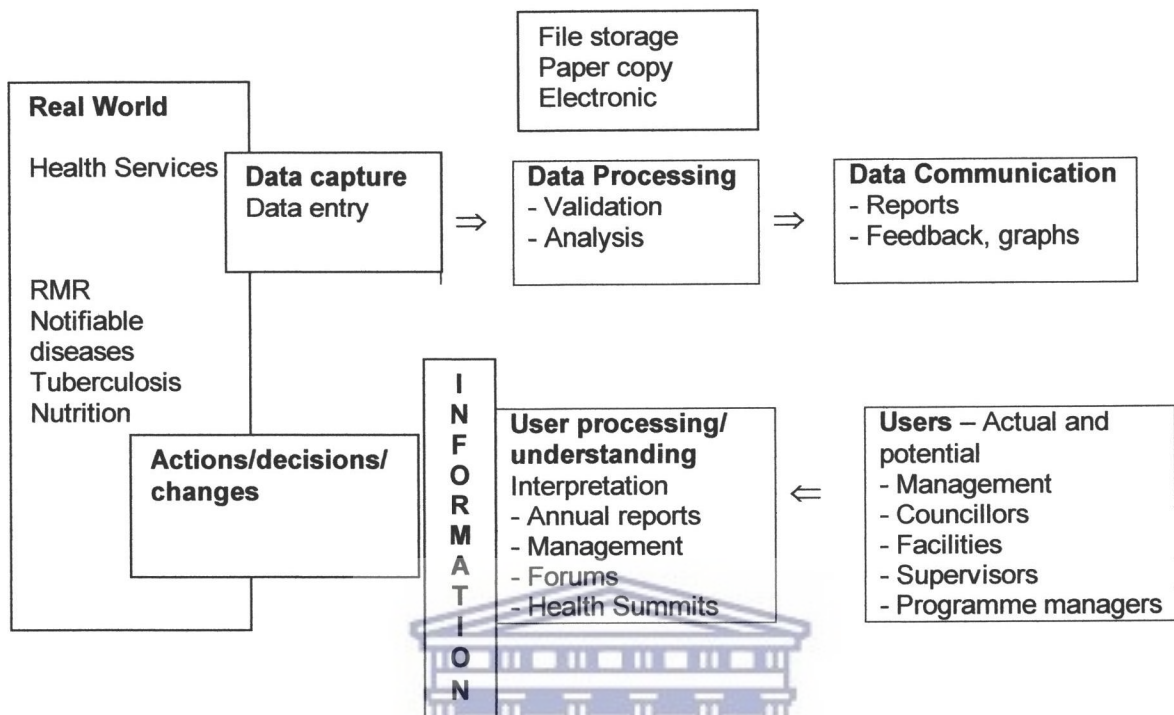
An evaluation of this routine collected data revealed substantial **problems** with the **quality of data** being submitted. (Braa, Hedberg, Heywood & Mahomed 1997). Problems described included data missing for some months, data inconsistencies i.e. more patients seen in preparation room than the headcount, data showing large variations from month to month and facilities reporting on services they did not render.

1.2 Data Flow and Use of Data

Data collection forms part of the process in a management system. A comparison of Lucey's **management information system** (1991) and Heywood's modified **planning cycle** (1994) demonstrate a high degree of similarity in the data handling processes. The management information system provides a generic model for understanding data processing, whereas the planning cycle is attuned to health management. An outline of the two models highlights the main elements.

Lucey (1991) describes a management information system as follows: *a system to convert data from internal and external sources into information and to communicate that information, in an appropriate form, to managers at all levels in all functions to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible.* See Figure 3.

Figure 3: Applied outline of a management information system from Lucey 1991



The planning cycle is used in order to determine what information is required. See Figure 4. Information obtained at the Situation Analysis stage provides the baseline for determining what action plans need to be developed in order to reach the set goals. Monitoring and evaluation allows progress towards goals to be measured and adjusted as needed. This again forms the basis for the next planning cycle that is adjusted according to the determined outcomes.

Figure 4: Planning Cycle.



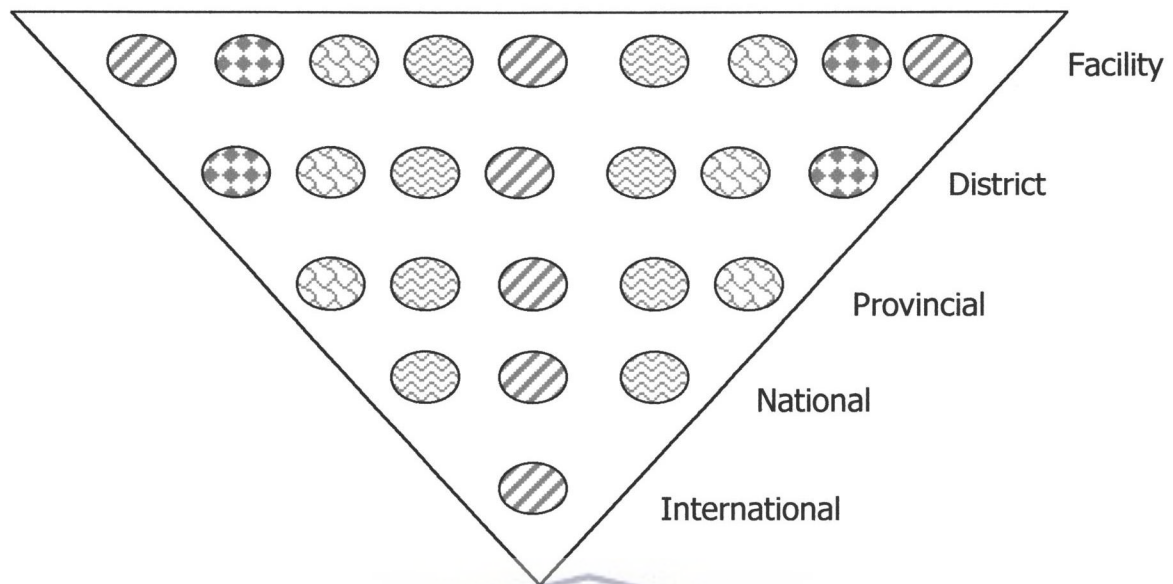
1.3 Routine Monthly Report

Historically, health care workers who routinely collected data that was submitted to higher levels were given no feedback and were not involved in management decision-making regarding coverage and quality of health services. This is demonstrated in Figure 1. This data, with the emphasis on workload, was neither used in the planning or evaluation of health services nor easily accessible to clinicians, researchers, community or local managers.

The proposed district health management system, in promoting greater accountability and transparency, demanded a review of what health services are provided and how they are managed. The use of **goals, targets and indicators**, in order to support **management by objectives**, evolved from the creation of a Provincial Minimum Dataset, which was implemented in July 1998 in the Western Cape. This dataset, known as the **Routine Monthly Report (RMR)**, consisted of 47 data items that were to be provided by health services that rendered primary level care.

