Analysing the functions, roles and skills of District Information Officers in the implementation of the District Health Information System in South Africa

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Keywords

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Abstract

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The production of health information has not only become a priority but a demand for the functioning of the District Health System. The implementation of the District Health Information System led to the establishment of a new group of health cadres, District Information Officers. Health workers with different professional backgrounds have been appointed or seconded into the position of a District Information Officer to produce the information to be used for decision making and planning of health services. District Information Officers are thus an essential part of the information system tasked with collating, analysing, interpreting and disseminating the information produced by the district.

The problem is that the existing and required qualifications, functions, skills and roles have not yet been investigated or explored but job descriptions and training programmes have been developed for this health cadre. The purpose of the study is to develop a comprehensive perspective of what currently exists and what is

identified as required to fulfil the job category of a District Information Officer. The study is important for the development of training programmes and job descriptions.

The study used a descriptive study design with qualitative techniques providing a description of the functions, roles and skills of District Information Officers. Three types of data collection techniques were used in the study: job descriptions, checklist and standardized open-ended interviews with two groups of informants, District Information Officers and District Managers, to develop an in-depth understanding of the functions, skills and roles of a District Information Officer. The thesis provides a comparative description by highlighting the difference between the existing and the required functions, skills and roles of a District Information Officer.

The study found that there is no standardised job description, the expected functions were different from province to province, different job titles were given to District Information Officers and a career path is practically non-existent. In addition, the study also identified a skills gap and suggests that systematic training is required to develop the prerequisite skills to perform the functions required for the successful implementation of the District Health Information System.

November 2003

Declaration

I do declare that "*Analysing the functions, roles and skills of District Information Officers in the implementation of the District Health Information System in South Africa*" is my own work, that it has not been submitted for any degree or examination by any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete reference.

Verona Mathews

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List of Abbreviations

DIO	-	District Information Officer
DHIO	-	District Health Information Officer
DHIS	-	District Health Information System
DM	-	District Manager
HISPP	-	Health Information Systems Pilot Project
HISP	-	Health Information Systems Programme
NHISSA	-	National Health Information System South Africa
PHC	-	Primary Health Care
PHCA	-	Primary Health Care Approach
PHC MAP	-	Primary Health Care Management Advancement Programme
WHO	-	World Health Organisation
DHS	-	District Health System
HST	-	Health Systems Trust

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CHAPTER ONE

Introduction and Background

South Africa has a total population of 44.8 million residents of which almost half are non-urban residents and until 1994 lived under apartheid policies (Statistics South Africa, 2003). In April 1994, the first democratic election was held and a new government was elected to establish a democratic society in South Africa. The South African apartheid policies are well known and although the new government abolished them, the effects of these policies on health are still strongly felt. The health system was fragmented, which reflected both the historical development of the colonial health services and the effect of the apartheid policies (Braa & Heywood, 1995). The fragmentation of health services is typified by race, type of service, geography and it is centralised along vertical lines (Braa & Heywood, 1995: Buch, 2000).

The racial fragmentation resulted in different authorities providing services for each of the four race groups with resources preferentially being allocated along racial lines, whites most and blacks least. Until 1994, fourteen departments of health at central level and more than four hundred local authorities and regional service councils provided health services. The health services were provided within the framework where different services provided preventative and curative care separate from specialised 'vertical' services. In addition, the country was divided into four provinces and ten 'homelands' where each 'homeland' and province had its own

separate system functioning independently from each other. The health system operating within each province, 'homeland' and vertical programme had their own standards where different institutions were providing different or similar services in the same area but without coordination. Historically, there was a predominant focus on hospital and curative care, with Primary Health Care (PHC) severely underdeveloped. Budgets were overspent and human resources maldistributed and trained to serve an elite, rather than the national need (Buch, 2000).

One of the priorities identified by the new government in 1994 was the reconstruction of the health sector, which would involve the complete transformation of the entire delivery system (African National Congress (ANC), 1994). Furthermore, it stated that the national health system must be driven by the Primary Health Care Approach (PHCA), which emphasises community participation and empowerment, inter-sectoral collaboration and cost effective care, as well as the integration of preventative, promotive, curative, and rehabilitative services (ANC, 1994).

The district level was found to be the most appropriate level due to its close proximity to communities. It was also found ideal for coordinating top-down and bottom-up planning, which led to the establishment of a District Health System for the provision of district health services using the PHCA (World Health Organisation (WHO), 1988). The definition of a District Health System that was adopted by the World Health Organisation (WHO) in 1986 describes a District Health System to be based on PHC, is more or less a self contained segment of the national health system,

a well-defined population living within a clear delineated administrative and geographical area, and includes all institutions and individuals providing health care in the district (WHO, 1988).

The reconstruction process geographically divided South Africa into nine provinces, one hundred and twenty (120) districts and thirty-eight (38) regions (of which six are also considered districts) towards the reorganisation and restructuring of the health system according to the District Health System (DHS) model. Further reconstruction took place, illustrated by McCoy & Engelbrecht, 1999: Barron & Asia, 2001, outlining the development and alignment of District Health Systems and local government.

Three new categories were proposed: Metropolitan municipalities (Category A), Local area municipalities (Category B), District municipalities (Category C). The country was recently divided into a set of new local government structures, namely six (6) category A municipalities, forty-seven (47) category C municipalities and two hundred and thirty-two (232) category B municipalities (Barron & Asia, 2001). The 47 category C municipalities and 6 category A municipalities comprises 53 'health districts', and the case of the category C municipality, one or more category B municipalities can be grouped to form a 'health sub-district'. The South African terminology 'health sub-district' would be equivalent to the World Health Organisation terminology of a 'health district' and also equivalent to the 'old health

district' that were in place prior to the final local government demarcation process (Barron & Asia, 2001).

The establishment of health districts and District Health Systems was key to the transformation of the health sector and specifically for the decentralisation of management. As the decentralised districts were given more authority, managers started to demand improved quality and timeliness of data as its value for local decision-making and routine supportive supervision of PHC facilities became evident (Heywood & Magaqa, 1998). Huge amounts of data was collected by the health workers at facility level consuming much of their time and the data entry clerks at the different administrative levels did the capturing of data. Due to the fact that a large amount of data was being collected, it was found that the data was either incomplete or out of date due to the time it took to collect and collate the data. Data was collected and collated by individual provinces and vertical programmes.

There were no DIO's before because the country had a fragmented health system with vertical services producing data that was not aggregated at district level but at the provincial and vertical programme level. The fragmentation in the health system caused a lack of confidence in the health information system. The data was considered untrustworthy and unreliable because the data elements collected were not defined in the same way for all departments.

The need for a health information system became clear as the problems with the existing system were identified: a large amount of data was collected and it was very time consuming for nurses as the demand for the completion of the forms were put on them by their supervisors. Organisations collected data independently and reported raw data to their head office receiving virtually no feedback, and finally due to the fragmentation of health service each service worked in isolation with no common goals or targets and duplicating data (Heywood & Magaqa, 1998). To overcome this, a committee was established by the Minister of Health in 1994, namely the National Health Information System South Africa (NHISSA). The White Paper for the Transformation of the Health System in South Africa proclaimed that the NHISSA will be developed as an overall parent system comprising various components and will be held responsible for facilitating the development of a District Health Information System (Government Gazette, 2000).

In parallel with the establishment of the NHISSA committee, an initiative was born after the 1994 elections that involved the establishment of strategic management teams to oversee the restructuring process. The strategic management team set up a task group in the Western Cape province, tasked to deal with health information systems in the province (HISPP, 1998). One of the main recommendations of the task group was that a pilot project be set up to develop district level health and management information system. This led to the establishment of the Health Information Systems Pilot Project (HISPP). The task group found that the main aim of the project was to develop a district based health and management information

system guided by the PHCA (HISPP, 1998). The project was a collaborative project by the University of Cape Town, University of the Western Cape, Provincial Administration of the Western Cape, Community Health Services Organisation and the Local Authorities. The project sought methods to move from a vertical and fragmented to a horizontal and unified district health and management information system.

The first phase of the pilot project was from 1995 to 1998, when it developed district health and management information systems in three pilot districts in the Cape Town. The pilot project produced successful implementable processes and structures: the development of the minimum data set for PHC, seven steps for creating district health and management information systems and the District Health Information Software. Due to the success of the pilot project, it was rolled out to the rest of the Western Cape Province.

HISPP designed and implemented mechanisms for the processing, analysis and use of information at all levels called the District Health Information System (DHIS). In addition, a computer software program was developed to support the DHIS for the capturing of the data collected. The software provides mechanisms of data verification and validation, analysing the data by converting the raw data into indicators and produces reports. The computer software known as the District Health Information Software is a tool that is free and open-source software available to everyone. In 1999, the National Department of Health and NHISSA adopted the

District Health Information System developed by Health Information Systems Programme to be the national model. A national roll out took place and the district health information software underwent further developments with additions and modifications to meet the needs of provinces. All nine provinces in South Africa adopted the District Health Information Software by the year 2000. The District Health Information Software is currently being rolled out nationally and internationally; some of the countries adopting the District Health Information Software are India, Malawi and Mozambique.

In the second phase from 1999 to 2001, the pilot project became the Health Information Systems Programme (HISP). The programme is a collaborative research and development programme comprised of several role players: University of the Western Cape and the University of Oslo (Norway). Other roleplayers in DHIS's were the University of Cape Town, Universidad Eduardo Mondlane (Mozambique), Departments of Health (South Africa and Mozambique), Health Systems Trust (HST), Centre for Health and Social Studies (CHESS) and the Equity project.

The establishment of the District Health System within the national health system identified the requirement of the DHIS that in turn identified the need for District Information Officers. The district level has been identified as the first and central point for data aggregation, ensuring quality of data, analysis, and the use of information. Integral to the development of a sustainable DHIS was the establishment of a new job category, the District Information Officer. The District

Information Officer has been identified as the person who will provide the information needed for decision-making and planning. The District Information Officer is situated at the district level and responsible for information handling and maintaining the District Health Information Software. District Information Officers are thus an essential part of the information system tasked with ensuring that quality data is produced for the use of information at district level and to send the data to the next level for further aggregation and use.

In the past few years, persons with very different professional backgrounds, qualifications and employment experiences have been appointed or seconded into the position of District Information Officers on the basis of the requirements of implementing the DHIS. They vary from being an administrative clerk, professional nurse, environmental health officer, to a facility supervisor. The fact that no entry level has been established for District Information Officers before they were appointed led to the situation of different professional categories having similar scopes of work. To complicate the situation further, different terminology is used to describe the person responsible for information management at district level. The different terminologies used are District Information Managers, District Health Information Officer and District Information Officer. The term District Information Officer will be used for consistency and to avoid confusion.

In conjunction with developing processes and mechanisms, staff training was conducted where health workers were sensitised and trained on health information

systems. Health information systems is a new field for health workers as it is not included in their basic training and all health workers had to be trained. The national roll out also entailed extensive training of health workers aimed at all levels: data and administrative clerks, nurses, information officers, various levels of supervisors, District Managers and Programme Managers, staff from district, regional, provincial, and national level (Khumisi et al., 2002). The School of Public Health, University of the Western Cape, offers 7 to 8 different one-week courses during the Summer and Winter schools on health information systems. Both theoretical and computer training are conducted, which augmented the training conducted by HISP and their partners. The training provided by HISP and their partners is tailored training for the specific provinces using their data and has a more practical focus.

Considerable work has been done to define new scopes of work of District Information Officers through new or revised job descriptions and training and practice (Khumisi et al., 2002). Training programmes, mostly practical based, have been developed to firstly overcome the fact that health information systems was an unknown field and secondly to train District Information Officers in preparation for the implementation and maintenance of the DHIS. Continuous education, using the training materials produced from the existing training programmes, is provided to this cadre of health workers with the future promise of formal degree-yielding education paths within the fields of health information systems where the University of Natal and University of the Western Cape are working towards such studies (Khumisi et al., 2002).

