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Organizational Strategies for improving Health Information at district level - a field study of Management Implemented Support Structures in Malawi

Master thesis

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Abstract

My study is part of the Health Information Systems Programme (HISP), an international effort to bring sustainable health information systems to third world countries. Two support structures for improving how health facility staff collect, use, analyze and report health data were studied. These were “Supervision” and “The Recognition Scheme”. In addition, I suggested a third, “Pair Reporting”.

My findings are based on two months of field work conducted in Malawi from August to October 2006. To approach the problem, interviews and observations were done in the two districts Chikwawa and Chiradzulu. In addition I have conducted literature reviews on relevant theory to expand my understanding of what I have observed and in turn, support my findings.

The challenges with health facility staff’s performance in working with the HMIS in Malawi is related to shortage of staff and limited resources for training. My findings conclude that intensified use of support structures can result in radical improvement in data collection and reporting performance, although with some changes in how the support structures are arranged.

Supervision is highly appreciated among staff at health facilities in Chikwawa and Chiradzulu. It is perceived as a support channel rather as surveillance of performance. My findings conclude that is increases productivity, motivation and encourages facility staff to improve performance.

The Recognition Scheme has the objective of rewarding staff at health facilities that perform well and to train those who struggles with HMIS reporting. My study shows that recognition is an effective way of motivation health workers in Malawi, and the Task Force meeting has a strong educational value and works as a structured situation of where health workers can build their self-efficacy which in turn produces personal accomplishment. The task force meeting also enables pooled knowledge and collaborative learning which results in wide sharing of knowledge.

Pair Reporting uses principles from Pair Programming in the activity of compiling HMIS15 quarterly reports. My results show that when facility staff practice Pair Programming, they produce reports with less mistakes, they have a higher confidence in their result, they are able to gain knowledge from each other which makes them able to solve difficult issues, and they have higher enjoyment in the task of compiling reports. The staff-loss risk is also reduced as multiple people are familiar with the reports.
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1 Introduction

The practice of collecting and maintaining information on health is as old as the history of medicine itself. Since the earliest times, those who were engaged in the art of healing found it necessary to record various outcomes in relation to the number of patients attended. As a result, the health data collected proved to be valuable in all aspects of health care provisions. In contemporary times, health information systems were transcended to the domain of modern health practices, and they hold great significance in the planning and decision-making of health delivery services (Lungo, 2003).

The Human Development Index (HDI) is a comparative measure of life expectancy, literacy, education, and standard of living for countries worldwide. It is a standard means of measuring well-being, especially child welfare. It is used to determine and indicate whether a country is a developed, developing, or underdeveloped country and also to measure the impact of economic policies on quality of life (Wikipedia, 2007).

Every year the United Nations Development Programme releases a human development report ranking countries based on the HDI. In the Human development report of 2006 Norway was ranked first with a human development index of 0.965, a life expectancy at birth of 79.6 years and a GDP per capita of 38,454 US$. Malawi was ranked number 166 out of the 177 countries on the list, with a human development index of 0.400, a life expectancy at birth of 39.8 years and a GDP per capita of 646 US$. Malawi has a population of about 12.6 millions; prevalence of HIV of population ages 15-49 is 14.1 percent, infant mortality rate is 109.8 per 1000 live births, and mortality rate under 5 is 175.2 per 1000 (United Nations Development Programme, 2007).

In January 2002 the Ministry of Health and Population (MOHP) in Malawi implemented a comprehensive and integrated routine Health Management Information System (HMIS) in the whole country. The system was guided by the principles of integration of all routine information systems, decentralization of information and use, information for action and simple to establish and maintain. The HMIS was designed to provide programme managers and staff with reports on how well each programme is functioning and to alert the service providers and programme managers to take necessary corrective actions.

At the end of August 2006 I traveled to Malawi to do field work for this thesis. I stayed in the country for two months, and interviews and observations were done in cooperation with fellow students Gro Alice Hamre and Marlen Stacey Galimoto. Together we visited two separate districts (Chikwawa and Chiradzulu) with the intention to study how staff at district level worked with the HMIS.

The first and the main objective of the information system is to ensure that the required health and management information is available to all users in the health sector to meet each of their predefined needs (Ministry of Health and Population, 2003). In order to enable availability of information at all levels, it is completely necessary that reporting takes place and that reports are correctly filled by competent staff and handed over to recipient in a timely manner.
1.1 Motivation

There are several reasons why I decided to write a masters thesis about the Health Information System in Malawi. My personal motivation was mostly related to being able to travel to and explore a country in a continent where I had never been before. Another motivational factor was the challenge of conducting research in a foreign country, not knowing their culture, mothers tongue or how they work with information.

The reason why I chose to travel to Malawi and not another developing country was that I would be able to communicate in English, it enabled me to conduct fieldwork in cooperation with Galimoto and Hamre and friends that had been there before recommended it to me.

Malawi is one of the poorest countries in the world, and although they have a functioning health information system, I knew prior to my study that they struggled with management and use of their Health Management Information System. I found inspiration in having the opportunity to conduct research that could be meaningful in the sense of trying to be of assistance to a developing country facing huge challenges in a field where I had relevant competence.

1.2 Who can read this thesis

This thesis is targeted to healthcare information system workers, Ministry of Health in Malawi, researchers in Information Systems and developing countries and anyone who might have interest in Health Information Systems in developing countries in general. It is my sincere hope that health care workers on facility, district and national level in Malawi might find this thesis helpful. It primarily deals with issues on facility and district level, but in order to expand the use of this knowledge to other districts it is important also to include national level management. I also want to emphasize that some background material on Health Information Systems and developing countries in general is required in order to understand all the issues discussed in this thesis.

1.3 Research objective

My initial research objective was to look for and identify what I perceived as good practice in the context of data collection, use of data and reporting. This research objective developed as the study was conducted and my understanding of the subject and the HMIS in Malawi grew.

Economy in Malawi is very poor; it’s among the ten poorest countries in the world. Malawi is short of staff at all levels in the health sector, and staff are often not competent due to poor education and not having received proper training. Health workers collect and report data routinely on all their activities. The health workers at facility level should be able to interpret, analyze and use local data as well as reporting it to higher levels. Due to the county’s poor economy, they cannot afford costly initiatives in supporting staff in work related activities. To support staff at facility level in data collection and reporting, management have therefore implemented various support structures. These support structures are intended to help facility staff in improving their reporting performance. As I identified what support structures were implemented, my interest and desire of a further study of these structures grew.
My final problem addressed was as follows:

To study management implemented support structures in Chikwawa and Chiradzulu and evaluate their potential for improving health information at district level in Malawi.

### 1.3.1 Support Structures

In my thesis I use the term *support structure* as a management implemented initiative with the intention to support staff at facility level with the tasks of collecting, analyzing, make use of and being capable of initiating actions based on data, and report correct data to higher levels in the health organization. The support can come in terms of various factors that have the potential of improving how facility staff works with information. Some of the most important factors include:

- Providing facility staff with extensive learning on data collection and reporting
- Motivating staff to working with information through awarding good performance
- Giving a broader understanding by providing meaning behind the task of reporting
- Expressing gratitude to staff by supplying them with incentives
- Showing that management emphasizes the importance of data collection and reporting by involving district management in facility supportive activities

I have studied two separate support structures; “HMIS Supervision” and “The Recognition Scheme”. The HMIS supervision is implemented in both Chikwawa and Chiradzulu. The Recognition Scheme is only implemented in Chikwawa, but management in Chiradzulu expressed that they might want to adopt the system in the future.

### Supervision

The HMIS supervision is implemented with slightly different approaches in the two districts. In Chikwawa they use so-called cluster supervision, meaning that they have appointed several cluster supervisors, each being responsible for conduction supervision to all health facilities in his/her cluster. A cluster typically contains three or four health facilities. In Chiradzulu the District Health Management Team conducts supervision in general (including HMIS) on all health facilities in the district. In addition the HMIS officer conducts supervision specifically on HMIS to all health facilities in the district.

The study by (Sloan, 1999) found that nurses’ perceptions of the characteristics of a good clinical supervisor was the ability of creating a safe environment, form supportive relationships, having relevant knowledge/skills, expressing a commitment to providing supervision and having good listening skills.
In my study I will try to look for these qualities in supervisors in Malawi and investigate whether these qualities are the ones perceived to be most important by facility staff in the two districts.

**The Recognition Scheme**

The recognition scheme is a semi-annual award system implemented with the initiative from the Management Sciences for Health. Health facilities are awarded based on their performance on HMIS quarterly reporting. The reports are assessed by a task force and attendants to the task force are rotated among the facilities.

An important effect that could be caused by the recognition scheme is the supply of increased self-efficacy to staff at the health facilities in the district. According to (Bandura, 1994), a strong sense of self-efficacy enhances human accomplishment and personal well-being. He says that people with high assurance in their capabilities, approach difficult tasks with assurance that they can exercise control over them, and that efficacious outlook produces personal accomplishments, reduces stress and lowers vulnerability to depression.

**Pair Reporting**

While observing the support structures described above I also started to look for other possible mechanisms that could help facility staff in improving their reporting performance. I started looking at pair programming principles and whether they could be implemented in the discipline of HMIS quarterly reporting. In my thesis this is referred to as Pair Reporting. In cooperation with Hamre I performed an action research experiment with “pair reporting” on Bilal Health Centre in Chiradzulu.

The most important reasons for using pair programming is the fact that it contributes to a significant decrease in defects being produced, work tasks become more enjoyable, the increase in learning is significant and dependence on individuals decreases (Cockburn and Williams, 2000).

My objective was to see if these effects could also be achieved in using pair programming principles when compiling HMIS15 quarterly reports.

**1.4 Structure**

The field studies reported in this thesis was conducted by a team of the three master students Gro Alice Hamre, Marlen Stacy Galimoto and Jon Sandvand. Hamre and I conducted all interviews together as a team, and Galimoto joined us on a couple of occasions. Therefore the “Research Methods” chapter is written in cooperation with fellow student Hamre and is identical for the two of us. The “Background” chapter is written in cooperation with Hamre and Galimoto and thus, identical for the three of us. Other than that our research projects are independent. The thesis is arranged in the following order.
Chapter 1 gives an overview of my motivation; it introduces the research objective and gives a short description of the focus of my study. Chapter 2 presents a review of my most important sources of literature. Chapter 3 gives an overview of structure of the health system, health status and a description of the Health Management Information System in Malawi. Chapter 4 presents the research approach of this study by describing the origin of the research, the research team, design and process and the data collection methods. These first four chapters are intended to provide the reader with the background information required to understanding the findings, discussions and conclusions drawn in this thesis.

Chapter 5 presents my findings from my field work in Malawi. These are divided into three parts; Supervision, The Recognition Scheme and Pair Reporting. Each of these contains analysis and discussion of my findings. Chapter 6 presents my conclusion, a presentation of my key findings, recommendations on how to work with the HMIS based on my findings and suggestions for further research. At the end of the thesis I have attached appendices. They contain copies of reviewed documents and necessary permissions for the study.
2 Literature Review

My thesis is based on observations and interviews with people working with the health management information system in Malawi with additional influences from a review of literature as a secondary source of information. I have used a variety of relevant literature concerning multiple fields also including some organizational theory to support my findings on the impact of various support structures implemented in the two districts I visited in Malawi. I have deliberately chosen not to focus on literature directly related to information systems development, information systems in developing countries, health management information systems, etc, but rather concentrated on literature related to improving how people work with information. This chapter contains a review of my most important sources of literature.

I emphasize that what is outlined in this chapter are short descriptions of various theories on a variety of fields, and I recommend the reader to use the references to get a deeper understanding and a broader picture of the theories presented.

2.1 Pair programming

During our field work in Malawi we performed an action research experiment encouraging staff at a small health facility of using principles of pair programming when compiling HMIS15 quarterly reports. In my thesis this experiment is referred to as the Pair Reporting Experiment.

Pair reporting is based on two people working together on the same task having two different roles. One compiles the report while the other observes. The one writing the report is called the **driver**, while the one observing is called the **navigator**. The drivers’ responsibilities also include explaining everything he or she is doing to the navigator. The navigators’ responsibility is to constantly review everything the driver is doing, as well as giving feedback and asking questions. In pair programming it is recommended that the roles are changed so that the driver becomes the navigator and the navigator becomes the driver. That way we secure that both driver and navigator are always equally involved in the process, and that both understand what is being done.

The next sections contain theory on Pair programming which is of relevance to the Pair reporting experiment.

2.1.1 Pair Programming experiment (Nosek)

An experiment on pair programming was conducted by John (Nosek, 1998) of the Computer and Information Sciences Department of the Temple University in Philadelphia. The attendees in the experiment consisted of 15 full time system programmers. Five of these worked independently and the 10 remaining were divided in pairs. They were given the assignment to write a script in C, and the time limit was 45 minutes. The problem was important to the organisation they worked in, but the programmers had no previous experience with this kind of problem. All the programmers knew the tools they were to work with well, including the programming language. The pairs were allowed to communicate during the problem-solving phase while the solo programmers were not. The field experiment was set up to measure both performance and satisfaction. Performance was based on
readability, functionality, overall score and time. Overall score was determined as a sum of the readability and the functionality score. Satisfaction was determined based on confident and enjoyment. These were assessed immediately after the problem-solving session by a two-item questionnaire.

The basis for the experiment was four predictions:

1. Programmers working in pairs will produce more readable and functional solutions than programmers working alone.
2. Groups will take less time on average to solve the problem than individuals working alone.
3. Programmers working in pairs will express higher levels of confidence about their work and enjoyment of the process immediately after the problem-solving session than will programmers working alone.
4. Programmers with more years of experience will perform better than programmers with fewer years of experience.

Nosek found statistical support for predictions one, three and four. His results also gave an indication that prediction two was true. Especially confident and enjoyment scores were significantly higher for the collaborative programmers. Time was also convincingly better. The average for both groups were respectively 42.60 minutes for the individuals and 30.20 for the collaborative group.

The article concludes that their experiment provides further evidence that collaboration improves the programming process. Nosek admits that the amount of participants in the experiment was quite low, which of course weakens the reliability of the results. But he also says that their results and conclusion supports earlier research on the same subject and that way strengthens their predictions.

2.1.2 Costs and benefits of pair programming (Cockburn and Williams)

(Cockburn and Williams, 2000) try to exemplify why pair programming is beneficial in many levels. Based on an experiment with Pair Programming done at the University of Utah they argue that when practising pair programming the amount of defects in code are severely reduced which also makes the developing process much cheaper, programming tasks become more enjoyable, the increase in developing costs are very small, the increase in learning is significant both for experienced and novice programmers, dependence on individuals decreases and “time to market” is reduced.

The amount of defects produced while coding is supposedly reduced when practising pair programming. The article here refers to an experiment done at the University of Utah. Participants were undergraduates in a software engineering course. One third of the class worked individually while the rest were coding in pairs. The results showed that the paired ones produced code with about 15 percent fewer defects. For the record they also state that statistically programmers inject 100 defects per 1000 lines of code.

In the article the authors also state that more than 20 years ago inspections proved to be a very cost effective way of removing code defects. Still lots of programmers seem to think that inspection is a boring job and it is often not done properly or not done at all. The theory of
which justifies why inspections are done states that the earlier defects are found the more cost effective they are to correct. With pair programming reviews are done continuously. This outperforms inspection on removal speed and it reduces the need for formal inspections.

Cockburn and Williams also anticipate that programming tasks become more enjoyable when practising pair programming. They say that statistically significant results show that pair programming teams who had earlier programmed alone reported to have enjoyed working in pairs more than alone. They also point to an experiment done with pair programming where the paired groups had to complete two different programming tasks while the ones working alone only had to complete one task. One of the paired groups complained that they had twice the workload. The instructor suggested that they split up and completed each task individually. The suggestion was rejected almost simultaneously by both students. That is a strong indicator of the satisfaction of pair programming.

Increased learning is also significant for both experts and novices when practicing pair programming. They say that one of the most important aspects of apprenticeship is that the novice works in a “line of sight” of the expert. That way the novice picks up expertise by seeing and hearing the expert. To support the argument that experts also learn from the novice the authors quote a senior programmer working collaborative with a novice for the first time. He says that to his surprise after about five minutes the novice corrected him when he was off at a bad track. After a while the novice was calling out every formatting error and syntax mistake.

Dependence on individuals also decreases when practicing pair programming. They explain that the risk of losing key programmers when working on a project is reduced because there are always two people working on each part of the project making it less dependent on individuals. This is referred to as the “truck number” in some circles: “The number of people that would have to be hit by a truck before the project is incapacitated”.

2.1.3 Collaborative learning (Gokhale)

(Gokhale, 1995) did an experiment with the objective to examine the effectiveness of individual learning versus collaborative learning. He says that the concept of collaborative learning, the grouping and pairing of students for the purpose of achieving an academic goal has been widely researched and advocated throughout the professional literature. The term "collaborative learning" refers to an instruction method in which students at various performance levels work together in small groups toward a common goal. The students are responsible for one another's learning as well as their own. Thus, the success of one student helps other students to be successful.

Workers need to be able to think creatively, solve problems, and make decisions as a team. Therefore, the development and enhancement of critical-thinking skills through collaborative learning is one of the primary goals of technology education.

Definitions by Gokhale:

Collaborative learning is an instruction method in which students work in groups toward a common academic goal. Individual learning is an instruction method in which students work individually at their own level and rate toward an academic goal. Critical thinking items are
items that involve analysis, synthesis and evaluation of the concepts. *Drill-and-practice items* are items that pertain to factual knowledge and comprehension of the concepts.

Gokhale did an experiment with the objective to examine the effectiveness of individual learning versus collaborative learning in “drill-and-practice skills” and “critical-thinking skills”. The participants in the experiment were a total of 48 undergraduate students in industrial technology, enrolled at Western Illinois University, Macomb, Illinois.

The research questions examined in this study were:

1. Will there be a significant difference in achievement on a test comprised of "drill-and-practice" items between students learning individually and students learning collaboratively?
2. Will there be a significant difference in achievement on a test comprised of "critical-thinking" items between students learning individually and students learning collaboratively?

The experiment consisted of two separate activities, a lecture and a worksheet. The lecture was held simultaneously to both groups to prevent the effect of any extraneous variables. It was based on series DC circuits and parallel DC circuits. After the lecture half the students were randomly assigned to the "individual learning group", while the other section was assigned to the "collaborative learning group". The two sections worked in separate classrooms. The same worksheet was given to both treatment groups. It was comprised of both drill- and practice items and critical-thinking items. When designing the critical-thinking items it was ensured that they would require extensive thinking.

When conducting the individual learning the academic task was first explained to the students. Then they worked on the worksheets for 30 minutes. The students then received the solution to the worksheet and were given 15 minutes to compare their own answers with those on the solution sheet. The participants were then given a posttest that comprised of both drill- and practice items and critical-thinking items.

When implementing collaborative learning, the first step was to specify the academic task. Next, the collaborative learning structure was explained to the students. An instruction sheet that pointed out the key elements of the collaborative process was distributed. As part of the instructions, students were encouraged to discuss "why" they thought as they did regarding solutions to the problems. They were also instructed to listen carefully to comments of each member of the group and be willing to reconsider their own judgments and opinions. As experience reveals, group decision-making can easily be dominated by the loudest voice or by the student who talks the longest. Hence, it was insisted that every group member must be given an opportunity to contribute his or her ideas. Then the group can come up with a common solution.

According to Gokhale groups can be formed using self-selection, random assignment, or criterion-based selection. In this study they used self-selection, where students chose their own group members.

The choice of group size involves difficult trade-offs. Smaller groups (of three) contain less diversity; and may lack divergent thinking styles and varied expertise that help to animate collective decision making. Conversely, in larger groups it is difficult to ensure that all
members participate. This study used a group size of four. There were 24 students in the collaborative learning treatment group. Thus, there were six groups of four students each.

It was found that students who participated in collaborative learning had performed significantly better on the critical-thinking test than students who studied individually. It was also found that both groups did equally well on the drill-and-practice test. This result is in agreement with the learning theories proposed by proponents of collaborative learning.

The participants in the collaborative learning group were also asked to write comments based on their learning experience after the experiment. Most of the participants felt that group work helped them to better understand the material and stimulated their thinking process. In addition, the shared responsibility reduced the anxiety associated with problem-solving. The participants commented that humor too played a vital role in reducing anxiety. A couple of participants mentioned that they wasted a lot of time explaining the material to other group members. The comments were divided into three categories below:

1. Benefits focusing on the process of Collaborative Learning:
   - Helped understanding (21)
   - Pooled knowledge and experience (17)
   - Got helpful feedback (14)
   - Stimulated thinking (12)
   - Got new perspectives (9)

2. Benefits focusing on Social and Emotional Aspects
   - More relaxed atmosphere makes problem-solving easy (15)
   - It was fun (12)
   - Greater responsibility – for myself and the group (4)
   - Made new friends (3)

3. Negative aspects of Collaborative Learning
   - Wasted time explaining to others (2)

From this research study, it can be concluded that collaborative learning fosters the development of critical thinking through discussion, clarification of ideas, and evaluation of others' ideas. However, both methods of instruction were found to be equally effective in gaining factual knowledge. Therefore, collaborative learning has proved to be more beneficial if the purpose of the instruction is to enhance critical thinking and problem-solving skills.

For collaborative learning to be effective, the instructor must view teaching as a process of developing and enhancing students' ability to learn. The instructor's role is not to transmit information, but to serve as a facilitator for learning. This involves creating and managing meaningful learning experiences and stimulating students' thinking through real world problems.
2.2 Motivation

2.2.1 Hawthorne Effect (Wikipedia)

The Hawthorne effect has its name from a factory called Hawthorne Works, where several experiments on factory workers were carried out in the late 1920’s and early 1930’s. The purpose of the original experiment was to study the effect of lighting on workers’ productivity. Their main goal was to find the optimum level of lighting for productivity. When researchers found that productivity almost always increased after a change in illumination, no matter what the level of illumination was, they realized that something else besides lighting was affecting productivity. Then they started a second set of experiments making other types of changes in the working environment. They chose two women as test subjects and asked them to choose four other workers to join the test group. Together the women worked in a separate room over the course of five years (1927-1934) assembling telephone relays. Output was measured mechanically by counting how many finished relays each dropped down a chute. This measuring began in secret two weeks before moving the women to an experiment room and continued throughout the study. In the experiment room, they had a supervisor who discussed changes with them and at times used their suggestions. Then the researchers spent eight years measuring how different variables impacted the group's and individuals' productivity. Again, no matter the change in conditions, the women nearly always produced more. Some of the variables they changed were:

- Changing the pay rules basing salaries on group production rather than individual production
- Shortening the working hours
- Changing the amount and length of breaks

Changing a variable usually increased productivity, even if the variable altered was just a change back to the original condition. However it is said that this is the natural processes of the human being to adapt to the environment without knowing the objective of the experiment occurring. Researchers concluded that the workers worked harder because they thought that they were being monitored individually.

Researchers hypothesized that choosing one's own coworkers, working as a group, being treated as special (as evidenced by working in a separate room), and having a sympathetic supervisor were the real reasons for the productivity increase. One interpretation was that "the six individuals became a team and the team gave itself wholeheartedly and spontaneously to cooperation in the experiment." However, the most common and known definition of the Hawthorne effect is that any new or increased attention to workers will result in increased productivity.

2.2.2 Motivation by meaning (De Klerk)

(De Klerk, 2005) conducted a survey with a sample of 458 management level employees with the goal of measuring the role of meaning in a person’s work life. He says that if it is true that people’s search for meaning is the primary motivational force in life, then it is expected that this would also be true for a person’s work life. The objective of his research was to explore
whether relationships exists between man’s “will to meaning” with work aspects such as work commitment and work motivation.