This Minimum Dataset was a forerunner of the minimum dataset required at National level. Provinces were free to add on any additional data items required. Lower levels were to collect the minimum data required but were encouraged to add on additional items as the need arose. This is defined as the **data filter principle**. See Figure 5. This minimum data set, the RMR, was to be used for local management of health issues by local health management teams. This new minimum data set substantially decreased the number of data items required on a routine basis. (See Annexure 1)

Figure 5: Data Filter



1.4 Data handling process

Each facility that provides primary health care services **collected** and **collated their own data** on a monthly basis. The completed forms should be checked by the facility supervisor for **accuracy, completeness** and **consistency** prior to forwarding to the district data entry clerk for inputting into the computer. Some facilities, already equipped with the necessary computer hard and software, had the programme loaded in order to enter and validate their own data.

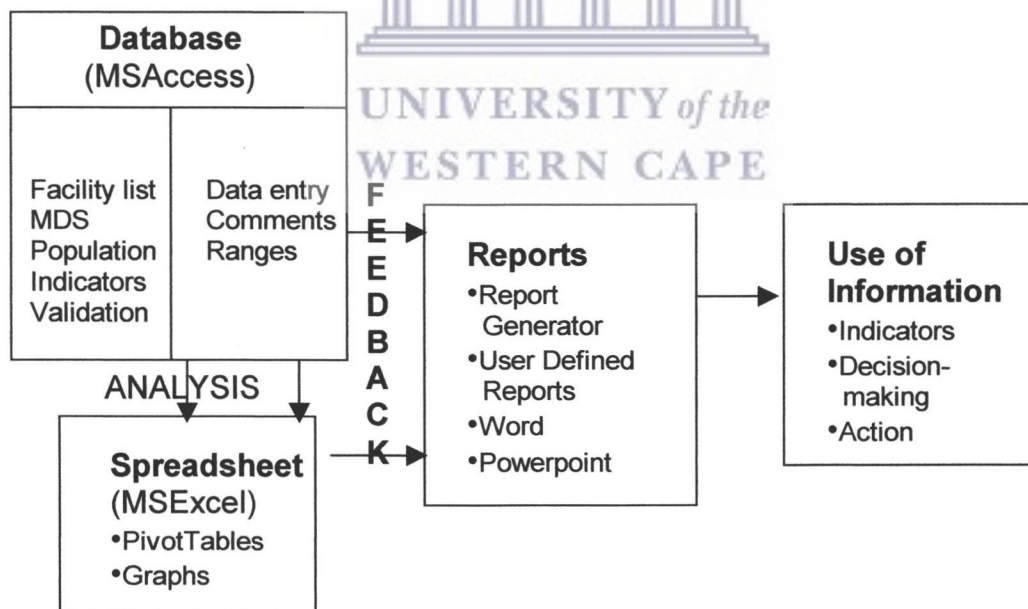
The data entry clerk is responsible for data validation, both electronic and hard copy. This data would be forwarded via email or computer diskette to the next level. **Monthly data or information** is then extracted in the form of **reports** and submitted back to the facility for **feedback**. Facilities and district managers are able to request a variety of report types such as time analysis, facility comparisons and graphs. These reports assist in decision-making for resource allocation, interpretation and monitoring of improvements to the health of the community.

1.5 HISP Computer Software Programme

As part of the district health information system, an innovative approach to the handling of the routine monthly data was devised in the form of a user-friendly computer software programme. This software, piloted as part of the broader HISP initiative and accepted by the Provincial Administration of the Western Cape Department of Health in July 1998, was to be used to capture the new Provincial Minimum Data Set, the RMR.

This computer software programme uses **Microsoft Office Professional Suite**, with Access as the relational database for data entry, data validation, and indicator definition. The data is then 'pulled' through to Excel PivotTables for data analysis, manipulation, graphing and reports. See Figure 6.

Figure 6: Conceptual Model of the Computer Software Programme



Developmental Process

Principles underlying the software development are based on the Scandinavian system of developing and evolving **participatory design**

concepts (Braa 1997). This process is aimed at using available technology to create an environment that will empower local users.

Developmental prototyping was the mechanism by which the software was refined, defined, improved, adapted and changed. (Braa and Hedberg, 2000). User input was considered crucial in the acceptance and progress of the software. Later features of the software were only designed and implemented after requests by users who then used, commented and made suggestions for improvements.

Principles to be considered included using **software** that was already **extensively used** and thus familiar to the majority of the users, as Microsoft Office was the *de facto* standard in the Department of Health. The software had to function with a **high degree of user flexibility** so as to avoid over-dependence on information technocrats. The software had to take into account the **data filter** whereby data items collected at lowest levels were only submitted to the required level. It would allow data to be **submitted electronically** to the next level and then be imported at that level. Much effort was put into **finding solutions** to some of the problems with data that had been encountered previously.

District Health Information Software

The computer software programme, called the District Health Information Software, was designed in a way that enables and assists the person entering the data to reduce the potential number of data errors as far as possible, thereby improving the quality of data (See Annexure 2). In essence this programme simplifies the data entry process, allows for instant analysis of the data entered and enables feedback and reporting to occur at facility, district and higher levels. After reporting, decisions are made and action occurs. The planning cycle is then repeated.

A primary objective of the software programme is to **facilitate** the **upward, downward and vertical flow of data** between facility, district, regional and provincial levels and the automatic provision of analysed data, i.e. feedback and reports, in the form of **indicators**. One of the purposes of the software was that health workers at all levels would be able to use, access and have input (both data and other) into what is collected, thereby taking ownership of the data-handling process leading to informed decision-making.

Some of the computer programme features relevant for use and adaptation at local level will be described.

The programme allows the users to set **minimum** and **maximum ranges** for all data fields. This is useful when data is entered above or below what is normal for that facility for a month. In order to explain values that are out of the norm, there is a **comment field** available to elaborate on any aspect of the data. **Validation rules** can be either absolute or expert. An absolute validation rule will state that any second value cannot be more than the first value. For example: children seen for curative care cannot be more than the total number of children seen. An expert validation rule is based on expert knowledge of a situation and is expressed in percentages. For example: normally not more than 70% (or any predetermined percentage) of children seen will be for curative care. Other tools in the database are the ability to add new facilities, the inclusion of population data and the setting up of indicators that are either facility- or population-based.

Once data has been entered, it can be extracted by the use of **automatic reports** based on the database called User Defined Reports and the Report Generator. These are either as raw data, indicator-based or a combination of both. The use of Excel spreadsheets in the form of **PivotTables** enables detailed manipulation of the data (See Annexure 3). The data is refreshed and the data newly entered into the database is made available. The PivotTables allow data to be viewed per facility or per time period as desired. **Graphs** are also easily created in order to visualise the information. The PivotTables can provide raw data, facility level indicators or population-based indicators as

printouts and graphs. The PivotTables can be copied into Word and/or PowerPoint for **formal reports**.

1.6. Training

Introduction of the computer programme was supported by a **strong training initiative**. Training was initially aimed at data entry clerks who were responsible for the bulk of the data-handling process. This training, done by HISP members who were familiar with the programme, focussed on **data entry, processing and manipulation**.