Problem Statement

Human provisioning is vital to the transformation of the health sector as staff is its greatest asset and staff costs form the largest expenditure item. The production of health information has not only become a priority but a demand for the functioning of the District Health System. The implementation of the DHIS led to the establishment of a new group of health cadres, District Information Officers. Health workers with different professional backgrounds have been appointed or seconded into the position of a District Information Officer to produce the information to be used for decision making and planning of health services. Job descriptions, training programmes, and degree-yielding education paths are being developed for District Information Officers, although the existing and required qualifications, functions, skills, and roles have not yet been investigated and defined. Job descriptions and specifications are important because they form the basis for the development of recruitment criteria and strategies for staff training. It is also vital that it is accurately defined for the successful carrying out of the duties and tasks. Failure to respond to this could lead to the lack of capacity to implement sustainable DHIS's in South Africa.

Purpose

A comprehensive perspective of existing and required roles, functions, and skills of District Information Officers in the newly developed District Health System will contribute to the systematic development of a new and vital job category within the District Health System. The results of the study will be disseminated to the relevant stakeholders including the National Health Information System South Africa (NHISSA), Health Information Systems Programme (HISP), Provincial Information Systems Departments and District Information Officers. The results of the study can be used to identify the gaps and develop adaptations to the job descriptions and training programmes for District Information Officers.

CHAPTER TWO

Literature Review

The importance of district health information systems

The PHC concept has evolved from its narrowest perception, front-line or first contact care, to a broader conception: "Primary health care is essential health care based on practical, scientifically sound and socially acceptable methods and technology, made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determinance" (WHO-UNICEF, 1978 in Walt &Vaughan, 1981:1). The five underlying principles, embedded in the definition, equitable distribution; community involvement; focus on prevention; appropriate technology and a multi-sectoral approach, were firstly used to distinguish the PHC concept from its earlier narrow perception and secondly led, in addition to other sources, to the development of the PHCA, a broad policy concept advocating the provision of first contact services within the framework of the five principles (Walt & Vaughan, 1981).

PHC services encompass a number of different components: education about diseases, health problems and their control; safe water and basic sanitation; maternal and child care (including family planning); immunisation against major infectious diseases; appropriate treatment of common diseases and injuries; and provision of essential drugs (Walt & Vaughan, 1981). Werner et al (1997: 18) point out the

purpose of this approach: "To achieve the ambitious goal of Health for All, the world's nations – together with WHO, UNICEF, and major funding agencies – pledged to work towards meeting people's basic needs through a comprehensive and remarkably progressive approach called Primary Health Care (PHC)".

Health information systems is considered imperative for the delivery of PHC services and the reorganising of health services:

- It provides the basis for planning and management of services and secondly it is found critical in a PHC system in achieving equality, effectiveness and efficiency, the underlying principles of the PHCA (Husein et al., 1993: Sandiford et al., 1992).
- It is required for the planning, monitoring and evaluation of health programmes and provides information on the health status of individuals and groups, on health services and factors affecting health, illustrated by several authors (Boerma, 1991: Campbell et al., 1996: Lippeveld et al., 2000).
- It helps to identify who is to be served, what their needs are and where they are (Husein et al., 1993).
- It can identify problems in implementation, monitor progress, show whether a programme is having any effect, including the impact on health status and show the cost of providing the services (Campbell et al., 1996).

The situation in South Africa before 1994, fragmentation of services, centralisation of management, problems with the health information system and poorly implemented

PHCA, not only required the transformation and reconstruction of the health services, but also the development of a new national health information system. A committee was established, National Health Information System for South Africa (NHISSA), as an overall parent to the national health information system.

The principles of NHISSA are as follows: it should be nationally coordinated in order to support the effective delivery of services at all levels of the health system; it should be used to monitor the implementation and success of the health priority programmes, both of the Department of Health and the Reconstruction and Development Programme (RDP); and reporting of data at all levels should be timeous, accurate and complete (Government Gazette, 2000).

An analysis conducted by NHISSA found that the existing information systems were fragmented and incompatible. The health information systems status of 1994 was uncoordinated and not comprehensive; software and hardware were incompatible and not user-friendly; most systems were manually driven, with minimal computerisation; and there was inadequate analysis, interpretation and use of the data at local level (Government Gazette, 2000).

HISP initiated the process of developing a district based health and management information system in pilot districts in the Western Cape province. HISP designed and implemented mechanisms for the processing and analysis of data and use of information at all levels. In 1999, the National Department of Health accepted the

DHIS developed by HISP to be the national model. The DHIS was adopted in all nine provinces in South Africa under the supervision of the NHISSA.

The development of District Health Systems and DHIS's are used to address the previously fragmented health service system. A health information system is considered to be a social system by several authors because it is concerned with the interplay of human, organisational and technical factors where routines for data collection and analysis are established providing routine reports for the use of information and action (Walsham et al., 1988: Braa, 1997: Feldman & March, 1981).

The DHIS is an ongoing process to design and develop the information system to ensure that it is locally 'owned' by the people it is supposed to serve. The DHIS allows health workers to document, analyse and use information to improve efficiency, quality and coverage by PHC services at all levels, by improving the effectiveness of planning, organisation and management functions (Heywood et al., 1994). The DHIS is considered a tool to help improve health management and achieving better health by using available information. The underlying principles of the DHIS are:

- It is action-led, only the data that is needed is collected.
- It endorses the principles of the PHCA.
- It promotes the decentralisation of decision-making.
- It collects the data that can be locally analysed and used.
- It is objective and indicator based.

- The design is simple, useful, flexible and standardised.

The DHIS can be described using two categories of components, the human components and the technical and procedural (process) components and the process components. The human components consist of all the people producing and using the information generated. The people involved are the community, facility level staff, district managers, programme managers and the District Information Officer. Together they form a district information management team.

The technical and procedural components include: the development of minimum datasets and indicators; the development of tools to collect the minimum datasets; a district database to organise and store the various data sets; the development of routine procedures for information handling, feedback, analysis and use; producing monthly, quarterly and annual district reports and disseminating to all relevant stakeholders; and in-service training programmes.

The seven-step model developed by HISP describes both the components and is used as a guideline for establishing a DHIS. It is summarised as follows: selecting pilot sites; the formation of an information team, which comprises of amongst others, a District Information Officer to run the information centre (information office illustrated in Appendix A), with a clear job description that will include co-ordination of all information handling, maintenance of the district database, updating the district profile, as well as the reporting and feedback of information; to conduct an

information audit to establish what is being collected and for what purpose; to set objectives, targets and indicators and defining a minimum data set; to create district based information systems and structures where the routines and structures for collecting, analysing, reporting and using information should become district orientated instead of vertical; develop staff skills and understanding of information management through sensitisation workshops, in-depth training, and person-to-person training during routine support; and creating an information culture through the use of information (HISPP, 1998). The combination of the two components leads to a unified district by directing the previously fragmented flow of information to the district information centre and creating PHC awareness by establishing a culture of local analysis and use of information.

The development of human resources

In the past, human resource development focussed on the production and distribution of human resources but Martinez and Martineau (1998) argue that the following issues needs to be considered for human resource development (HRD): reducing cost and increasing efficiency, improving staff performance, improving equity in the distribution of services and development of HRD policy and planning capacity. For the purpose of the study the major issue of improving staff performance will be concentrated on, as outlined by the authors: pay and conditions, staff development and career structures, to mention those most relevant. The issues suggested by Martinez and Martineau provide a framework from which to view the development of District Information Officers.

The authors state it well that "good performance requires, amongst other things, a willingness to perform well (motivation) and the capability (or requisite skill) to do the job" (Martinez & Martineau, 1998:350). In addition, to achieve the optimal job performance an adequate reward package has to be provided. The fact that people from different professional backgrounds are employed into the positions of District Information Officers led to major diversity in the salary packages allocated to this group of cadre. This has implications firstly for the motivation of less rewarded District Information Officers and secondly for the overall performance standard. A lack of career structure further impedes good job performance. A career structure has either not been developed yet or the existing structure provides little to no promotional options.

The emphasis on PHC in the new South African District Health System has meant that new skills are required for the implementation of the PHCA. Sanders et al. (2001) argue that health workers at various levels, especially at district level, require substantial public health skills in planning, advocacy, programme design, programme implementation, monitoring and evaluation which are fundamental to the implementation of the PHCA. However, the required skills and capacity of human resources have remained underdeveloped, although they are found to be crucial to the successful implementation of the new health system.

To give one example, a qualitative research study was conducted to investigate the challenges faced in translating the Integrated Nutrition Programme (INP) policy into

practice (Lehmann et al., 2003). The study found a number of key issues hampering the successful implementation of the programme: integration of services remained unresolved; a lack of understanding of the policy at all levels of management; the programme is not 'owned' by the key role players, but considered as imposed from above; capacity building for affected staff is insufficient (Lehmann et al., 2003). The study recommended that, in particular, management structures and capacity as well training provision should be addressed, a human resource strategy should be developed to identify staff roles, set out capacity development strategies and establish how the transformation of staff categories and development of job descriptions should be handled (Lehmann et al., 2003). The study illustrates that the inadequate attention given to the barriers experienced by the implementers contribute to the failure to implement the Integrated Nutrition Programme. In a similar fashion, the DHIS requires new skills, and a failure to provide the necessary skills and capacity of human resources will lead to the lack of capacity to implement the DHIS.

The changes brought about by the health sector reform challenge the ways in which health professionals and other staff are employed and deployed with either a view to cost containment or to fill a skills gap. The introduction of new cadres or groups of health workers is very commonly used to fill a skills gap or in response to consumer need to efficiency or effectiveness requirements (Buchan & Dal Poz, 2002: Adams & Buchan, 2000). However, the authors argue that the so-called new workers are often workers with advanced and enhanced skills or just a current worker with an extended role (Adams & Buchan, 2000: Buchan & Dal Poz, 2002). They question the extent to

which truly 'new' cadres of workers are being introduced into the health system due to the fact that conventional workers were just given extended roles with perhaps a new job title (Buchan & Dal Poz, 2002). They imply that there are no new types of workers but simply new types of work undertaken by existing staff.

In South Africa, the implementation of the DHIS has led to the introduction of a number of 'new' job categories in the health system of which the District Information Officer is one. However, like in the cases argued by Buchan and Dal Poz (2002), the District Information Officers in South Africa are usually people who were seconded into these positions from their existing positions and were given either extended roles and/or enhanced skills with a new job title.

In addition, cultural, professional and organisational differences mean that a role of a specified worker or professional in one country or health system may be different from that in another (Buchan & Dal Poz, 2002). In the United Kingdom, job descriptions and posts have been advertised for information officers in the health sector where the entry requirement for the post is a degree or post-graduate qualification in information management, librarianship or Information Technology (IT) (McGlew, 2003: CSU & ACGAS, 1998). The example of the United Kingdom illustrates that the functions, skills and roles have been defined and the entry requirement of a formal degree has been set for a position as an information officer. The situation in South Africa is that there is no standardisation to the entry level for

District Information Officers and people are seconded from different professional backgrounds into the same positions.

This is also shown with the establishment of posts which were created at different levels and staff were seconded into the positions. At the time of the creation of the post, the prerequisite for District Information Officers had not yet been determined, but various provinces were in the process of developing, approving or filling posts for information officers at all levels (Herbst & Vundule, 1997).

A review was conducted in 1998 on the progress made in South Africa on the development of DHIS which showed similar findings as Herbst & Vundule (1997). The review found that at the time, two provinces, the Eastern Cape and Mpumalanga Province, had appointed District Information Officers and Mpumalanga Province had appointed mostly nurses into the posts (Heywood & Magaqa, 1998). At the time, there was a single person in each of the three pilot districts of the Western Cape Province responsible for running the information centre who was however, not formally appointed into the post (Heywood & Magaqa, 1998). According to Heywood & Magaqa (1998), the positions were filled and systematic training was seen as a way forward although the people had to be appropriately trained and prepared to be competent in the job functions. Thus, people were appointed or deployed into the job position of a District Information Officer without receiving firstly the job requirements and secondly the appropriate training for the positions as it had not yet been fully determined.

Skills Development of District Information Officers

The value of information lies in the extent to which it is used. The situation regarding information use in South Africa can be considered as undetermined as very little documentation is found on information use in South Africa. However, a few successful case studies have been documented (Khumisi & Seopa, 2001: Mbananga & Sekokotla, 2002). Several authors believe that information would be more widely used if it were accurate, comprehensive and clearly presented (Campbell et al., 1996: Braa, 1997: Lippeveld et al., 2000, Opit, 1987: Muschel, 1999: Osibogun et al., 1996).