The participants in his survey were from six large companies from different industrial sectors in South Africa. The following constructs were measured: meaning, work involvement, work commitment and work motivation. The results were measured using various analyses.

The results of this research indicated that meaning was significantly associated with career commitment. The results also indicated that meaning was significantly associated with work motivation, as measured through intrinsic motivation and goal orientation. Furthermore, meaning generally showed statistically significant relationships with work values, job involvement or work involvement. Meaning also did not show statistically significant relationships with Biographical/demographic type variables.

These findings deepened the understanding of some of the origins of work commitment and work motivation. The findings from this study also pointed to a deeper more fundamental source of work motivation and work commitment than these sources covered in the existing work motivation and commitment theories; an existential source. The study also confirmed the significant role that meaning plays in a person’s work and his work life.

2.2.3 Factors for job motivation (Dieleman et al.)

(Dieleman et al., 2003) conducted a qualitative research study among health workers in two provinces in Viet Nam. Their objective was to identify entry points for developing strategies that improve staff performance in rural areas. The study aimed at determining the major motivating factors and looked at health workers’ job perception and motivation.

The study concluded that motivation is influenced by both financial and non-financial incentives. The main motivating factors for health workers was found to be appreciation by managers, colleagues and the community, a stable job and income and training. The main discouraging factors were related to low salaries and difficult working conditions.

The research team conducting the study consisted of 6 members: 3 researchers from the Hanoi School of Public Health, two provincial health workers from the two provinces and one kit expert on rapid appraisals.

The team investigated the following aspects of work motivation in the health sector:

1. Perceptions on what motivates and discourages (demotivates) health workers

2. Perceptions of health workers and managers on Human Resource Management (HRM) tools. The perception on the following HRM tools and their use was explored during interviews and group discussions:

- Continuing education and career development
- Communication and relationship among colleagues
- Performance management: supervision and staff appraisal
- Working conditions, such as equipment and transportation
- Other activities to retain staff
3. Perceptions of community members about health workers. Perceptions on the following issues were explored during interviews and group discussions:

- Treatment and advice received
- Staff attitude during consultations
- Criteria for a “good health worker”
- Overall performance of health workers and ways for improvement
- Current methods used by the community to show appreciation
- Suggestions for community methods to influence staff performance and staff motivation

(Dieleman et al., 2003) made some suggestions for improvements based on their findings. Below is a summary of the most important ones:

1. Improvement of staff motivation for better performance

Consider both non-financial and financial incentives for health workers. The study gives an indication that although financial incentives are important, they are not sufficient to motivate personnel to perform better. To achieve better staff motivation, attention should also be paid to incentives that focus on showing appreciation and respect. This can be achieved through performance management (supervision, training, performance appraisal and career development) and feedback from the community.

Improve implementation of performance management activities as they can contribute to motivation of health staff to work effectively. When non-financial incentives are considered, managers should have the capacity to implement selected performance management activities. Examples of performance management activities that were considered important in the study: supportive supervision, better use of performance appraisal and clearer access to training. These activities can be improved through training (and supervision) of managers and providing tools and guidelines.

2. Development of motivation systems

Ensure that managers clearly understand the impact of different HRM tools on staff retention and staff motivation to perform well. As many managers believe that an increase in salaries will solve the motivation problems, it is important that they understand that though important, improvement in payment will be insufficient to achieve a sustainable better performance. HRM experts should support managers in developing appropriate (and cultural and gender sensitive) HRM tools for staff motivation.

2.3 Self-efficacy

“Whether you think that you can or you can’t, you’re usually right.” Henry Ford.

2.3.1 Self-efficacy (Bandura)

Albert Bandura is a Canadian psychologist most famous for his work on social learning theory and self-efficacy. Bandura has received various awards and honors throughout his career including the William James Award from the Association for Psychological Science and the Distinguished Scientific Contributions Award from the American Psychological Association.
Perceived self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self-efficacy beliefs determine how people feel, think, motivate themselves and behave. Such beliefs produce these diverse effects through four major processes. They include cognitive, motivational, affective and selection processes.

Cognitive Processes: Processes that regulate people’s beliefs in their efficacy. These beliefs shape the types of anticipatory scenarios they construct and rehearse. Those who have a high sense of efficacy, visualize success scenarios that provide positive guides and supports for performance. Those who doubt their efficacy visualize failure scenarios and dwell on the many things that can go wrong. It is difficult to achieve much while fighting self-doubt.

Motivational Processes: Bandura defines these processes as the activation to action. The level of motivation is reflected in choice of action, and in the intensity and persistence to effort. Motivation is regulated by the expectation that a given course of behavior will produce certain outcomes and the value of those outcomes. But people act on their beliefs about what they can do, as well as on their beliefs about the likely outcomes of performance. The motivating influence of outcome expectancies is thus partly governed by self-beliefs of efficacy. There are countless attractive options people do not pursue because they judge they lack the capabilities for them.

Affective Processes: Processes that regulate how people react to difficult and stressful situations. People who believe they can exercise control over threats do not conjure up disturbing thought patterns. But those who believe they cannot manage threats experience high anxiety arousal. They dwell on their coping deficiencies. They view many aspects of their environment as fraught with danger. They magnify the severity of possible threats and worry about things that rarely happen. Through such inefficacious thinking they distress themselves and impair their level of functioning. Perceived coping self-efficacy regulates avoidance behavior as well as anxiety arousal. The stronger the sense of self-efficacy the bolder people are in taking on taxing and threatening activities.

Selection Processes: Processes that can shape the course lives take by influencing the types of activities and environments people choose. People avoid activities and situations they believe exceed their coping capabilities, but they undertake challenging activities they judge themselves capable of handling. By the choices they make, people cultivate different competencies, interests and social networks that determine life courses. Any factor that influences choice behavior can profoundly affect the direction of personal development.

*A strong sense of efficacy enhances human accomplishment and personal well-being in many ways. People with high assurance in their capabilities approach difficult tasks as challenges to be mastered rather than as threats to be avoided. Such an efficacious outlook fosters intrinsic interest and deep engrossment in activities. They set themselves challenging goals and maintain strong commitment to them. They heighten and sustain their efforts in the face*

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of failure. They quickly recover their sense of efficacy after failures or setbacks. They attribute failure to insufficient effort or deficient knowledge and skills which are acquirable. They approach threatening situations with assurance that they can exercise control over them. Such an efficacious outlook produces personal accomplishments, reduces stress and lowers vulnerability to depression (Bandura, 1994).

Bandura also claim that people who doubt their capabilities back out from difficult tasks which they view as personal threats. They do not strive for and have weak commitment for the goals they choose to pursue. When faced with difficult tasks, they dwell on their own personal weaknesses, on the difficulty of the tasks they are facing and what can go wrong rather than how to perform successfully. They decrease their efforts and are quick to give up whenever difficulties appear. If confronted with failure, they are slow to recover their sense of self-efficacy. Because the view unsuccessful performance in terms of their own inadequate competence little failure is required for them to loose faith in their capabilities. They also easily experience stress and depression.

2.3.2 Sources of self-efficacy

People's beliefs about their efficacy can be developed by four main sources of influence. The most effective way of creating a strong sense of efficacy is through mastery experiences. Successes build a robust belief in one's personal efficacy. Failures undermine it, especially if failures occur before a sense of efficacy is firmly established. If people experience only easy successes they come to expect quick results and are easily discouraged by failure. A resilient sense of efficacy requires experience in overcoming obstacles through perseverant effort. Some setbacks and difficulties in human pursuits serve a useful purpose in teaching that success usually requires sustained effort. After people become convinced they have what it takes to succeed, they persevere in the face of adversity and quickly rebound from setbacks. By sticking it out through tough times, they emerge stronger from adversity.

The second way of creating and strengthening self-beliefs of efficacy is through the vicarious experiences provided by social models. Seeing people similar to oneself succeed by sustained effort raises observers' beliefs that they too possess the capabilities master comparable activities to succeed. By the same token, observing others' fail despite high effort lowers observers' judgments of their own efficacy and undermines their efforts. The impact of modeling on perceived self-efficacy is strongly influenced by perceived similarity to the models. The greater the assumed similarity the more persuasive is the models' successes and failures. If people see the models as very different from themselves their perceived self-efficacy is not much influenced by the models' behavior and the results its produces.

Social persuasion is a third way of strengthening people's beliefs that they have what it takes to succeed. People who are persuaded verbally that they possess the capabilities to master given activities are likely to mobilize greater effort and sustain it than if they harbor self-doubts and dwell on personal deficiencies when problems arise. To the extent that persuasive boosts in perceived self-efficacy lead people to try hard enough to succeed, they promote development of skills and a sense of personal efficacy.

The fourth way of modifying self-beliefs of efficacy is to reduce people's stress reactions and alter their negative emotional proclivities and misinterpretations of their physical states. It is not the sheer intensity of emotional and physical reactions that is important but rather how they are perceived and interpreted. People who have a high sense of efficacy are likely to view their state of affective arousal as an energizing facilitator of performance, whereas those who are beset by self-doubts regard their arousal as a
debilitation. Physiological indicators of efficacy play an especially influential role in health functioning and in athletic and other physical activities.

2.3.3 Efficacy building

Successful efficacy builders do more than convey positive appraisals. In addition to raising people's beliefs in their capabilities, they structure situations for them in ways that bring success and avoid placing people in situations prematurely where they are likely to fail often. They measure success in terms of self-improvement rather than by triumphs over others. Teachers should also be dedicated to the building of high self-efficacy levels in their students by recognizing their accomplishments.

2.4 Supervision

2.4.1 Supervision of staff (VAL)

In the dictionary supervision is defined as to oversee; to inspect; to direct and to control. Voluntary Action Leicester is an England and Wales registered organization with the objective of helping voluntary and community groups and local charities in Leicester. They have produced a series of guidelines looking at different aspects of managing a voluntary organization. These guidelines also cover staff management and supervision. This section is based on their guidelines on “supervision of staff”.

(Voluntary Action Leicester, 2000) uses the following definition of the intention behind supervision: “providing a structured opportunity for workers/supervisors to discuss their work”.

They say that in order for supervision to be effective both parties need to understand the purpose of the supervision. They suggest nine main purposes of supervision.

1. To monitor work and performance

2. To evaluate work performance
3. To clarify priorities
4. To share information about work
5. To provide an opportunity to discuss how the worker and supervisor feel about work
6. To recognize and deal with existing or potential problems
7. To discuss how outside factors are affecting work
8. To provide a framework for discussing and agreeing change
9. To identify training or support needs

Evaluating work/work performance involves the assessment of standards and whether the workers have performed and whether the job or task is worth doing. It will also involve the identification of strong and weak points, encouragement of workers and any identification of training or support needs.

The purpose of these sessions is not to give supervisors an opportunity to insult or criticize workers. It is to enable two people to take time out and look together at how the work of the organization can best be done and how the workers can be best supported in that work.

For the session to be beneficial to both the worker and supervisor it is important to prepare beforehand. A supervisor may want to have a format that enables him/her and the worker to cover the necessary areas, and still have some time for any other issues.

The setting of which the session is carried out should be private and undisturbed and as relaxed as possible and the discussion focused. A “safe” and comfortable environment must be created so that both parties feel able to be honest and open otherwise barriers are created which may prove counter productive to effective working. There should be a feeling that the experience is a positive one with recommendations written down and used as the starting point for the next session. The supervisor must be able to accept criticism and look objectively at suggestions for improvements.

2.4.2 Good characteristics of a clinical supervisor (Sloan)

In a study by (Sloan, 1999) a qualitative methodology was used to identify and answer the research question: what are staff nurses', working in community mental health teams, perceptions of the characteristics of a good clinical supervisor. The three main aims of the study were first, to identify, from the supervisees' perspective, characteristics of a good supervisor, second, to prioritize these characteristics, and third, to explore staff nurses experience of the supervisory process.

The study was conducted in a community health care trust involving six adult community mental health teams. Each team provides broad ranging mental health services to one of six localities. The staff nurses involved in this study each had a community mental health charge nurse as their immediate line-manager. Clinical supervision was provided by this person.
A convenience sample of 13 participants were sent invitations requesting that they participate in the study. From the 11 who initially agreed to participate, eight completed the questionnaire. Six staff nurses participated in the focus group discussion. The author believed that the focus group discussion would be of considerable value when exploring the complex area of supervisees' perceptions of a good supervisor.

Findings from the questionnaire and focus group were used as a basis for the nominal group technique to establish a prioritization of those characteristics identified. Thematic content analysis of the focus group generated five major categories: who provides clinical supervision; what happens during supervision; factors affecting the choice of supervisor; characteristics of a good clinical supervisor; and limitations caused as a result of how supervision is conducted.

In response to the question 'Reflecting on your experience in this job, can you identify any qualities demonstrated by your clinical supervisor that you consider to be good qualities in terms of their clinical supervision role? Individual voting, ranking and discussion of group consensus generated the 10 most important good characteristics. These are listed in the table below.

<table>
<thead>
<tr>
<th>Position</th>
<th>Quality</th>
<th>Score</th>
<th>No. of scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>1=</td>
<td>Supervisor makes me feel comfortable enough to discuss my own limitations.</td>
<td>40</td>
<td>10/5/6/8/5/8</td>
</tr>
<tr>
<td>1=</td>
<td>Ability to develop supportive relationships encouraging trust, empathy and mutual regard.</td>
<td>40</td>
<td>10/10/10/10</td>
</tr>
<tr>
<td>3</td>
<td>Supervisor inspires by his knowledge base and clinical skills.</td>
<td>36</td>
<td>9/8/8/7/4</td>
</tr>
<tr>
<td>4</td>
<td>Role model.</td>
<td>28</td>
<td>9/7/5/4/3</td>
</tr>
<tr>
<td>5</td>
<td>Commitment to provide c/s.</td>
<td>22</td>
<td>10/5/4/3</td>
</tr>
<tr>
<td>6</td>
<td>Perceptive to the needs of the supervisee, clients and the team.</td>
<td>19</td>
<td>9/7/3</td>
</tr>
<tr>
<td>7</td>
<td>Supportive with me.</td>
<td>18</td>
<td>9/9</td>
</tr>
<tr>
<td>8=</td>
<td>Good listening skills.</td>
<td>17</td>
<td>9/6/2</td>
</tr>
<tr>
<td>8=</td>
<td>Supervisor acknowledges his own limitations.</td>
<td>17</td>
<td>7/7/2/1</td>
</tr>
<tr>
<td>10</td>
<td>Supervisor allowing supervisee to set agenda.</td>
<td>15</td>
<td>6/6/1</td>
</tr>
</tbody>
</table>

Table 1. Good characteristics of clinical supervisor (Source Sloan 1999).

The ability to form supportive relationships, having relevant knowledge/clinical skills, expressing a commitment to providing supervision, and having good listening skills were perceived by the staff nurses as important characteristics of their supervisor. Supervisees viewed their supervisor as a role model, someone who they felt inspired them, whom they looked up to and had a high regard for their clinical practice and knowledge base.
2.4.3 Colleague feedback (Gran)

(Bjørk and Kirkevold, 1999) conducted a study on four newly educated nurses with the intention to evaluate whether experience improves practical skills. They found that many of the same mistakes were repeated one year after the study started but that tasks were done more efficient. This was the background for a study by (Gran, 2003) to find to what extent do nurses at a surgical post give and receive feedback to each other in their workplace.

Gran conducted a survey at a surgical post on nurses with an average experience of 3,5 years. 78,5 percent responded that they did receive feedback by their colleagues and all respondents said that feedback was important to their professional and personal development. Feedback was found to result in reflections on everyday procedures and actions. The nurses also expressed a desire to receive feedback more frequently. Gran also says that other studies have concluded that professional feedback and guidance give nurses a greater potential to altering old routines and develop improved methods of action and that personal support reduces insecurity in work relations.

Gran also refers to a study by Vance and Olson were they concluded that nurses saw it as an advantage to use several and different supervisors and that the supervisors should have supportive attitudes and already be familiar to the ones being supervised.
3 Study Context

Co-authors of this chapter: Marlen Galimoto, Jon Sandvand and Gro Alice Hamre

This chapter presents the context in which the research was carried out. It presents the general profile of Malawi, the health system, the health management information system in addition to details on the two districts in which case studies were conducted. The chapter gives an extensive and detailed background to the context, due to the fact that it provides the background for three different thesis works.

Illustration 1. Malawi map (SAHIMS, 2003 - 2005)
3.1 Malawi Country Profile

Malawi is a small landlocked country in Sub-Sahara Africa covering 118,484 square kilometres of which 20 percent is Lake Malawi. The country is 901km long and shares its borders with Tanzania, Zambia and Mozambique (Illustration 1).

The country is administratively divided into three regions namely North, South and Central. These regions are further divided into 28 districts countrywide. The case studies were conducted in two districts, Chikwawa and Chiradzulu, located in the southern region of the country (see Illustration 1 above).

Malawi's most striking feature is the Rift Valley, which runs the entire length of the country from Lake Malawi in the Northern and Central regions, to the Shire Valley in the Southern Region. The country has a sub-tropical climate, which varies in three main seasons: a dry cool season from May to July; a dry hot season from August to November; and a warm rainy season from November to April. The low-lying areas such as Lower Shire Valley are usually vulnerable to floods during the rainy season.

Malawi is densely populated with a population estimated at 12.7 million for the year 2006 and a growth rate of 3.32 percent (NSO). Around 47 percent of the population are aged between 0-14 years, 52 percent are aged between 15-64 years, and only around 4 percent over 65 years (ONSDF 2005). The southern region of the country is the most densely populated followed by the Central and Northern region. The population is predominantly rural with only 13 percent estimated to live in the four major urban centres; Blantyre, Lilongwe, Mzuzu, and Zomba (See Illustration 1).

There is no dominant ethnic group in Malawi but there is a dominant indigenous language, Chichewa, which shares the status of official language with English. However, all official records in public administration are in English only.

Malawi has different tribal, linguistic and cultural groups and varying customs, beliefs, and traditions have strong daily influence on Malawians. This help to determine the acceptability of modern practices or ways of life such as agriculture, education, family planning and modern health care as opposed to traditional customs, e.g. use of traditional healers (MoH, 2001).

3.1.1 Political history

Malawi gained independence as a nation in 1964 after 73 years of British rule. After another 30 years of one-party rule under Dr Hastings Banda, a multi-party democracy was introduced in 1994 (ONCF 2005, Lawton et al. 2002) and in 1995 a new constitution that provided for human rights and the rules of law was adopted (Lawton et al., 2002). The new democratic dispensation brought with it a flurry of non-governmental activity, as well as free press and the pursuit of gender equality, but the speedy deregulation and liberalisation proved traumatic for the Malawian economy (Lawton et al. 2002).
The new political team that has evolved following the 2004 elections has set out a strong economic growth and anti-corruption agenda but President Dr. Mutharika and his government faces great challenges in developing a democratic culture, political institutions, policy decision-making and implementation capacities, efficient delivery of public services, and in coping with exogenous shocks (ONCF 2005).

3.1.2 Socio- Economic Profile

With more than 10 years of national multiparty democracy, Malawi remains relatively stable, but is still one of the poorest countries in the world with some 65 percent of the population living below the poverty line (TheWorldBank, 2006, ONCF, 2005). The country ranked 83 out of 95 on the United Nations Development Program’s Human Poverty Index scale in 2005 and had the 4th lowest Gross Domestic Product (GDP) in the world (WHO, 2005).

Poverty reduction efforts face many challenges that need to be overcome and achieving the health Millennium Development Goals (MDGs) remains a major challenge due to the poor macroeconomic environment, the increasing levels of poverty, and the critical shortage of human resources in the health sector (ONSD 2005).

Agriculture is the mainstay of the economy and accounts for more than 90 percent of its export earnings, contributes 45 percent of gross domestic product (GDP), and supports 90 percent of the population (TheWorldBank, 2006). It is estimated that less than 15 percent of the labour force is employed in the formal sector of the economy and that more than three quarters of the labour force are small-scale subsistence farmers (ONCF 2005). High population density in rural areas generates pressure on the best lands and ongoing rural out migration adds to already crowded urban areas bringing additional strain on urban facilities and services (ONCF 2005).

As a landlocked country, Malawi depends greatly on connections to neighbouring countries for the overland movement of exports and imports and since independence, the road system has expanded to around 15,000 km, of which around 3,000 km are tarred (ONCF 2005). The low number of tarred roads hampers the free movement of goods in and around Malawi as many dirt roads become impassable in the rainy season.

Malawi’s electricity supply is unreliable and power cuts and fluctuating power levels are a major problem for manufacturers and act as a disincentive to new investment (ONCF 2005). The water and sanitation sector is characterised by an uneven distribution of resources, poor coordination and fragmented institutional arrangements. It is estimated that 51 percent of the rural population and 69 percent of the urban population have access to clean water.

High illiteracy rates and poverty have led to environmental degradation of all resources. A large portion of Malawi’s biomass is burned each year, and this has resulted in large areas of land becoming deforested and degraded, which has led to soil erosion, which in turn has reduced the quality of water resources (ONCF 2005).

Malawi is characterised by low political empowerment of women, despite women’s large contribution to the economy (ONCF 2005). Early motherhood reduce women’s educational
and employment opportunities, further worsening their social and economic vulnerability and exposing them to HIV/AIDS. The adult illiteracy rate among women stood at 54 percent in 2005, compared to 77 percent for men (NSO 2006).

3.1.3 Health Status

The average life expectancy in Malawi has declined from 40.2 years (1998) to 37.5 years (2002), the maternal mortality rate has risen from 620 to 1,120 deaths per 100,000 live births (2000) in a few years and 50 percent of children under five years in are chronically malnourished (ONSD 2005). Communicable diseases, food insecurity and insufficient health services makes large parts of the population very vulnerable.

The African Development Fund reports on evidence indicating that the HIV prevalence has stabilised over recent years at around 15 percent (ONCF 2005). The social and economic effect of the pandemic is huge: family structures are dissolving, and children are being orphaned. At the economic level, AIDS-related illnesses are removing large numbers of otherwise active workers from the labour pool. In response to the epidemic, the government launched a National HIV/AIDS Strategic Framework (2000–04) and established the National AIDS Commission in 2001 to coordinate the national response, provide support to implementing agencies, mobilise resources, and monitor progress.

In addition to HIV/AIDS, Malaria and Tuberculosis are the other main killer diseases in Malawi. But malnutrition, Sleeping Sickness, Bilharzias, Hepatitis and Typhoid are also long-standing major health problems (ONCF 2005).

3.1.4 The Public Sector

There are two systems of government administration in Malawi, namely Central and Local Government. The Central Government is organized through a central coordinating office, the Office of the President and Cabinet (OPC), while Local Government is a single tiered system of 28 rural districts subdivided into Traditional Authorities, and 11 urban councils subdivided into wards.

The Office of the President is responsible for public service delivery, including District Administration and Civil Service Personnel management. The central government consists of ministries and non-ministerial departments with their headquarters located in the Capital City, Lilongwe. The ministries and governmental departments also have field services organised at regional and district levels. The District Assemblies are the local governmental structures headed by District Commissioners who are directly responsible to the Office of the President and Cabinet, while the other field staff is responsible to their heads of ministries and departments.

In Malawi the government has introduced structural reforms with implications for the public sector (Durewall, 2003). The wage compression that resulted from the Africanization of the civil service has remained at the core of the incentive problems in Malawi’s civil service. In the early 1990s, Malawi was one of the countries in which the civil servants were paid fairly decent salaries but since 1994 the situation changed. Progressive depreciation of the national
currency resulted in significant erosion of salaries that could not be increased to compensate for the reduction in the currency value (Adamolekun and Mvula, 1999). The health ministry provides an example of the consequences of low salaries and wages, as there have been large-scale resignations from the ministry. By 1999, up to 50 percent of the employees had left, mostly doctors, nurses and other clinical staff, and most vacancies remain unfilled (Durevall 2003).