Training consisted of a formal one-day session with strong post-training support, including troubleshooting and hot line backup. Subsequent training, within the framework of the Public Health Programme Summer and Winter School one-week courses, targeted both data entry clerks as well as health managers. Manuals were made available for use with the programme. **On-site visits and telephonic backup** was provided on an *ad hoc* basis. This was both supportive and troubleshooting in nature.

A basic introduction to the computer programme was included in a variety of HISP training initiatives. Health managers were not specifically targeted for training and seldom attended courses as data/information was deemed the responsibility of the data entry clerk.

1.7 Definition of Terms

Data

The raw figures provided at the end of the month by facilities. This could give the headcount of patients seen, the number of children under six years and other data requested by the Provincial Authorities.

Analysed data/Information

Analysed data is data that has been converted into indicators. These indicators can be based on the monthly data or on population figures. Analysed data that is used can be described as information.

HISP Computer software programme

The programme as developed by HISP that uses Microsoft Access as the database and Excel PivotTables for presentation, manipulation and graphing of the data. It is called the **District Health Information Software**.

Feedback

Providing to the data and information to facilities that originally submitted the raw data. The computer programme is able to produce various reports. These reports can be obtained from either the Access, Excel or from the Report Generator.

Minimum Dataset

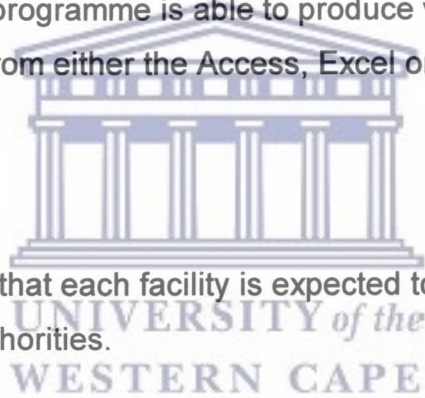
The least amount of data that each facility is expected to provide on a monthly basis to the provincial authorities.

Personal Computer

A computer that stands alone on a desk and operates independently of any other computers, i.e. it is not linked to other computers.

Health District

The term district used implies the geographical area within the boundaries of the local metropolitan council. In the case of the large health districts, they fall within the boundaries of a much larger metropolitan council that has more than one health district within its boundaries



2. LITERATURE REVIEW

2.1 Using computers in a District Health Information System.

An International Perspective

There is a substantial body of literature on the use of information technology, which includes the use of computers by health workers in primary or district level health care settings. (Braa & Heywood, 1995; Heeks et al., 1999; Hull, 1994; Indrayan, 1995; Opit, 1987; Sandiford et al., 1992).

The Aga Khan Foundation sponsored a visionary workshop in 1987 to look at the use of computers in management information systems in primary health care settings. A common theme emphasised was the increasingly important role that micro-computers (PCs) could offer as one of the more useful management tools available (Wilson 1988). Chanawongse and Signhadei (1988) stated that computers were going to be essential if any management information system was to be useful as the basis for planning and operating primary health care or rural development programmes.

Schware, a World Bank official, highlighted four points at this workshop. Firstly that before Primary Health Care programme efficiency could be improved, there had to be improved management, with access to relevant and accurate information and an efficient and reliable feedback mechanism of the information used. Secondly, he makes a plea not to abuse the very tools a microcomputer is used for i.e. processing large amounts of data very rapidly and giving output in any variety of formats resulting in information overload. Thirdly, that in order to make a management information system successful it is dependent on the feedback of the data collected. Until staff understands the importance of data items they are collecting, the value and use of the information system will be of little use. Lastly he addresses some of the challenges in using PCs in management systems. They include the fact that data collection, compilation and analysis procedures must be specified and monitored. Other issues are that reporting procedures and routines for

generating and using processed data and management information must be done in terms that staff can understand and interpret.

Various authors have expressed the view that computers have limitations and their use must not be seen as a panacea for all information problems in primary health care services. Sandiford et al (1992) noted that the 'technocrats' want to persuade health services to use computerised health information systems as a solution towards many of the problems in health services.

Nabarro et al (1988) reported on practical problems experienced with a computerised management system that was used in Nepal with very little potential for local use adaptation. Difficulties were encountered with the hardware and software that staff was not always able to resolve. This system appeared only to be of use to the people working with the computer, as the health managers who needed the information did not have the computer skills to access the information. This view was reinforced in the Philippines where a Health and Management Information System included an element called BLACKBOX that contained the routine data on public health programmes. In practice computerised information systems tend to be mainly data systems that concentrate on database management that involves collecting, coding, editing, deleting, backing up and ensuring integrity of the data. This is frequently the domain of a small group of users, the information experts. The people who actually need the information are usually those with the lowest level (if any) of computer literacy – frequently health managers (Marte & Schwefel, 1995). The issues of affordability, infrastructure, logistics, computer literacy and computer technology may impede the expansion and sustainability of use of computers in many primary level settings.

Hedberg (1991) makes a strong plea that where any electronic data processing development occurs cognisance must be taken of all the surrounding issues i.e. staff and facilities. Moyo (1996) provides some insight into different aspects of information technology (IT) by listing some of the

factors that can hinder use of computers. These include low levels of IT literacy and inadequate human resource capacity for IT development as some of the basic issues. The suggestion is made that, in order to use IT effectively at organisational level, managers need to be adequately informed about issues relating to IT. This is related specifically to the development of systems that are needed for strategic issues and planning as it affects the organisation.

A South African Perspective

The beginnings of a District based Primary Health Care Information System can be traced to a meeting at Broederstroom in 1994 where all provinces agreed to develop their own system but to share their experiences with the other provinces. (Power, 1994)

In the Free State there was the vision to implement a centralised database system to service all fixed and mobile clinics. A computerised patient record system has substantial advantages such as improved accuracy, increased management control and less nursing time spent on submitting statistical reports. The Free State eventually installed a computerised tick sheet system. Each client was recorded appropriately on an individual tick sheet that was sent to a central point to be scanned in and onto the central database. (Blignaut & McDonald, 1994)

In the North West Province Primary Health Care data was collected on spreadsheets at the Provincial Head Office. However there are 2 Pilot District with Health Information Systems where data was captured at the district level on MS Access. (Vundule, 1997)

At a facility level the Alexandra Health Centre in Johannesburg developed a health information system for primary health care towards the end of 1980s. No description is given of the mechanism of data collection and analysis except to note that the move from a manual system to PCs was becoming more and more necessary. (Buch, Ferrinho, Robb & Phakathi, 1991)

Heywood and Magaqa (1998) were commissioned by Health Systems Trust to do a review on the State of Primary Health Care Information Systems. In conclusion they noted that district level information systems that have been developed can be divided into different categories. Firstly, individuals using spreadsheets, with all the inherent problems associated in trying to manage large files in a spreadsheet format; secondly, the use of commercial off-the-shelf health information systems which tend to be rigid and not adaptable to local circumstances or adapted as information needs change and lastly the use of centralised hi-tech systems, as seen in the Free State, which have failed.

The chapter by Muschell in the South African Health Review (1999) on District Health Information Systems notes that the actual computer use, provided training is given, tends to be satisfactory, but that data analysis and feedback is still in developmental stages.