Reports are often seen as the final product of the information system but are found meaningless if they are not communicated to and used by decision-makers, managers and planners according to the WHO (1994). In addition, Muschel (1999) conducted a short review involving eight districts in South Africa and found that even though monthly reports are produced and disseminated to various target audiences within the districts, they consisted mainly of graphs and charts with not much contextual analysis. The review found that the DHIS is running, but the analysis, reporting and feedback mechanisms remained weak at the district level (Muschel, 1999). Converting data into information requires analysis and interpretation skills with a good comprehension of some basic epidemiological concepts. They need to have the time and skill to extract all useful information from the data, which would then be summarised and presented to decision-makers.

More recently, a couple of processes were undertaken to define the required functions and skills of District Information Officers, but these processes were restricted to geographical bounded areas and did not take into account the diversity of the situation in South Africa. A series of workshops was conducted with the District Information Officers of the Unicity of Cape Town/Cape Town Metropole to identify the functions and skills of information staff at the different levels. The process undertaken to develop the functions and skills of District Information Officers was to first develop the categories, then the functions required in the categories and then finally the skills required to perform the functions. The categories that were used are:

- Determining the information required
- Collection of data
- Collation of data
- Analysis of data to provide to relevant information
- Reports and presentation
- Use of information
- Support services (Reagon, 2001).

The outcome of the workshops regarding the functions and skills of the District Information Officers is summarised in a table, attached as appendix A, Table 1: Functions and Skills determined for DIO's in the Unicity Cape Town/ Cape Metropole DHIS Workshop. One aspect that is important to note is that the participants who participated in these workshops comprised mainly of clerks who

were previously employed as data capturing clerks for health information and then their role was extended to that of a District Information Officer.

A case study was conducted in the Free State Province to establish the resource requirements for the DHIS. The study found the functions of the district level information management to include:

- Aggregation of data
- Collation and entry of this data into a district database
- Interpretation of information
- Training and technical support for hardware and software used
- Database management
- Design management of periodical surveys
- Informed input into the regional management process (National Department of Health, 1998).

These functions were used to establish the knowledge, skills and attitudes of the District Information Officer, summarised in a table, attached as appendix B, Table 2: Knowledge, Skills and attitudes of DIO's based on a Free State Case Study. This was however not the focus of the case study but the focus of the study was to provide a guideline on the resource requirements for the implementation of the DHIS based on what was found in the Free State Case Study. The case study's findings are used as part of a national guideline for the implementation of the DHIS.

The table on the Cape Metropole DHIS workshop (Appendix A) provides more detail on the functions and skills of the District Information Officer than the one based on the Free State Case Study (Appendix B), which is used as a national guideline for the implementation of the DHIS. The two tables, Unicity Cape Town/Cape Metropole DHIS Workshop and the Free State Case Study, will be used for comparisons to the existing and required functions and skills of District Information Officers that will be illuminated in the findings of the study. It will be used to highlight the similarities but more importantly the differences or gaps regarding the functions and skills of District Information Officers.

In the case of the United Kingdom (McGlew, 2003), the health information management categories include: management and maintaining a variety or resources, analysing and reporting on the information demand, developing information management processes and documentation, training and communication and project management. In general comparison, the functions expected of the information officer in the United Kingdom are similar to what is suggested by Reagon (2001) and Department of Health (1998).

However, the functions in the UK are much more advanced when it comes to information technology where they put more focus on software development, software maintenance and computer security. This is not surprising considering that their entry requirement is a degree in IT, Information Management or Librarianship. It seems as if in the United Kingdom IT people are being recruited for health

information management whereas in South Africa the situation is different, as health workers are recruited for health information management, implying a need for capacity building in lacking skills required for software maintenance and development.

There is clearly a need for a broader range of skills for District Information Officers: firstly technical skills need to be supplemented with behavioural awareness and secondly they need to understand the organisation's structures, functions and decision-making processes in addition to statistical tools (Walsham et al., 1988). De Kadt (1989) found that manuals and instructions are provided on how to conduct the process of implementing an information system but little to nothing is said about the analytical use and interpretation of the information produced. This is also found in the case of the Guidelines to Implementing the DHIS (Department of Health, 1998) where little is said about the analytical use and interpretation of the information produced. The World Health Organisation (1994) also found that there is insufficient training and development of skills in data analysis, presentation and use. The challenge is to use the most effective training and skills development approaches.

Training on Health Information Systems

Training on health information systems is considered the key to bridging the gap between existing and required skills and capacity. However, little consideration is given to the platform from which training programmes are being developed for bridging this gap. The question arises as to whether training programmes are based

on the needs of the people implementing the system or the requirements of the system that needs to be put in place. The following two examples illustrate different platforms used in developing training programmes and the outcome of the training programmes.

In Nigeria, a training programme was devised whereby staff from health centres could appreciate the value of adequate and accurate data as a means of raising the standard of services (Osibogun et al., 1996). The training programme dedicated more than 40 percent of its time to the learning area of the uses of data and 20 percent to the presentation and communication of the results of data due to the importance of communicating the findings. The training programme dedicated more time of the course to the needs of the people receiving the course to achieve the desired outcome of using the information.

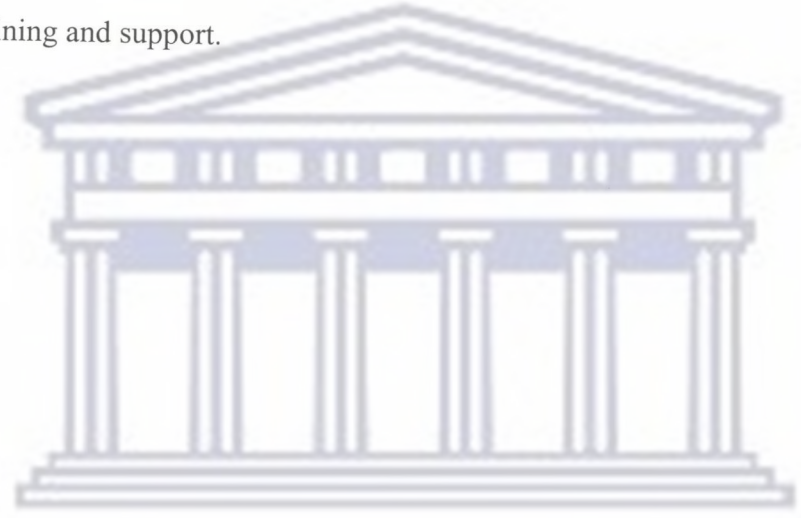
A case study was undertaken to understand the process occurring when externally developed training materials, the Primary Health Care Management Advancement Programme (PHC MAP), was introduced to a low-income country (Gladwin et al., 2002). The case study used a qualitative approach and included participant observation, interviews, official document examination, written field notes and diaries. The training materials introduced new information management strategies intended to promote an informational approach to management at the operational health service level. One of the study's main findings was that the potential users of

PHC MAP suggested that developers had inappropriately assessed the needs in their country and it was unlikely to be of much use to them (Gladwin et al., 2002).

HISP, HST, CHESS and Equity mainly conduct training on the DHIS in South Africa. The training components consists of both theoretical and computer software training to provide the knowledge and skills to implement the District Health Information Software. Each of these organisations develop their own training course based on their experiences and opinions on what training is required. In addition, the training is focussed around the software and the skills and knowledge required to implement the software. However, it has been established and is generally considered that the software is only a tool to be used in establishing a DHIS. Thus, training programmes are being developed around the software to be used in the implementation of the system.

Training materials and programmes needs to be more connected to local and personnel needs, as also stated by Sanders et al., (2001). The development of training programmes for District Information Officers needs to be preceded by establishing the District Information Officers' requirements for optimal job performance. One of the dire consequences might be inappropriate training in relation to their needs and not have the desired effect on job performance and thus impede on the successful implementation of the DHIS.

In addition, continuous training plays an important role for implementation and sustainability of a system or job position. The research study entitled "investigating the roles and functions of clinic supervisors in three districts in the Eastern Cape Province" concluded that while clinic supervisors have a great range of skills at their disposal, training and support are ongoing and urgent requirements (Lehmann et al, 2001). The study illustrates how people with job competence still require continuous training and support.



Aim

It is the aim of the study to gain a better understanding of the existing and required qualifications, functions, roles and skills of District Information Officers in the implementation of The DHIS, and to make recommendations for the development of job descriptions and training programmes.

Objectives

- To identify the current functions in work activities and duties of District Information Officers
- To identify the current roles the District Information Officers perform in the context in which they work
- To identify the existing skills of District Information Officers
- To identify the training received by District Information Officers
- To identify the required functions of District Information Officers
- To identify the required roles to be performed by District Information Officers
- To identify the required skills of District Information Officers
- To identify the training required for District Information Officers
- To make recommendations based on the findings of the study

CHAPTER THREE

Methodology

Study Design

A descriptive study design with qualitative techniques was used to conduct the study. The study design was chosen because it will provide an in-depth insight into the description of the functions, roles and skills of District Information Officers.

Study Population

The study population consisted of two groups namely, District Information Officers and District Managers. Both groups are considered key informants to meet the aim of the study, the District Information Officer because they are the group of health cadres under study and the expectations of the District Managers are important to establish for the analysis of the functions, roles and skills of District Information Officers.

Sample Size

Purposive sampling was used for the selection of participants for the study. The sample size consists of eight District Information Officers and eight District Managers. The reason for restricting the sample size is for the timely completion of the study.

Sampling Procedure

Purposive sampling was chosen because it is non-randomised and selection is made based on criteria. The sampling procedure is described using four stages of purposive sampling. The first stage is the purposive selection of the sample provinces in South Africa. The second to fourth stage can be described as being conducted almost simultaneously where districts, District Information Officers and District Managers were selected. The first stage was the selection of provinces during which four provinces were selected. The researcher selected the North West Province, Free State Province, Western Cape Province and Mpumalanga Province. These provinces were purposively selected for three reasons: firstly, they have fully implemented functional and operational DHIS in place; secondly, the researcher is familiar with the setting and the level of functionality of these provinces; thirdly, these provinces were easily accessible for the researcher because she has worked in the provinces and known by the authorities in the provinces.

Stages two to four were the selection of districts, District Information Officers and District Managers within the previously sampled provinces. The researcher used the old health district structure instead of the new health structure to select the sample of District Information Officers because at the time of the sampling procedure the new health district structure according to municipality was still in its implementation phase and not fully operational yet.

The sample of District Information Officers was selected using the following characteristics: they are currently in the position of District Information Officer, the district had a functional DHIS, the District Information Officer have received training on The DHIS and they are currently actively involved in the development of the DHIS. Purposive sampling then continued by selecting two District Information Officers representing firstly demographic variety specifically urban vs. rural districts and secondly in terms of their previous job positions. The previous job positions which were selected in the four provinces were: nurses, clerks, facility supervisors and dual positions. The fourth stage was the selection of the District Managers. The District Managers of the District Information Officers obtained automatic selection in the study because they are the direct reporting line, manager and the person using the information produced by the District Information Officer.

Data Collection

Three types of data collection methods were used in the study: job descriptions, standardized open-ended interview guides and a checklist.

Job Descriptions

The job descriptions of the District Information Officers were collected to firstly compare it to each other and secondly to compare it to the functions, skills and roles they are actually performing.

Standardized, Open-Ended Interview Guides

The researcher combined an interview guide approach with a standardized, open-ended interview approach. An interview guide is a list of questions or issues to be explored in an interview ensuring that the same information is obtained from a number of people by covering the same material (Patton, 1982). The standardized, open-ended interview consists of a set of questions carefully worded and arranged for taking each respondent through the same questions using essentially the same words (Patton, 1982). Combining the two approaches allowed the researcher to compile a number of basic questions worded quite precisely in a predetermined fashion, while permitting the researcher flexibility in determining when it is appropriate to explore certain subjects in greater depth, or even to undertake whole new areas of inquiry that were not originally included in the interview instrument (Patton, 1982).