In 2002 the Government produced its first Malawi Poverty Reduction Strategy (MPRS) paper, aimed at identifying the obstacles to equitable, sustainable economic growth and strategies for overcoming them. The MPRS is based on four pillars:

1. Promoting sustainable, pro-poor growth
2. Developing human capital
3. Improving the quality of life for the most vulnerable
4. Establishing good governance

Among the specific issues the MPRS highlighted were the needs to increase agricultural production and marketing, improve financial management, stop the spread of HIV/AIDS and provide treatment for those affected, reduce environmental degradation, and obtain debt relief (TheWorldBank 2006).

Adamolekun and Mvula (1999) point to main weaknesses and strengths of the Malawian public administration:

… Three areas of strength of the Malawi public administration system are noteworthy: (1) the importance attached to management education and skills upgrading, (2) the efforts aimed at transforming public financial management, and (3) the conscious linking of public administration reform to democratization and economic reform. Although the democratization process in Malawi is still in the transition stage, the manner in which it is linked closely both to public administration reform and to economic reform is likely to enhance the country's chances of moving to the democratic consolidation phase. Four main weaknesses in Malawi's public administration system in 1997 stand out: (1) poor policy management, (2) weak implementation capacity, (3) the problem of corruption, and (4) the existence of three de facto capitals. (Adamolekun and Mvula 1999, pp. 287-288)

3.2 The Malawian Health System

3.2.1 Goals and objectives of the health system

The challenges faced by Malawi have justified the development of a Sector Wide Approach by the Ministry of Health and its Development Partners aiming at improving the availability of quality healthcare for poor and vulnerable populations (ONSD, 2005). The Sector Wide Approach is based on the reorganization of the health sector based on the principle of decentralization of health services to District Assemblies. The strategy for the implementation
of a 6-Year Programme of Work (POW) for the period 2004-2010 based on the Sector Wide Approach (SWAp) was agreed upon in November 2002 and outlines how the Ministry and their partners will implement an Essential Health Package (EHP) over a period of six years. The goal is to strengthen the health systems through equitable health financing, increased human resources, reliable pharmaceutical and supplies logistics, and effective monitoring and evaluation. The program will also enhance the capacity of the Ministry of Health for stewardship and policy development, and strengthen the systems for planning, budgeting, and delivery of quality health services in the districts. Finally, it will expand communities’ participation in the delivery of essential health interventions.

The Government has made a policy decision that all services within the Essential Health Package will be delivered free-of-charge.

3.2.2 Structure of the health system

Health Providers

The Health Sector has a plurality of health service providers as is the case in most low-income countries and the providers can be separated into the traditional and modern sectors (ONSD 2005). A large number of people use the two systems simultaneously or consecutively, and they compliment each other.

Traditional providers

Traditional health providers exist in most communities and they can be divided into two main categories: traditional healers who deal with diseases/spirits, and traditional birth attendants (TBAs). The TBAs have more established links with the modern health sector as they have been trained to support primary health care since 1992, and they deliver approximately 25 percent of the pregnant women (MoH 2001).

Modern health sector

There are three main categories of health service providers in the modern sector; the public sector, non-profit private sector and for-profit private sector. Health facilities by type and ownership are presented in Table 2.
Table 2. Health facilities by Type and Ownership in Malawi 2005 (HMIS Bulletin 2005).

The public sector

The Ministry of Health provides about 60 percent of public health services, mostly for free. Government District Health Offices (DHO) are responsible for the provision of public services at district level. The Ministry of Local Government, through District and Urban Councils, provides different types of health services, about 1 percent of total. The Ministries of Agriculture and Education also provide health services, and there are services for specific target groups such as armed forces, prisons and police.

Non-Profit private sector

The Christian Health Association of Malawi (CHAM) provides a large proportion of services at variable charges. The Association is made up of independent church-related and other private voluntary agency facilities. It operates autonomously about 160 health units in the rural areas. Though primarily curative in orientation, most units also provide primary health care services. Most of these health institutions provide training for nurses and other health personnel. The quality of services provided at Christian Health Association of Malawi facilities is considered to be better than those at Ministry of Health facilities.

Some private companies provide health services to their employees and people in their catchments areas in particular estates. Some national and international non-governmental organisations (NGOs) also support scattered small-scale community based vertical health projects, but most integrate their activities with the existing health system (MoH 2001). To a lesser extent there also exists Community-Based Distribution Agent for family planning commodities, Drug Revolving Funds provided by community volunteers, Home Based Care volunteers and Faith Healing groups.

Private-for-profit

Some grocery shops sell drugs in rural areas and there is growth of private practitioners running clinics in the urban areas.
Levels of Health Care

Health services are provided at three levels: primary, secondary and tertiary (ONSD 2005).

- At the primary level, services are delivered through health centres, health posts, and outreach clinics.

- The secondary level provides mainly back up services to those provided at the primary level including surgical services, mostly obstetric emergencies, and general medical and paediatric in-patient care for common acute conditions. District hospitals and Christian Health Association of Malawi hospitals, although some have specialist functions, provide secondary level health care services.

- At present, tertiary level hospitals provide services similar to those at the secondary level, along with a small range of specialist surgical interventions.

A recent assessment of health facilities indicated that a significant number of them need rehabilitation and upgrading in order to be able to provide the full Essential Health Package (ONSD 2005). Most of these facilities have serious shortages of essential drugs as well as essential medical diagnostic equipment and surgical supplies.

Administrative organisation

The Ministry of Health has overall responsibility for developing policies, planning strategies and programmes, and also ensuring that all providers follow the national policies and standards so that quality health services are provided to the population. It has a Secretary for Health and Population who is responsible for the financial and administrative affairs of the ministry. The ministry has seven technical divisions, see Figure 1 for more details (MoH 2001, ONSD 2005).
Below the central level, the MoH is divided into 27 districts and each district’s District Health Officer (DHO) is accountable to the Principal Secretary. The District Health Officer, assisted by the District Health Management Team (DHMT), is responsible for the dissemination of national policies, overall coordination of health services and programs, and provision of services at district level. Although the DHMT has the mandate to supervise all health facilities and services within the district, the full extent of authority is unclear. The District Health Office is mainly based at the Ministry of Health District Hospital, and manages and supervises both hospital and peripheral government facilities (health centres, dispensaries and mobile clinics). Therefore the team has direct control over MoH units only. The Christian Health Association of Malawi hospitals supervise only their peripheral clinics and the central hospitals report directly to the Principal Secretary as well. (MoH 2001, ONSD 2005)

However, with the policy direction to decentralize health services to District Assemblies, the DHO will have the responsibility for the management of all health services in the district and
will be accountable to the District Assemblies for decisions on financial planning and expenditures (ONSD, 2005).

Until 1999 the MoH had an explicit regional level, but these Regional Health Offices were abolished due to that no tangible decisions were taken at the Regional Health Offices and therefore they did not add any value to the delivery of health services at district level.

The abolishment of the regional level created however difficulties in the supervision of the district health services from the centre. This led to the formation of ‘zones’, with MoH Directors allocated the task of general supervision of the districts within their assigned zone. This arrangement has worked less than satisfactorily, because the MoH Directors have serious time constraints. In view of this deficit in support to the districts, the MoH have established Zonal Health Support Offices to facilitate the management and coordination of the health services at the operational level by reducing the management distance between the MoH headquarters and the District Health Offices. The Zonal Support Office’s functions include technical advice and facilitation support of decentralization, Essential Health Package (EHP) implementation, and inter-district collaboration. (ONSD 2005)

3.2.3 Functions and Performance of the Health System

Health Financing

Health care financing in Malawi has five sources (MoH 2001):

1. Ministry of Finance, which uses funds collected from general tax revenue and distributes them through voted expenditure.

2. Local Government – the funds are collected from utility taxes.

3. Donors - the donor support is provided through Government’s development budget, commodity aid and direct support to programs and to other providers.

4. Employers- these include firms for-profit and parastatals. They finance health care services through contributions to health insurance to organisations such as Medical Aid Society of Malawi; or direct provision of health care services for the junior employees or through direct payment of medical expenses on behalf staff members and the their beneficiaries.

5. Households who pay direct out-of-pocket contribution to providers when seeking care or through contributions to Medical Aid Society of Malawi. The poor households were identified as the main purchasers of health care goods and services using out-of-pocket payment mechanisms.

The overall per capita expenditure on health is only US$ 14 and the financing is mostly private (ONSD 2005?). In 1998/99 the public expenditure on health was 2.30US$ per capita, raising to 4.93USD in 2002/03 (Conticini, 2004). Government accounted for 26 percent, and donors for around 30 percent (See Figure 2). Putting Malawi Government and donor sources together, public funds accounted for 56 percent of health expenditure, the total of which was
estimated at 7 percent of GDP. Private sources accounted for the remaining 44 percent, of which 26 percent came from out-of-pocket expenditures by households. There is no social security system in place for health care and out-of-pocket payments amounts to almost half the private expenditure on health (WHO 2005).

Figure 2. Health financing sources 1998/1999 (Conticini, 2004)

Although the budgetary allocation to the Ministry of Health approved by Parliament has been rising, this has not met the increasing needs of the health sector. In the past decade, economic difficulties (devaluation and inflation) have led to a decline in the real value of health expenditure, both from the recurrent budget and the government contribution to the development budget (ONSD, 2005).

Figure 3. Per Capita Health Expenditure in US$ in 1998/99 (Conticini, 2004)

The adoption of the Sector Wide Approach is expected to strengthen the financing of essential health care services. An average of USD 10.3 per capita per year will be required to implement the planned Programme of Work (ONSD, 2005). This amount includes the cost of Essential Health Package and non – Essential Health Package tertiary services. The majority
of finance for the Programme of Work will need to come from donors. Agreement has been made between the Ministry of Health and a core group of partners pooling all or at least a part of their resources into a basket fund (DFID, NORAD, World Bank and UNFPA) to use common implementation arrangements for planning and budgeting including procurement, financial management and technical assistance.

Overall development assistance to Malawi totals about $400 million per year, excluding debt relief (TheWorldBank 2006). Malawi was approved for relief under the World Banks programme for Heavily Indebted Poor Countries in 2000 (TheWorldBank 2006, WHO 2005).

**Health service provision and resource generation**

The Malawi health service delivery is focused on the provision of the Essential Health Package (EHP). The EHP consists of a cluster of cost-effective interventions delivered together in order to reduce the total cost of the interventions by reducing the cost to patients obtaining the services as well as the costs of providing services (ONSD 2005). The EHP addresses the major causes of morbidity and mortality among the general population and focuses particularly on medical conditions and service gaps that disproportionately affect the rural poor. Its objectives are to improve technical and allocative efficiency in the delivery of health care; to ensure universal coverage of health services; and to provide cost-effective interventions that can control the main causes of disease burden in Malawi (ONSD 2005).

**Human resources**

One of the crucial factors affecting the quality of delivery of the Essential Health Package (EHP) is human resources. The workforce in the health sector as a whole is estimated at 15,700 persons (ONSD, 2005). This does not include an estimated 3,600 traditional birth attendants and 2,300 community-based distributor agents for contraceptives. Sixty eight percent (68 percent) of the workforce are employees of the Ministry of Health. The Christian Health Association of Malawi employs some 26 percent with the remaining 6 percent divided among local government, police, army and non-governmental organizations (NGOs).

In terms of staff, numbers of health personnel per head of population show large differences from the WHO-recommended norms (ONSD, 2005). The total number of physicians in the country is 219, being one doctor per 45,662 Malawians, well below the WHO average ratio of 1 to 10,000. The College of Medicine produces about 20 doctors per year. Considering the population, this figure is extremely low and this has resulted in heavy reliance on other categories of health professionals such as clinical officers and nurses to carry out some of the work for doctors (ONSD, 2005).

There is also a severe shortage of nurses, having a 64 percent of the 6,084 establishments vacant during the implementation of the 4th National Health Plan (1999-2004). The current training outputs are too low to fill the large number of vacant posts. Furthermore, most of the skilled health workers are leaving the public services mainly due to poor salaries and working conditions. Thus there is a collapsing human resource capacity and this has negatively
affected the performance of the health systems as the health personnel are required to work beyond their limit (Mtonya et al., 2005, ONSD, 2005).

Table 3. Established posts and vacancies within MoH 2004 (Conticini, 2004).

<table>
<thead>
<tr>
<th>Category</th>
<th>Established Posts / Required</th>
<th>Filled posts</th>
<th>Vacancy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurses</td>
<td>8,084</td>
<td>2,178</td>
<td>64%</td>
</tr>
<tr>
<td>Clinical Officers</td>
<td>356</td>
<td>212</td>
<td>40%</td>
</tr>
<tr>
<td>Medical Assistants</td>
<td>892</td>
<td>327</td>
<td>53%</td>
</tr>
<tr>
<td>Doctors:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generalists</td>
<td>356</td>
<td>212</td>
<td>40%</td>
</tr>
<tr>
<td>Surgeons</td>
<td>115</td>
<td>17</td>
<td>85%</td>
</tr>
<tr>
<td>Ob-Gyn</td>
<td>126</td>
<td>11</td>
<td>91%</td>
</tr>
<tr>
<td>Medicine</td>
<td>85</td>
<td>3</td>
<td>95%</td>
</tr>
<tr>
<td>Paediatrics</td>
<td>60</td>
<td>5</td>
<td>92%</td>
</tr>
<tr>
<td>Anaesthetists</td>
<td>14</td>
<td>4</td>
<td>71%</td>
</tr>
<tr>
<td>Pathologists</td>
<td>22</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>All Categories</td>
<td>7,890</td>
<td>2,909</td>
<td>62%</td>
</tr>
</tbody>
</table>


In response, the government is implementing a Human Resource Programme, under the Programme of Work (PoW), which aims to address the critical shortage of human resources required to deliver the EHP. The programme activities include financing the recruitment of more health workers to filling the vacant posts, ensuring retention of all trained health workers, and providing in-service training. (ONSD 2005)

Material resources

In addition to human resources, another crucial factor is the material resources such as drugs and medical supplies. WHO surveys from 2002-2004 show that almost half of all facilities are short of drugs, have inadequate means of communication and inadequate transport and there is a lack of emergency drugs in zonal warehouses and the cholera preparedness system is weak (WHO 2005). This has been attributed to the shrinking of the drug budget in the face of the local currency devaluation and increased pilferage of drugs. This in turn has hampered government’s effort to minimize morbidity from treatable diseases such as malaria, tuberculosis thus affecting the overall performance of the health system in delivering services (Mtonya et al. 2005, ONSD 2005).

To address this problem, the Pharmaceutical and Medical supplies programme will be implemented under the Programme of Work to strengthen national procurement, distribution and stock management systems for medical and non-medical consumables. The programme will finance an adequate volume of pharmaceutical and medical supplies at service delivery points. The overall objective is to enable the health system deliver drugs and medical supplies for the EHP. (Mtonya et al. 2005, ONSD 2005)
**Education**

The National Health Account from 1998/1999 (MoH 2001) reported that the educational levels in Malawi were very low. 48 percent of women and 22 percent of men had never attended school at all and only around 3 percent of women and 9.5 percent of men had completed secondary school. Moreover, the quality of education was poor, primarily as a result of high teacher to pupil ratios (1:70 in 1997) and lack of basic teaching materials, since exacerbated by the introduction of free primary education in 1994 (MoH 2001).

It is estimated that almost all primary school age children are attending primary education, but the quality of the education provided is very poor (due to a large number of poorly trained teachers and inadequate teaching resources) (ONCF, 2005). Only 30 percent of those who start school complete the final year of the primary cycle, and whole the school drop-out rate for girls has increased the rate for boys has been reduced. At the secondary level, access and quality remain major concerns. In 2004, only 18 percent of the relevant secondary age group was enrolled in secondary schools, one of the lowest secondary enrolment ratios in sub-Saharan Africa (ONCF, 2005). Secondary education quality is also low.

Since 1998 the World Bank Group has been supporting the Government of Malawi in its efforts to improve access to education. The Secondary Education Project has supported construction of around 20 new secondary schools, as well as efforts to improve school management and curricula and to develop materials to address the problem of HIV/AIDS through the school system. Over the project period (1997–2004), the rate at which students have passed the Malawi School Certificate Exam (MSCE) has increased from 23 percent to 50 percent (or 27 percentage points), and the completion rate of girls has increased from 17 percent to 39 percent.

**Inter-sectoral advocacy**

Several donors have entered into delegated cooperation agreements in Malawi, e.g., on country program (Norway and Sweden; Switzerland and the Netherlands), education (UK and the Netherlands), health (Norway and Sweden; Canada and Japan) water development (Canada and Japan), and energy (Germany and the Netherlands).

The Poverty Reduction Strategy (PRSP) has contributed to improving donor coordination (TheWorldBank 2006). Major donors and sectoral donor working groups in the areas of economic management, poverty reduction, water and agriculture meet regularly. Work is ongoing towards common conditionalities and joint financing arrangements (including pooled funding), joint reviews and single reporting. Donor harmonization work is expected to be focused on the health sector, where the Sector Wide Approach is being conducted.

3.3 **Management Sciences for Health**

Management Sciences for Health is a US AID funded programme of the Ministry of Health supporting systems strengthening in different health programmes, including the Health Management Information System. The programme is supporting eight districts, namely
Mzimba, Kasungu, Salima, Ntcheu, Balaka, Mangochi, Mulanje and Chikwawa, as well as the two Central Hospitals of Malawi.

In 2003 the Management Sciences for Health conducted an assessment on the implementation status of the Health Management Information System. Although implemented in all districts, the Health Management Information System was facing some problems that were affecting the quality of the collected data in the system (MSH 2003 referred in Appendix C). The assessment revealed that in many cases untrained staff was used for data recording in daily routine data registers. The registers were also often found to contain problems of missing data, incorrect data, mathematical errors, and duplicate data among others. Timeliness of reporting was not adhered to, and there was little evidence of use of data to monitor performance. Targets to support performance monitoring were also lacking, and a general lack of managerial support, supervision and feedback to HMIS work was identified.

Based on this assessment different performance assessment and supervision tools are being piloted and implemented interventions in the eight supported districts include:

- Support to the orientation of personnel to HMIS
- Support to the orientation of District health Officers and District Nurse Officers to DHIS
- Support to the orientation of Assistant Statisticians to DHIS
- Support to the dissemination of the national HMIS policy
- Support to the development of job aides to support health workers in executing HMIS work
- Piloting a monthly reporting system
- Support to the orientation of Sub District level Cluster Supervisors on HMIS which has so far been integrated into the routine supervision of the District Health system
- Support to HMIS supervision and HMIS reviews at facility, sub district cluster and district levels
- Emphasis has also been made on linking HMIS to District Implementation Plan development and monitoring
- Introduction of a HMIS Recognition Scheme (currently in three of the eight supported districts; Chikwawa, Balaka and Mulanje)
- Linking up with the Zonal Support Offices –capacity building through orientation of Officers in DHIS

The responses to these interventions are reported by Management Sciences for Health to be very positive in the districts but the pace of implementation has been at different levels. Where there has been proper management support and dedicated Health Management Information System teams, one can easily detect the results. Evaluation of the interventions
are in progress and some of the reported perceived benefits of these interventions are improved timeliness and completeness of data, improved data quality that result in more confident users that are increasing the demand for data (Moyo 2006). There is improved supervision and performance reviews using health data are bringing a culture for information use.

3.4 Malawi Health Information System

In January 2002 the Ministry of Health and Population (MoH) started the implementation of a comprehensive and integrated routine Health Management Information System (HMIS) throughout the country. The introduced system was guided by the principles of; integration of all routine information systems; decentralisation in information generation and use; information for action; and being simple to establish and maintain. For the first time Malawi would have access to continuous monthly data on all agreed indicators for each health facility, district and the nation. It was also the first time that each public health facility and district health office would know the catchments area and the population size to be served.

The integrated HMIS is designed to provide programme managers and staff with reports on how well each programme is functioning and to alert the service providers and programme managers to take timely necessary corrective actions (MoH, 2003). MoH officially endorsed a limited set of core health sector indicators (Chaulagai et al. 2005).

3.4.1 Overall Structure of the HIS

The Ministry of Health recognises that the HMIS can never be fully integrated into a single entity in any setting. Therefore, logically grouped, a number of sub-systems have been identified as interdependent components of the national HMIS as seen in figure 4 below.

These sub system are: (a) the financial management information system (FMIS), (b) human resource management information system (HRMIS), (c) logistic and supply management information system (LMIS), (d) physical assets management information system (PAMIS), and (e) integrated health services management information system (HSMIS).

The integrated health services management information system is at the core of this structure and derives information from all other sub-systems to serve as a comprehensive health and management information system. Malawi has fully integrated all service-related information systems and the disease surveillance system into a single entity of a health services management information system. The programme-specific logistics and supply components have been integrated into a broader logistics management information system.

3.4.2 Objectives of the Information system

The main mission of the national health management information system is to improve the health status of the people by providing reliable, relevant, up-to-date, adequate, timely and reasonably complete information for health managers at community, facility, district and national levels and through increased effectiveness and efficiency of health services.
Increased efficiency should be achieved through rational management and policy decisions that should be rationalised through appropriate use of information (MoH 2003).

**Objectives intended to be achieved through this IS**

According to MoH (2003) there are three main objectives intended to be achieved through the HIS, these are:

1. To ensure that the required health and management information is available to all users in the health sector to meet each of their predefined needs.
2. To ensure that the required information is accessible to all concerned users.
3. To ensure that the intended primary users of the information are informed about the information. (The individual and organisations involved in delivering and managing health services and providing support to this effect are the primary users of information).

**Principles guiding the design of the HMIS**
The design of the health information system has been guided by the principles of:

1. Data for decision-making
2. Integration of management of health service specific routine information systems into a single system
3. Data collection for local analysis and use
4. Data collection, analysis and use by the same health and support personnel who are responsible for the management/delivery of health services
5. Complete information available at a single repository
6. Strong links between all data collection systems in order to avoid duplication and produce synergy in data analyses and dissemination

3.4.3 Data Sources

The health system obtains required information from several direct sources as well as other systems within and outside the health sector. The most important sources are; (1) the census; (2) the registration of vital events; (3) health facility based records; (4) community monitoring reports; (5) population surveys and research; (6) records from central ministries and institutions.

The information is used to: (1) measure the health status of the people; (2) quantify the health problems; (2) quantify the medical and health care needs; (3) formulate health policies, plans and strategies; (4) set priorities to allocate resources; (5) design health interventions; (6) mentor trends and changes; (7) assess progress; (8) evaluate effectiveness and efficiency of health services.

*Data collection*

Health data is collected/compiled from both the primary and secondary sources. Data is converted from information to knowledge and stored in appropriate forms at all levels of the health service management and delivery.

The HIS provides information in: (1) demography; (2) vital events; (3) health status: morbidity, mortality, disability and quality of life; (4) utilisation of health services: service coverage, attendance, admission etc.; (5) health resources: facilities, beds, human resources, transport, communication etc.; (6) health financing; (7) environmental health; (8) supplies: drugs, vaccines, medical equipment etc.

*Primary sources*

Each health and support personnel collect data while delivering services and undertaking other management functions. The same person aggregates data in the prescribed format.
Secondary sources

Data required for planning and management of health services, but not collected directly from primary sources, are gathered from all available secondary sources.