2.2 Data analysis

Central to being able to analyse the data is the use of population data for estimates of coverage, rates etc. Two authors combine the development of information for improving health and computers. Peter Byass (1993) in *Epidemiology and Health Information in Africa* defines macro-epidemiology as the application of epidemiological methods on a population basis to improve health planning and policy development. This can only be done in conjunction with appropriate information systems i.e. computerisation. Sishana (1993) in her article 'The process of developing and monitoring national health objectives in South Africa' talks about the need to define the target population. This is then, by implication, linked to the establishment of a Health Information System, which will be required in order to collect, analyse, interpret and disseminate health information. This leads to a need for the development of standards, definitions, training and the use of computers. Tanahashi (1978) in his article examining the evaluation of health service coverage indicates that a

target population figure is required in order to estimate coverage and utilisation.

2.3 Questionnaire development

Campbell (1997) used a format for interviews for determining if management was using information in order to make decisions regarding certain Primary Health Care services. This format has been the basis for the structured questionnaire, with adaptation for determining local use of information.



3. AIMS AND OBJECTIVES OF THE STUDY

3.1. Problem Statement

Anecdotal evidence suggested that while training and support had been provided, the full potential of the computer programme had not been achieved.

While data entry clerks experienced few difficulties with actual data entry and extraction, data was submitted to the next level, frequently without accuracy, completeness and validation checks. Historically, data entry clerks have not been responsible for ensuring the quality of data and have no background in health and health service management, limiting their ability to identify data errors and inconsistencies.

Health managers have demonstrated limited use of information in the management of health services, reflecting a bias towards quantity rather than quality of health care, thus a workload focus rather than one of health status. This may have been due to the lack of organisational infrastructure, uncertainty regarding areas of responsibility and a traditional perception that health information is not relevant for service management. Within the eleven health districts of the Cape Metropole, management structures have developed at different rates in terms of structure and skill. Thus districts have displayed varying degrees of expertise in their awareness of and use of information as a management tool.

3.2 Purpose of the Study

The purpose of the study was twofold. The first was to **observe** to what degree the selected districts have used the available tools in the computer programme to satisfy local data needs and secondly, to determine whether any of the **analysed data**, in the form of indicators, **has been accessed and used** by management.

Factors influencing use and/or non-use of the software programme were identified and recommendations made to facilitate both the use of the computer programme tools and the access and use of analysed data as a basis for informed decision-making.

3.3. Aim of the Study

The aim of the study was to evaluate the use of the computer software programme and its output in selected health districts.

3.4 Objectives of the Study

1. Evaluate the use of the HISP computer software programme by data entry clerks.
2. Determine management use of analysed data produced by the computer programme.
3. Make recommendations to promote use of the computer software programme in providing information for decision-making.



4. METHODOLOGY

4.1 Study Design

4.1.1 Study Type

This is a cross-sectional descriptive study design with both qualitative and quantitative techniques. The study had an action-based component where assistance was given as requested and problems were solved for local staff.

4.1.2 Study Population and Sampling

The study population was the eleven health districts of the Cape Metropole Region. A purposive sampling procedure was used to select five health districts on the basis of district size. Two small, one medium sized and two large health districts were selected.

4.1.3 Data Collection Techniques and Instruments

Direct observation of the data entry clerks in each selected district was done in order to obtain quantitative data on the use of the computer programme.

A **Yes/No checklist** was administered to the data entry clerks. Fourteen criteria evaluated actual use of the software such as adaptation to local use, refreshing of the PivotTables, reports generated and number of validation errors. Four criteria evaluated technical competence to manipulate the database and extract the relevant output. (See Annexure 4)

A **structured interview** was held with members of each selected district health management team to obtain qualitative data on whether analysed data has been accessed and used. The interview guide was modified from Campbell. (See Annexure 5)

4.2. Ethical Considerations

Permission was requested from the relevant authorities to access and view the data/information. Participants were told of the aim of the study, their right to confidentiality and the right to refuse to participate or withdraw at any stage. The right to feedback at the end of the study was conveyed. The districts are not named and only referred to in terms of their size. No actual patient data/information as such was used; it was only viewed when looking at the software output.

4.3 Data Analysis

This research was both quantitative and qualitative in nature. The quantitative data, the Yes/No checklist, was analysed using 2x4 descriptive tables. The findings were summarised according to each item for the five districts. As the numbers were so small, no attempt was made to convert the answers into percentages. The qualitative interview themes allowed for the identification of common issues and responses. Notes were taken during the interview. In order to confirm the interview statements, the notes were typed out and submitted to the interviewees for confirmation of their statements. Themes were also be independently verified to ensure all relevant issues have been extracted.

4.4 Limitations of the Study

Three of the five districts sampled are small and medium-sized districts who function as individual local Metropolitan Councils, it is thus possible that the sample size biased the outcome and that an increased sample size, which would include more of the districts that are contained within larger local authorities, would provide different results.

Many districts are in the process of undergoing changes in structure, functions and staffing and it is possible that the responses given were to the best of the respondents' abilities but not necessarily a true and accurate reflection of current events and thinking in the district, specifically if there were potentially multiple levels of management and responsibility, as was the case in the two large districts sampled.

One of the major limitations of this study is that it looked only at the services, facilities and management under control of the Local Metropolitan Councils. The Community Health Services Organisation facilities were not included, as they do not yet form part of the district health structures.

A major limitation of the structured interview was that it did not seek conclusive 'proof' that the data collected using the computer programme was used for decision-making. Another limitation was the use of the term 'indicator'; the assumption was that respondents would understand the term. This was not necessarily so. Thus the interview was not rigorous enough to ensure a high degree of validity and reliability. Internal and external constraints were not adequately considered in the design of the interview guide. Assessing an understanding of the term 'indicator' may require other methods.

The checklist used was piloted during the initial phases of the study and provided consistent appropriate answers. The only aspect that may affect reliability were the responses in the Partial column as there may be differences in interpretation.

4.5. Dissemination of Results

Provisional results were presented at the Helina Conference, Zimbabwe in 1999. The final results of this study will be presented at an academic meeting of the Public Health Programme. It will also be made available to all the districts in the Cape Metropolitan Region. A copy of this thesis will be kept

at the Public Health Programme at University of the Western Cape. A copy will also be sent to The Democratic Nursing Association of South Africa who provided some funding during the initial stages of study. An article will be written and submitted to local journals for publication.



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5. RESULTS

5.1 Use of the HISP Computer Software Programme

The on-site visit provided opportunity to administer the Yes/No checklist and offer ad-hoc training and support. The findings demonstrated that, while data entry clerks were technically competent to enter data, few adaptations of the available tools had been made for local use. Absolute validation errors, over a three-month period, were picked up in all five districts. The PivotTables for district and facility level indicators had generally not been refreshed and few reports other than the monthly raw data reports were generated. The findings are summarised in Table 1.

5.1.1 Use of the Computer Programme by Data Entry Clerks

Data inputting is considered the domain of the data entry clerk, and with the exception of one district, it has generally remained so. The data entry clerks visited all managed to manipulate the database with ease and also extract the monthly raw data from the PivotTables.