The style combination approach was used to compile interview guides for both groups. The interviews were conducted using the style combination approach with both District Information Officers and District Managers to gather a richer understanding of their perspective on the existing and required functions, skills and roles of District Information Officers. The interviews were tape-recorded and were mostly conducted telephonically and very few face-to-face because of the proximity of the interviewees to the researcher.

Checklist

The need for a checklist was recognised during the course of the interviews when the District Information Officers had trouble in recollecting their existing skills and roles. The researcher acted upon this and recognised that a checklist could be used for two purposes. Firstly to assist the District Information Officers in identifying their existing skills and roles. Secondly, to compile the checklist in such a way that it could be used as an additional data collection tool. The researcher compiled the checklist near the end of the course of interviews with the District Information Officers using the input she received from the interviews and her knowledge on the topic.

Validity and Reliability

De Vos (1998) refers to Guba's model for assessing the trustworthiness and proposed the following four ways to meet validity and reliability of qualitative research studies: (1) Truth Value: A qualitative study can be credible when it presents accurate description or interpretations of human experiences that people who also share that experiences would immediately recognise the description. Recording the interviews and making notes during the interviews ensured an accurate description of the interview to validate the study.

(2) Applicability: Research meets this criterion when the findings fit into contexts outside the study situation that are determined by the degree of similarity or goodness of fit between the two contexts. It is argued that as long as the original researcher

presents sufficient descriptive data to allow comparisons, the problem of applicability has been addressed. The interviewees provided accurate and sufficient descriptive data and the method used for data analysis allowed for comparisons.

(3) Consistency: It is the extent to which repeated administration of a measure will provide the same data or the extent to which a measure administered once, but by different people, produced equivalent results. Two data collection tools (interview guides) were developed for the interviews with the two groups. The style combination approach used for the interview guide allow for the study to be easily replicated in new settings using the same instrument with different subjects because it would be known what was previously asked and what was not previously asked (Patton, 1982). The same data collection tool was used for all the District Information Officers and the same tool for the all district managers.

(4) Neutrality: Shifting the emphasis of neutrality in qualitative research from the researcher to the data, so that rather than looking at the neutrality of the investigator, the neutrality of data are considered. One of the purposes of the standardized open-ended interview is to minimise interviewer effects by asking the same question of each respondent and because the interview is systematic, interviewer judgment during the interview is reduced (Patton, 1982).

The researcher is wary of her potential biases due to her active involvement. The researcher have been actively involved in the implementation of the DHIS and the

training of District Information Officers and District Managers for more than three years. She has had very close relationships with both groups of District Information Officers and District Managers where she has worked with them as colleques and trainees. The researcher has played significant roles in the establishment of the DHIS by being a supporter, motivator, trainer, advisor and mentor to the District Information Officers. She has assisted the District Information Officers to acquire the skills required for perform the functions required for the implementation of the DHIS.

The researcher is biased in the sense that she has developed her own preconceived opinion of what the functions, skills and roles of District Information Officers should be based on her experiences in implementing the DHIS. She is also biased where she has identified shortcomings and skills gap in District Information Officers during the training sessions she conducted and has made conclusions on what in her opinion they require. The researcher has been explicit about her biases as opposed to others' opinions and experiences. She has shifted the neutrality of the investigator to the neutrality of the data by being explicit in the documentation of the sampling procedure, data collection methods and data analysis strategies.

In addition, a fifth way, was used to counter her biases and to increase validity and reliability. (5) Triangulation: The researcher used two types, data and participant triangulation. Participant triangulation was applied when the researcher used two groups as informants, District Information Officers and District Managers. Data

triangulation was applied when she used three types of data collection methods the interviews, checklists and job descriptions.

Data Analysis

The researcher used two methods to analyse the data, firstly managing the data by developing and applying a coding system to the transcripts, job descriptions and checklist to comprise a master file, secondly analysed the data using a constant comparative method. Data storage and retrieval is at the heart of data management and is critical for keeping track of what data are available for easy, flexible and reliable use of data (De Vos, 1998). A numerical coding system was developed where each District Information Officer (DIO) was ascribed a number and the District Manager (DM) received the same number to maintain the association e.g. DIO1 and DM1.

The interviews were transcribed and the transcriptions, job descriptions and checklists were coded according to the coding system which firstly maintained the association and secondly to allow for multiple comparison opportunities. The numerically coded transcripts, job descriptions and checklist were put together in one file to comprise the master file, which represented the data in its raw form.

The researcher used the constant comparative method of Lincoln and Guba (1985:339-344) cited in De Vos, 1998 for the data analysis. The constant comparative method of Lincoln and Guba is a continuous developing process that

takes place in four stages: comparing units applicable to each category, integrating categories and their properties, delimiting the theory, and writing the theory. The researcher identified units of information that served as the basis of establishing categories within the transcripts, job descriptions and checklists. Once the categories were established, the units were coded and placed in the appropriate categories.

The researcher used mostly tables to analyse and present the results. Summary tables were used to firstly represent the lists of functions, skills and roles and secondly to conduct comparisons within categories. The comparisons were done within a table by comparing rows and columns to each other and more comparisons were made by comparing tables with tables. The dynamic and constant comparisons integrated the categories and their descriptions, which led to the development and compilation of two profiles, the existing and required functions, skills and roles of the DIO.

In addition to the continuous comparisons, the researcher continuously looked for abnormalities and emerging themes, coded and analysed them separately, and presented them in the results. Finally the researcher used all of the above analysis, profiles of the existing and required functions, skills and roles, emerging themes, adding them to the literature reviewed and her own knowledge and experience to compile a suggested profile of functions, skills and roles for DIO's.

Ethics

All the participants have cooperated and participated willingly in the study. Permission was sought and granted to conduct the study in the sample population and selected sample. Consent was received from the participants/informants. The participants/informants were notified of the aim of the study and their right to confidentiality, feedback and withdrawal from the process at any stage. Coding the transcripts preserved the anonymity of the interviewees. Feedback on the findings of the study was ensured to all participants of the study and relevant stakeholders. The researcher was non-judgemental as far as possible in conducting the study.

CHAPTER FOUR

Results

The results are divided into five main categories: Existing District Information Officer's Profile, Obstacles experienced, Compilation of Job Descriptions, Required District Information Officer's Profile and Training. The main categories are furthermore divided into several sub categories.

Existing District Information Officer's Profile

Job positions and staff categories

The following table was compiled to establish the job positions and staff categories of DIO's. The table is constructed to reflect each individual DIO's previous job position and category and to compare it to their current position and category to firstly uncover whether they have been placed in the same or different staff categories and secondly to identify the job titles being ascribed to them.

Table 3: Job Positions and Staff Categories of DIO's

	Previous Staff Category	**Previous Job Position**	**Current Staff category**	**Current Job Position**
DIO1	Administration	Data Capturing Clerk	Administration	Health Information Officer
DIO2	Administration	Data Capturing Clerk	Administration	Administrative Assistant (District Information Officer)
DIO3	Nursing	Chief Professional Nurse	Nursing	District Information Officer and District Training Coordinator

DIO4	Nursing	Chief Professional Nurse	Administration	Chief Professional Nurse (District Information Officer)
DIO5	Nursing	School Nurse	Support Services	Health Information Manager
DIO6	Nursing	Mental Health Nurse	Social Services and Support	Chief Community Liaison Officer (District Information Officer)
DIO7	Nursing	Distant Facility Supervisor	Administration	District Health Information Officer
DIO8	Nursing	Clinic Supervisor	Nursing	District Health Information Officer

The table illustrates that DIO's are not only in different staff categories but also that some have been moved to different staff categories with their appointment as a DIO. There is no uniformity regarding the category placement of DIO's. The results reflect that DIO's have been moved from being previously in a Nursing category to an Administration category and to a Support category where others have stayed in their original categories. The interviewees ascribed the movement of staff categories to the fact that they were not performing nursing duties anymore. One of the DM's felt that it was inappropriate to ascribe DIO's to an administrative component because the job functions do not entail administration:

> *"I see in my province that they have attached the DIO to an administrative component where I differ with that I will remove her from the administrative component and put her in the community health service".*

There is also no uniformity in the job titles ascribed to DIO's. Different terminologies are ascribed to the job position of a DIO namely: Health Information

Officer, District Health Information Officer, Health Information Manager and District Information Officer. In addition, three of the eight DIO's were in other job positions but known as the DIO. For them, the job titles reflecting the functions they perform are different from the job title stipulated on the job description or pay slip. All the interviewees suggested that the post of a DIO should be a full-time and permanent post. However, one of the interviewees performed a dual function, one being the DIO and the other a Training Coordinator. This not only influences the functions required of her, but also the time she is able to dedicate to being the DIO.

Several DM's also stressed their dissatisfaction with the current job position and category of DIO's. They described that the DIO's current position is influenced by their job title, which is firstly associated with a staff category and then attached to a grade (a position on the salary scale), as well as their previous job position. In one particular case, a DM used an example of a DIO that was ascribed a contrasting job title to the functions performed, causing concern that grades are being ascribed using titles and if inappropriate titles are being used then the inappropriate grade will be ascribed:

> *"At the moment they are using what they call community liaison officer which starts at level 6 which goes up to chief community liaison officer."*

In addition, some of the interviewees felt that it is '*unfair*' that "*there is no salary scale for health information officers across districts and no set job description for all of us*". When the interviewees were asked the significance of the difference, they

responded that it was a very significant difference with more than two grades. The study found that disparities amongst salaries are not only between provinces but also within provinces, which is associated with the DIO's job title and their professional background.

Existing Work Functions of District Information Officers

The work functions, as described by the DIO's, were compared to the work functions ascribed in the job description to ascertain the existing functions. This in turn was used to establish the relationship between the two. An initial review revealed that there are common functions between the two and that those functions can be grouped together and form core categories. The additional functions, which were not common between the DIO's or the job descriptions, were then illustrated as other categories. Thus, the core functions are those considered common to the DIO's and the other functions are those considered not common to DIO's. The core categories identified are: data processing, maintaining the District Health Information Software (DHISoftware), analysis of data, producing reports, interpretation, providing feedback and training. Furthermore, the additional functions, which did not form part of the core categories, were illustrated separately and additional categories were identified for them to enable the comparison of the other functions performed to the other functions ascribed in the job position. The use of information and providing support are the additional categories created.

The following table was created, using the core categories, to compare the current functions performed to the functions ascribed in the job description. Each individual DIO's response of their current work functions is compared with their corresponding functions in their job description to establish the relationship. The differences found between the current functions and the functions in the corresponding job descriptions are illustrated in the last column of the table.