3.4.4 Information flow

The main responsibility of recognising disease outbreaks, low coverage of health services and adverse environmental conditions weigh upon local health staff. The main response and actions take place at facility level followed by district level. The transmission of information is designed to elicit help from higher levels, and not merely to find a place in an archive (Figure 5).

Figure 5 shows how information is communicated between the levels of the health organisation (MoH 2003).

A facility generates quarterly reports on each predefined indicator for use by the concerned health programmes and other stakeholders. Each facility compiles data from its entire catchments area. The District Health Offices compiles data from all facilities and performs comparative analysis and sends feedback to each health facility. The Ministry headquarters compiles data from all districts and central hospitals, performs necessary analysis and provides feedback to all reporters.

The Health Management Information Unit at headquarters sends reports to national programme managers and provides general feedback to the District Health Offices and central hospitals. The Programme managers at the national level also respond to the district and the Central hospital based on the report received. In this way, technical feedback by higher levels becomes as important as the bottom-up reporting.
Besides the bottom-up reporting and top down feedback mechanism as described above, the Health Management Information Unit in headquarters compiles data on core indicators from all reliable secondary sources and sends to districts and central hospitals for their use in planning and management of health services (MoH 2003).

### 3.4.5 Data processing

All health personnel involved in managing and delivery of health services collect, aggregate and analyze information using paper, pencil and a simple calculator and make immediate use in their daily work. This concept will remain as a basic fundamental principle of design of a routine information system in the country for many years to come.

### 3.4.6 Dissemination of data

#### Facility level

At the end of every quarter each facility aggregates data from all the registers into a quarterly report and submit it to the district health office. The facilities also report through various program specific reports (MoH2003). See Figure 6 for more details.

![Diagram showing information process at facilities](image)

Figure 6 Information process at health facility level (Chaulagai et al., 2001).

#### District level
Each district compiles a report each quarter based on the quarterly reports they receive from the facilities in the district. This report is submitted to the MoH, information is also fed back to the health facilities and other stakeholders who are partners in health service management in the district.

Each district also conducts an annual review meeting with its facility in-charges and other stakeholders and produces an annual performance report with the following contents:

1. District at a glance: Maps, facts and figures.
2. Current health status in the district: analysis of routine indicators.
3. Organisation of health services: types of services, delivery points and frequencies.
4. Quality assurance, monitoring and supervision.

![Diagram of routine actions within each level](https://example.com/diagram.png)

Figure 7. Routine actions within each level (Chaulagai et al., 2001).
Central hospital

Each central hospital produces quarterly monitoring reports on tertiary care indicators. Annually, performances are analysed and comprehensive report is produced covering the area of service delivery, human resources, financial management, physical assets, drugs and supplies, etc.

National level

Each quarter the MoH compiles data from all districts and central hospitals and produces quarterly monitoring aggregated and comparative reports for use of different national programmes and other stakeholders. A copy of this report is sent back to district health offices and central hospitals for their self-assessment, comparative analysis and actions. Details about routine monitoring functions at different levels are provided in Figure 7.

District health offices have established computerised systems to process data of each catchments facility including the district hospital (MoH 2003).

3.5 District Profiles

3.5.1 Chikwawa

Chikwawa district is situated in the Lower Shire valley in the Southern region of Malawi, 48 km south west of Blantyre city. The population is estimated at 450, 609 for the year 2006 (NSO).

The district is served by one district hospital, two rural hospitals and 17 health centres. 16 facilities belong to the MoH and four belongs to The Christian Health Association of Malawi (CHAM) and all 20 facilities in the district report through the HMIS. Only 65 percent of the facilities have a functioning water system, while 60 percent has functioning electricity (Figure 8. The Programme of Work (PoW) target for 2010 is to reach 90 percent and 80 percent coverage respectively. A more encouraging 85 percent of the facilities have access to a functioning telecommunication system and already reach the target of 80 percent coverage.

| Percentage of Health Facilities with Functioning Utilities (SW Zone, July 2006) |
|----------------------------------|---------|---------|---------|---------|---------|---------|
| Utility (PoW Target 2010)        | BT      | CK      | CZ      | MW      | NS      | TO      |
| Water (>90%)                     | 88% (15/22) | 65% (13/20) | 69% (9/13) | 88% (14/16) | 100% (13/13) | 29% (5/17) |
| Electricity (>80%)               | 59% (13/22) | 60% (12/20) | 62% (8/13) | 69% (11/16) | 62% (8/13) | 35% (5/17) |
| Telecommunication (>80%)        | 91% (20/22) | 85% (17/20) | 85% (11/13) | 81% (13/16) | 54% (7/13) | 82% (14/17) |

a: due to unreliable water supply from Blantyre Water Board

Table 4. Facilities with percentage of functioning utilities compared to targets of the Programme of Works (CK – Chikwawa, CZ – Chiradzulu)(SWZHSO, 2006).
Shortage of staff affects the delivery of health services and only 20 percent of the facilities have the established minimum staff norms of two nurses, one clinical officer and one medical officer (Figure 3.5:2). Chikwawa is the worst affected district in the South West Zone with severe human resource shortage, and only 59 percent of the facilities have at least one nurse. The district has 22.7 nurses per 100,000 population and only 5.4 clinicians both far from the targets for 2010. The severe shortage of staff is attributed to the unfavourable high temperatures and the seasonal flooding and poor housing conditions in the district.

The coverage status of health indicators in programmes such as Maternity and Child Health for the last nine months (July 2005 – March 2006) shows decline compared to the same period last year. Malaria, Pneumonia, Skin and Eye infections and Diarrhoea are major disease problems in the district.

The district is being supported by Management Sciences for Health and different performance assessment and supervision tools are being piloted in the district. As part of these pilots the district is divided into six sub-district clusters.

<table>
<thead>
<tr>
<th>Health Centers with Minimum Staff Norms as compared to targets of the Programme of Works (CK – Chikwawa, CZ – Chiradzulu) (SWZHSO, 2006).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Staff Norm</strong></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>2 nurses</td>
</tr>
<tr>
<td>at least 1 nurse</td>
</tr>
<tr>
<td>1 clinical officer</td>
</tr>
<tr>
<td>1 medical assistant</td>
</tr>
<tr>
<td>2 nurses + 1 clinical officer + 1 medical assistant (PoW target 2010: &gt;60%)</td>
</tr>
</tbody>
</table>

Table 5. Health Centres with Minimum Staff Norms as compared to targets of the Programme of Works (CK – Chikwawa, CZ – Chiradzulu) (SWZHSO, 2006).

### 3.5.2 Chiradzulu

Chiradzulu is a small district situated 23 km east of Blantyre in the Southern west part of Malawi taking up an area of 767 square kilometres with a population estimated at 290 780 for 2006 (NSO).
The district population is served by one district hospital, one rural hospital and 10 health centres. Nine facilities are run by the MoH, two by the Christian Health Association of Malawi (CHAM), and one by the Islamic Bilal association. In Chiradzulu 69 percent of the facilities have a functioning water system and 82 percent have functioning electricity. As in Chikwawa, 85 percent of the facilities in Chiradzulu have a functioning telecommunication system.

Chiradzulu also experience a shortage of staff in the governmental facilities but is considered better off than Chikwawa as it has reached about 50 percent of the required number in some staff categories such as nurses. The district have respectively 33.8 nurses (Figure 8) and 7.6 clinicians per 100,000 population (Figure 9), but is still far from the target set in the Programme of Work of 67 nurses and 20 clinicians per 100,000 people. There are various NGOs operating in the district in various developmental areas including health and these include MSF, OXFAM, Concern Universal, DAPP and World Vision.

Figure 8. Nurse to population ratio in districts in South West Zone compared to Programme of Work target for Malawi by 2010 (CK – Chikwawa, CZ – Chiradzulu) (SWZHSO 2006).
Figure 9 Clinician to population ratio in districts in South West Zone compared to Programme of Work target for Malawi by 2010 (CK – Chikwawa, CZ – Chiradzulu)(SWZHSO, 2006).
4 Research Approach

Co-Authors Jon Sandvand and Gro Alice Hamre

4.1 Research team

The field studies reported in this thesis was conducted in a team of two, sometimes three, master students. Although all interviews and observations were performed as a team, we prepared questions individually and have had different focus of analysis throughout the field studies. We did however discuss our findings and make plans for whom to talk to further as a team. Working in a pair during our field studies proved helpful both related to the interpretation of findings, but also in practical matters. We wanted to spare our participants from wasting their time by arranging interviews together as we were both interested in many of the same issues. We shifted between asking the questions quite frequently and whenever it felt natural during the interviews. We see our approach as a strength in our field work because it enabled us to touch upon several issues we might have overlooked if we had done the interviews individually. We also believe that our notes and transcripts from the interviews improved when working together, as one could focus on taking notes while the other one could ask questions. Working in pair also proved helpful as we were both new to the Malawian context. The native language in the areas we visited is Chichewa, but English is used as the official language. Most of the people we collaborated with spoke fairly fluent English and we did not encounter too many language problems. Sometimes however, it was a bit difficult to understand the English accent and again we could discuss our interpretations of what had been said.

In some instances we also joined a third fellow master student, Marlen Stacey Galimoto, when we realised we had interest in the same people and issues, or when we knew that language could be a problem. Galimoto is a Malawian citizen and speaks both English and Chichewa fluently. This arrangement was also practical related to transport as we had access to a vehicle in parts of our field study period. And planning of our work also needed coordination among the three of us for that reason.

4.2 Research origin

This research was enabled through the EU funded project known as BEANISH, proposed by EU-African partners and IFIP (International Federation for Information Processing) and building upon another existing global research and development network called HISP (Health Information Systems Program). HISP was initiated in 1994 by researchers from Norway in collaboration with the University of Western Cape and University of Cape Town as an action research HIS project in post-apartheid South Africa (Braa et al. 2003). This is now a collaborative research and development programme with partners in South Africa, Norway, Mozambique, Ethiopia, Tanzania, India, Malawi and Nigeria that seeks to strengthen the HIS through efforts in three areas: (1) the design, development and implementation of free and open source software; (2) training and support to field level health facilities; and, (3) research and education through doctoral and Masters studies. The case of Malawi as a HISP partner is a bit different from most partners, as Malawi is a self initiated node in the network (Braa et
al., 2004) and the HISP software, the DHIS, was implemented nationally in 2001 on the initiative of the Ministry of Health.

BEANISH seeks to involve various institutional actors (government, universities, private sector and NGOs) to strengthen and extend an existing Europe-Africa collaborative network to support the application and sharing of ICT application development so as to support cooperation, learning and innovation in mutually beneficial ways. The BEANISH project in Malawi is established at the College of Medicine in Blantyre and at the Ministry of Health in Lilongwe.

This study is a partial fulfilment for the degree of Master of Science in information systems and part of the research and education part of HISP. Being accepted as a self funded student under this programme and also the collaborative partners available in Malawi through the establishment of the BEANISH project, enabled us to conduct this research in Malawi within the domain of health information systems.

We now present the research approach of this study by describing the research setting, the research team, research design and process, and finally the data collection methods. There is also a discussion of the ethical considerations used to conduct the research, and the limitations of this study.

4.3 Research design

This study has been an interpretive in-depth case study in which “the researcher enters a social setting without any a priori constructs but with a good understanding of the literature” (Jones and Hughes, 2001). Information Systems (IS) as a field of study developed in response to the increasing necessity of organisations to improve their capabilities to process and manage data (Elliot and Avison, 2005) and Interpretive research in IS is by now a well-established part of the field (Walsham, 2006). According to Klein and Myers (1999) IS research can be classified as interpretive if it is assumed that our knowledge of reality is gained only through social constructions such as language, consciousness, shared meanings, documents, tools and other artefacts. Interpretive research focuses on the complexities of human sense making as a situation emerge, and interpretive methods of research in IS are “aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context” (Walsham, 1993). Interpretive research can help IS researchers to understand human thought and action in social and organizational contexts and has the potential to produce deep insights into information systems phenomena (Klein and Myers, 1999). In this instance the aim was to understand what is perceived to be good working routines and practices related to a health management information system by the perception of different levels and categories of professionals in the health sector in the developing country context.

Due to the general shift in IS research away from technological to managerial and organizational issues there has been an increasing interest in the application of qualitative research methods. Qualitative research methods were developed in the social sciences to enable researchers to study social and cultural phenomena. Examples of qualitative methods
are action research, case study research and ethnography. Qualitative data sources include observations and participant observations, interviews and questionnaires, documents and texts, and the researcher’s impressions and reactions (Myers, 1997). The IS discipline examines more than just the technological system, or just the social system, or even the two side by side, it investigates the phenomena that emerge when the two interact (Elliot and Avison, 2005), and qualitative research methods are designed to help researchers understand people and the social and cultural contexts within which they live (Myers, 1997). In this study, qualitative case studies were the selected method.

Our main focus has been to understand the functioning of the official health management information system (HMIS) in Malawi, including the established routines and practices and the meanings and values attributed to these routines and practices by the participants in this study. We focused also on structures and mechanisms that were introduced to support the functioning of the HMIS and aimed to understand the origin and intentions of these structures and how they were perceived to function by the different actors.

We chose two health districts based on the recommendations from the Health Management Information Unit and Management Sciences for Health in Malawi. Chikwawa is the best performing district of the six district supported by Management Sciences for Health, especially in terms of timely and accurate reporting on HMIS. As we were looking for good working practices Chikwawa district seemed like a relevant and good recommendation.

We decided to look at one more districts, one that did not get the same degree of support and that did not perform as well in terms of HMIS activities. Looking at two districts offered the opportunity for us to understand more about the diversity of the Malawian context than what only one district could offer. Chiradzulu district was recommended and chosen for the above described reasons, in addition to its relative proximity to both Chikwawa and Blantyre as this would allow travelling between the two districts if necessary.

4.4 Research Process

During our field studies we have talked to health managers, supervisors, health workers responsible for HMIS activities, and clerks responsible for data collection. Knowledge of whom to talk to were developed through what we learnt from our interviews, starting at the Ministry of Health and working our way down through the different levels of the health system (Table 6). The participants in our studies were chosen based on their responsibilities or involvement related to HMIS activities of our interest in addition to geographical location and availability.
Table 6. Organisational levels of the Malawian health system

<table>
<thead>
<tr>
<th>National level</th>
<th>Sub-national level</th>
<th>District level</th>
<th>Cluster level</th>
<th>Health Facility level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Management Information Unit, MOH</td>
<td>South-West Supervision Zone Office</td>
<td>Chikwawa District Health Office</td>
<td>Cluster Supervisors</td>
<td>The District Hospital</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Three Health Centres</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chiradzulu District Health Office</td>
<td>Not Applicable</td>
<td>The District Hospital</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Programme Coordinators</td>
<td></td>
<td>Four Health Centres</td>
</tr>
</tbody>
</table>

The first point of contact in Malawi had been established by our supervisor at the University of Oslo with the Health Management Information Unit at the MOH in Lilongwe. The Health Management Information Unit supported us through the process of getting our research proposals accepted, introduced us to the health management information system in Malawi, and helped us establish contact with Management Sciences for Health. After our first introductory discussions at the MOH, we were invited to participate in an annual HMIS review meeting for the South West Supervision Zone, to which zone both our selected districts belong. In this meeting we were introduced to all district representatives by the MOH who encouraged everybody to welcome us and help us during our studies.

Apart from our official approval to perform our studies by the Research Unit at the MOH we were not required any other formal approval to access our chosen districts other than the agreement of the district representatives present in this meeting. We established contact with the Technical supervisor in the South-West Supervision Zone office and representatives from Chikwawa and Chiradzulu districts. The two HMIS Officers in these two districts became our main point of contact throughout the remainder of our studies.

*The first case study: Chikwawa*

We started off in Chikwawa district, and being relatively new to health management information systems and the health sector in general, we spent quite some time with the HMIS Officer to understand how information is handled, how information flows and who is involved. We also spent time at the district hospital talking to health workers involved in data
collection to understand their routines on collection, analysis and use of information. Concurrently we revised official policy documents and guidelines to understand the intentions of the system and what was expected at the national level.

After some time we started to focus on HMIS related activities in the district. First we observed quarterly HMIS cluster review meetings. The intention of this was threefold; (1) to establish contact with cluster supervisors, (2) to understand the dynamics of these review meetings, and (3) to look for and establish contact with well performing health facilities in terms of HMIS. Of the six planned review meetings we chose three that were within a fair distance from where we were based, and also accessible by public transport. One of these meetings were however postponed on short notice and ended up being conducted at a time when we could not attend. We also observed a biannual Task Force meeting for the Recognition Scheme where quarterly HMIS reports from the two preceding quarters from all health facilities were assessed and the best ones awarded. Following these observations our focus was directed to the understanding of what kind of support was provided from district to the health facilities. We interviewed cluster supervisors and were invited to observe cluster supervision. Again we consulted guidelines and policies to get an understanding of what was intended and expected from these routines at the national level. We were also invited to observe a quarterly meeting where cluster supervisors report on district supervision to the district health management team and other stakeholder. This meeting was however moved twice and ended up being conducted without our knowledge.

After spending some time with district level representatives we decided to visit health facilities to learn more about their HMIS routines, and to understand how they perceived the quality of their routines, their data quality, and the quality of the cluster supervision, the quarterly HMIS cluster review meetings and the recognition scheme. At the facilities we met with either the facility In-Charge or the HMIS focal person. We talked to health workers who were responsible for filling the quarterly HMIS report if he or she was present, as well as other health workers involved in data collection. Usually these visits developed into group interviews.

At the end of our stay in Chikwawa we were able to observe the districts annual review of the District Implementation Plan and the HMIS.

**The second case study: Chiradzulu**

In Chiradzulu we started by talking to the HMIS Officer to understand the HMIS routines and who were involved in HMIS activities in the district. As we now knew more about the intentions and requirements of the national system, we decided to start our studies in the health facilities this time. Our intention was to look for similarities and differences in facility staff’s perception of their HMIS routines, their data quality, and the support provided by district level representatives. Again we talked to the people responsible for reporting, but also people filling registers and the in-charges, often all in a group. The main issues that were raised by these facility staffs were related to training on HMIS and supervision.
At the district management level we then talked to those responsible for training and supervision related to the HMIS. This included members of the district health management team including the district health officer, and health program coordinators. We joined and observed both monthly HMIS specific supervision, and the district health management team’s integrated monthly supervision. We also observed a training session on cholera prevention and handling at the district hospital where facility representatives were present.

4.5 Data collection methods

Data has been collected using qualitative research methods in this study. A major strength of case study data collection is the opportunity to use many different sources of evidence. The use of multiple sources of evidence in case studies allows an investigator to address a broader range of historical, attitudinal, and behavioural issues (Yin, 2002). In addition we conducted an action research experiment with pair reporting at one health centre. Each of the data collection tools used is described in the following sections.

4.5.1 Interviews

The interview technique, especially the semi-structured interview, is an essential technique for many knowledge acquisition methodologies and semi-structured interviews combines a highly structured agenda with the flexibility to ask subsequent questions (Milton, 2003). In open ended interviews you can ask key respondents about the facts of a matter as well as their opinion about events (Yin, 2002).

In total we have conducted 37 interviews, some of which were group interviews, and made a total of 13 direct observations of different meetings over a period of 11 weeks. Table 7 shows the numbers of respondents at different levels of the health organisation hierarchy.

All our interviews were open-ended, semi-structured interviews. When we first arrived in Malawi we didn’t know much about their health management information system. Therefore we found that using semi-structured interviews gave us the opportunity to get a broader understanding of how health staff worked with information. Basically we prepared most of the questions in advance, but to be able to go deeper into interesting issues we were always on alert to ask follow up questions.

Our introductory interviews were focused on our understanding of how the system was supposed to work, and whether the system functioned as intended. This was important for us to be able to understand if good practice was observed or communicated by respondents and also if this practice supported the intention of the system.
Table 7. Aggregated list of performed interviews and observations.

<table>
<thead>
<tr>
<th>Performed Interviews and Observations</th>
<th>Chikwawa</th>
<th>Chiradzulu</th>
</tr>
</thead>
<tbody>
<tr>
<td>National level Observations</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>National level Interviews</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sub national level Observations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub national level Interviews</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual HMIS review meeting in SE Zone</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>District level Observations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>District level Interviews</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual HMIS/DIP review meeting</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Supervision</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Cholera training</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Recognition Scheme Task Force</td>
<td>1</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Health facility level observations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health facility level interviews</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Cluster HMIS Review meeting</td>
<td>2</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Pair Reporting Experiment</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Health facility level group interviews</td>
<td></td>
<td></td>
</tr>
<tr>
<td>District hospital</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Health centre</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

When our understanding of the system increased we started asking the respondents to propose their own insights into certain issues that were mentioned and we used such propositions as the basis for further inquiry. The data quality was such an issue that had direct relevance to the routines we investigated and comments about what affected quality led us to follow up on perceived data quality by the respondents. We asked how they thought quality could be improved, whether or not they thought the quality was good enough, and what they perceived to be good quality. That way we also gained a better understanding of what they saw as potentially better practice and how better practice could be achieved.

As most case studies are about human affairs, these human affairs should be reported and interpreted through the eyes of specific interviewees, and well-informed respondents can provide important insights into a situation (Yin, 2002). However, the interviews are subject to the common problems of bias, poor recall and poor or inaccurate articulation. One such example was how we through interviews with different district level and health facility representatives often got different answers related to both intentions and expected outcome of certain routines, as well as related to what was actually carried out of described practices. This cross checking of information revealed interesting differences in perception, expectations and performance of the respondents.

Before starting our studies we had considered the possibility of recording the interviews. However, those interviewees who were asked refused or appeared clearly uncomfortable with the prospect of being recorded. As the main intention of our studies was to understand the
overall dynamics of the HMIS related routines, rather than to investigate specific details, there was no plan for transcribing or systematically listening to the contents of such recordings other than for a refresher of memory. During our studies we were always 2 or 3 investigators present during interviews, and through conversations and comparison of notes and transcripts from the interviews we felt that this provided the necessary memory to be able to record our findings satisfactory.

According to Yin (2002) respondents in a case study can suggest other persons for you to interview as well as other sources of evidence. The more that a respondent assists in this manner, the more the role may be considered one of an “informant” rather than a respondent (Yin, 2002). The HMIS Officers in both districts took the role as informants and they were both crucial to the success of our case studies. Not only did they provide us with great insight into the health management information system and its intended functions and routines in their respective districts but they also suggested key people to talk to and helped us establish contact on several occasions. They arranged for us the opportunities to observe important meetings, and made us aware of, and when possible gave us access to, written documentation.

On a few occasions it was hard for us to carry out planned interviews. Sometimes interviewees showed up very late and on one or two occasions they didn’t show at all. Still, after a couple of attempts we were able to conduct all our interviews and the interviewees were always helpful and shared valuable information with us.

### 4.5.2 Observations

Observational evidence is often useful in providing additional information about the topic being studied (Yin, 2002). Observation can lead to deeper understandings than interviews alone, because it provides a knowledge of the context in which events occur, and may enable the researcher to see things that participants themselves are not aware of, or that they are unwilling to discuss (Patton, 1990).

The observations can range from formal to casual data collection activities that can involve observations of meetings or less formally including those occasions during which other evidence is collected.

The intention of our observations was to understand the dynamics of the event observed. Table 7 presents the nature of the observed events and the organisational level in which the event took place. We wanted to investigate whether what we observed reflected the same impression of value, content and form as had been expressed through interviews with key people involved. We used these observations as a source to corroborate and sometimes contradict information and understanding achieved through interviews.

According to Yin (Yin, 2002) more than one single observer increase the reliability of observational evidence. We were always 2 or 3 investigators present when we made direct, planned observations and we discussed our interpretations of the observed upon writing the documentation of the events.
4.5.3 Documents

We have collected and analysed a total of 18 documents on policies, guidelines, reports and minutes from meetings. Table 8 lists the level of origin of the documents.