One clerk was unaware of the User Defined Reports. A quick refresher course was given where needed in different aspects of the database and PivotTables. The making of graphs were also reviewed where skills had been forgotten due to lack of use.

Use of the tool to determine validation errors was not apparent as errors were picked up in all five districts. No absolute validation rules should be triggered, unless there is some supporting comment. The number of absolute validation rule errors triggered was on average, between 1 and 4 per district. Although only one absolute validation rule error was identified by the data entry clerk at the time of data input, no explanatory comments had been inserted. On asking about this error, an explanation was forthcoming which was then inserted. In one district the errors were due to misinterpretation of

the data item definition given during training. No explanations were given for the other errors identified. The expert validation rule errors triggered were within reason. In one district the researcher, in conjunction with the data entry clerk, modified an expert rule to reflect the current reality for that district.

In four districts all facilities had set their own minimum and maximum ranges, while in one district they had not done this at all. The PivotTables worksheet for facility and district-based indicators had not been refreshed. In three districts the Facility Indicator PivotTables were updated during the on site visit for the first time in many months. This also applied to the district indicators that are population based. In two districts the clerk was unaware of a small bug in the software that did not allow calculation of the population based indicators since January 2000. This was only discovered some five months into the New Year. As a remedial intervention the bug was fixed and the indicator PivotTable updated. District level indicators were prepared and printed out.

No graphs were produced on a regular basis as they were seldom requested. In two districts data entry clerks had produced graphs on request of managers and/or facilities. One clerk indicated that she had stopped giving facilities feedback in graph and indicator format, as the facilities did not understand and could not interpret the indicators and were also therefore unable to make sense of the graphs.

Table 1: Use of Computer Software Programme

Question (n=5)	Yes	No	Partially	Comments (refer to Partially)
1. Is data inputted at facility level		2	3	Only from one facility in 2 districts One facility has ability but sends hard copy
2. Is data from facilities accepted electronically or on diskette	1	3	1	From one facility
3. On running the validation function for the past 3 months, were there absolute validations ¹ errors present	5			
4. Were the expert validation ² errors within reason	5			
5. Have new fields been added	1	4		
6. Have new indicators been developed using the new fields	1	4		
7. Have validation rules been developed for the new data fields		5		
8. Have facilities set their own ranges ³	3	1	1	This was done in conjunction with data entry clerk
9. Are reports produced for feedback to facilities	1	3	1	For one facility and on request only
10. Are monthly aggregated reports produced for the district	5			
11. Are Facility Indicator PivotTables updated (refreshed)		3	2	One district has developed own raw data/indicator report One district manager calculated own indicators from raw data
12. Are District Indicator PivotTables updated (refreshed)		4	1	One district uses only diarrhoea and acute chest infection in children
13. Are graphs produced on a regular basis		5		
14. Have any of the User Defined Queries and Reports been used	3	1	1	Has used them but not recently
15. Can the respondent run the validation rules	5			
16. Can the respondent refresh the PivotTables	5			
17. Is the respondent able to use the User Defined Queries and Reports	4	1		
18. Can the respondent make graphs	4	1		

¹ Absolute Validation error – One figure is higher than another where this is impossible

² Expert Validation error – one figure is a percentage of another as determined by experts in the field

³ Ranges – data is expected to fall between a certain range i.e. the minimum and maximum values

5.1.2. Use of the Computer Programme by Management

Management in all five districts have no direct access to the HISP computer software and thus do not use it. Any use of the computer programme is related to requesting modification of the standard programme provided and making use of the output, i.e. the data and reports generated.

The data entry clerks in all five districts provided management with raw aggregated monthly data. While all districts produced monthly aggregated district level reports, only one produced reports with both raw and indicator data. The stated aim of these reports was for presentation at local council meetings. Copies of the reports were also made available to the Area Managers, the Nursing Service Manager, the Chief Professional Nurse and other level of supervisors but not to individual facilities. Only one district provided each facility with monthly feedback of both raw and indicator data on a regular basis while the others provided feedback on an *ad hoc* basis.

The one district that provided indicator reports did not use the PivotTables for their indicators. The raw data was copied across onto a clean Excel worksheet where they manually put in the formulas for the calculations. This occurred because the PivotTables were unable to produce, on one page, both raw data and indicators as required in that district. This problem has been addressed by development of a Report Generator Module in the computer programme.

It is the function of management to define and ask for new data fields and indicators. Four of the five districts had not asked for additional data items to be collected. Two districts indicated that they were in the process of looking at what additional data items are required at district level, but had not put them onto the database. The additional items added were not based on indicators and there was no plan for what would be done with the data once it was obtained. Only one district had added new data items and new indicators. No

validation rules were written for these new data items to ensure that the data was not subject to gross errors and misinterpretations.

5.2 Use of Analysed Data produced by the Computer Programme

Structured interviews were done with representatives of the management team in each of the selected districts in order to determine what use was made of the outputs of the computer programme. The questions asked during the interview are listed below and a composite of the answers given is provided.

1. *The computer programme can produce automatically calculated indicators. Have you used any of these, and if so, which were the most useful?*

- Four of the five districts reported that they had used calculated indicators, with one of these districts reporting using the specially designed indicator printout.
- Useful indicators were those on Child Health, Teenage Pregnancy rate and children seen for curative services were commonly mentioned. Also noted were workload, TB indicators and Nutrition/Growth Monitoring data/indicators and referral rates by Professional Nurse
- In one district, the manager re-entered the raw data and calculated his own indicators for total attendance and child health. The programme had not been installed on his computer, but this would be rectified shortly.

2. *What graphs have you requested from the computer programme? Have you seen any of the graphs?*

- All five districts reported having seen graphs, but not necessarily to having requested them.
- Graphs were used for reporting into community newsletters and for Child Health and STDs (raw data). One facility used graphs to illustrate workload.

- Graphs were made from own data in one district i.e. they did not use the PivotTables to get graphs. Some graphs originated from other programmes such as TB.
3. *What Raw Data items from the Routine Monthly Report have you used?*
- Commonly used data items included Headcount/attendances, Child Health, Curatives services, referral patterns and the split between morning and afternoon attendances in one district
 - Less commonly used data items included those related to Child Nutrition and Growth Monitoring.
4. *Have you requested any additional items to be included on the routine monthly data collection?*
- One district reported adding additional items to the provincial minimum data set.
 - Three of the five districts indicated that they were in the process of discussing new fields. Examples of the new fields included number of teenagers receiving reproductive health services, number of Tuberculosis patients under and over 15 years, HIV.
 - One district stated they wanted to reduce the number of data items collected, as there were too many.
5. *Can you give examples of where you have used data/information for decision-making? (Respondents were not asked to 'prove' they had used data/information i.e. copies of minutes etc)*
- Four of the five districts reported using data/information for decision-making. Examples included:
- Calculating the number of items per script to motivate for an additional pharmacy assistant.
 - Using Goals, Targets and Indicators to determine a clinic strategic plan for the year.
 - Shifting of staff and evaluating the need for expanding clinic hours/services.