Table 4: Current functions performed by DIO vs. the functions ascribed in the Job Description to the DIO's

DIO	Classification	Category	Existing Functions	Job Description Functions	Difference
1	Core	Data Processing	Data collection	Collect data from internal and external sources	
		Maintaining the DHISoftware	Data capturing	Capture data on various databases	
			Maintain the DHISoftware	Maintain the DHISoftware	
			Accuracy checks	Evaluate data submitted by collection points	
		Analysis of Data	Analysis of data	Analysis of data	
		Producing Reports	Issuing of reports	Produce ad hoc reports for clients	
		Interpretation of Data		Monitor trends in health and comment thereon	Monitor trends in health and comment thereon
		Providing Feedback	Feedback	Provide feedback	

		Training	Software support and training	Software support and training	
	Other	Coordination of health information activities	Attending all relevant meetings	Attending all relevant meetings	
			Convene health information meetings	Convening district information team meetings	
			Monthly typing of minutes	Taking, typing and distribution of minutes	
			Invite all stakeholders to meeting	Invite all stakeholders to meeting	
DIO	**Classification**	**Category**	**Existing Functions**	**Job Description Functions**	**Difference**
2	**Core**	Data Processing	Submission of data	Submission of data	
		Maintaining the DHISoftware	Assisting in capturing data	Coordinate computer entry of data at clinic level	
			Maintain the DHISoftware	Maintain the DHISoftware	
			Accuracy Checks	Accuracy Checks	
			Validation	Validation of data	
		Analysis of Data	Analysis	Analysis and reports to head office	
		Producing Reports		Production of reports for district management team	Production of reports for district management team
		Interpretation of Data			
		Providing Feedback	Feedback	Feedback to staff	
		Training	Training	Training	

	Other	Coordination of health information activities	Attending all relevant meetings	Attending all relevant meetings	
			Convene health information meetings	Convening district information team meetings	
			Monthly typing of minutes	Taking, typing and distribution of minutes	
			Invite all stakeholders to meeting	Invite all stakeholders to meeting	
		Providing Support	Assisting TB/HIV coordinator	Assisting TB/HIV coordinator	
		Maintaining DHISoftware	Fix problems with computers		Fix problems with computers
DIO	**Classification**	**Category**	**Existing Functions**	**Job Description Functions**	**Difference**
3	**Core**	Data Processing		Collecting data	Collecting data
		Maintaining the DHISoftware	Capture all the data	Capturing data	
			Maintain the DHISoftware	Maintain the DHISoftware	
			Accuracy checks	Accuracy checks	
		Analysis of Data	Analysis of data	Analysing data	
		Producing Reports	Reports	Reports	
		Interpretation of Data		To interpret the data	To interpret the data
		Providing Feedback	Feedback on problems of data	To provide feedback	
		Training	Monthly training	Training	
	Other		Visit facilities	Visit facilities	

		Providing Support		Support and guide managers and clinic staff	Support and guide managers and clinic staff
		Use of Information		Identify areas of need for conducting surveys and research projects	Identify areas of need for conducting surveys and research projects
				Monitor and evaluate the quality of service	Monitor and evaluate the quality of service
				Raise awareness within communities	Raise awareness within communities
				Identify health problem areas	Identify health problem areas
DIO	**Classification**	**Category**	**Existing Functions**	**Job Description Functions**	**Difference**
4	**Core**	Data Processing	Aggregate data		
		Maintaining the DHISoftware	Capture the data		
			Validation		
		Analysis of Data	Analysis of data	No job description	No comparison could be made
		Producing Reports	Produce reports		
		Interpretation of Data	Interpretation		
		Providing Feedback	Feedback		
		Training	Training		
	Other				
DIO	**Classification**	**Category**	**Existing Functions**	**Job Description Functions**	**Difference**
5	**Core**	Data Processing	Collecting	Collection of data	
			Collating	Collation of Data	
			Data capturing	Data capturing	

		Maintaining the DHISoftware	Maintain the DHISoftware	Maintain the DHISoftware	
			Accuracy Checks	Accuracy Checks	
		Analysis of Data	Analyse the data	Analysis of data	
		Producing Reports	Reports	Compile quarterly and annual reports	
		Interpretation of Data		Draw conclusions	Draw conclusions
		Providing Feedback	Feedback	Provide feedback	
		Training	Training	Training	
	Other	Use of Information		Utilising of data regarding management and heath	Utilising of data regarding management and heath
				Facilitate service managers and communities in utilising data	Facilitate service managers and communities in utilising data
				Initiate and participate in research and conduct surveys	Initiate and participate in research and conduct surveys
				Market Health Informatics	Market Health Informatics
				Situational Analysis	Situational Analysis
				Participate in monitoring and evaluating of all aspects of health care	Participate in monitoring and evaluating of all aspects of health care

				Active member in district health management team	Active member in district health management team
		Providing Support	Visit all facilities	Visit all facilities	
				Empowerment of all relevant personnel	Empowermen t of all relevant personnel
				Support and motivate	Support and motivate
DIO	**Classifi cation**	**Category**	**Existing Functions**	**Job Description Functions**	**Difference**
6	**Core**	Data Processing		Collection of data	Collection of data
			Aggregate data	Collation of Data	
		Maintaining the DHI Software	Data Capturing	Data Capturing	
			Maintain the DHISoftware	Maintain the DHISoftware	
			Accuracy Checks	Accuracy Checks	
		Analysis of Data	Analysis	Analysis of data	
		Producing Reports	Creating reports	Quarterly and annual reports	
		Interpretation of Data	Interpretation	Draw conclusion	
		Providing Feedback	Feedback to facilities	Draw conclusions and provide structured feedback	
		Training	Training	Training	
	Other	Use of Information		Market Health Informatics	Market Health Informatics
				Utilising of data	Utilising of data

				Facilitate service managers and communities in utilising data	Facilitate service managers and communities in utilising data
				Situational Analysis	Situational Analysis
				Participate in monitoring and evaluating of all aspects of health care	Participate in monitoring and evaluating of all aspects of health care
				Empowerment of all relevant personnel	Empowerment of all relevant personnel
				Active member in district health management team	Active member in district health management team
		Providing Support	Visit all facilities	Visit all facilities	
			Liaison with other organisations		Liaison with other organisations
				Support and motivate	Support and motivate
				Initiate and participate in research and conduct surveys	Initiate and participate in research and conduct surveys
DIO	**Classification**	**Category**	**Existing Functions**	**Job Description Functions**	**Difference**
7	**Core**	Data Processing			
		Maintaining the DHI Software	Accuracy Checks	Accuracy Checks	
			Maintain the DHISoftware	Maintain the DHISoftware	

		Analysis of Data	Analysis of Data	Analysis of data	
		Producing Reports	Produce reports	Compile and present reports	
		Interpretation of Data	Interpret information		Interpret information
		Providing Feedback	Provide Feedback	Provide Feedback	
		Training	Training	Training	
	Other	Use of Information	Use information		Use information
				Contribute to budgetary inputs	Contribute to budgetary inputs
				Conduct research	Conduct research
		Provide Support		Support facility staff and district management	Support facility staff and district management
		Maintain DHISoftware		Manage and control asset register for IT equipment	Manage and control asset register for IT equipment
DIO	**Classification**	**Category**	**Existing Functions**	**Job Description Functions**	**Difference**
8	**Core**	Data Processing	Collection	Collection	
			Collation	Collation	
		Maintaining the DHI Software	Validation	Validation	
			Maintain the DHISoftware	Maintain the DHISoftware	
			Capturing of data	Capturing of data	
		Analysis of Data	Analyse	Analysis	
		Producing Reports	Compile reports	Compile and present reports	
		Interpretation of Data	Interpret data	Interpret data	
		Providing Feedback	Provide feedback	Provide Feedback	
		Training	Training	Training	

	Other	Use of Information		Undertake research and surveys	Undertake research and surveys
		Provide Support		Clinic visits	Clinic visits
		Maintain DHISoftware		Manage IT resources	Manage IT resources

The table found that all the DIO's perform the same core functions with the exception of the interpretation of data. The interpretation of data is not performed by some of the DIO's although it is an ascribed function in the job description. Only in the case of DIO2 was the interpretation of data not an ascribed function in the job description but the DIO was also not producing any reports as ascribed in the job description.

The table also illuminates the functions ascribed in the job description which are not performed by the DIO. The key differences found are in the functions classified as other. The most common functions found that were not performed by DIO's but ascribed in the job description are: identifying and conducting research, use of information, conducting a situational analysis, providing support to facility staff and district management.

Reflecting on these ascribed functions stipulated by the job description, some of the interviewees felt that their job descriptions reflected functions that they could not perform. One of the interviewees responded by saying that the functions ascribed in her job description are more appropriate for an Assistant Director:

"The job description is quite detailed and quite advanced requirements for the level that we work at we think. The one that they gave us that the team wrote in at the end and was accepted by the province should really be at the level of an Assistant Director minimum".

The general feeling amongst DIO's is that if they were expected to perform all the functions ascribed in the job description, they would need assistance from both subordinates and DM's. One of the interviewees suggested the following subordinates:

"I do think that for the information officer are to do all the things we are mentioning they must have a support group below them meaning either the two that we have the SASO and the data capturing clerk or like further what we have done is made information officers per sub district. Because she definitely won't be able to do all of that that we have just mentioned".

The study found that there are DIO's in the same province having different job descriptions, performing the same core functions but with different additional functions required. In addition, it was found that even those DIO's who have the same functions are put on different salary scales.

An emerging theme from the interviews and job descriptions is career pathing. Several interviewees among both DIO's and DM's felt that there is a lack of career structure for DIO's. The situation presented by the DIO's is that they cannot move

up to another salary grade because they have reached the end of their salary scale. The interviewees also felt that the next level indicated by the job description is highly unlikely to be attained, as it is a senior management post (a level refers to a position in the department, used to reflect promotional capacity, and is closely associated with job titles and a salary scale). The next level indicated by the job descriptions is PHC manager or Assistant Director. One of the interviewees explained why the next level is unlikely to be reached:

> *"There is not really a career path. I'm on the same level has never been moved. The next level is Assistant Director and there are no posts in district for that post".*

Existing Roles and Skills of District Information Officers

When the DIO's were asked to describe their existing roles and skills they had trouble in ascribing names to the skills they possess and the roles they perform. A checklist was compiled to assist the interviewees in identifying their functions, skills and roles. The checklist was compiled when the majority of the interviews were conducted and the researcher used their responses and the literature to compile the checklist. The interviewees were asked to complete a checklist on what they consider their existing functions, skills and roles to be. The following table reflects the results of the checklist on the roles and skills they possess.

Table 7: Checklist Results on the Existing Roles and Skills of DIO's

Roles	%	Skills	%
Trainer	100	Communication	100
Negotiator (between facility staff and managers)	87.5	Knowledge of Health Information Systems	100
Supporter (initiatives, emotional)	100	Facilitation	100
Advisor (recommending strategies and changes)	100	Event Organization	100
Monitor (trends in information)	100	Writing	100
Evaluator (trends in information)	100	Filling	100
Facilitator	100	Training	100
Interpreter (Making sense out of the information)	100	Monitoring and Evaluation	100
Planner	100	Policy Analysis and Implementation	87.5
Analyser (Converting data into information)	100	Interpretation of Data	100
Presenter	100	Advocacy	87.5
Enabler (bring about change or improvements)	75	Data Analysis Techniques	100
Motivator (providing encouragement)	100	Presentation Techniques	100
Innovator (developing new tools, methods or strategies)	100	Computer Literacy	100
Developer	100	Specific software competency	100
Informer (providing feedback and highlighting health issues)	100	Organizational networking and logistical	100
Problem Identifier	100	Numeric and analytic	100
Problem Solver	87.5	Writing Reports	100
Advocator (market or raise awareness regarding the use of information)	87.5	Decision Making	100
		Planning	100
		Problem Solving	100
		Capacity Development	100
		Interpersonal Skills	100
		Problem Identification	100

The checklist results indicated firstly that they had the same skills and roles. However, some of the interviewees were able to describe their roles by relating it to the activities they perform, highlighting the important functions they perform. One of the interviewees described the roles she plays with the clinic supervisors and the managers and between the two:

> *"I am actually the middleman between the facilities and the managers on health information. I monitor the data and then monitor what the facilities are doing about the data. The supervisors and managers are they really using the data. Then I give them advice on how to use the data, how to analyse the data, how to interpret the data. It is mainly the support I give and guide them and monitor them and evaluate to see that they really are using the health information for what it should be used for".*

The interviewees highlighted amongst others how they perform the roles of advisor, interpreter and trainer to different levels of staff. One interviewee highlighted the important role she played with the management of the district:

> *"Trainer, liaison, advisory to management to make them aware of any health shift and health status, interpreter, analyser".*

The role of a trainer was reported by almost all of the interviewees and the following interviewee highlighted the importance of training facility managers and interpreting the information by comparing districts:

"I give training for facility managers on data collecting, accuracy. Motivator, everything you can think of, secretary as well, administrator, enabler, monitor, and evaluator, planner, comparisons between districts".

Current Profile of the District Information Officer

The following table provides a profile of the existing functions, skills and roles based on the combined views of the DIO's and the results of the checklist they completed. The table is based on the previous tables on existing functions, skills and roles, providing the common functions performed by all the DIO's, as well as the skills they use to perform the functions, and is associated with the roles identified by them.