The most important use of documents is to corroborate and augment evidence from other sources (Yin, 2002). Table 8 contains an aggregated list of the number of documents we obtained from different levels of the health organisational hierarchy. Appendix x shows a complete list of these documents with description.

The introductory questions in our study were based on what we identified as important issues for the HMIS based on official guidelines and policy documents, mainly supervision checklists and job aids for different positions, on HMIS activities. The aggregation of an extended list of questions based on these documents was crucial for our understanding of what is expected of the different people at different levels, and also what is expected of the performance of the system.

Minutes from meetings were collected to enable comparison of content and focus of previous meetings of the same nature as those we observed. Minutes from meetings we observed was also collected whenever possible to offer an interesting reference for comparison of our own interpretations of the same event. National and district reports concerning or with relevance to the HMIS has been identified along with official policy documents, that served as background information to the study context.

Table 8. Aggregated list of documents used as background information

<table>
<thead>
<tr>
<th>DOCUMENTS</th>
<th>National level</th>
<th>Sub national</th>
<th>District level</th>
<th>Health Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Policies, guidelines and annual reports</td>
<td>10</td>
<td>Reports</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Reports and annual reports</td>
<td></td>
<td>Chikwawa</td>
<td>Chiradzulu</td>
</tr>
<tr>
<td></td>
<td>Chiradzulu</td>
<td></td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Feedback</td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

4.5.4 Action research

In action research, the researcher wants to try out a theory with practitioners in real situations, gain feedback from this experience and modify the theory as a result of this feedback (Avison et al., 1999).

We never had the intention of using action research as a method for data collection. However as our knowledge of the HMIS in Malawi grew, it felt natural to do an action research experiment to further investigate the activity of writing HMIS quarterly reports.

Cockburn and Williams (2000) describe pair or collaborative programming as a process/situation where two programmers develop software side by side at one computer.
Our action research experiment was conducted using the principles of pair programming while compiling an HMIS quarterly report at one health centre. Our intention was to see if using these principles would lower the amount of defects done while compiling the report and to investigate whether working in a pair would apply more satisfaction to the working process.

4.6 Ethical statement

Ethical considerations were made throughout our study and we did our best to protect privacy among our respondents. The following is a list of issues that were considered.

- Formal research clearance was given by the MOH in Malawi. Access to the districts was arranged by being introduced by the MOH to the district HMIS Officers who in turn clarified their participation and assistance in our research with their District Health Officer.

  All participants were informed about the nature and purpose of our study and all participation in our research was voluntary and based on oral informed consent.

- All transcripts of interviews and observations excluded name of participants.

- All photographs, of people, figures or other written material, were only taken after consent from those affected.

- All planned meetings were conducted at a time and place chosen by the respondent. When meetings had not been planned ahead, we waited until the respondent had finished other duties.

- We tried our best not to conflict with the respondents daily duties. We (the three master students) coordinating for instance our plans and arranged meeting together when we wanted to talk to the same people.

- In our reporting of findings we do not relate them to specific facilities or persons. In some cases, as in the case of people in key positions some findings are related to this position. However whenever any findings could compromise this person, findings are reported with out reference to position.

- In our preliminary report to the districts and the MOH in October we aggregated findings for the two districts together as to not display problems or issues as originating from one specific district. We summarised findings and proposed general recommendations.

- In many cases respondents associated us with international aid organisations and sometimes wished to focus on lack of material and money in the hope that we could perhaps help them. In these cases we always spent time explaining that we were self-funded students and that our research was mainly for our own academically purpose, but that we hoped the HMIS in Malawi could benefit from our research.

- All participants were informed that they would not receive any personal benefits from participating, apart for the possibility to learn something new, but that important issues would be addressed as recommendations to the superior level as to attempt some
contribution of the time spent. In a few cases we did provided feedback to facility staff on how we perceived the quality of their data collection and reporting. This was only done upon request.

4.7 Limitations to this study

We have already described some limitations to this study, like some meetings being moved on short notice and conducted without our knowledge. Sometimes we also had to spend a lot of time waiting for meetings. In addition to these practical issues during our research there were however other general limitations. A list of these limitations is provided below.

- Given the time frame of the master programme we could not spend more than 3 months of field studies to allow enough time for analysis and writing. We wanted to do in-depth interpretive case studies but we also wanted the opportunity to observe different practices. Three months is a short time and we decided to settle for two cases. Still this prohibited us from visiting all health facilities in both districts.

  It is likely that because we are not from Malawi, and did not speak the local language we might have missed some aspects in our findings. It is our hope however that the assistance and support by Marlen Galimoto has helped us in this matter at least to some extent.
5 Analyses

5.1 Supervision

*Supervision is a quintessential, interpersonal interaction with the general goal that one person, the supervisor, meets with another, the supervisee, in an effort to make the latter more effective* (Hess, 1980, quoted in Hawkins and Shohet, 1989:41).

In October 2003 the Ministry of Health (MOH) in Malawi decided to implement integrated supervision of health personnel and infrastructure in all districts and health facilities in the country. Each district was to be supervised by a “zonal supervision team” and each health facility by the District Health Management Team. The MOH decided that supervision sessions should be conducted once in three months on both district and facility level and the supervisors should carry out the supervision using integrated checklists ensuring adequate coverage of all aspects.

Integrated supervision will be the main strategy for the improvement of quality of data and use (Ministry of Health and Population, 2003).

According to my observations in Chikwawa and Chiradzulu, and relevant literature discussed later in this chapter, supervision can in various ways influence how health staff works with information, all of which can contribute to improvement in quality of data. In this chapter I will focus on why supervision can provide advantages to how health staff works with information.

When conducting supervision in Malawi, supervisors do not only cover activities related to the HMIS but also several other issues and activities which affects the health service delivery. My interest in the subject is limited to the HMIS and therefore my focus will be on supervision related to the HMIS only.

5.1.1 Responsibilities of a supervisor

When reviewing Health Management Information Systems the aim is to ensure that there is regular collection of accurate information, compilation and local utilization of health information, proper use of data collection instruments and timely feedback on information forwarded to the higher levels of the system (Ministry of Health, 2005).

According to (Ministry of Health, 2005) when conducting supervision in general the supervisor has the following responsibilities:

- Identify standards of good practice and performance and communicate these to staff
- Work with staff to assess on a regular basis their performance against the agreed standards
- Provide feedback to staff about their performance
- Work with staff and the community to identify appropriate interventions that will lead to improved delivery of quality services
- Mobilize resources from different sources to implement interventions
- Ensure that the interventions have the intended effect
- Ensure that the items on the RED-FLAG list (Appendix C) are at all times upper most in
  his/her mind

Supervisors use different checklists (see Appendix C) when conducting supervision. The
MOH have developed these checklists as a support mechanism to ensure that supervisors
conduct supervision on all important issues related to health service delivery.

The red flag list contains questions about issues that are invaluable for the facilities to be able
to conduct their service. For instance drug stock outs, refrigerator not functioning, staff not on
duty, broken equipment, public health impact (indicators), health centre advisory committee,
health facility visits and supervisory visits.

The regular review list contains questions on staff management, clinic management,
information review, referral review and clinical care.

The HMIS list contains questions related to the use of HMIS reports and registers on the
clinics. Subjects that are taken up are data collection, monthly PHC report, data
analysis/interpretation, feedback, staff issues, comments and notes and follow up activities.

The Program Specific lists contain information related to the different programs and program
specific activities.

### 5.1.2 HMIS Cluster supervision

In 2004 Management Sciences for Health (MSH) decided to pilot a new and altered
supervision scheme in the districts they were involved in. The background for this was that
the demand for supervision was bigger than the current supervision scheme seemed to cover.
They decided to appoint several cluster supervisors in each district. Each cluster supervisor
got responsible for conducting supervision on a small number of health facilities. These
facilities were to be supervised monthly and the supervision was to be conducted using the
same guidelines and the same integrated checklists as they did earlier when the supervision
was conducted by the District Health Management Team. The cluster supervisors were
obliged to report on supervision activities to the District Health Management Team each
quarter.

According to Management Sciences for Health the HMIS should be supervised monthly along
with other aspects of facility performance. When conducting supervision the supervisor
should:

- Interview health care providers
- Review clinic registers
- Review monthly /quarterly reports
- Observe data graphs and wall charts
The supervisor should also give support on data analysis; interpretation and presentation, in linking performance to service delivery, ensuring that health facility staff received feedback from the district health office, assist facilities in timely collection of monthly and quarterly reports and ensure that a core set of indicators were monitored every month. The supervisor also was to act as a link between the District Health Management Team and health facilities, to inform and provide feedback to both sides.

5.1.3 Supervision in Chikwawa

Chikwawa is one of the districts supported by Management Sciences for Health and they exercise the cluster supervision scheme. There are 26 facilities in the district supervised by six cluster supervisors. Each facility is supposed to be supervised once every month by their cluster supervisor. During supervision the supervisors use different integrated checklists as a tool to evaluate the facility in terms of performance and condition. The Red Flag List and the Regular Review List are used on each visit while the other checklists (program-specific and HMIS) are rotated on each round of visits. The supervisors always agree on which third checklist to use prior to the supervision. That way they always use the same checklist on the same round of supervision. At the end of each supervisory visit at a facility the supervisor is obliged to leave a written report. This report should describe the strengths and weaknesses as well as provide staff with an action plan to help the facility improve their performance.

Every quarter the cluster supervisors team up to write a joint report on the status in the district. This report is based on the checklists they have used that quarter. This report is presented to the District Health Management Team and the Management Sciences for Health.

Facility staff in Chikwawa say that they receive supervision on quarterly basis in average. Staff at one facility expressed so much satisfaction with the supervision scheme that they recommended that it was done monthly. An interview at another facility revealed that the staff did not think that supervision was helpful because they received it so infrequent and that they would gain much more from monthly supervision. They explained that monthly supervision would allow the supervisor to follow up on difficult issues while they were still fresh in their minds. Staff at facilities also say supervision creates awareness of where they need to improve.

Feedback is almost without exception given orally on the spot at the time of supervision. From what I have observed health facility staff does not seem to have a very big desire to receive written feedback, and they do not write down any of the feedback they get either. One Health Surveillance assistant, however, expressed a wish to receive written feedback in addition to the discussions as he explained that they easily forget the details between each supervision session.

During interviews the cluster supervisors in Chikwawa expressed that they want to conduct supervision monthly, but due to transport problems, heavy workloads and other responsibilities, they are only able to do it quarterly. All supervisors in Chikwawa have other
important duties, the supervision is only an extra workload. During interviews I have asked the supervisors what sources of motivation make them conduct this extra workload. It seemed like there were many motivating factors, the most important ones are:

- They are part of a system designed to improve reporting performance in the district
- The title supervisor, is perceived to give higher professional status
- Management Sciences for Health provide them with allowances for lunch and occasionally for fuel
- They see improvement in reporting when comparing to how performance was before the supervision scheme was implemented

The District Health Officer in Chikwawa said that cluster supervision was introduced as an action with the objective of decreasing the amount of supervision activities and thereby make supervision more cost-efficient. The reason was that cluster supervision means sending only one person on supervision to each facility. They were not sure that the cluster supervisors could solve all program specific issues, so the cluster supervision was introduced to replace or at least supplement program specific supervision. The reason for problems of sufficient supervision at the time of introduction of the zone supervision was lack of funding.

5.1.4 Supervision in Chiradzulu

In Chiradzulu the District Health Management Team is responsible for conducting supervision. This is in resemblance to all the other districts in Malawi where Management Sciences for Health is not involved.

Supervision sessions will be conducted, once in three months at each health facility by the District Health Management Team (Ministry of Health, 2005).

According to the District Health Officer in Chiradzulu they have increased the frequency of supervisory visits. The District Health Management Team makes a schedule at the beginning of each year for supervision so that the facilities are aware of when they will be visited. Chiradzulu is being served by 13 health facilities. The facilities are supervised approximately twice each quarter by the District Health Management Team. Usually they are able to conduct supervision to approximately three health facilities in one day. This means that to be able to conduct supervision to all health facilities they must set of three full days each month as an average. The team consists of the district health officer, the district nurse officer, the district environmental officer and the district hospital administrator. To ensure that all important factors are handled, they use an integrated checklist during supervision. At the start of a supervision session at a facility they gather all staff and give them a short briefing. Then they split up, and each of the members of the District Health Management Team conducts supervision within their scope of responsibility. At the end of the session they gather all staff again and give a short debrief explaining some of the important issues they have identified at that facility. Written feedback should also be given to the facilities, this is not yet the case but the District Health Officer reported that it is his intention to make this happen in the future. After supervision the District Health Management Team gather at the central hospital to discuss issues they have identified at the different facilities.

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In addition to the supervision by the District Health Management Team the HMIS-officer conducts supervision specifically on HMIS related issues. This is done because the HMIS-officer feels that the general supervision done by the District Health Management Team is not sufficient and the facilities need extended supervision and guidance specific on the HMIS. The HMIS-officer reports that he conducts HMIS-supervision to all the facilities once every month.

We want to alter the supervision scheme. The district will be divided into four zones and we will appoint a team to each of these zones. With the new system we will be able to supervise all the facilities on all health related issues on monthly basis. The new system will be set in place by the 4th of October this year – (District Health Officer in Chiradzulu, September 2006).

That adjustment means that supervision will be conducted equally to how they conduct it in Chikwawa; however the HMIS-officer in Chiradzulu stated in an interview that he wants to continue the HMIS-specific supervision done by the HMIS-officer. He argues that the demand for HMIS-specific supervision will still be substantial and that the other supervisors have not received sufficient training to be able to provide such supervision.

As opposed to the HMIS officer, the District Health officer in Chiradzulu said that there is usually not much improvement between supervisory visits. He explained that maybe the people he talks to during supervision do not inform their friends at the facility about what needs to improve and sometimes they don’t bother so improve. He also said that orientation of all staff together might help.

"If they are informed and hear it from me then it will be more difficult for them not to improve, as they have no excuse. Otherwise they just say that they have not received training and don’t know how to do it." – (DHO Chiradzulu)

As mentioned earlier the HMIS-officer conducts HMIS-specific supervision to all the facilities in the district. He strives to supervise all facilities each month, but due to other important responsibilities and low funds, he is not always able to do this. On supervisory visit the HMIS-officer often takes notes on issues found on each facility. On the next visit he brings the notes to see whether there has been improvement between each visit. Earlier he was dependent on these notes, but now they are almost superfluous because he can remember what issues the different facilities strive with between each supervisory visit.

5.1.5 Evaluation of the Supervision scheme

The supervision scheme was an important issue on most of the interviews done during my fieldwork in Malawi. The scheme was praised as crucial to the HMIS functioning by staff at district management level and especially by staff at facility level. All of our interviewees wanted continuous pursue and most of them wanted intensification, meaning that they wanted supervisors to conduct supervision more frequent.
Hawthorne Effect

There are several factors that can explain the desire to receive supervision. For instance during supervisory visits staff is in the position to ask questions related to their work, they can report on issues related to equipment, etc. But there is one more factor that is much more important, and that is what is often referred to as the *Hawthorne effect*.

The Hawthorne effect has its name from a factory called Hawthorne Works, where several experiments on factory workers were carried out in the late 1920’s and early 1930’s. The experiment was to change the working environments in the factory and study the effect it had on the workers’ productivity. Their main goal was to find the optimum level of lightning for productivity. The result was quite astonishing. Whatever they did, whether it was to increase the light levels or to decrease it, the workers increased their productivity. After a while they came to the conclusion that the workers knew that they were under observation, and this certainty was the reason that they were working harder.

The supervision scheme in Malawi creates the same effect. Staff at the facilities knows that they are under observation. The supervisors come to visit them, they go through their registers and reports and inspect their working environments. From my interviews and observations I have also realized that the workers being supervised do not feel mistrusted or pressured by the fact that they are under observation, they rather feel motivated that management cares about what they are doing and that they want to help them improve.

Attention

About 90 percent of the population of Malawi live in rural areas (goafrica.com), thus most health facilities are also located in rural areas where they do not get much exterior attention. This creates a huge desire for attention from the outside among the health workers. They highly appreciate it when management come on visits to see how they are performing. I also experienced huge engagement among facility staff in rural areas when we came to do interviews. To be able to provide good quality health care services it is important to motivate staff in these rural areas.

In a study done by (Dieleman et al., 2003) with the target to identify factors for job motivation of rural health workers in North Viet Nam, they identified that one of the main motivating factors was appreciation by managers. They found that to achieve better staff motivation, attention should also be paid to incentives that focus on showing appreciation and respect.

The supervision scheme is based on district management level staff visiting workers at facility level even though it might be difficult to travel there. When observing supervision sessions in both Chikwawa and Chiradzulu I noticed an enormous engagement by the supervisees. Supervision was obviously appreciated and they got very excited. According to (Dieleman et al., 2003) this can be explained by the fact that management shows appreciation and respect through showing that they care about how they are performing and want to help them even though it means that they have to travel far distances. I also noticed that even though the
supervisors corrected several mistakes done by the supervisees, they were also focused on praising what was good. It was clear from the supervisee’s response that they were very motivated by the feedback they got and they expressed a strong will to correct their mistakes and improve their work.

**Feedback**

An important part of the supervision scheme is the feedback given to the supervisees. Feedback is the process by which information is passed back to the people providing the data. The process allows for two-way communication (Ministry of Health and Population, 2003).

(Gran, 2003) conducted a survey on nurses at a surgical post. All respondents said that feedback was important to their professional career and development. The nurses also expressed a desire to receive feedback more frequently.

The HMIS national plans and policy implies that the health facilities shall provide data to the district through quarterly reports and that feedback from the district is to be given during supervisory visits. When observing supervision I noticed that oral feedback is indeed given during supervision sessions. The supervisors commented on what was done right and wrong, what was improved since last supervision session and what was not. To be able to conduct such a comparison the supervisor needs to know the history of performance of the different health facilities. To a limited extent the supervisors kept written records explaining the performance of each health facility, but the most important source of information seemed to be in their minds.

During the supervision sessions I observed, no written feedback was ever given to the health facilities and after asking health facility staff I understood that oral feedback is more or less the only form of information they receive by the district management. In the beginning I was questioning why the supervisors were not providing staff with feedback in writing, but after a while I realized that facility staff seemed satisfied with the oral communication. (Bacal, 1998) recommends the combination of both oral and written feedback in communication between manager and staff, but he emphasises that there are several advantages with using oral communication. Here is an abstract of the most important ones:

- Oral communication provides more opportunities for getting and keeping interest and attention.
- Oral communication provides chances for all persons involved in the interaction to let off steam and create a climate for understanding.
- It is easier to understand feedback when the opportunity is in place to observe body language and ask questions.
- Oral communication provides better opportunities to gain attention.
- Oral communication provides more flexibility, opportunity for emphasis, chances to listen to and remove resistance, and is more likely to affect people’s attitudes.
- If details and issues are complicated and cannot be well expressed on paper, it is easier to explain them in words.
When observing supervision I got the chance to study how communication worked between supervisor and supervisee. The oral communication allowed supervisors to get attention, motivate and teach. Both supervisors and supervisees contributed to mutual understanding through explaining and asking questions.

During an interview with the In-charge at Bilal health centre in Chikwawa an interesting matter occurred. When filling registers, health staff has to use specific disease codes to imply what kind of disease the patient is suffering from. These codes are simply numbers, but there are a good deal of different diseases so the health facility staff are supposed to have a “disease code book” explaining all the codes. All health facilities in Malawi are supposed to have this book, so just to check, we asked if she had it. Her response was: “Yes, but I never use it”. We asked why, and she explained that she knew all these disease codes by heart. And then she demonstrated her skills by rattling of a number of diseases and their respective code.

When watching supervisors give oral feedback and studying how the supervisees perceived the information one question came to mind: Is oral feedback better fitted for Malawians than feedback in written due to their culture of handling information? As mentioned above, the supervisors kept information about the performance status of the different health facilities in their minds. Except for the quarterly reports, only on a few occasions did they have information written down on paper. This was true for staff on district level, like program coordinators, district health officers, but especially for staff at facility level, like facility in-charges and nurses, they all kept information needed to be able to conduct their jobs in their mind. All over there seemed to be little demand for written sources of information.

5.1.6 The Supervisors

The supervision scheme is a quite vulnerable system. Each cluster of health facilities rely on one supervisor only. As I have explained before, the supervisor conducts supervision on various fields; HMIS is only one of them. This means that the supervisor must have quite extended knowledge to be able to conduct satisfactory supervision. For health facility staff, supervision is the only reliable source of information, meaning that they do not have any other scheduled appointments with key personnel that can help them with difficult issues, and they can only hope for training and refreshment courses once in a while. Other sources of information, like books are very limited and computers are of course out of the question. In a perfect world health facility staff would know everything there is to know about their jobs, they would be motivated and not in need of supervision, but that is not the issue, and it probably never will.

I have asked the supervisors what actually motivates them to do the extra workload that their role holds. According to the Management Sciences for Health the title supervisor is perceived to give higher professional status. The Management Sciences for Health supports the supervisors with lunch allowance for their quarterly meetings, and they usually do this at
someplace nice. The District Health Office provides them with transport both on supervisory visits and quarterly meetings. When it is necessary the Management Sciences for Health also provides them with money for fuel. Some of the supervisors also say that they are motivated by the fact that they see improvement in performance on their facilities and they also like the fact that their role is established to help the overall improvement of the district. Still as we have seen, the supervision is not done quite the way it was initially meant to. Maybe the district management has to figure out other ways of motivating the supervisors. If they want to take serious actions they might consider making the supervisory role a full time job and that way secure that the supervisors conduct their job the way they where intended to.

As a supervisor you must demonstrate technical, communications and management skills. You must transfer skills and knowledge and facilitate problem solving by the team. Use an inclusive style of communication and let the supervision instrument guide you in documenting what you observe during the visit. Hold a meeting with the in-charge and his/her staff (Ministry of Health, 2005).

The MOH make high demands on the abilities of the supervisors. In addition to the demanded skills in the section above they are also required to hold technical knowledge making them able to advise the facility staff in all kinds of issues related to their performance in health service delivery. The supervisors we interviewed had quite strong backgrounds both in terms of education and working experience, although the subjects differed substantially. For instance the Nchalo supervisor had a diploma in Environmental health and experience from working as an Environmental health officer in the City assembly in both Lilongwe and Mzuzu. The Boma supervisor was a Malawian registered nurse and had a 1st degree as an operating nurse from South Africa, she had experience from working both as an in-charge and acting matron at the Central hospital in Blantyre.

The cluster supervisors have not received any additional training for being capable of conducting supervision. Some of them pointed out that they find it difficult to advise facilities in some areas. Their solution to that is to refer these issues to the responsible program manager or officer.

(Sloan, 1999) conducted a study to identify nurses’ perceptions of the characteristics of a good clinical supervisor. The ability of creating a safe environment, form supportive relationships, having relevant knowledge/skills, expressing a commitment to providing supervision and having good listening skills were perceived by the staff nurses as the most important characteristics of their supervisor. Supervisees viewed their supervisor as a role model; someone who they felt inspired them and whom they looked up to.

(Voluntary Action Leicester, 2000) characterizes supervision as to provide an opportunity for workers/supervisors to discuss their work. It should involve evaluating working performance, identification of strong and weak points, encouragement of workers and identification of training and support needs. To strive for both parties being honest and open the supervision sessions should be held in a “safe” and comfortable environment, in a quiet and undisturbed place and the atmosphere should be relaxed.
During my observations of supervision sessions in Malawi I saw many similarities with what (Sloan, 1999) found and with the characteristics described by (Voluntary Action Leicester, 2000). Evaluation of working performance was discussed behind closed doors. The supervisors pointed out weak points, but were also very focused on praising good working performance and encourage workers to improve. The supervisees seemed to see the supervisor more as a friend than a boss but still they paid great attention to what was pointed out and seemed to have great respect for the supervisor.