- Available data used in presentation at the local Health Summit meeting.
6. *Have you discussed any data/information received from the Routine Monthly Report at management meetings?*
- Four of the five districts indicated that they discussed the data received from the Routine Monthly Report. Examples given ranged from condoms distributed, attendances, curative services and child health.
7. *As a manager you are responsible for programmes. Have you set any targets? If so, how far are you towards achieving these targets?*
- Four of the five districts reported that targets had been set. Both positive targets i.e. achieving a certain number of condoms distributed and negative targets i.e. preventing the teenage pregnancy rate rising above a certain level had been set.
 - One district indicated a more generalised response, saying that TB and Preventive and Promotive Health were to be prioritised during 2000.
8. *Which National targets have you adapted for your district?*
- All five districts indicated that they had adapted national targets. The example most commonly noted was that of the Cure Rate of New Smear Positive patients. In some districts the target was to achieve the desired 85%, in other districts with a very low cure rate it was to improve by 5% or aim for 70%, depending on their present status.
9. *Which parts of the computer programme are useful to you?*
- All five districts reported that the raw data monthly print out was the most useful.
 - One district indicated that the graphs were very useful.
10. *Do you have any suggestions to make regarding how to improve the use of the computer programme?*
- A common theme was that there had to be more computers and the programme more freely available. This implied that there had to be

computer literacy training and training in using the computer programme.

- Some respondents noted that the whole concept of the role and function of a district health system needed to be clarified.



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6. DISCUSSION

The study sample does not reflect the reality in the Cape Metropole region. Where the large health districts form part of a Metropole structure with more than one health district, the failure to consider the vision and role of top management structures has skewed the findings as the interview structure focussed on local management levels.

The assumption that if analysed data was made available management would use it, proved too simplistic. Use of information for management in the absence of a culture of information use highlighted the lack of local management knowledge and skills. The role of 'champions' in promoting both understanding and use of health information systems serve as an example of the vital role leaders can play in generating a culture of information use.

6.1 The HISP Computer Programme

The HISP computer software programme, functioning for almost two years and widely tested in both pilot and implementation sites in the Western and Eastern Cape provinces, has been refined to suit evolving needs of a DHIS. The success of the computer programme may be attributed to its **high degree of flexibility** that allows it to overcome many of the barriers associated with alternative systems. The centralised individual tick register form of the Free State system, dependent on specialised paper forms, scanning and the services of highly trained information technologists, failed largely due to an inability to meet resource demands. Use of commercial software in the form of spreadsheets has proved unsatisfactory due the inability to maintain good data quality through verification and replication.

The attractions of the computer programme are that of **user-empowerment** created through hands on training and user support. **Local flexibility** and **ease of manipulation** and use has further strengthened the use of the programme by being able to accommodate the differing needs of

the various districts and provinces. The programme is being expanded to include a hospital minimum data set and meet the needs of environmental officers and Emergency Medical Rescue services.

Success of the computer programme is demonstrated in the decision by the Department of Health via the NHISSA (National Health Information Systems of South Africa) committee and the top level Primary Health Care Restructuring Committee to **implement** the **HISP** processes and computer software programme as the mechanism for handling district level primary health care data **throughout all** the provinces in the **country**. Testing and evaluation of the programme is also occurring in other African countries.

The strength of the computer programme lies in its adoption of the **principles of a primary health care approach** for responsive and accountable health care delivery.

Affordability of the whole process of a district health information system using the programme as a basis was promoted through development of provincial business plans that specified a structured process for the acquisition and implementation of computer hardware and software requirements, including a strong training and support initiative. The computer programme is provided as freeware i.e. there is no cost involved in obtaining and using the programme.

Technological appropriateness has been promoted throughout in terms of hardware, software and flexibility in programme design. The programme runs off ordinary personal computers, using Microsoft Office, the most widely used software package, as the basis for the computer programme. The use of the Office package as the user interface and relatively low level of computer literacy required to access the programme and enter data has enhanced health worker acceptability of the new software. More skill is required in order to manipulate the PivotTables and produce graphs and reports. Technically it is relatively robust, with a high degree of user-friendliness.

A major strength of the programme can be found in the 'human' approach that sought user interaction and comment to promote programme **acceptability**. The ability of local level health workers to tailor the computer programme at each facility, district and regional level, i.e. its user-definability, promotes ownership of the information process. Technical skills development in data processing, computer literacy and programme manipulation has enhanced a conceptual understanding of the broader public health implications of data handling and information use. The empowerment implicit in this process has the potential to increase both transparency and accountability in service rendering.

The software compatibility with other health programmes, i.e. TB Sys, allowing ongoing functioning of existing national systems, has ensured provincial **acceptability**. Integration of data analysis at all levels means that TB data derived from the Quarterly TB reports are subjected to the same data entry and validation processes as the monthly data. Data is easily forwarded to the next level, either on computer floppy or via email. This has reduced the time period between data transfer from district to regional to provincial level to six weeks, ensuring availability of current data. The recent development of the Report Generator that allows the analysis and presentation of data in both raw and indicator format on one page has improved the feedback and reporting features of the programme.

The opportunity to directly access not only data (statistics), but also locally relevant and current health information, a primary aim of the programme, is a major strength that has yet to be fully realised. The Cape Metropolitan Council top management buy-in of the programme encouraged acceptance of the concept of a health information systems tool that would provide information, assisting managers in the decision-making process. This was endorsed through provision of funding for training of district level staff in information management.

Local level **access** was promoted by training of facility and district based health workers. The technical skills of a group of super-users, those more skilled in manipulation of the software, were developed; they were used to provide additional support, so that ownership of the programme does not lie with the developer but with all users. Success of the programme relates to the ease of access to support through a telephonic hotline and on-site visits. A pro-active problem-solving approach and easy accessibility to the hotline, where problems with the software are actively sought and resolved, has promoted a collegial networking process.

6.2 Barriers to Computer Programme Use

Barriers to full usage of the computer software programme may be described against the changing background of health service delivery in terms of **health organisations, information culture and human resources**. Restructuring of the health service is characterised by creation of district-based management teams that should be responsive, transparent, responsible and accountable to both the health service authorities and community served. A district health information system has been identified as central to this process.

Historically health services have been characterised by fragmentation, centralised control, a limited worldview, and an emphasis on case management at the cost of a programme management perspective with their health information systems following suit. Nurses played no role in the health information process, with the responsibility of the 'stats' frequently given to junior or clerical staff.

The shift to a primary health care, district based approach to service delivery has required management to approach the provision of health services from a public health perspective, which includes aspects of epidemiology as it pertains to the health profile and status of a community. The actual management process, using concepts such as objectives and

targets in order to measure, monitor and evaluate health services is not widespread. These are often perceived as new principles that need to be grappled with, requiring training and support programmes. Thus the need for analysed data with indicators and thinking in terms of numerator and denominator seldom occurred.

The weak **information culture** forms a fundamental barrier to the use of information for informed decision-making. The lack of demand for processed information resulted in the tools of the computer programme being ignored i.e. demanding additional indicators, viewing indicators on a routine basis that would require refreshing of the PivotTables.