Table 8: Existing profile of the DIO

	Category	Functions	Skills	Roles
CORE	Data Processing	Collect all raw data Collation of data		
	Maintain DHISoftware	Capture raw data Accuracy checks Validation of data Maintain the DHISoftware	Computer Literacy Specific software competency	Motivator Innovator Developer
	Analysis of Data	Analysis of data	Data Analysis Numeric and analytic	Analyser
	Interpretation of Data	Interpret the information	Evaluation Numeric and analytic	Problem Identifier Advocator Interpreter Adviser Monitor Evaluator

	Producing Reports	Produce various types of reports	Communication Writing	Informer Presenter
	Provide Feedback	Feedback to facility staff and management	Communication Facilitation Writing Presentation Techniques	Presenter Facilitator
	Training	Conduct training on health information systems	Communication Facilitation Writing Training Presentation Techniques Numeric and analytic	Trainer Negotiator Supporter Presenter Enabler Facilitator
OTHER	Providing Support	Support facility staff and district management Visit facilities	Problem Solving Interpersonal Skills	Negotiator Supporter Adviser Motivator Problem Solver

Obstacles experienced

The DIO's raised several obstacles centered mainly around information technology and personal obstacles. Some raised the issue of infrastructure, specifically with the development of sub-district and local municipality areas, whilst others felt overworked and demotivated.

One of the interviewees was concerned about her job security:

"We do not really know where we stand with the new organogram we did not feature anywhere on the organogram. Job insecurity, it is demotivating if only we could get clarity on whether we will still have jobs in the future."

Some of the interviewees felt that assistance from a data capturer is necessary and that a post should be created for that purpose:

> *"If you can have somebody that can enter the data for you, just do the basic entering of data".*

The other obstacles faced by the DIO's are the lack of transport, where they have to make use of pool cars, "*language and delays*", and *"inadequate training"*. One of the interviewees felt that too much additional work is placed on her and that it hampers her ability to perform well regarding health information systems:

> *"Basically our workload is quite high and we often work at the crisis management that is our main problem really because we cant really do justice to our information system as we have been taught".*

The DM's highlighted several obstacles ranging from logistical to computer hardware requirements for the DHIS. The view shared by the managers was that they are struggling with establishing an infrastructure, especially with the constant changes within the health system, having to adjust to these changes however small they may be, and that this was having an impact on the functioning of the district.

Some of the managers identified the supply of support staff to the DIO as a key obstacle, especially when staff go on leave, retire or move to different positions. This has two major consequences: firstly, there are either no replacements or inadequate replacements; secondly retraining has to occur for the new person in the position of

data capturer. On the issue of training, some of the interviewees felt that *"if people are not well trained definitely you are going to have problems"* and *".... getting people adequately trained to know what is going on. I think the other one is that we are heading more and more into a sort of computer age and not everyone is computer literate"*.

Compilation of Job Descriptions

When the interviewees were appointed into the post, there was no job description and only after the appointments, the development of the job descriptions took place. Some of the interviewees took the initiative and developed a job description for themselves when they were appointed whilst others waited for their job descriptions to be developed. The following table provides a summary of the responses of the DIO's when they were asked who and how their job descriptions were compiled. The table provides information regarding the people involved in compiling the job description and the process undertaken.

Table 9: Compilation of the Job Descriptions

	People involved in compilation of the job description	**Process taken**
DIO1	District Manager	The DIO provided the detail of the work and manager compiled it from there
DIO2	Epidemiologist	The DIO do not know how it was compiled
DIO3	DIO in cooperation with district manager	The DIO compiled it then discuss and finalised it with manager
DIO4	No job description	
DIO5	DIO in cooperation with	The DIO compiled it in cooperation with the

	Provincial Health Information Unit	Provincial Health Information Unit
DIO6	Task Team – Provincial and district information people with some representatives from sub-district and local level	National, provincial and district policies and procedures where used to see what are the activities of an information officer and compiled it from there
DIO7	Provincial Task Team	Guidelines and requirements were provided and DIO developed it from there
DIO8	Director, DIO and immediate supervisor	Director of Information and Planning circulated the first draft and the DIO and supervisor provided input and was then finalised by the Director

The DIO that did not have a job description refused to compile her own job description as she felt that it is the responsibility of the managers:

"I must write my own job description. But I don't think that it is right cause then you can write anything you want to. I think it must come from higher positions they actually tell what to write but I think they actually don't know what a real job of a DIO is."

The fact that the DIO's initially compiled their own job descriptions and that most of the interviewees were asked to provide the functions that they performed, as one of the interviewees stated "*I had to give them all the work that I was doing from A-Z to produce all those things and the reports I do I had to give them",* reinforces the opinion of the previous interviewee.

Required District Information Officer's Profile

Qualifications Required

In the majority of the job descriptions, Grade 12 or equivalent with a Bachelors Degree was the qualification required for the job position of a DIO. The table below reflects the different views of the DIO's and DM's regarding prerequisite qualifications. The table is a summary of their view on what the qualification should be and reflects the diversity within a group and amongst the two groups.

Table 10: DIO's and DM's views on the qualifications required for DIO's

DIO's View	DM's View
• Nursing or health background. • Health background • Formalised training in technology. • Standard 8 / junior equivalent • Standard 10 • Nursing experience, not necessarily a professional nurse can be an enrolled nurse • Diploma or Degree with a speciality in epidemiology. • Background of nursing and the basic health information training. • Health promoter or somebody with some health background.	• Professional Nurse • Not necessarily a professional nurse • Medical person, qualification in epidemiology, trained in health information, computer literate.

The table suggests that the qualification of a DIO can be a professional nurse, someone with a health background or a clerk. However, the majority of the responses reflect that it should be someone with a health background who has been formally

trained in health. The interviewees gave the following motivation for their choice of prerequisite qualifications required for the post of a DIO.

Reasoning behind a person with a health background instead of a clerk for the position of a District Information Officer

Some of the interviewees felt firstly that nurses have an advantage to clerks because they have the nursing experience in PHC and secondly that clerks lack the capacity to perform particular vital tasks of a DIO. One of the interviewees said "*About 80% of the data captured is primary health care that is our (nurses) function why we are all here.*" Another interviewee highlighted the obstacles faced by the clerk in contrast to nursing staff "*Because we are working with statistics mostly and terminology is difficult for them (clerks) to analyse or interpret. But if you are a nurse you know exactly what is meant by headcount, bed occupancy*".

One of the managers pointed out that although a clerk might be able to do the job, a professional nurse would be more appropriate "*However if one is professional nurse that might have some advantages because one understands the situation and when you talk of this concepts terminology within health very important, say for example a person who is health orientated they are appropriate*".

Another interviewee reflected on her own experiences and pointed out one of the shortcomings of a clerk "*It just makes it easier because for example we picked up with the data capturing clerk and some of the health information officers where they*

did not have a nursing background don't understand definitions of the data elements properly and if they have to check for the correctness and quality of the data it is very difficult for them before they send it to the next level. They struggle to pick up problems".

One of the managers felt that a clerk would be able to perform the tasks except one and found this task crucial to the job position *"To take a clerk and try to give them all the things they can do it very well but when it comes to analysis they cannot relate actual things that are happening in the workplace nicely".*

Another manager pointed out that not any nurse can be a DIO and particularly said it has to be a professional nurse because he intends to hold the person responsible and accountable for the information:

> *"I'll go for a professional nurse person and in terms of qualification it must be a senior nurse not a junior nurse then I have problem if you want to make responsible, accountable in my view as well just adding to your question it must be the nurses that person is the heartbeat of the organization and for me the immediate supervisor to the district manage".*

In contrast, to all the abovementioned opinions, one of the DIO's felt that a clerk would be more appropriate for the job position:

> *"My experience is that nursing staff are more medically based. They think in medical terms. They don't think that much in administration. And I would*

think that health info is more administrative and if they do have the necessary training, we now think that they don't have. I think in most cases they don't have the admin skills to perform that kind of job".

Required Work Functions, Skills and Roles

The DIO's agreed that the functions, skills and roles required should be the same as the existing ones, with a few additions. The additions the DIO's suggested are to the skills and functions. The following table represents the DIO's view on what they consider the required functions, skills and roles to be. Because the DIO's felt that the required functions, skills and roles are largely the same as the existing ones, the table was compiled by using the current profile of the DIO's as presented in Table 8 and adding the additionally identified requirements in bold.

Table 11: DIO's view on required work functions, skills and roles

	Category	Functions	Skills	Roles
CORE	Data Processing	Collect all raw data Collation of data		
	Maintain DHISoftware	Capture raw data Accuracy checks Validation of data **Maintain the DHISoftware**	Computer Literacy Specific software competency **Epidemiology Knowledge on health information systems**	Motivator Innovator Developer

	Analysis of Data	Analysis of data	Data Analysis Numeric and analytic **Epidemiology Knowledge on health information systems**	Analyser
	Interpretation of Data	Interpret the information	Evaluation Numeric and analytic **Microsoft Package Skills** **Knowledge on health information systems**	Problem Identifier Problem Solver Advocator Interpreter Adviser Monitor Evaluator
	Producing Reports	Produce various types of reports	Communication Writing **Epidemiology Knowledge on health information systems**	Informer Presenter
	Provide Feedback	Feedback to facility staff and management	Communication Facilitation Writing Presentation Techniques Numeric and analytic	Presenter Facilitator
	Training	Conduct training on health information systems **Determining training needs**	Communication Facilitation Writing Training Presentation Techniques Numeric and analytic **Epidemiology Knowledge on health information systems**	Trainer Negotiator Supporter Presenter Enabler Facilitator

OTHER	Providing Support	Support facility staff and district management Visit facilities	Problem Solving Interpersonal Skills	Negotiator Supporter Adviser Motivator Problem Solver
	Use of Information	**Initiate, participate and conduct research** **Policy implementation, and interpretation** **Situational Analysis**	**Policy analysis, implementation, interpretation** **Epidemiology** **Knowledge on health information systems** **Research skills**	

The additions to the functions include: the identifying and conducting of research, maintaining the DHISoftware and conducting a situational analysis. These functions correspond with some of the functions ascribed in the job descriptions (Table 4). The additions to the skills include, Microsoft Package skills, research skills, epidemiology, policy analysis, implementation and interpretation skills.

The DM's were asked what they considered the required functions, skills and roles of the DIO to be and they provided a rich description of what and how the functions should be performed. The table is different from the previous tables on the functions, skills and roles (Tables 8 & 11) because firstly it reflects what the managers' expectations, as the DIO's direct reporting line, are and secondly provides more functions under the categories of Providing Feedback and Use of Information not identified by the DIO's. The next table was compiled by summarising the functions identified by the DM's according the categories already established in the previous

tables. The skills and roles identified by the DM's was then associated to the corresponding functions they identified.

Table 12: DM's' view on required work functions, skills and roles

Category	Functions	Skills	Roles
Data Processing	Collect and Collate data	Information Management	Central person Collate information
Maintain DHISoftware	Capture data Accuracy Checks Troubleshooting on computers	Advanced computer skills Inquisitive Meticulous Information Management	
Analysis of Data	Analyse data Compare data with other districts Incorporate other sources of information	Advanced computer skills Compiling information Monitoring and evaluation skills	Monitor and Evaluator
Interpretation of Data	Interpret data	Advanced computer skills Monitoring and evaluation skills Problem solving Trained in epidemiology	Making meaning out of information Advisory to facility staff, managers Monitor and Evaluator
Use of Information	Identify, participate and conduct research Identify problems Part of management team to interpret, advise and guide Advocate for the use of information Involved in planning	Analytical Communication Management skills Information Research Trained in epidemiology Monitoring and evaluation skills Problem solving Advocacy skills	Advisory to facility staff and managers Identify problems Monitor and Evaluator Facilitator Advocator Planner Link between facilities and managers, different

	Advisory to facility staff and managers		authorities, different departments Ally of management
Producing Reports	Provide reports Lead in developing the District Health Plan and District Health Expenditure Review	Trained in epidemiology Advanced computer skills Research Presentation	Advisory to facility staff, managers
Provide Feedback	Make manager aware of gaps and highlight problems Raising issues found in data	Communication Interpersonal People management Advanced computer skills Management skills Information Management Research Presentation	Advisory to facility staff, managers Motivator Supporter Liaison Provide Feedback Coordinator Empowering agent
Provide Support	Provide support to all relevant staff Visit facilities	Communication Interpersonal People management Advanced computer skills Information Management	Skill and empowering subordinates Motivator Supporter Liaison Provide Feedback
Training	Identify and conduct training	Communication Interpersonal People management Training Trained in epidemiology	Skill and empowering subordinates Coordinator Empowering agent

The study found that the DM's view is more in line with the functions ascribed in the job description than with the current functions of the DIO. As identified in Table 4,

the DM's also expect the DIO's to conduct research, be part of management by interpreting and using the information over and above the other functions.