(Voluntary Action Leicester, 2000) also recommend that recommendations are written down and used as a starting point for next session.

The HMIS officer in Chiradzulu pointed out that he would write down notes during supervision sessions to be able to measure whether there was improvement between each session. The supervisors I observed in Chikwawa did not write down any notes, but they seemed to remember what issues the various facilities struggled with, because I remember them pointing out to supervisees issues that had been improved and what had not been improved since last session.

5.2 Recognition Scheme

Recognition and incentives appear to be effective ways of motivating staff at health facilities to improve their HMIS reporting routines. In 2003, about one year after the HMIS was implemented nationally, Management Sciences for Health performed an assessment of the implementation status of the HMIS in the eight districts they are supporting. Based on this assessment they decided to pilot several interventions in supported districts. According to minutes from the quarterly HMIS review meeting of the South-West zone at Shire Highland Hotel, August 4-5, 2006 the representative from the Management Sciences for Health expressed that they perceived the following benefits from the interventions:

- Improved timeliness and completeness of data
- Improved quality of data, leading to more confident users of data
- Increase demand for data
- The creation of an information culture

One of the interventions initiated was the Recognition Scheme. It was introduced as a pilot in the districts Balaka, Mulanje and Chikwawa.

The recognition Scheme is designed to award good performing facilities on their reporting performance and motivate facilities that are not performing well to improve how they are reporting. The facilities are assessed biannually based on their performance in HMIS quarterly reporting. A task force is responsible for assessing the reports and rating the facilities. Members of the task force are in-charges, deputies or HMIS-responsible from the health facilities in the district, the Assistant Statistician and the HMIS Assistant/Ward clerk at the district hospital. The Management Sciences for Health have provided the task force with
guidelines on how to perform the assessment and rate the facilities and the HMIS15 quarterly reports are assessed based on completeness, correctness, consistency and timeliness. The ten best performing facilities are rewarded with incentives. These incentives are given in form of equipment that can come handy for facility staff when working with tasks related to the HMIS. When I observed the awarding process in Chikwawa the incentives were calculators, flip over charts and felt pens. The next section describes the task force meeting I observed. It took place August 26th in Nchalo.

5.2.1 Task Force Meeting

Attending the task force meeting was the following facilities and their representatives’ position: Ngabu (Community nurse), Mfera (In charge), St. MontFort (Clinical officer), Maphera (Nurse), Ndakwera (Senior Health Surveillance Assistant), Chikwawa Hosp. (HMIS ass/Assistant statistician). The objective of the meeting was to analyse the HMIS 15 quarterly reports from January – March and April to June (3rd and 4th quarter of the prevailing fiscal year) for all the facilities in the Chikwawa district and to rate the facilities based on the quality of the data reported. The second objective of the meeting was the educational value the attendees gained from assessing the reports considering that they would learn more about both how to fill the registers and the importance of reporting accurate data.

The meeting was chaired by the Clinical Officer at Montfort hospital and the group used the draft guidelines (see Appendix E) from Management Sciences for Health to guide the assessment.

The participants were divided into 2 groups, 3 attendants in each group; the HMIS Assistant was not taking part in any group and mostly acted as an observer. They divided the reports between the groups, so that one group assessed the reports from 3rd quarter and the other assessed reports from 4th quarter.

The reports were assessed checking for timeliness, sufficient signatures, number of gaps, number of zero/dashes and consistency. The values were recorded in a form for each facility, but no notes were recorded on details of gaps or mistakes.

- Timeliness was approved if the date received was marked on the report with a date prior to the 15th of the month after the end of the quarter. It is the responsibility of the Assistant Statistician to mark the date when he receives the reports. They assumed that marking was done correctly.

- The HMIS15 quarterly report contains three fields for signatures. Prepared by, verified by and approved by. For it to be approved prepared by and verified by or approved by must be signed. The same person could not have signed more than one place.
- If any of the fields in the HMIS15 quarterly report were not filled they were counted as number of gaps.

- If a health facility does not provide a service asked for in the HMIS15 quarterly report they are supposed to fill N/A (Not applicable). If they provide the service but have not seen any patients that quarter or month they are supposed to fill zero or dash. Any mistakes done were counted as number of zero/dash.

- It was quite hard for us to understand how the consistency was assessed, but they used various techniques to verify whether there was consistency between the numbers in the reports. Below are samples of validation rules copied from the assessment tool by the Management Sciences for Health.
  
  o Malaria in-patient death under 5 must not exceed Malaria New cases under 5
  o Number of babies born less than 2500g MUST be less than total number of live births
  o Number of Ceasarian sections should be less than Total number of deliveries
  o Number of fully immunized under 1 children can be equal to or less than total number of under 1 children given measles dose (absolute)
  o Diarrhoea cases in under 5 is correlated with the total number of children attending under 5 clinic (Expert)
  o Caesarian sections is correlated with deliveries by skilled health personnel (Expert)

- To simplify the process the clinical officer from Montfort hospital (also chair of the meeting) made a system for rating the quality of the reports based on consistency. They assigned numbers 1 – 3 to indicate number of mistakes. It there were no mistakes they wrote a 1, it there were between one and five mistakes they wrote 2 and it there were more than five mistakes they wrote 3.
When rating the reports they started out by arranging them in two separate lists according to how they performed on the two quarters. They did not have a clear system on how to rate the reports, and to some extent rules were made while they were evaluating. They ended up with rating on the following criteria’s starting with the most important:

- Consistency
- Timeliness
- Signatures
- Gaps & Zero/Dash

First they looked at consistency and used the numbers from 1 to 3 to rated all the reports. A problem arise when they realized that almost all the reports contained more than five inconsistency errors and therefore had a score of 3. This lead to that almost all the reports were rated equally based on inconsistency. One solution would have been to alter the system increasing the number of mistakes assigned to the different numbers. Although they realized that there was a weakness in the system, altering it and recounting would have consumed a lot of time and was therefore never an issue.

They also used their own judgement when rating reports based on the criteria’s. For example if signatures were there, but there was an incredible amount of gaps, they would rate the facility worse than one without signatures but no gaps.

After the two lists were done they aggregated them into one by using their judgement on just about where the facilities deserved to be according to the two lists. The evaluation was not
very accurate, and it seemed like they were getting tired of the meeting, and just wanted to finish.

Illustration 3. The final rating of the facilities done by the Recognition Scheme task force.

5.2.2 Evaluation of the Recognition Scheme

The recognition scheme is a support structure with the intention to strengthen facility staffs’ understanding of HMIS15 quarterly reporting and providing motivation by giving incentives based on performance.

The recognition scheme involves three separate activities; quarterly reporting, evaluation by a task force and recognition of the best performing facilities. Further in this chapter I will evaluate how these activities can contribute to strengthening reporting performance.

Educational value (Task force meeting)

According to Jane Mwafulirwa (Management Sciences for Health) the task force meeting works as an eye opener and shows staff that the data collection makes sense. She also says that after attending the task force meeting the participators seem to be very motivated by the fact that they have developed a better understanding of the reported data.

An important principle of the recognition scheme is that participation in the task force meeting is rotated among the facilities. The Assistant Statistician in Chikwawa also said that facilities that do not report well are prioritized when inviting staff to attend the task force
meetings. That way they enable more people to attend the evaluation which contributes to all the clinics profiting from the system in the long run.

Mwafulirwa also said that the primary objective of the task force meeting is the educational value facility staff develop through assessing the reports. When observing the task force meeting in Chikwawa I found it very gratifying to see how staff from the different facilities worked together. They had an extraordinary involvement throughout the process and discussions on difficult issues were ongoing often ending in somebody understanding something new. They also seemed delighted to be able to both share and receive knowledge among each other. As I see it gathering various people with various knowledge within the same field and making them work together on the same task means gathering a very high amount of knowledge and the task force meeting helps the attendees in sharing this knowledge with each other.

Another important issue is that when attendees at the task force meeting assess reports from all facilities in their districts they are not only able to learn from their own mistakes, but they also see what kind of mistakes others do and common mistakes done when reporting. That can give them an extended knowledge on critical and difficult issues with reporting and they get a broader understanding and insight on common pitfalls. As I mentioned earlier district management is also represented in the task force meeting, though only as observers. This gives them a unique opportunity to see for themselves what challenges they face which enables them to better plan future training activities.

**Collaborative Learning environment**

As the main objective of the task force meeting is for the attendees to gain knowledge, it is natural to further investigate whether the meeting facilitates the right environment for learning.

The term "collaborative learning" refers to an instruction method in which students at various performance levels work together in small groups toward a common goal. The choice of group size involves difficult trade-offs. Smaller groups (of three) contain less diversity; and may lack divergent thinking styles and varied expertise that help to animate collective decision making. Conversely, in larger groups it is difficult to ensure that all members participate. A group size of approximately four is recommended. The students are responsible for one another's learning as well as their own. Thus, the success of one student helps other students to be successful (Gokhale, 1995).

(Gokhale, 1995) found that the students in his experiment emphasized on that the pooled knowledge was one of the most important benefits of practising collaborative learning.

(Jonassen) says that when learning collaborative people naturally work in learning and knowledge building communities, exploiting each others skills while providing social support and modelling and observing the contributions of each member. Humans naturally seek out
others to help them to solve problems and perform tasks. Why then do we in schools insist that learners "do their own work" and if they do not, we accuse them of cheating. Individualized, reproductive methods of instruction cheat learners out of more natural and productive modes of thinking.

At the task force meeting we observed in Chikwawa they were working in groups of three, with the common task of performing a comprehensive assessment of quarterly reports. The attendants came from different health facilities, had various background and different levels of knowledge; some were experienced with the reports and others where not.

According to (Gokhale, 1995) proponents of collaborative learning claim that the active exchange of ideas within small groups not only increases interest among the participants but also promotes critical thinking.

This enhances my idea that cooperation and discussions within the two groups strengthened their understanding of the reported data. When facility staff understand the reported data they are also more likely to comprehend the intention and meaning behind reporting data. The fact that they can attach meaning to the practice of reporting is very important. When conducting interviews with staff at health facilities in both Chikwawa and Chiradzulu we always asked the following questions:

- Is HMIS 15 quarterly reporting important?
- Are the numbers you report accurate?
- Can you trust the data you report?

From the response we received to these questions it was clear that they thought that reporting was important because management at district level told them so, but they had no idea why. Whether or not they expressed confidence in the data they reported varied, but the most common response was that they thought their data was not very accurate.

(De Klerk, 2005) says that a man’s search for meaning is the primary motivational force in his life and this is also true when it comes to a person’s work life. He emphasises the important role that meaning plays in work and in the workplace and that people with meaning approach their work with intrinsic motivation.

I saw from my own observations that the attendees at the task force meetings got a significant rise in their understanding of the HMIS15 quarterly report. Now they were also able to see how the data could be used and why reporting was important. In other words they were able to apply meaning to their jobs. Taken into account De Klerk’s finding that people with meaning approach their work with intrinsic motivation the task force meeting can play a significant role also in providing motivation to the attendees.

**Self-efficacy**

(Bandura, 1994) defines self-efficacy as people’s beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self-efficacy determines how people fell, think, motivate themselves and behave.
My interviews and observations in Malawi revealed that facility staff generally had quite low beliefs in their capabilities to conduct working tasks related to the HMIS. Although there were exceptions they generally had doubts that their reports were without mistakes and they were usually complaining about insufficient training and heavy workloads. In other words, they had a low level of self-efficacy in their work.

According to (Bandura, 1994) self-efficacy can be created by mastery experiences, seeing people similar to oneself succeed, verbal persuasion that they possess the capabilities to master given activities and reduce or at least modify how people perceive their stress reactions. Ha says that successful efficacy builders, in addition to raising people’s beliefs in their capabilities, structure situations for them in ways that bring success and avoid placing people in situations prematurely where they are likely to fail often. Teachers should be dedicated to the building of high self-efficacy levels in their students by recognizing their accomplishments.

The main point with the Recognition Scheme is to recognize accomplishments. If we see district management in Chikwawa as teachers and the facility staff as their students, then the fact that district management recognizes good performance should provide facility staff with a higher level of self-efficacy. From observing the task force meeting in Nchalo, I could see that it actually worked as a structured situation of which participators could obtain higher levels of self-efficacy. They developed mastery experiences through discussion which lead to understanding of the reports. The reports that were rated on top based on the assessment were developed by facility staff with similar backgrounds in terms of education and training, to the ones that were attending the task force meeting. This provides them with a higher level of self-efficacy through seeing people similar to them succeed.

(Bandura, 1994) also says that those who have high self-efficacy visualize success scenarios that provide positive guides and supports for performance. A higher sense of self-efficacy would result in facility staff in Malawi having stronger faith in the fact that the work they are conducting is satisfactory. This would also enhance the probability of a positive outcome.

Motivation is regulated by the expectation that a given course of behavior will produce certain outcomes. Therefore, if a person has a high level of self-efficacy, he will believe in a successful outcome of his actions, which again will provide him with motivation. A higher level of self-efficacy would make facility staff believe in a positive outcome which in turn also would provide them with increased motivation to conduct their tasks.

People who believe they can exercise control over threats do not provoke disturbing thought patterns. The stronger the sense of self-efficacy, the bolder people are in taking on challenging activities. The fact that facility staff in Malawi have doubts about their ability to compile HMIS quarterly reports in a satisfactory manner makes them avoid the challenging tasks. However, given a higher level of self-efficacy they would get bolder in taking on these challenging activities.
Satisfaction factors

Through attending the recognition scheme task force meeting the participators also go through several processes presumably leading to job satisfaction.

(Herzberg 1959) found that the factors causing job satisfaction were different from the ones causing job dissatisfaction. The top six factors causing job satisfactions were achievement, recognition, work itself, responsibility, advancement and growth.

Several of these factors causing job satisfaction are direct consequences of activities set in motion by the recognition scheme. The attendants at the task force meeting experience responsibility through being set responsible for conducting an assessment affecting the whole district, advancement and growth in the sense of getting a higher understanding behind the intention behind data collection and reporting. The top ten performing health facilities in the district experience achievement by being ranked high in the task force assessment list, and the top three performing health facilities also experience recognition by receiving incentives as a reward for their achievement.

Recognition (incentives)

After conducting interviews with several health staff and observing meetings and training sessions it is quite clear to me that in Malawi health workers’ motivation is to a strong degree driven by incentives. In my experience with the Malawian context they generally use two kinds of incentives:

1. An appreciation given as a natural consequence of a job related action. This is usually in a context were a health worker is invited to join a job related meeting or a training session. The incentives they receive are allowance for fuel, free lunch, soft drinks and cookies.

2. A reward for an accomplishment. They also have systems for rewarding staff based on special accomplishments. The recognition scheme is such a system, were the whole health facility is rewarded for its performance in HMIS15 quarterly reporting. The rewards are called incentives and they are usually various office supplies that can be helpful in conducting tasks related to the HMIS like for instance calculators and flip-over charts.

Compared to Norwegian conditions and economy it might seem strange that small and cheap incentives like soft drinks, free lunch and flip-over charts works as motivation to the health workers. But the fact is that even though they have steady jobs, they are still poor. They can not usually afford to buy soft drinks, their health facility does not have the funds to buy office supplies and a free lunch means that they can spare some money that day. I never stopped to
be amazed on how eager they got when cookies were handed out during meetings. At the annual HMIS review meeting in Chikwawa the HMIS officer explained that they had to hand out the exact amount of cookies to each attendant on the meeting to assure that nobody took boxes of cookies and hid them in their bags. The reward given based on the recognition scheme assessment also seems very motivating because the whole health facility is rewarded not only one person. When we asked staff at health facilities what they thought about the recognition scheme they all praised it and said that they really wanted to win it. A Senior Health Surveillance Assistant even said that: "It creates a spirit of data collection".

5.2.3 Challenges

The recognition scheme is a support structure with the intention to strengthen facility staffs’ understanding of HMIS15 quarterly reporting and providing motivation by rewarding good performance. I have seen on my observations and from interviewing facility staff that these goals are reached. Still they face some challenges.

Even though participants are very motivated after attending the task force meeting, it is difficult to maintain that degree of motivation after they return back to their everyday jobs. Now they are back to an environment were they cannot expect the same kind of engagement with the task of reporting, and their fellow employees probably don’t have the same degree of understanding on the task of reporting. From several interviews we have understood that sharing of information is difficult in Malawi. For somebody to bother to learn something new, they expect to receive incentives first. It seem like the general understanding among staff is that if someone at a health facility has been to a meeting, a training session or the task force meeting, he or she has also received some kind of incentive/reward for attending, and should therefore be able to solve the tasks he or she learned alone.

There may also be a conflict of interest if the responsible person for HMIS15 quarterly reporting at a health facility for some reason is not able to attend the task force meeting. This is quite usual and we saw in on the task force meeting we attended as well. Then the facility in-charge sends somebody else to attend the meeting. It is of course good that more people from each facility are able to attend and learn from the meeting, but it might be hard to transfer the knowledge over to the HMIS responsible afterwards.

As I have mentioned before the attendees at the task force meeting seemed to learn a lot from the assessment. However, the second objective of the meeting was to conduct a thorough assessment of the reports and based on this assessment make a list rating the facilities’ performance. The reports were indeed assessed quite thoroughly, but the task of rating them was difficult because it was hard to compare them based on mistakes done on different areas. Facilities were also rated based on reports from two different quarters which made it even harder to conduct a just rating. If they had conducted the assessment one more time, the rating might very well have been different, which means that it was somehow a bit of a coincident what facilities were actually rated on top of the list. Again, I emphasize that this was only the
second objective of the meeting, and maybe it is not that important if the list is not entirely correct. But in the long run this might turn into a problem. If the general impression of the health workers in the district comes to that the rating of the facilities in the recognition scheme is partly confidential, they might not experience the same kind of raise in motivation. A solution to this problem could be to further develop the criteria’s of how to conduct the assessment and make them both easier to understand and more focused on getting a proper rating.

5.3 Pair Reporting

Malawi has a total of 606 health facilities. 517 (85 percent) of these are health centers and dispensaries. Each facility is expected to submit its report to the district health office on a quarterly basis (Ministry of Health, 2006). This means that reporting from the smaller health facilities accounts for a substantial share of the population data. Therefore it is extremely important that this reporting is done in a proper and accurate manner. Since most of these health facilities are located in rural areas, and district management are sited at district hospitals or central hospitals it is difficult to provide the same support to health staff at these facilities. In Malawi funds are not at hand to be able to implement expensive activities for supporting staff at rural health centers. Therefore it is crucial to use cost efficient methods and focus on making the most out of them.

While conducting fieldwork in Malawi, we spent a lot of time observing and asking questions about how staff at different levels of the health organisation reported the health data which is available. We also tried to identify what mechanisms were set in place by management to improve the way staff were working with health data and the reporting. This made us reflect on other solutions and working practises which they could use and which could contribute to better quality reporting.

In Malawi they use a form named HMIS15 quarterly report (see Appendix B) for reporting to their district health office. At each health facility they have one person responsible for compiling and submitting this report, this person is referred to as an HMIS focal person. The HMIS focal person aggregates data from the different registers used at the facility. They have a big challenge with training HMIS focal persons in Malawi. When HMIS was introduced, focal persons went through training, but staff does not usually stay in one position for very long, and they do not have the capacity to train new people. They are usually just briefed on their new duties since it is difficult to obtain funding for gas and allowances to be able to conduct training sessions.

After conducting interviews with a lot of staff and asking them why staff at the facilities cannot train or to a further extent help each other with difficult tasks I have come to the understanding that they have a challenge related to their culture. The problem seems to be that staff doesn’t want to do specific work duties without having received training first. The In-charge at Bilal Health Centre explained it like this: “Staff refuses to conduct duties when
they haven’t received training that involves lunch allowance, cookies and soft drinks”. To me this is quite shocking since staff seem to be aware of that it is almost impossible to get funding for having training sessions.

In both Chikwawa and Chiradzulu the HMIS officers lend us all the HMIS15 quarterly reports from the preceding quarter. We spend quite some time examining these reports to see whether we could find errors in reporting. We did not have a professional health background and were therefore not familiar with all the terms used in the reports, but after consulting health staff at several health facilities, we got quite a good understanding of the reports. Our conclusion was that quite a lot of errors were done and most of them could have been avoided by a more thorough review of the compiled data.

5.3.1 Action research experiment

While observing facility staff doing a good deal of mistakes while compiling HMIS15 quarterly reports, I started thinking about possible solutions in order to reduce the amount of mistakes done. I then got the idea that using principles of pair programming while compiling HMIS15 quarterly reports might help to improve reporting quality.

In cooperation with Gro Alice Hamre I conducted an action research experiment at Bilal health centre, which is in Chiradzulu district. The idea was for them to use principles of pair programming while compiling the HMIS15 quarterly report; we called this discipline Pair Reporting. Our intention was to see if this could improve the reporting quality of the health centre.

Pair reporting is based on the principle of two people working together on the same task having two different roles. One compiles the report, while the other observes. The one writing the report is called the driver, while the one observing is called the navigator.

The drivers’ responsibilities also include explaining everything he or she is doing to the navigator. The navigators’ responsibility is to constantly review everything the driver is doing, as well as giving feedback and asking questions. To ensure that the report is filled correctly and that both driver and navigator equally understand the data, it is extremely important that the navigator always asks questions if he or she doesn’t understand what the driver is doing.

In pair programming it is recommended that the roles are changed so that the driver becomes the navigator, and the navigator becomes the driver. That way we secure that both driver and navigator are always equally involved in the process, and that both understand what is being done. In filling the HMIS15 report we suggested that the roles were changed every time they started compiling data from a new register.

Participants were two health surveillance assistants; one of them (Edwin) was also the HMIS focal person of the health centre and experienced with the HMIS15 quarterly report, the other one (Emile) was not familiar with the report. The In-Charge at the health centre, one senior health surveillance assistant, Hamre and I were observing the session.
Based on pair programming principles by (McDowell et al., 2006) and (Herzog, 2005) we had made a short document (see Illustration 4) explaining the most important principles, the major benefits of pair programming and how we thought they could apply these principles in compiling reports. We started out the experiment by handing out a specimen of the document for all participants to keep and gave them some minutes to read it. Afterwards we presented them with a short video clip demonstrating how to perform pair programming in practice enabling them to understand and remember the method.

Illustration 4: Hand-out explaining Pair Reporting
Afterwards we had a short session for questions to the method and how they should work with it, but they seemed more eager to get started than to clarify the method. The only comment we got was that they thought pair reporting sounded smart, and that they wanted to implement it and use it in the future.

In the beginning of the experiment the attendees seemed a bit nervous, that was very understandable as they were both new to this method of working, and only the HMIS focal person was familiar with the HMIS15 quarterly report. I acted as a guide through the whole process helping the by asking questions, making them change roles and assuring that both kept track of what was going on all the time. To release some pressure on Emile since she was not familiar with the report, we decided that the Edwin should start out as the “driver” and the rest of us would act as “navigators”. This worked very well and after a while Emile questioned decisions made by Edwin assuring that she understood everything he did. They also discussed difficult issues and what to fill in complicated fields. After a while we encouraged them to change roles, and they did. To begin with Edwin seemed more comfortable in both the “driver” and the “navigator” role and he did most of the work while Emile struggled to keep track. But after a short while, as Emile comprehended the report, they started working together and decisions were based on mutual agreements.