Role confusion regarding the areas of responsibility of both data entry clerks and management structures is problematic. The facility completes the monthly data forms. The facility supervisor is responsible for signing the completed form, which implies that data has been checked and verified. The data entry clerk is responsible for inputting the data and submission of standard monthly reports. This process does not ensure good quality data, as job descriptions have no built-in responsibility and accountability at each level for ensuring that data is accurate and complete. Thus inaccurate and poor quality data is forwarded up the different levels with scant regard for the importance and need of good quality data.

There is a traditional perception that issues relating to health information belong within the realm of the data entry clerk. This is demonstrated when information meetings are called requiring in-depth understanding of health issues, i.e. Goals, Targets and Indicators, and the data entry clerk is sent to represent the opinions, input and experiences of a district. Both management and clerks are disempowered by a lack of understanding of the role of information in health care issues.

The job descriptions of nursing staff do not include elements of responsibility for health information. They avoid involvement with these issues

stating that as data entry clerks 'deal with the stats'; it is 'not their business'. The term frequently used to describe health information is 'stats', with its very negative connotation. Any feedback given by supervisors regarding the 'stats' is almost always negative i.e. why is the data submitted wrong, why is data late etc? This reinforces the negative view regarding health information. The concept that local nursing staff could be taught to enter and validate their own data has been met with mixed response, with some staff refusing and other willing to learn but severely limited due to low levels of computer literacy. This situation is compounded by restricted access to computers and a low premium being placed on computer skill and knowledge.

Use by Data Entry Clerks

The relatively high degree of competence demonstrated by data entry clerks reflects an understanding of the technical aspects of data processing. The failure to refresh indicator PivotTables, identify and correct validation errors and negotiate with the erring facility to fix the problems, demonstrates a lack of understanding of health issues. Historically, data entry clerks have been recruited from administrative ranks and have no formal health training. The expanding role of this cadre of health worker in all aspects related to a DHIS without providing supportive training in broader public health issues, limits their ability to participate fully in the whole health information systems development occurring at present. Poor use of information by management means that skills taught were forgotten, i.e. graphing, use of User Defined Reports.

Clerks who have been using old DOS-based data entry programmes have indicated their unhappiness with the computer programme, as traps such as warning alerts have halted the previous carefree data entry process when data is entered outside the minimum and maximum range. They have 'solved' this problem by making the ranges so big that they become meaningless. Range alerts are also ignored, resulting in erroneous data being entered into the system. An example seen was when 6000 condoms were distributed but it

was accidentally entered into the IUCD (loops) data field, the range alert was ignored and the error passed up to the next level, thus distorting the indicator, Couple Year Protection Rate.

(Non) Use by Management

Use of data and information by management is generally limited. The slow pace of service integration and change management is aggravated by the failure to target management structures for training in the programme. The lack of awareness of the potential use of the computer programme regarding the availability and use of both facility and district level indicators is demonstrated by a lack of understanding of public health concepts and by the fact that numerators and a denominators are both required in order to assess, monitor and evaluate the health status of a district.

The one outstanding difference noted between the larger and smaller districts sampled was that the larger districts were producing and using indicators whereas the smaller districts were still concentrating on raw data. This is due to the large districts forming part of a local metropolitan council that has access to greater resources such as funding, skills and manpower. The failure to produce and use graphs on a regular basis, even in the one district with a sophisticated reporting system that used raw data and facility level indicators, demonstrated the limited application of use of information in feedback or decision-making.

The discrepancy between the stated recognition of the importance of indicators and failure to refresh the indicator PivotTables demonstrated the lack of use. This contradiction was not fully explained and may be due to the fact that other data sources were being used or that the concept of indicators was not fully understood. The fact that indicator information had been available, for both facility and district levels for the past year, was generally a surprise. This lack of awareness of potential output of the computer programme and use of information is disturbing. The fact that management

generally acknowledged their shortcoming is to be lauded. One district indicated that they realised that they were actually unsure of how to use the information available. Another response was that as only now at the end of the training were they beginning to understand what a district health information system was about and wanted to be trained all over again.

The DHIS aims at empowering district level health workers to use locally generated information to improve coverage and quality of primary health care services. The failure to target management levels in training initiatives to date has limited the ability of management to appreciate the role of both numerator and denominator data in monitoring and managing the health of communities and may explain their failure to utilize the potential of the computer programme and health information produced. The inclusion of management levels in the revised training programme, focussing on analysis and interpretation of data and use of information, is an attempt to redress this matter.

6.3. Recommendations

Recommendations encompass the range of issues associated with the development and functioning of a district health information system, incorporating the six steps in the DHIS model.

Change management and development of a culture of information use starts at the top. Central to effective functioning of a DHIS is human resource development. An understanding of **public health**, including epidemiological concepts, builds a culture of information use. The process should start at management level. Introspection and revision of all management processes, creating systems of access to information use for rational decision-making, should lead to a regular demand for good quality data, used for monitoring the health status of communities and district served.

Information teams at both facility and district levels, perform a crucial role in collating, analysing and presenting the data/information to ensure completion of the information cycle at each level. The development of these teams will need appropriate **ongoing training** and substantial management support. Implicit in the functioning of these teams is the need for the revision of job descriptions, so that health information is seen as an integral part of every health worker's function.

The use of regular **monitoring and evaluation processes** in the progress towards goals using indicators, needs support from the highest level i.e. **management by objectives**. The objectives of the health services as determined by goals, targets and indicators needs to be communicated to all levels of staff.

The **Provincial Minimum Dataset** as the starting point for all data that is collected must be expanded at both facility and district levels, as their need for locally relevant information as a decision-making tool in management is much greater. The expanded minimum dataset, based on goals, targets and indicators, so that all data collected has local relevance and use, should stimulate epidemiological thinking and facilitate the development of an information culture. Streamlining of the data flow processes and district level analysis and interpretation supports the development of DHIS systems and structures.

The use of the computer programme to produce regular **standardised reports**, incorporating raw data, indicators, tables and illustrated with appropriate graphs, are critical to informing management on past and current trends and progress towards achieving pre-defined targets. Good quality data and neat reports, tables and graphs are of no value unless there is a forum for their discussion. Easy access to locally relevant information does not guarantee its use. Existing routine facility and district level meetings need to incorporate discussion of data and information-based health issues, leading to rational decision-making. **Feedback** between management and health

workers must be supported by local access to data and information. Greater local **access** to computers and increased computer literacy will facilitate to this process. Ongoing training and support in maximising the use of the computer programme is integral to the process of ensuring effective and efficient functioning of the district health management team.

The study has identified the need for additional research to be done on the perceptions and role played by the data entry clerks. Areas to be explored include the use of inappropriate range values, the use of the validation tool, reasons for poor data entry and validation and the development of further monitoring and evaluation mechanisms



7. CONCLUSION

The identification of key actors and supporting cast in terms of both job function and areas of responsibility in the development of sustainable health information systems is central to successful implementation and use of the computer programme as part of a District Health Information System. The establishment of a framework for communication and networking to facilitate use of the tools and output sets the scene for the development of a supportive infrastructure.