All of the DM's agreed that they expect the DIO's to: visit the facilities, use the information by highlighting issues and identifying gaps, produce analysed and interpreted reports (even if it is verbal), identify and participate in research and act as advisory to management. They consider the DIO to be an ally of management and some of them considered the DIO as part of managing the district. All of the managers expected the DIO's to produce and interpret the information, but not all of them expected the DIO to provide input and advise regarding planning and decision-making. Those who did not agree that the DIO's should advise and provide input into the planning and decision-making felt that it was the managers and experts' (epidemiologist) responsibility to use the information, as one manager stated: " *it is the responsibility of the professionals that know enough about that particular area, the manager in particular*".

Training

Training Received

All the DIO's interviewed received training from HISP. They provided the interviewees with in-service training and support. The training received from HISP was a Block Course Training, consisting of twelve days computer and theoretical training, in-service training within districts with DIO's and facility supervisors, and a Train the Trainers course that targeted selective DIO's. In addition, the majority, with a few exceptions, have received training at the University of the Western Cape, School of Public Health, on information systems that included both theoretical and computer training. The short courses attended by the interviewees are:

- Computerised District Health Information Systems: An Intermediate Course
- Using Information for Effective Management of Health Services
- Computerised District Health Information Systems: An Advanced Course
- Introduction to Health Informatics for District Health Workers

The majority of the interviewees attended all of these courses with the exception of one interviewee who has not attended a single course at the School of Public Health. Some of the interviewees have also sought additional training especially in the computer industry, but most were completely dependant on the available courses presented by HISP and the School of Public Health. The interviewees have found the training very useful and applicable.

Training required

Although some interviewees identified gaps in their abilities, they were unable to identify the appropriate training required. When the DIO's were asked what training is required for aspiring DIO's, one interviewee summarised the response of all the DIO's:

> *"The training I had, block training, UWC courses, epidemiology".*

DM's felt that DIO's needed capacity development in the areas of information technology, analysis of data, epidemiology and interpretation. One of the DM's suggested the following courses, presented at the School of Public Health, as required training:

> *"More on epidemiology, GIS, Intermediate DHIS, Advanced DHIS, Using info for effective management, hospital course".*

Several managers suggested that there should be a focus on epidemiology, theoretical and practical training on health information systems:

> *"Health Care system training, training on health issues, could be diseases, training on epidemiology, presentation and analysis, computer training, software training, basic statistics, to understand statistic items like mean and averages. Theoretical training on information systems on terms, concepts, also practical training on the computer software'.*

Another DM re-emphasised the importance of training in epidemiology, as it will help with the analysis of data:

> *"They have to know analysis according to epidemiology and populations, must have a health background".*

Training on research and information management was also highlighted as training requirements for DIO's:

> *"Advanced training, upgraded, management training, information management, presentation, operation planning and budgeting, research".*

Some of the DIO's identified training in research as an additional required but the DM's suggested several training requirements and combining it provides the following list of additional training required for DIO's:

- Statistics
- Epidemiology
- Research
- Operational planning and budgeting
- Advance training in computer systems
- Analysis and Interpretation of Information
- Management
- Information Management

CHAPTER FIVE

Discussion

The study aimed to explore the existing and required functions, skills and roles of DIO's in the implementation of the DHIS. What emerged from the interviews and job descriptions was a rich description of existing and required functions, skills and roles of the DIO which pointed out the key differences amongst DIO's. The results of the study were not only able to provide detailed lists of what was considered to be the existing and required functions, skills and roles but also identified the gaps between the two. The study illuminates an important stage in the development and implementation process of the DHIS.

The DHIS was put in place to address some of the problems experienced with the inadequate and inappropriate health information (Heywood & Magaqa, 1998: Government Gazette, 2000). However, without appropriate human resources, the DHIS is destined to fail. For this reason, in the development of the DHIS, a need was identified for a DIO who would be the central person of the system responsible for information handling, maintaining a district database and providing feedback on the information (HISPP, 1998). This is in line with findings in the literature that human resources are considered a critical component in determining the success or failure of a system, programme, policy or health reform (Martinez & Martineau, 1998: Sanders et al., 2001: Lehmann et al., 2003).

The implementation of the DHIS led to health workers being seconded into the newly developed post of a DIO. The results indicate that the seconded health workers originally performed clinical and clerical duties and are presently expected to perform vital functions and roles in the implementation of the DHIS. In fact, as suggested by Buchan & Dal Poz, 2002, a new cadre of workers was introduced to fill the skills gap to implement the DHIS and instead of appointing completely new employees, existing workers were developed through training to perform the new type of work required.

Developing Job Descriptions

The implementation of the DHIS adopted the seven-step HISPP model as a guideline. The guideline recommended that a DIO with a clear job description be placed in each district although no guideline was provided for all the components that the job description should comprise of (HISPP, 1998). Job descriptions are not only important for recruitment criteria but also provide accurately defined duties and tasks. It is common to expect a job description when you enter a job position and that the job description was developed by higher positioned people stipulating the expectations for the job position. In the case of the newly appointed DIO's, they often found themselves in a position of having to perform the tasks of establishing what the job entailed and then proceed to develop a job description.

In different districts and provinces the development of the job descriptions comprised different processes. Some of the DIO's developed their own job descriptions based

on what they considered to be their functions before official processes took place. The study found four common features. Firstly, there is no standardised job description. The expected functions as reflected in the job descriptions were different from province to province. The main difference in the functions comparing the job descriptions are: managing and controlling the asset register for IT equipment, to conduct research, to conduct and keep an up to date Situational Analysis and to be an active member of the District Management Team. Secondly, different job titles are ascribed to the DIO's. Thirdly, differences in job titles combined with the fact that health workers with different professional backgrounds were seconded into the posts influences the different salary scales amongst them. Lastly, it was established that a career path is practically non-existent.

These features combined with the obstacles experienced by the DIO, such as perceived high workload and uncertainties about their place in the structure of the DHS, is likely to undermine their performance. In addition, the lack of motivation, lack of requisite skills and inadequate reward packages can cause poor performance, as argued by Martinez & Martineau, 1998, which would impede the successful implementation of the DHIS. There is a strong need for a standardised job description with a clear career structure within provinces with guidelines from the National Department to improve job performance and to standardise expected functions to be performed by DIO's.

Existing and Required Qualifications

However, will a standardised job description provide the answers to the required qualification, functions, skills and roles for a DIO? It would certainly help the process of developing an entry level, but the processes of defining the functions, skills and roles has to be completed before a standardised job description with an appropriate career structure is developed.

The results reflect that the majority of the DIO's are formally trained in health, specifically nursing, whereas the exceptions are clerically trained. A strong requirement that was convincingly agreed upon by the majority of the interviewees was the need for the DIO to possess a health background. The interviewees did not define what type of health background would be appropriate but the results implied that it need not be a professional nurse but that it can be a health promoter as well. This is in contrast to similar posts in another country (United Kingdom) where a degree in Information Management, Librarianship or IT is required (McGlew, 2003: CSU & ACGAS, 1998). Health background was not the required qualification for these posts, but instead the requirement was put on a qualification in IT. In the context of South Africa and considering the required functions to be performed by the DIO, as stated by the interviewees, it was suggested that the entry level for a DIO post should be a person with a health background and with a knowledge of information management.

The Functions, Skills and Roles of District Information Officers

The results of the study have determined the existing profile of DIO's (Table 8) by highlighting the common and different functions performed by them (Table 4). The results show that the required functions of the DIO are influenced and determined by two key factors, the expectations of the DM and the job description.

Expectations by DM's are influenced by several key factors: firstly, by their knowledge of health information system and specifically the DHIS; secondly, by the qualification and experience of the DIO where some interviewees felt that more expectations are put on them, which is likely because they are qualified and experienced in health issues; and thirdly, by their perception of the role of the DIO. Some managers expect the DIO to produce, interpret and advise on the information produced whereas others expect a report with minimal interpretation. The study also found that the functions ascribed to the DIO's in the job description are very similar to required functions as identified by the DM's.

The common functions required for DIO's, as identified by the results of the study, can be described in the following categories: data processing, maintain the DHISoftware, analysis of data, interpretation of data, use of information, producing reports, provide feedback, provide support and training. These categories provide an umbrella for a more accurate description of the functions performed by the DIO. In addition, the above-mentioned functions are performed to different degrees where some are more advanced than others.

To perform the functions required, a support group is required consisting of either a data capturing clerk or information officer per sub district. Most of the DIO's have data capturing clerks either in full-time posts, part-time posts or facility managers capturing the data. A data capturing clerk is valuable to the DIO in terms of saving of time and relieving workload. The capturing of data consumes a lot of time depending on how many facilities there are, and not having to perform that task provides more time to dedicate to the other functions.

The DIO's have suggested that the required roles are the same as their existing roles. Further development is required in the areas of: interpreter, advocator and problem solver. In addition, the importance of the DIO to the DM and facility staff was recognised. DM's expect the DIO to be the link between them and the facilities and to perform an advisory role to both them and the facility staff. In addition, DM's consider the DIO's as an ally to management, to be fully integrated as part of management to identify problem areas and to be part of the planning process. To perform these important and intricate roles, the DIO's need to possess a substantial amount of advanced skills.

The results indicates that DIO's need to possess management, analysis and interpretation skills, not only to be able to perform a more significant supportive role in the management of the district, but also to enhance their capacity and job performance. Analysis and interpretation skills have also been identified as a skills gap when looking at the reports produced by the DIO's (Muschel, 1999). Analysis

and interpretation is closely associated with epidemiology. The majority of the DM's agreed that training in epidemiology would be a great advantage for DIO's. In addition, conducting research is considered as an inherent competency and illustrated as one of the functions to be performed by the DIO according to the job descriptions, but the results show that none of the DIO's possesses research skills.

The results of the study identified the following skills gap:

- Epidemiology
- Interpretation of Information
- Use of Information
- Management Skills
- Research Skills.

The guidelines outlining the resource requirements for implementing the DHIS developed by the Department of Health (1998) provide insufficient detail to what the functions expected from the DIO are and instead provided broad categories of functions to perform. The outcome of the series of workshops, illustrated in Table 1, conducted by the Unicity of Cape Town to determine the functions and skills of DIO's (Reagon, 2002), provide functions that are more detailed and the accompanying skills required to perform these functions. A comprehensive suggestion concerning the required functions, skills and roles could be compiled combining the outcome of the series of workshops (Reagon, 2002) with the results of this study, illustrated in Appendix C: Table 13. The table reflects on the rich

descriptions provided by the interviewees, the literature and the researcher's knowledge.

Training

All the DIO's had to be trained on the DHIS, as it was a new system to be implemented by the health sector. Several organisations (School of Public Health, HISP, CHESS, HST and Equity) conducted the training of health personnel. Both DIO's and DM's consider the training courses provided to the DIO's to be useful and applicable. Developing training materials needs to take into account the needs of people being trained, considering that people from different professional backgrounds are appointed to these posts, and that the expected functions are different and performed at different levels. The training courses provided are uncoordinated and no formally certificated course has been developed for DIO's. The additional training required as suggested by the DIO's and DM's included the following:

- Statistics
- Epidemiology
- Research
- Operational planning and budgeting
- Advance training in computer systems
- Analysis and Interpretation of Information
- Management
- Information Management

- Reports and presentations

The required training identified is also in line with the skills gap identified. This forms the basis for identifying the need for a formal certification course, which should include all the required training for a prospective DIO. Developing a formally certificated course would not only provide structure to the question of qualifications, existing and required training for the DIO's, but would harmonise a training curriculum and be a stepping stone in developing a career path for DIO's.

In summary, there is broad agreement that the ideal DIO should be someone with a health background, as well as an information management and IT background. That would be possible if we were living in an ideal world, but considering the situation and context of South Africa and specifically the health sector, where the need of capacity building has been identified across the health sector (Sanders et al., 2001), other methods of reaching our goal have to be considered. It appears that providing the appropriate and continuous education and bridging the existing skills gap is the more feasible solution for South Africa at this stage.