Both attendees were very eager through the whole session even when they were acting as navigators. It was very interesting to see how they solved the different tasks both in compiling the report and the method of working in a pair. A challenge when working as a pair can be that the one acting as the navigator struggles to keep attention and looses track of what is going on. This was not a problem for Edwin because he was so experienced with the report that it was easy for him to keep track. Emile struggled more, but she solved this by repeating what Edwin said and in that way expressing that she understood and agreed on decisions being made. We never encouraged them to use the repeating technique; therefore it was very encouraging to see that they improvised their way to solve issues due to the method of working as a pair.

Edwin said that he usually consumed a bit under an hour in finishing the report. We spent about 45 minutes when compiling the report using pair reporting, but for the sake of not making the experiment last too long we agreed to only complete one month. Usually they would complete all the three months simultaneously, which is more efficient because all months contain the same data elements. Still they obviously used a bit more time working as a pair.
5.3.2 Discussion

In this section I will discuss my observations from the Pair Reporting experiment using various sources of literature to support my findings.

Similarities

(Nosek, 1998) emphasises that his experiment alone is not enough to prove whether collaborative programming is beneficial or not. He rather claims that the fact that previous research has given the same results in turn proves his points. He also attaches importance to the fact that in his experiment experienced programmers were working on an important challenging problem in a natural setting.

Our experiment with pair reporting at the health centre in Malawi is also far from enough to prove the benefits of using the pair programming principles in HMIS15 reporting. Still I have strong beliefs in the benefits of using the method. This is based on the results from previous research on pair programming and my observations on our experiment in Malawi. In our experiment we also tried to create the natural setting and the important challenging problem that Nosek is describing. The attendees were working on the actual report which they were
supposed to hand in for the quarter that just ended, they used their own registers to get the raw data, and they did the task in their own working environment and with their own working equipment.

There are several similarities between the activities of computer programming and compiling HMIS15 quarterly reports. Both programming and report writing is usually taught and practiced as an individual activity. In both programming and report writing you use a formal language. Usually a good deal of defects are produced even if the one doing the programming or report writing is experienced. These defects are often easily identified with the use of software inspections.

**Inspections**

According to (Carbon et al., 2005), software inspections are an industrial-strength quality assurance technique used to detect defects in software engineering. The main benefit from software inspections is in reducing defects in code. A set of inspectors read a code document to ensure that a certain quality criteria are fulfilled. The point is to get many eyes on the code; that is, people with relevant technical knowledge verify its quality.

When the HMIS15 quarterly reports are done they are supposed to be signed by three different representatives from the health facility. First it is signed by the person who prepared the report, second it is signed by a person verifying the report and finally it is signed by someone approving the report. The HMIS officer in Chiradzulu said that verifying and approving a report means checking in the registers to ensure that the numbers reported in the report are correct. This is very similar to software inspections and the objective is the same; to reveal and correct mistakes in an early stage of the process.

Code reviews are often not done, some software engineers avoid inspections because they find them boring (Williams, 2004).

Facility staff in Malawi very often admitted to do the same. After the report was prepared, the one responsible for the report asked his colleagues to verify and approve the report by double-checking in the registers. Usually his colleagues would just sign the report without having even looked at it. However, there were some exceptions where the one verifying the report did some cross-checking with the registers to see if the numbers reported were true.

**Affordability**

An important issue is whether or not management at health facilities in Malawi find it profitable to engage two people in compiling HMIS15 quarterly reports rather than continuing with the existing system of only using one person.

*The affordability of pair programming is a key issue. If it is much more expensive, managers simply will not permit it. Skeptics assume that incorporating pair programming will double code development expenses and critical manpower needs* (Cockburn and Williams, 2000).
The issue of affordability is of very high relevance in Malawi since they have very limited resources available. Therefore cheap solutions should be prioritised. (Cockburn and Williams, 2000) say that there is no doubt that pair programming can be justified on purely economic grounds. They base this statement on the cut down in expenses related to time to market, less mistakes produced and learning through the process of working as a pair. I discuss each of these variables later in this chapter.

**Reduce defects**

According to (Cockburn and Williams, 2000) one of the most important reasons for using pair programming is the fact that it contributes to a significant decrease in defects being done while programming. This decrease is mostly related to the constant review that takes place while the code is being produced. To achieve a good cooperation between the driver and the navigator it is extremely important that they both pay full attention to what is going on all the time. It is easy to loose concentration when you have the navigator role for a long time period; therefore pairs should be encouraged to change roles quite frequently. While we were doing our pair reporting experiment in Malawi, we saw that a lot of potential defects were identified as they were writing the report. Usually this occurred because the navigator was questioning what the driver was doing, and the result was a short discussion that ended up in correcting the defect seconds after it was typed. This proves the potential of using pair reporting in the sense of reducing the number of mistakes being done. This also replaces the need for a further verification process of the report. As mentioned above facility staff in Malawi often skip the task of conducting a thorough verification of the report. When looking at lots of HMIS15 reports I have seen that they have a huge problem with making typing errors and other mistakes. When confronted with these mistakes the health workers usually understand what they have done wrong, and they are able to correct the mistakes immediately. When practising pair reporting the process of verification occurs simultaneously with the task of compiling the report, and therefore eliminates the necessity for further inspection of the reports and removes the problem of facility staff not bothering to conduct verification thoroughly.

**Time to market**

The time from the start of the development of a software program until it is launched, is often referred to as “Time to market”. According to (Nosek, 1998) you can expect faster delivery of software when taking use of collaborative programming. This is very relevant when talking about HMIS15 quarterly reports in Malawi. At the end of each quarter all the health centres have 14 days (10 workdays) to complete and deliver their reports to the district management. This has become a problem for two reasons. The health workers responsible for finishing the reports are often very busy on other important duties making it hard for them to find the time. Lots of the health centres are stationed far from the district hospital (where the management usually is stationed) and they might not have access to a motorized vehicle making it hard for them to actually deliver the report on time. The cheapest way to improve this situation is to make the task of completing the reports go faster which I think can be achieved by practising pair reporting.
Staff loss risk

(Cockburn and Williams, 2000) mention decrease of staff-loss risk as a result of using pair programming. This is due to the fact that multiple people are familiar with each part of the system. Before we did our experiment at the health centre in Malawi only one person at the health centre was familiar with their quarterly report. If he for some reason was away when the report was due it would simply be delayed. After interviewing staff at several health centres in Malawi I know that this is usually the case.

Constantly having two people on each part of a project is referred to as the “truck number” in some circles: “The number of people would have to be hit by a truck before a project is incapacitated” (Cockburn and Williams, 2000). When having only one person working with the HMIS15 quarterly report, their “truck number” is one. With practising pair reporting the “truck number” would increase to two, which means that if one is away, they are still able to conduct the work. Even more important, if one quits the job, the other one is still capable of training another one just by continuous use of pair reporting.

Collaborative training and learning

In the end of the article (Nosek, 1998) raises an important and interesting question. Can average or less experienced workers collaborate to perform tasks that may be too challenging for each one alone? In Malawi the district managements have a huge problem with providing a satisfactory amount of training to the health workers. This is related to the fact that the workers move around a lot. Therefore it is difficult to keep everybody updated all the time. The result is low-skilled and unconfident workers that are demoralized because they haven’t received the training they are entitled to. By practicing pair reporting I think they would achieve a working environment less dependent on training where the health workers could be able to solve difficult tasks by putting their heads together.

One of the variables measured in the experiment done by (Nosek, 1998) is the degree of confidence the attendees had in what they produced. The results showed that the collaborating programmers had a substantial higher confidence in their solution. Several of the health personnel we spoke to in Malawi complained that they didn’t know if the reports they compiled contained errors or not, in other words they had a lack of confidence in what they produced.

I haven’t received proper training in filling HMIS15 quarterly reports, only orientation by the HMIS officer. Sometimes I forget things, and I could really need some more training. It would be nice if my friends (colleagues) knew how to fill the reports so that they could help me and do the job when I am away – Health Surveillance Assistant and HMIS responsible, Bilal Health Centre.

I think the fact that pair reporting includes the thinking of two different individuals would result in a much higher confidence in the report’s quality. The fact that the health workers are confident in what they produce will also make them much more motivated to do the reporting
properly. This can also affect staff at both the facilities and in the district in the sense that when data quality reaches a certain level people start to trust it and are also motivated to use it.

*Knowledge is commonly socially constructed, through collaborative efforts toward shared objectives or by dialogues and challenges brought about by differences in persons' perspectives (Salomon, 1993).*

When two people with different backgrounds come together to work on the same problem, the knowledge available is huge considerable, the challenge is to make use of it and learn from each other.

(Cockburn and Williams, 2000) says that knowledge is constantly being passed between partners, from tool usage tips, to programming language rules, design and programming idioms and overall design skill.

This brings us back to what I said above about the need for training. With practicing pair reporting health staff could exploit the effect of learning from each other. That way they would further decrease the need for formal training and take use of the knowledge they have together.

**Enjoyment**

In the experiment with pair programming conducted by (Nosek, 1998), he found that enjoyment of the process was significantly higher for the ones working in pairs. The experiment by (Cockburn and Williams, 2000) gave statistically significant results that pair programming teams who had earlier programmed alone reported to have enjoyed working in pairs more than alone.

During the pair reporting experiment with Edwin and Emile from Bilal Health Centre I could see that they both had a high level of enjoyment in the tasks while working together. Emile seemed to draw much excitement from the fact that she was learning something new, and she was learning it fast. Edwin seemed happy to be able to share his knowledge, and I think he was especially exited by the fact that this resulting in one more person being capable of filling the report and that way sharing his burden.

**Self-efficacy**

Successful efficacy builders do more than convey positive appraisals. In addition to raising people's beliefs in their capabilities, they structure situations for them in ways that bring success and avoid placing people in situations prematurely where they are likely to fail often.

One way of increasing self-beliefs of efficacy is to reduce people's stress reactions and alter their negative emotional proclivities and misinterpretations of their physical states. It is not the sheer intensity of emotional and physical reactions that is important but rather how they are perceived and interpreted. People with a high sense of efficacy are likely to view their
state of affective arousal as an energizing facilitator of performance, whereas those who are beset by self-doubts regard their arousal as a debilitation (Bandura, 1994).

Pair Reporting is a structured situation that can work as a self-efficacy builder. The first minutes of the pair reporting experiment, Emile was acting very defensive and was afraid of writing anything in the report. It was obvious that she experienced stress reactions related to her low self-efficacy of dealing with HMIS15 reports. This was due to the fact that she had never worked with the report before. But after a short while she got bolder and seemed more and more secure and comfortable with the situation. What she experienced was a mastery experience, because with Edwin helping her, she was almost certain to succeed and thereby increase her level of self-efficacy.
6 Conclusion

This chapter concludes my research by presenting my conclusions concerning the main problem area, research contributions, limitations to my research, recommendations and further research areas. I start with presenting some concluding remarks of my research.

My research falls under the domain of health information systems implementation and use in the context of developing countries. The aim of my study has been to look for good working practices related to data collection, data analysis, use and transmission of information at district and facility level in the Health Management Information System (HMIS) in Malawi.

The study was guided by the following main objective:

To study management implemented support structures in Chikwawa and Chiradzulu and evaluate their potential for improving health information at district level in Malawi.

According to the research results discussed in this thesis I found that at present time the quality of the routine data collected and reported from facility level in Malawi is of fluctuating quality. Still, quite radical improvements in data collection and reporting performance can follow from continued and intensified use of support structure strategies that are already to some extent taking place. This can be accomplished by further support from management at higher levels putting extended priority to these strategies.

6.1 Research findings

To reach my objective of identifying good working practices I have studied two management implemented support structures; HMIS supervision and The Recognition Scheme. In addition I have done an action research experiment, using principles of pair programming when compiling HMIS15 quarterly reports, in my thesis referred to as Pair Reporting.

6.1.1 Supervision

My research has shown that supervision is highly appreciated among staff at health facilities in Chikwawa and Chiradzulu. It is not perceived as surveillance on performance, but rather as a support channel enabling facility staff to receive help on difficult issues.

My findings support results from experiments at the Hawthorne works which stated that staff knowing they are under observation and receiving management attention, increases their productivity. While the Hawthorne effect was considered as a negative factor on research quality, here it should be utilized for its positive effect on staff. (Dieleman et al., 2003) identified that one of the main motivating factors was appreciation by managers. Supervision has the same effect on workers at health facilities in Malawi; they enjoy attention from management and supervisory visits increases staff motivation and creates a desire to improve performance.
(Voluntary Action Leicester, 2000) characterizes supervision as to provide an opportunity for workers/supervisors to discuss their work. It should involve evaluating working performance, identification of strong and weak points, encouragement of workers and identification of training and support needs. (Sloan, 1999) found that nurses’ perceptions of the characteristics of a good clinical supervisor was the ability of creating a safe environment, form supportive relationships, having relevant knowledge/skills, expressing a commitment to providing supervision and having good listening skills.

Being a supervisor requires quite extended knowledge on the Health Information System; still I have found that the most important qualities of a supervisor is their ability to build personal relations, encourage staff, provide supportive feedback and having the required skills. This is in line with what was found by (Sloan, 1999) and the characteristics by (Voluntary Action Leicester, 2000).

6.1.2 The Recognition Scheme

Recognition and incentives are effective ways of motivating staff at health facilities in Malawi to improve their HMIS reporting routines. My study has proved the Recognition Scheme to be a strong support structure motivating facility staff to perform better as well as strengthening their knowledge on HMIS15 quarterly reporting.

The task force meeting has a strong educational value and it is a structured situation of which staff can build self-efficacy. According to (Bandura, 1994) successful efficacy builders, in addition to raising people’s beliefs in their capabilities, structure situations for them in ways that bring success and avoid placing people in situations prematurely where they are likely to fail often. A strong sense of self-efficacy enhances human accomplishment and personal well-being. People with high assurance in their capabilities approach difficult tasks with assurance that they can exercise control over them. Such an efficacious outlook produces personal accomplishments, reduces stress and lowers vulnerability to depression.

When I was observing a task force meeting, I could see that it actually worked as a structured situation of which participators could obtain higher levels of self-efficacy, like Bandura described. They developed mastery experiences through discussion which in turn, lead to an increased understanding of the reports.

The task force meeting enables collaborative learning. Staff with different backgrounds and knowledge cooperate in groups which results in wide sharing of knowledge. (Gokhale, 1995) says that collaborative learning promotes critical thinking and the students in his experiment emphasized in the advantage of pooled knowledge. According to (Jonassen) it is wrong to insist on individual work in learning. Humans naturally seek out others to help them solve problems and perform tasks. On the task force meeting the attendees clearly benefited from cooperating and sharing different knowledge.
6.1.3 Pair Reporting

I conducted an action research experiment with using pair programming principles when writing HMIS15 quarterly reports at one health facility in Chiradzulu. In my thesis this is referred to as Pair Reporting. This experiment alone might not be sufficient to prove improvement in reporting. Similar to (Nosek, 1998) I emphasize that the fact that previous research has given the same results in turn supports my point.

My study showed that when practising Pair Reporting, facility staff produce reports with less mistakes. According to (Cockburn and Williams, 2000) one of the most important reasons for using pair programming is the fact that it contributes to a significant decrease in defects being done while programming. This decrease is mostly related to the constant review that takes place while the code is being produced.

The participants in the pair reporting experiment reported to have a higher confidence in the result. In the experiment done by (Nosek, 1998) one of the factors measured was the degree of confidence the attendees had in what they produced. The results showed that the collaborating programmers had a substantial higher confidence in their solution.

When practising pair reporting, the attendees are able to combine their knowledge and learn from each other. This also makes them able to solve difficult issues which they might not have been able to solve individually. (Cockburn and Williams, 2000) says that when practising pair programming, knowledge is constantly being passed between partners.

The participants in the pair reporting experiment also reported to enjoy the task more when working as a pair. (Nosek, 1998) found that enjoyment of the process was significantly higher for the ones working in pairs. The experiment by (Cockburn and Williams, 2000) gave statistically significant results that pair programming teams who had earlier programmed alone, reported to have enjoyed working in pairs more than alone.

The risk of losing key staff also decreases when practising pair programming (Cockburn and Williams, 2000) mention decrease of staff-loss risk as a result of using pair programming. This is due to the fact that multiple people are familiar with each part of the system.

I cannot prove that practicing pair reporting while compiling HMIS quarterly reports gives the same effect as practicing pair programming while developing computer software. What is for certain is that many of the challenges of the two disciplines are the same and my findings show that working in a pair using pair programming principles results in staff being able to cope with many of the challenges of compiling HMIS quarterly reports, learning from each other and enjoying work. This indicates that the long term effects of pair reporting may resemble those of pair programming.
6.2 Research Contributions

My research provides recommendations on how to improve data collection, analysis and reporting at facility level in Malawi. This can give health management knowledge on how to plan and manage health care activities for improved health care delivery services at district and facility level. I believe my findings can be applied to other developing countries as well as they often struggle with the same issues like shortage of staff and low funding.

6.3 Limitations

My field work in Malawi was limited to two months and I only visited two districts. I believe this kind of study requires at least a stay for as long as one month in each district to have sufficient time to learn each district’s distinctive characteristic, make appointments to the right people and to identify which people to speak to. A good approach to my kind of research would have been to conduct a full comparative study. That would have required more time, funds and visits to more districts.

My professional background is quite strictly from informatics. I do not have extended knowledge on developing countries nor health management. Although I learned a lot from my stay in Malawi, it has sometimes been difficult for me to understand the culture in the country. I also have sometimes struggled with understanding issues with the HMIS that were related to health management in general.

An important factor is that I during my fieldwork rarely could give participants to my study any physical contributions as recognition to helping me. Although most health workers I spoke to were extremely obliging and happy to be of assistance, I sometimes experienced some difficulties with conducting my research. This was usually related to people missing appointments or expecting incentives based on their involvement. I believe these difficulties are also related to the fact that they have shortage of staff and that people in general have little spare time in their jobs.

The last week of my stay in Malawi I fell ill and was unable to conduct my last interviews and observations. However, this did not affect my field work much because of my cooperation with Gro Alice Hamre, who was able to conduct the interviews and observations alone and report to me.

6.4 Recommendations

In this section, I present recommendations on how to work with the HMIS based on my findings. These are recommendations to both facility staff and district level management. My suggestions are all related to the support structures I have studied.
6.4.1 Supervision

Regular supervisory visits enable invaluable follow up of routine tasks and responsibilities. It enables discussion and feedback on the spot that can assist in identifying weak areas of practice and the creation of action plans. Reporting of findings to management increases awareness of existing problems and challenges. The division of the district into sub clusters is of value. Follow up on important issues is easier when a supervisor can concentrate on a limited number of facilities, and this can improve the continuity of the supervision. Regular HMIS specific supervision seems however to be an important addition to the integrated supervision as it allows necessary follow up in greater detail. Through interviews we have learned that supervision visits are valued as very helpful and motivating when performed regularly. It is also our impression that on the spot feedback and discussions is a unique opportunity to encourage and motivate both individuals and groups of health workers.

Most important issues to take into account planning future supervision activities:

- Give priority to more than one visit per quarter
- Ensure mutual understanding of frequency of supervisory visits
- Ensure that feedback is communicated to the responsible person
- Provide staff with feedback (oral and written) on the spot of supervision
- Ensure continuity by following up on issues from earlier supervision visits

6.4.2 The Recognition Scheme

Recognition and incentives appear to be effective ways of motivating staff to improve their HMIS reporting routines. Awards like calculators and flip chart provide another incentive for the winners to improve the quality of reporting, analysis and information use.

The Task Force meeting has a great educational value. The participants of the Task Force are rotated among representatives from the different facilities and through the assessment process they learn how they can improve their reports. It is my impression that district management also sends the message that data collection and reporting are priority issues when they devote time and money to such a scheme.

Most important issues to take into account planning future activities related to the Recognition Scheme:

- Assess whether the guidelines for the Task Force meeting should be evaluated to make the assessment more accurate
- Ensure that all staff in the district are informed about the award system
- Ensure that the educational value of the Task Force meetings is sustained through continuous rotation of the participants

- Emphasize on inviting HMIS responsible persons from the health facilities

- Evaluate whether it is appropriate to increase the frequency of the Task Force meetings and the awarding of the facilities making the Recognition Scheme a quarterly rather than a bi-annual activity

6.4.3 Pair Reporting

Based on my understanding of existing practices related to HMIS reporting I also want to make a suggestion on implementing Pair Reporting as an additional initiative when compiling HMIS15 quarterly reports. I believe that working in pairs can prove helpful in improving the quality of the reported data and that it is worth considering in the effort of strengthening the HMIS.

At present time Pair Reporting is only implemented at one health facility in Chiradzulu. For it to be expanded to the entire district, initiatives from management at district level have to be taken. I believe the best and most cost efficient solution is for the HMIS officer to encourage and teach facility staff about the Pair Reporting in combination with HMIS supervisory visits.

Sadly we did not have sufficient time to conduct the experiment with Pair Reporting in Chikwawa. Still, they have the same premises for implementation of the principles. My proposal is that initiatives can be taken from the Assistant Statistician or the HMIS officer. Continuous pursue in learning and encouragement can be executed by cluster supervisors. An instruction manual explaining Pair Reporting is attached as Appendix C.

6.5 Further research

I advise further research on support structures in Malawi. Emphasizes on studying other districts in the country that perform well on HMIS activities might lead to identification of vital elements of other support structures.

During my field work I often experienced that health staff struggled with understanding how to use HMIS registers and -reports. This probably has a relation to limited training, but there might also be potential for improvements in the HMIS forms. Therefore it could prove helpful to perform a further assessment on the registers and reports used in the HMIS.
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Appendices

Appendix A

Interview Guide

This interview guide presents the initial questions asked in this study. It does not provide an extensive list of questions asked during the course of all interviews. As our understanding of the HMIS and staff working with the HMIS grew, our focus changed and questions were added. The questions list does not reflect the sequence of which the questions were asked during each interview, and since our interviews were semi-structured, additional questions were usually added.

**Data collection, Use of Data & Reporting**

Is all staff who participates in data collection process adequately trained?

Is there an HMIS focal person at the facility?

Is facility staff trained in HMIS?

Are HMIS quarterly reports submitted on time?

Are there gaps in the reports you submit?

Are comments made against any gaps in the forms?

Do you trust the data you report?

Are copies of the HMIS quarterly reports kept at the health facility?

Does the District management review reports from facilities to check for mistakes?

Does the District management follow up with data collectors on identified issues?

Is the population size of your catchments area known?

Are graphs prepared for key indicators?

Do you have graphs displayed on the walls?

Are the graphs up to date?

Is staff able to interpret graphs and tables?

Are the graphs discussed with staff and management of the facility?

Is there any action based on the information from graphs and tables?

Do HMIS reviews occur regularly (quarterly) at district and facility level?

Do the health centers receive written feedback from the DHMT?
**Supervision**
When was the last supervisory visit on HMIS made to the facility?
What are the benefits of supervision?
How often are you supervised on HMIS?
Do you receive feedback based on the supervision?
Was there written feedback from the supervision?
Are there discussions with all staff on all identified problems and action points noted?
Has the sub-district supervisor conducted supervisory visits in the zone?
Is staff supervised by DHMT in relation to HMIS?
How is staff at facilities supervised on HMIS?