Currently, the key actors at district level are local management and data entry clerks. Targeting both in a combined training initiative should promote both a clearer understanding of the role of health information systems and use of the HISP software tools in generating analysed data order to improve quality and coverage of health care services. Skilling in the use of the computer programme should facilitate both awareness of the importance of updating, refreshing and validating data as well as the use of analysed local data as a basis for informed decision making

This may lead to a need for a revision by management towards an action driven information system that will allow for monitoring and evaluation of pre-set goals, targets and indicators. The development of monitoring and evaluation mechanisms i.e. Yes/No Checklist, provide a framework for the identification of ongoing training needs and indicates areas for intervention.

The limited role played by nurses in the data handling process, specifically data entry, validation, provision of automatic reports and feedback should be explored. Re-targeting of district level staff for training, such as nursing cadres could facilitate an improvement in the quality of data as well an understanding of data analysis and interpretation.

Computer literacy among nursing cadres is very low. While the importance of computer knowledge and skill is recognised, role confusion regarding areas of responsibility in terms of data handling coupled with a

limited access to computers exacerbates a situation of poor access and opportunity to practice and develop computer and health information skills. Computers are often regarded as a way out rather than as a support to a clinical role.

While the study has verified the limited use made of the computer programme, both in terms of local adaptation and as a management decision-making tool, it is clear that while the computer programme itself is regarded as a useful tool, its full potential can only be realised in an environment that ensures a supportive technical and management organisational infrastructure, promoting understanding of the concept information culture as well as the use of information for decision-making.



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Annexures

Annexure 1	Western Cape Provincial Minimum Dataset
Annexure 2	Computer Programme data entry form
Annexure 3	PivotTable
Annexure 4	Yes/No checklist
Annexure 5	Interview guide



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Annexure 1

Western Cape Provincial Minimum Dataset

Category	Item
Total Attendance	Headcount under 6 years
	Headcount over 6 years
Development Assessment	Babies examined for 1st time up to 6 weeks
	Children under 6 years with development assessment
	Children under 6 years with developmental delays
Immunisation	Primary Course completed
Growth Monitoring	Children under 6 years <3rd percentile and above 60% EWA
	Children under 6 years below 60% EWA
	Children with growth faltering/failure
Curative Services	Seen by Medical Officer
	Seen by Clinical Nurse Practitioner
	Seen by CNP and referred to Medical Officer
	Children under 6 years
	Children under 6 years with diarrhoea
	Children under 6 years with Acute Chest Infection
	Sexually Transmitted Diseases
Penile Urethral Discharge	
Reproductive Health	Couple Year Protection Rate
	Oral Contraceptives
	Depo Provera
	Nuristerate
	IUCDs
	Sterilations
	Vasectomies
	Condoms
	Emergency Contraception
	Referred for Termination of Pregnancy
Laboratory	Cervical smears women 30-59 years
School Health	Grade 1 children assessed
Mental Health	Mental health visits
	New mental health clients
	Clients referred to 2nd level
	Clients referred to 3rd level
Rehabilitation	Assistive devices required
	Assistive devices issued
	Home visits for rehabilitation purposes
	Referrals to 2nd & 3rd levels
Maternal Health	Antenatal visits
	Antenatal booking visits
	Antenatal booking visits under 20 weeks
	Live Births
	Still births
	Unbooked deliveries
	Deliveries to women under 18 years
	Births under 2500gs
	Deliveries to women over 34 years
Deliveries to women with parity over 4	

Annexure 2

District:		wc South Peninsula Health District	<input type="checkbox"/> Short names	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Regression Analysis
Facility:		wc Lotus River Clinic	Last Changed by:	on Date:	Validation	Add data elements	Delete Displayed Dataset
Period:		March 2000	sdfourie	2000/04/06 11:57	<input type="checkbox"/> Show both active and inactive facilities		
Data Element Category	No	Data Element	Min	Max	Entry	Check!	Comment
Attendance	1	PHC headcount under 5 years	330	479	512	<input type="checkbox"/>	
Attendance	2	PHC headcount 5 years and older	600	1,000	670	<input type="checkbox"/>	
Curative Services	3	DOTS visit - Facility	0	500	395	<input type="checkbox"/>	
Developmental assessment	4	Baby examined 1st time before 6 weeks	15	25	24	<input type="checkbox"/>	
Growth Monitoring	8	Underweight for age under 5 years - new	0	13	6	<input type="checkbox"/>	
Growth Monitoring	9	Severe malnutrition under 5 years - new	0	5	1	<input type="checkbox"/>	
Curative Services	11	Seen by doctor	0	20	78	<input type="checkbox"/>	
Curative Services	12	Seen by Professional Nurse	200	250	169	<input type="checkbox"/>	
Curative Services	14	Curative case under 5 years	150	230	164	<input type="checkbox"/>	
Curative Services	15	Diarrhoea under 5 years - new	5	20	11	<input type="checkbox"/>	
Curative Services	16	Lower respiratory infection under 5 years - new	0	46	1	<input type="checkbox"/>	
Curative Services	17	Case treated as STI - new	0	10	11	<input type="checkbox"/>	



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Annexure 5

In-depth interview guide

1. The computer programme can produce automatically calculated indicators, have you used any of these?
2. If so, which ones are the most useful?
3. What graphs have you requested from the computer programme? Have you seen any of the graphs?
4. What Raw Data items from the RMR have you used?
5. Have you requested any additional items to be included on the routine monthly data collection?
6. Can you give examples of where you have used data/information for decision-making?
7. Have you discussed any data/information received from the RMR at management meetings?
8. As a manager you are responsible for programmes. Have you set any targets? If so, how far are you towards achieving these targets?
9. Which National targets have you adapted for your district?
10. Which parts of the computer programme are useful to you?
11. Do you have any suggestions to make regarding how to improve the use of the computer software?



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Annexure 3

DistShort	South Peninsula
FacShort	(All)
Year	2000

Sum of CalcFac			Period				
Order	Indicator	IndicatorType	Jan-00	Feb-00	Mar-00	Apr-00	Grand Total
1	Child case load	%	22.0	20.3	19.1	19.2	20.1
11	Not gaining weight under 5 years rate	%					
41	Curative case load	%	38.2	39.0	40.0	42.0	39.8
42	Curative case load under 5 years	%	35.7	30.6	37.5	40.8	35.9
43	Curative seen by doctor rate	%	76.7	75.8	77.6	78.8	77.2
44	Referral rate to doctor (curative)	%	5.6	6.8	6.2	6.2	6.2
81	Mental health case load	%	1.2	1.4	1.5	1.5	1.4
82	Referral rate mental health clients to secondary level	%	0.9	1.4	1.3	1.2	1.2
83	Referral rate mental health clients to tertiary level	%	0.1	0.1	1.0	0.5	0.5
84	Mental illness rate	%	5.2	5.2	4.7	5.9	5.2
101	Antenatal visits before 20 weeks rate	%	100.0	100.0	100.0	100.0	100.0
102	Antenatal visits per antenatal client	Units	1	1	1	1	1



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