Conclusion

The study is aimed at establishing a comprehensive perspective on the existing and required functions, roles and skills of DIO's. The results of the study provide, through the constant comparisons between the DIO's, job descriptions and DM's, a description of the current situation and the requirements of the DIO.

The current situation, as reflected by the results of the study, paints the following picture. There is no standardised job title or job description for DIO's within provinces and a variety of approaches were undertaken to develop job descriptions, producing various expected functions to be performed by the DIO. The results illuminate the diverse entry levels that were used to fill the existing posts, such as administrative clerk, professional nurse and facility supervisor. Furthermore, a career path for DIO's is practically non-existent.

The results reflect the common core functions, skills and roles amongst DIO's and highlight the additional requirements based on the results of the job descriptions and expectations expressed by the DM's. The study identified key factors that need to be addressed to implement the DHIS. Firstly, required functions, with corresponding skills and roles need to be identified and furthermore the basis for the development of job descriptions for the DIO needs to be determined. Secondly, a skills gap was identified to perform the required functions and roles and appropriate training plays a critical role in the capacity development of DIO's. Based on the findings of the study

it was felt that the training received was useful and applicable but additional and systematic training is required to develop the prerequisite skills required to perform the additional functions required for the implementation of the DHIS.

Recommendations

- NHISSA in consultation with the Provincial Information Teams need to develop a guideline for the prerequisite entry level, functions, skills and roles of DIO's aimed at developing standardised expectations ascribed to DIO's in their job descriptions
- The current training providers (HISP, HST, CHESS and Equity) need to coordinate their efforts and in collaboration solicit a review of the current training courses and identify the training required. The review should be conducted both internally and externally, using both the human resource capacity within the organisations and seeking external experts, aimed at addressing the skills gap and training required which were identified in the study to provide the stepping stone for the development of a formally certificated course and a career structure for DIO's.
- District Health Management Teams need to ensure that DIO's have appropriate and adequate resources (both human and non-human) available to them to be able to perform the tasks required. The main resource requirement identified in the study is a data capturer who is considered very valuable to the DIO in terms of assistance with the functions required and support.

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Appendix A

Table 1: Functions and Skills determined for DIO's in the Unicity Cape Town/ Cape Metropole DHIS Workshop

Category	Functions	Skills
Determining the information required	Engagement with amongst others managers, programme managers, staff to decide on information required Organise, facilitate and participate in workshops to identify the information required	Communication Knowledge of Health Information Systems Facilitation Event Organisation
Collection of the Data	Customise data collection tools Train people on data definitions and data collection procedures	Knowledge on various data types, data definitions and data collection methods Adult training ability
Collation of the Data	Collect all raw data Trace the flow of data Capture all raw data Summarise raw data Store the data safely while ensuring confidentiality where appropriate Check the accuracy of data Provide feedback on errors detected	General Computer Literacy Specific Software Literacy Numerate Communication and People skills Error Detection skills
Analysis of Data to provide relevant information	Perform required analytical calculations Identify and produce important indicators Distribute analysed information	Numerate and analytic skills More detailed knowledge of Information Systems Specific computer skills More detailed knowledge of Software
Reports and Presentations	Produce various types of reports as required (graphs, tables etc.) Present the reports to various groups (management and staff) Interpret the information contained in reports	Numerate and Analytical skills More detailed knowledge of Information Systems Specific computer skills More detailed knowledge of software Communication skills Presentation techniques

Appendix B

Table 2: Knowledge, skills and attitudes of DIO's based on the Free State Case Study

Basic Knowledge	**Detailed Knowledge**	**Skills**	**Attitudes**
Health policy and systems	Health Information Systems Management	Presentation and communication	Community Orientation
Planning, Leadership and Management	NHIS/SA Policy and legislation related to health information	Change management, facilitation and training	Commitment to quality service provision
Ethics and Confidentiality	Data Security	Information Query and data retrieval skills	Advocacy for informed planning and decision making
	Coding, classification and quality assurance	Technical Information Skills	Respect for confidentiality of individual information
	Information analysis and presentation	Accessing external data resources information (map development)	Freedom of access to organisational information
	Dissemination	Proactive ability to support management in decision making	Respect and tolerance of cultural differences

(National Department of Health, 1998)

		Knowledge on health systems in general, management and planning Writing skills
Use of Information	Provide advice around the planning and management Distribute all reports and other analysed information more widely Advocate for the use of information at all levels Respond to all queries on information produced and disseminated Educate people as required regarding information systems Identify and assist with important research	More detailed knowledge on Information Systems Communication skills Presentation techniques Knowledge on health systems in general, management and planning Writing skills Advocacy skills Organisational networking and logistical skills
Support Services	Training of people on: Information Systems Software Information Management	More detailed knowledge on Information Systems Communication skills Presentation skills Specific computer skills Adult training ability
	Software: Maintenance of all databases and programmes Support to all staff using above databases and programmes	Specific computer skills Communication skills Adult training ability
	Driving	Driver's Licence
	Storage, Filing and Distribution Management	Communication skills Organisation networking and logistical skills Filing skills

(Reagon, 2001)

Appendix C

Table 13: Suggested functions, skills and roles for the DIO's

Functions	• Tasks	Skills	Roles
Determine information required	• Organise, facilitate and participate in workshops to identify the information required • Conduct a Situational Analysis and keep it up to date • Assist in developing the District Health Plan and the District Health Expenditure Review • Review the Minimum Data Set periodically • Extend the Minimum Data Set by incorporating information from finance, human resource, transport • Participate, identify and conduct research	Event organising Research skills Facilitation skills Organisational networking skills Policy analysis skills	Organiser Facilitator Negotiator Researcher Liaison Coordinator
Data Processing	• Design and customise data collection tools • Collect and collate raw • File and store hard copies of data collected • Capture all raw data (in the absence a subordinate) • Trace the flow of data • Respond to all queries on data collected	Specific Software skills Record keeping skills Filing skills Data management skills	Innovator Developer
Ensuring Data Accuracy	• Apply manual accuracy checks and computer validation checks on the data in search for errors • Fix errors	Error Detection skills Specific Software skills	
Analysis of Data	• Converting raw data into information by performing required analytical calculations • Identify and develop	Numerate and analytical skills Specific Software skills Epidemiological	Analyser

	additional indicators	skills Information management skills Data analysis skills	
Interpretation of the Information	• Monitor and evaluate the information produced • Put the information in context and attach meaning to the information • Conduct comparisons with previous data and other districts	Interpretation skills	Interpreter Informer
Use of Information	• Provide advise around the planning and management of the district health services • Report and advise on information to the district management team • Identify problems and gaps in information • Raise issues and advise and guide on the issues • Advocate for the use of information at all levels	Monitoring and evaluation skills Reporting skills General management skills Advocacy skills Strategic Planning skills	Interpreter Monitor Evaluator Advocator Planner Informer Advisor
Produce Reports and Presentations	• Provide ad hoc verbal reports on information produced as required • Produce various types of reports and presentations and present it to various groups, especially managers and facility staff • Disseminate all reports and presentations produced	Writing skills Communication skills Presentation skills	Presenter
Support all relevant staff	• Provide support on correcting the errors found in the data with facility staff • Provide support and coordination to information related matters in the district • Visit facilities and motivate and empower facility staff by	Communication Skills Presentation skills People skills Capacity development skills	Enabler Empowering agent Ally to management Liaison Supporter Motivator

	raising awareness of the importance and use of information • Raise awareness about the use of information with health staff and communities		
Provide Feedback	• Inform facility staff about the errors in the data • Provide feedback on the information produced	Presentation techniques Interpersonal skills	Presenter Informer
Training	• Determine the information training needs in the district • Develop and conduct in-service training based on the needs identified • Provide training to subordinates where applicable (data capturer, sub district information officers etc) • Provide training on information management, health information systems and using the software	Communication Skills Presentation skills People skills Training skills Adult training skills Capacity development skills Facilitation skills Advocacy skills Specific Software skills Microsoft Package skills Intermediate Computer skills Troubleshooting skills	Trainer Facilitator Presenter Coordinator
Maintaining the DHISoftware	• Maintain and keep an up-to-date District Health Information Software and other software programmes • Ensure data availability and security • Maintain IT resources by keeping a register and ordering the resources required in the district • Perform troubleshooting on the computers	Specific Software skills Microsoft Package skills Intermediate Computer skills Troubleshooting skills Record Keeping skills Filing skills	Coordinator Advocator Enabler

Appendix D

Analyzing the functions, skills and roles of district information officers in the implementation of District Health Information Systems in South Africa

District Information Officer Interview Guide

- What is your job position or title?
- What is your staff category?
- Are you acting and permanent in your job position as a district information officer?
- Do you have a job description? What are your main work functions according to your job description?
- Who compiled your job description? How was it compiled?
- How long are you working in your job position in health information systems?
- Describe your main work functions and duties in your job position?
- Describe your other work functions not part of health information systems?
- What are the roles you currently undertake in your health information systems work functions? How?
- What skills do you have and how are you using it in your job position?
- What and when did you receive training on health information systems?
- Are you in a position to use or apply the training you have received? Why not?
- What are the main obstacles you have experienced in your job position?
- What qualifications should a district information officer have to perform the work functions expected? Why?
- What should the main work functions of a district information officer consist of? Why?
- What roles should a district information officer perform in a district health information system?
- What skills should a district information officer possess to perform the work functions and duties in a district health information system?
- What types of training is required for a district information officer to perform optimally in the job position?
- What additional resources are needed to perform as a district information officer optimally?
- Other recommendations?

Appendix E

Analyzing the functions, skills and roles of district information officers in the implementation of District Health Information Systems in South Africa

District Manager Interview Guide

- What are your expectations of the district health information system?
- How would your expectations be met?
- What are the main obstacles you are faced with in the district health information system?
- How do plan to tackle these obstacles you are faced with?
- What are the qualifications necessary to perform optimally as a district information officer?
- What are the main work functions and activities you expect from the district information officer?
- What roles should a district information officer perform in a district health information system?
- What skills do the district information officer need to possess?
- What types of training should a district information officer receive?

Appendix F

Analyzing the functions, skills and roles of district information officers in the implementation of District Health Information Systems in South Africa

District Information Officer Checklist

Province:_____

Work Functions and Activities

Please select by ticking the box of YOUR current Health Information work functions. If your functions are not listed please add it to the list and select the box.

Health Information Systems Responsibilities	Select
Design Data Collection Tools	
Customize Data Collection Tools	
Collect all raw data	
Collation of data	
Capture all raw data on computer	
Check the accuracy of data	
Correct errors found in the data	
Respond to all queries on information produced	
Analyze data collected	
Produce various types of reports	
Present the reports to various groups	
Interpret the information contained in reports	
Distribute all reports	
Determine training needs and requirements in the district with regard to information matters	
Conduct training on health information systems	
Provide support and coordination to all information-related matters in the district	
Advocate for the use of information at all levels	
Identify and assist with important research	
Provide advice around planning and management	
Reporting, and advising on information related matters to the district management team	
Monitor and evaluate the district health information system	
Feedback to facility staff and management	

Skills

Please complete the table below by selecting the skills you possess and applying a level to each skill selected.

Skills Category	Possess the Skill	Level of Skill		
		Basic	Intermediate	Advanced
Communication				
Knowledge of Health Information Systems				
Facilitation				
Event Organization				
Writing				
Filling				
Training				
Monitoring and Evaluation				
Policy Analysis and Implementation				
Interpretation of Data				
Advocacy				
Data Analysis Techniques				
Presentation Techniques				
Computer Literacy				
Specific software competency				
Organizational networking and logistical				
Numeric and analytic				
Writing Reports				
Decision Making				
Planning				
Problem Solving				
Capacity Development				
Interpersonal Skills				
Problem Idenfication				

Roles

What are the current roles you perform as a district information officer in the district health information system? If your functions are not listed please add it to the list and select the box.

Role	Select
Trainer	
Negotiator	
Supporter	
Adviser	
Monitor	
Evaluator	
Facilitator	
Interpreter	
Planner	
Analyzer	
Presenter	
Enabler	
Motivator	
Innovator	
Developer	
Informer	
Problem Identifier	
Problem Solver	
Advocator	

Thank you very much.