**The Recognition Scheme**
Does DHMT reward facilities that performed well in HMIS based on set criteria?
What kinds of rewards are given?
What are the benefits of the Recognition Scheme?
Does the Recognition Scheme work as motivation?
When was the last Task Force meeting?
What is the objective of the Task Force meeting?
Appendix B

HMIS 15 Quarterly Report

<table>
<thead>
<tr>
<th>Indic No.</th>
<th>Data Elements (DE)</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>Quarterly Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maternal Services</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>39</td>
<td>Number of pregnant women starting antenatal care during their first trimester</td>
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<td>6</td>
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<tr>
<td>40</td>
<td>Total number of new antenatal attendees</td>
<td>104</td>
<td>160</td>
<td>149</td>
<td>252</td>
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<tr>
<td>40</td>
<td>Total antenatal visits</td>
<td>329</td>
<td>368</td>
<td>360</td>
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<tr>
<td>41</td>
<td>Number of deliveries attended by skilled health personnel</td>
<td>27</td>
<td>23</td>
<td>24</td>
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<tr>
<td>42</td>
<td>Number of women with obstetric complications treated at obstetric care facility</td>
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<tr>
<td>43</td>
<td>Number of caesarean sections</td>
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<td>44</td>
<td>Total number of live births</td>
<td>44</td>
<td>87</td>
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<td>45</td>
<td>Number of babies born with weight less than 2500g</td>
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<td>46</td>
<td>Number of abortion complications treated</td>
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<td>47</td>
<td>Number of eclampsia cases treated</td>
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<td>Number of postpartum haemorrhage (PPH) cases treated</td>
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<td>49</td>
<td>Number of sepsis cases treated</td>
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<td>50</td>
<td>Number of pregnant women treated for severe anaemia</td>
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<td>51</td>
<td>Number of newborn treated for complications</td>
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<tr>
<td>52</td>
<td>Number of postpartum care within 2 weeks of delivery</td>
<td>16</td>
<td>18</td>
<td>10</td>
<td>44</td>
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<td>Family Planning</td>
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<tr>
<td>53a</td>
<td>Number of persons receiving 3 months supply of condoms</td>
<td>1</td>
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<tr>
<td>53b</td>
<td>Number of persons receiving 3 months supply of oral pills</td>
<td>6</td>
<td>8</td>
<td>4</td>
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<tr>
<td>53c</td>
<td>Number of persons receiving Depo-Provera</td>
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<td>418</td>
<td>689</td>
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<td>53d</td>
<td>Number of persons receiving Norplant</td>
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<td>53e</td>
<td>Number of persons receiving IUCD</td>
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<td>53f</td>
<td>Number of persons receiving sterilisation method of FP</td>
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<td>Child Health</td>
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<td></td>
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<td>55</td>
<td>Number of fully immunised under 1 children</td>
<td>29</td>
<td>64</td>
<td>56</td>
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<tr>
<td>56</td>
<td>Number of under 1 children given BCG</td>
<td>149</td>
<td>165</td>
<td>173</td>
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<td>56</td>
<td>Number of under 1 children given Pentavalent-III</td>
<td>41</td>
<td>70</td>
<td>73</td>
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<td>56</td>
<td>Number of under 1 children given polio-III</td>
<td>51</td>
<td>85</td>
<td>81</td>
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<td>Number of under 1 children given measles 1st doses at 9 months</td>
<td>30</td>
<td>64</td>
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<td>Number of Vitamin A doses given to 6 - 59 months population</td>
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<td>102</td>
<td>49</td>
<td>239</td>
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<td>62</td>
<td>Number of under-weight in under-fives attending clinic</td>
<td>29</td>
<td>44</td>
<td>19</td>
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<td></td>
<td>Attendance</td>
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<td>Data Elements (DE)</td>
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<td>Month</td>
<td>Month</td>
<td>Quarterly Total</td>
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<td></td>
<td>April</td>
<td>May</td>
<td>June</td>
<td></td>
<td></td>
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<td>Number of 15 - 49 years receiving volunteer and confidential testing and serostatus result</td>
<td>30</td>
<td>31</td>
<td>32</td>
<td>193</td>
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<tr>
<td>Number of 15 - 49 age group tested HIV positive</td>
<td>26</td>
<td>26</td>
<td>22</td>
<td>74</td>
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<td>Number of HIV positive persons receiving ARV treatment</td>
<td>114</td>
<td>113</td>
<td>87</td>
<td>344</td>
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<td>Number of pregnant women receiving VCT and serostatus result</td>
<td>1</td>
<td>16</td>
<td>51</td>
<td>68</td>
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<tr>
<td>Number of pregnant women tested HIV positive</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Number of HIV positive women treated for PMCT</td>
<td>14</td>
<td>18</td>
<td>7</td>
<td>34</td>
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<tr>
<td>Total number of children attending under-five clinic</td>
<td>934</td>
<td>1194</td>
<td>820</td>
<td>2957</td>
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<td>Number of OPD attendance</td>
<td>1942</td>
<td>1024</td>
<td>580</td>
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<td>Tuberculosis</td>
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<td>Number of confirmed TB new cases</td>
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<td>1</td>
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<td>Number of smear negative and extra-pulmonary cases completed treatment</td>
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<td>Number of new sputum positive cases proved smear negative at the end of treatment</td>
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<td>Supplies</td>
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<tr>
<td>Was there any stock outs of SP for more than a week at a time (Y/N)</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Was there any stock outs of ORS for more than a week at a time? (Y/N)</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
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<tr>
<td>Was there any stock outs of cotrimoxazole for more than a week at a time? (Y/N)</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>No</td>
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<tr>
<td>Was there any stock outs of SP, ORS and cotrimoxazole for more than a week at a time? (Y/N)</td>
<td>7</td>
<td>7</td>
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<td>Number of functioning ambulances</td>
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<tr>
<td>Number of insecticide treated nets distributed</td>
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<td>400</td>
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<tr>
<td>Community Health Activities</td>
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<td>Number of households with access to safe drinking water</td>
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<td>209</td>
<td>206</td>
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<td>Number of households with at least a sanplat latrine</td>
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<td>40</td>
<td>41</td>
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<tr>
<td>Number of HBC patients followed-up and provided treatment</td>
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<td>0</td>
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<td>Human Resources Currently at Work</td>
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</tr>
<tr>
<td>Clinical Officer</td>
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</tr>
<tr>
<td>Doctors</td>
<td></td>
<td></td>
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<tr>
<td>Dental Surgeon</td>
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<tr>
<td>Dermatologist</td>
<td></td>
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</tr>
<tr>
<td>Medical Officer</td>
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<tr>
<td>Obst/Gynaecologist</td>
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<tr>
<td>Ophthalmologist</td>
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<tr>
<td>Paediatricist</td>
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<tr>
<td>Pathologist</td>
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<tr>
<td>Physician</td>
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<tr>
<td>Surgeon</td>
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<td>Environment Health Officer</td>
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<td>Health Surveillance Assistant</td>
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<td>Nurses</td>
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<td>Registered Enrolled/Midwife</td>
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<td>Pharmacist</td>
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<td>Physiotherapist</td>
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<td>Radiologist</td>
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<td>Radiography</td>
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<td>All other positions</td>
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<td>Total personnel currently at work</td>
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<td>18</td>
<td>18</td>
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<tr>
<td><strong>Finance</strong></td>
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<tr>
<td>Total income from cost sharing</td>
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<td><strong>Physical Facilities</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have functioning water supply system? (Y/N)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have functioning electricity? (Y/N)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have functioning communication system? (Y/N)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have functioning water supply, electricity and communication system? (Y/N)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Management and Supervision</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the health centre committee functional? (Y/N)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Were you supervised by DHMT members using the integrated supervision checklist? (Y/N)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td><strong>New Cases (OPD plus inpatient)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexually transmitted infections - new cases</td>
<td>28</td>
<td>34</td>
<td>56</td>
<td>118</td>
<td></td>
</tr>
<tr>
<td>Syphilis in pregnancy</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>HIV confirmed positive (15 - 49 years) new cases</td>
<td>28</td>
<td>25</td>
<td>21</td>
<td>74</td>
<td></td>
</tr>
<tr>
<td>Opportunistic infections-new cases</td>
<td>48</td>
<td>106</td>
<td>149</td>
<td>353</td>
<td></td>
</tr>
<tr>
<td>Acute Respiratory infections-new cases (under 5)</td>
<td>149</td>
<td>90</td>
<td>46</td>
<td>284</td>
<td></td>
</tr>
<tr>
<td>Diarrhoea non-bloody - new cases (under 5)</td>
<td>50</td>
<td>84</td>
<td>30</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>Malaria - new cases (under 5)</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Malaria - new cases (5 &amp; over)</td>
<td>210</td>
<td>314</td>
<td>384</td>
<td>908</td>
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<td>86</td>
<td>Rabies - confirmed new cases</td>
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<td>May</td>
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<td>Common injuries and wounds (except RTA)</td>
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<td>03</td>
<td>04</td>
<td>09</td>
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<td>98</td>
<td>Number of road traffic accidents</td>
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**Admissions**

<table>
<thead>
<tr>
<th>20a</th>
<th>Bed capacity for monthly admission rate</th>
<th>Changes for bed capacity (if different form)</th>
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<tr>
<td></td>
<td>Total number of admissions (including maternity)</td>
<td>14</td>
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<tr>
<td></td>
<td>Total number of discharges</td>
<td>23</td>
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<tr>
<td></td>
<td>Total inpatient days</td>
<td>48</td>
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</tbody>
</table>

**Inpatient Deaths (including Maternity Deaths)**

| 102 | Total number of inpatient deaths from all causes (excluding maternity)         | 00                                           |
| 50  | Number of direct obstetric deaths in the facility                             | 00                                           |
| 59  | Acute Respiratory Infections - inpatient deaths (under 5)                      | 00                                           |
| 61  | Diarrhoea non-bloody (under 5) - inpatient deaths                              | 00                                           |
| 64  | Malnutrition - inpatient deaths (under 5)                                      | 00                                           |
| 68  | TB - inpatient deaths                                                           | 00                                           |
| 69  | Malaria - inpatient deaths (under 5)                                           | 00                                           |
| 74  | Malaria - inpatient deaths (5 & over)                                          | 00                                           |
| 80  | Cholera - inpatient deaths                                                      | 00                                           |
| 89  | Dysentery - inpatient deaths                                                    | 00                                           |
| 98  | Number of road traffic accidents - inpatient deaths                            | 00                                           |

**Signatures**

- Report prepared by: [Signature]
- Report verified by: [Signature]
- Report approved by: [Signature]

**Notes:**
1. HMIS-13 has to be completed before transcribing data onto this form.
2. Management team has to analyse data and provide feedback to its staff before sending report to DHO.
3. This quarterly report is due on 16th of October, January, April and July.
Appendix C

Supervision Checklists

HMIS

CHECKLIST: HEALTH MANAGEMENT INFORMATION SYSTEM

HEALTH FACILITY NAME
NAME OF SUPERVISOR

Data Collection
- Is there an HMIS focal person at the Health Centre?
- Is the clinic using HMIS registers for recording clients?
- Are the ages of clients recorded?
- Are all children under five weighed and recorded?
- Are children not gaining weight recorded?
- Are the immunizations recorded?
- Are those fully immunized recorded?
- Have pregnant women been given Tetanus Toxoid (TTV)?
- Have contact slips been issued for STI?
- Have contact slips been issued for HIV?
- Have the pepe and monthly totals been recorded?
- Is data entry recorded correctly?
- Is the data from registers, HMIS 13 and reporting forms the same?

Monthly PNC Report
- Are the Monthly/Quarterly Reports submitted on time?
- Are copies kept in the clinic?
- Are there any gaps/unfilled spaces in the forms?
- Have comments been made against the gaps?
- Does the staff discuss the report?
- Is data used for programme planning and changes?

Data Analysis/Interpretation
- Do they have a map of the catchment area?
- Are indicators calculated?
- Do they have graphs displayed on the wall?
- Are the graphs up to date?
- Child Health Graphs, e.g.
  - Immunization Coverage
  - Children Not Gaining Weight
  - Diarrhoeal Incidence
  - Acute Respiratory Tract Infection
- Maternal Health Indicators
  - Malaria in U5
  - Maternal
- Communicable Diseases indicators
- Any other additional graphs displayed (e.g. ANC attendance – new & subsequent, deliveries, FP coverage)
- Are there any trends and variation noted on the graphs?
- Is there any action taken – based on the information?
- Are the graphs discussed with the clinic supervisor?
MOH/MSH Malawi 2004

CHECKLIST: INFORMATION SYSTEM

Tick appropriate box [✓]

Feedback
- Do they receive written feedback from the supervisor? [✓✓]
- Is the information shared with the community through the Health Centre Advisory Committee? [✓✓]
- Do you conduct HMIS reviews? [✓]
- Do you conduct Zonal HMIS reviews quarterly? [✓]
- Do you do annual data verification meetings? [✓]
- When new registers are introduced do you have orientation meetings? [✓✓]
- Is the information shared among health team members? [✓]
- Do the current registers capture all indicators required for running your programme? [✓]

If yes, please comment:

Staff Issues
- Are facility staff trained in HMIS? [✓]
- Are staff supervised in relation to HMIS? [✓]

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td>Do they receive written feedback from the supervisor?</td>
<td>✓</td>
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</tr>
<tr>
<td>Is the information shared with the community through the Health Centre</td>
<td>✓</td>
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<tr>
<td>Advisory Committee?</td>
<td>✓</td>
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<tr>
<td>Do you conduct HMIS reviews?</td>
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<tr>
<td>Do you conduct Zonal HMIS reviews quarterly?</td>
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<td></td>
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<tr>
<td>Do you do annual data verification meetings?</td>
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<tr>
<td>When new registers are introduced do you have orientation meetings?</td>
<td>✓</td>
<td></td>
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<tr>
<td>Is the information shared among health team members?</td>
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<tr>
<td>Do the current registers capture all indicators required for running</td>
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<tr>
<td>your programme?</td>
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If yes, please comment:
CHECKLIST: INFORMATION SYSTEM

NOTES

1. Code in the register should correlate with code in reporting from.

FOLLOW UP ACTIVITIES

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# Supervision Checklist

## Red Flag

### RED FLAG LIST

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- Check also on tracer drugs (Fanidar, ORS, Bactrim, Paradox/Kaprin, ORT corner and IPT corner)

### REFRIGERATOR NOT FUNCTIONING

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<th>Apr</th>
<th>May</th>
<th>Jun</th>
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### STAFF NOT ON DUTY (LEAVE, TRAINING, ABSENT WITHOUT LEAVE)

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<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
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### BROKEN EQUIPMENT

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- Syphonomometer
- Scale
- Timer
- Thermometers
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<th>ROUTINE REVIEW</th>
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<th>Mar</th>
<th>Apr</th>
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<td>Fully immunized children rate</td>
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<td>FP new acceptors</td>
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<td>Sanitation - safe water - toilets</td>
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<td>Review of the environment</td>
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<tr>
<td>Energy: Electrical, solar, paraffin, gas</td>
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<td>Health Centre Advisory Committee</td>
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<td>Meeting held last month (quarterly)</td>
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<td>Y/N</td>
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<td>New projects initiated (specify)</td>
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<td>Health Facility visits</td>
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<tr>
<td>Doctor/Clinical (routine) visits</td>
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</tr>
<tr>
<td>Other</td>
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<tr>
<td>Supervisory visit actions completed</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
</tr>
</tbody>
</table>

(*) Please indicate the number of days each category absent i.e., Enrolled Nurse (EN) Nurse Technicians, and Medical Assistants, HSA 2 Health Assistant, Assistant Environmental Health Officers, Clinical officer

Insert a blank sheet for additional form for use by supervisors and districts for additional information.
## Supervision Checklist

### Regular Review

**MOH/MSH Malawi 2004**

**REGULAR REVIEW LIST**

<table>
<thead>
<tr>
<th>HEALTH FACILITY NAME</th>
<th>SUPERVISOR NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

### Routine Review

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<tr>
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<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff Management</td>
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<tr>
<td>Leave forms completed</td>
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<tr>
<td>Attendance staff reg. correct</td>
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<tr>
<td># In-service training activities</td>
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<tr>
<td># Days people absent (*)</td>
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<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
</tr>
<tr>
<td>Fridge T correct</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
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<tr>
<td>Sharps disposal correct</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
</tr>
<tr>
<td>Bin/Stock cards correct</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
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<tr>
<td>Monthly stock take done</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Report breaks repaired</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visit and check all rooms at facility</td>
<td></td>
<td></td>
<td></td>
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### Information Review

<table>
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<tr>
<th>Category</th>
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<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistical return correct</td>
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<td>Y/N</td>
<td>Y/N</td>
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### Referral Review

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<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
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<tr>
<td>Back referrals received</td>
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<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
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### Clinical Care

<table>
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<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
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</thead>
<tbody>
<tr>
<td>RTH Card correct (Health Passport)</td>
<td>15</td>
<td>15</td>
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### STG's Followed

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<tbody>
<tr>
<td>1 Dosis/Correct Manag</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Dosis/Correct Manag</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
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<tr>
<td>3 Dosis/Correct Manag</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
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<tr>
<td>4 Dosis/Correct Manag</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
</tr>
<tr>
<td>5 Dosis/Correct Manag</td>
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<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
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### Do health Care providers ask mothers of care takers about

<table>
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<tr>
<th>Condition</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cough</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
</tr>
<tr>
<td>2 Convolusions/lethargy</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
</tr>
<tr>
<td>3 Diarrhoea</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
</tr>
<tr>
<td>4 Vomiting</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
</tr>
<tr>
<td>5 Fever</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
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<td>Y/N</td>
</tr>
</tbody>
</table>
Appendix D
Consent Form

Title of Study: Opportunities of Existing Working Practices: Case studies of a District Based Health Information System in Malawi

Principal Investigator 1: Gro Alice Hamre
Principal Investigator 2: Jon Sandvand
Co-investigator / translator: Marlen Stacey Galimoto
Study Contact telephone number: 09186375
Study Contact email: groah@ifi.uio.no & jonsan@ifi.uio.no

What are some general things you should know about this study?

You are being asked to take part in a qualitative research study. To join the study is voluntary. You may refuse to join, or you may withdraw your consent to be in the study, for any reason, without penalty.

Details about this study are discussed below. It is important that you understand this information so that you can make an informed choice about being in this study. You should ask the investigators any questions you have about this study at any time.

What is the purpose of this study?

The purpose of this study is to learn about what different health professionals in different positions in the health district perceive as good working practice related to data collection, data analysis, information use and information dissemination.

The hope is to gain insight of thoughts and opinions that you may have on what is or
could be good working practices in these areas of practice so that we can learn from this and look for opportunities to improve the use and impact of the health information system.

**How many people will take part in this study?**

The study will be conducted in two different health districts in Malawi, and all health workers and managers with responsibilities related to data collection, data analysis, information use and information dissemination will be offered to participate.

**How long will your part in this study last?**

If you decide to be in this study, you will first be asked to participate in one initial interview that will last for no more than one hour. Later we would like to observe work routines in your workplace, attend meetings if possible and based on this we might have more questions at a later date, or if appropriate during observations or meetings. Time and place for any further questions will be arranged by your preference and convenience.

**What will happen if you take part in the study?**

The initial interview is made up of a series of general questions about how data and information is handled in your workplace and whether you have opinions on whether some of these work practices are better functioning than others. There are no wrong answers or bad ideas, just different opinions.

If you agree to participate in the interview we will record your response on a piece of paper. Also, if you do not object, we would like to tape record the discussion to make sure we do not miss anything. Only the investigators will listen to the tapes. The tapes will be erased after the study is over. You can ask us to turn off the tape recorder anytime. If you have any questions about the study, you can ask us at any time. You also have the right to stop the interview at any time.

**What are the possible benefits from being part of this study?**
You will have the opportunity to share your thoughts about the district based health information system; how it affects your work, your work place, and ways you think it could be improved.

Although you may not experience any direct benefits, your participation may help to make things better in your work place over time. Research is designed to benefit society by gaining new knowledge. However, there is a possibility that you may receive no direct benefit. You will not be paid to participate and there is no costs for participating in the study other than your time spent.

**What are the possible risks or discomforts involved from being in this study?**

The main risk is that you may feel uncomfortable answering some of the questions during interviews. You may be embarrassed or afraid to disclose information about your work relations or colleagues. You may refuse to answer any question that you do not want to answer. You can also stop participation at any time. You should report any problems to the researcher.

**How will your privacy be protected?**

No names will be attached to interviews and the data will be kept confidential. To protect your privacy, all of the information you provide will be stored only with an identification number, not with your name. Participants *will not* be identified in any report or publication about this study.

The only people with access to all of the data are the investigators. All notes and audiotapes containing your interview responses will be stored in a locked room at the investigator’s place of residence in Malawi and will be destroyed in October 2006 when the study is over.

**What if you have questions about this study?**

You have the right to ask, and have answered, any questions you may have about this research. If you have questions, or concerns, you should contact the principal investigator listed on the first page of this form.
I have read the information above and give my consent to participate in the above described research project.

_________________________________________  _________________
Signature of Person Giving Consent     Date

_________________________________________
Printed Name of Person Giving Consent
Appendix E

Guidelines for the Task Force

Terms of Reference for the HMIS Recognition Scheme Task Force

The membership of HMIS Recognition Scheme Task Force shall include membership from the MoH, CHAM, Private Health Facilities and the District Assembly.

The HMIS Task Force Recognition Scheme shall have a Chairperson, Secretary and the HMIS Office shall be the Secretariat.

The HMIS Officer shall be the convener of meetings on a quarterly basis in each calendar year.

The duties of the HMIS Recognition Scheme Task Force shall include:
1. Assessment of the quality of reports based on set criteria looking at completeness, correctness, consistency and timeliness of the reports from all the Health Facilities.
2. During assessment, members shall record all issues identified, compile a report by Health Facility and provide feedback to all Health Facilities.
3. After validating the reports, the Task Force shall select the best performing Health Facilities in accordance with the guidelines.
4. The Task Force shall identify the best award (related to HMIS work) to be provided to the successful Health Facilities.
5. The Task Force shall be responsible to select the best Zonal Supervisors based on percentages of the number of successful Health Facilities in that Zone ensure equity.
6. The Task Force shall organize field visits to successful Health Facilities to ascertain Health Facilities demonstrate use of data and are reporting religiously.
7. The Task Force shall have powers to disqualify any Health Facility that shall be found cheating in its reporting.

Note: The Terms of Reference shall be subject to change as deemed necessary by the Management of the Task Force.
Appendix F

Research Approval

[Image of official document]

[Text content]

RE: P. F. 404: Opportunities of Existing Working Practices: Case studies of a District Based Health Information System in Malawi

Thank you for the above titled proposal that you submitted to the National Health Sciences Research Committee (NHSRC) for ethical and scientific review. Please be advised that the NHSRC has reviewed and approved your application to conduct the above titled study.

- **APPROVAL NUMBER**: NHSRC 404
- **APPROVAL DATE**: 28/07/2006
- **EXPIRATION DATE**: This approval expires on 27/07/2007
- **MODIFICATIONS**: Please NHSRC approval using standard forms obtainable from the NHSRC Secretariat is required before implementing any changes in the protocol (excluding changes in the consent documents). You may not use any other consent documents besides those approved by the NHSRC.
- **TERMINATION OF STUDY**: On termination of a study, a report has to be submitted to the NHSRC using standard forms obtainable from the NHSRC Secretariat.
- **QUESTIONS**: Please contact the NHSRC on Telephone No. (01) 780314; 0384997 or by e-mail on docconnor@malawi.net
- **OTHERS**: Please be reminded to send in copies of your final research results for our records as well as for the Health Research Database.

Kind regards from the NHSRC Secretariat.

[Signature]

FOR CHAIRMAN, NATIONAL HEALTH SCIENCES RESEARCH COMMITTEE

PROMOTING THE ETHICAL CONDUCT OF RESEARCH

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[Additional text and logos]