Monitoring of the Road to Health Chart by nurses in the public service at primary health care level in the community of Makhado, Limpopo Province South Africa

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Declaration

I **Dr**. **KITENGE Tshibwila Gabin** hereby declare that the work on which this research is based is original (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being or is to be submitted for another degree at this or any another university.

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Signed: KITENGE TSHIBWILA GABIN   Date

Dedication

This work is dedicated to my father:

Professor Dr. Kitenge Kia Kayembe Charles

To my son:

Kitenge Kia Kayembe Jonathan

And

My Daughter:

Kitenge Ilumba Keren

Acknowledgements

Acronyms & Abbreviations

DoH	Department of Health
DRC	Democratic Republic of Congo
EPI	Expanded Programme of Immunization
GMP	Growth Monitoring Programme and Promotion
H/A	Height-for-age
HIV	Human Immunodeficiency Virus
IGME	Inter-agency Group for Child Mortality Estimate
IMCI	Integrated Management of Childhood Illness
INP	Integrated Nutritional Programme
LTMH	Louis Trichardt Memorial Hospital
MDG4	Millennium Development Goal number 4
NPC	National Population Commission
PEM	Protein-Energy Malnutrition
PHC	Primary Health Care
PMTCT	Programme Mother-to-Child Transmission
RtHC	Road to health Chart
SPSS	Statistics Package of Social Science
UN	United Nation
UNICEF	United Nations Children Fund
W/A	Weight-for-age
W/A	weight-for- height
WHO	World Health organization

Definition of terms
(Cogill, 2003)

Anthropometry: The study and technique of taking body measurements, especially for use on a comparison or classification basis.

Gomez classification system: A classification system that uses percentage of the median weight-for-age to identify children as being normal or having mild malnutrition, moderate malnutrition or severe malnutrition.

Growth chart: A graph that is usually used to record a child's weight-for-age in months; a chart typically used by mothers and health workers to determine if a child is experiencing a normal gain in weight.

Growth faltering: A condition identified by emphasizing the direction of growth obtained in serial recordings, rather than actual weight-for- age itself; signified by no change or an actual decrease in measurements.

Growth monitoring and promotion: The practice of following changes in a child's physical development, by regular measurement of weight and sometimes of length with accompanying information to guide the caregivers' nutritional and related care.

Height-for-age: An index of past or chronic nutritional status; an index which assesses the prevalence of stunting.

Malnutrition: A nutritional disorder or condition resulting from faulty or inadequate nutrition.

Morbidity: A condition resulting from or pertaining to disease; illness.

Mortality rate: Death rate; frequency of number of deaths in proportion to a population in a given period of time; death.

Percentiles: A number that corresponds to one of 100 equal divisions in a range of values; a measure of relative location. For example, the 60th percentile means that 60% of values in the data set are less than or equal to it and (100 - 60) 40% are greater than or equal to it.

Protein-energy malnutrition: Undernutrition that results in an individual not receiving adequate protein or calories for normal growth, body maintenance, and the energy necessary for ordinary human activities.

Stunting: A slowing of skeletal growth resulting in reduced stature or length; a condition that usually results from extended periods of inadequate food intake and infection, especially during the years of greatest growth for children.

Underweight: A condition measured by weight-for-age; a condition that can also act as a composite measure of stunting and wasting.

Wasting: A condition measured by weight-for-height; a condition that results from the loss of both body tissue and fat in a body; a condition that usually reflects severely inadequate food intake and infection happening at present.

Waterlow classification system: A nutritional classification system that uses percentage of the median of height-for-age and weight-for-height in combination to identify children who are wasted, stunted or both.

Weighting: A data analysis process that involves adjusting key variables used for sample selection to their actual proportions in the population

Weight-for-age: An index of short and long-term malnutrition referred to as undernutrition; a valuable index for use with very young children or when length measurements are difficult to do accurately.

Weight-for-height: An index of current nutritional status also referred to as wasting.

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Abstract

Introduction: The Road-to-Health Chart remains a powerful tool for screening and for educational purpose worldwide. Children of any ethnicity or nutritional status may be assessed by using the RtHC. The RtHC helps in the monitoring of the growth of the child, informing on the immunization status, vitamin A and deworming, and also in the management of other illnesses. The success of the Road-to-Health Chart programme depends on the knowledge, commitments, and expertise of the professional nurses at the primary health care level.

Aim/Objectives: The aim of this study was to determine the challenges faced by professional nurses in the monitoring of the Road-to-Health Chart during a consultation, the degree of the implementation of the Road-to-Health Chart programme and the aspect of the Road-to-Health Chart utilized the most.

Material and Method: A study with a cross-sectional descriptive method was conducted at Louis Trichardt Memorial Hospital and the surrounding local Primary Health Care clinics, among professional nurses for a period of two months, in the Tshilwavhusiku local area, subdistrict of Makhado B, Vhembe district, Limpopo Province, South Africa. An all-inclusive method was used to select professional nurses for the study. Each professional nurse completed an interviewer administered questionnaire. The administration of the questionnaire was done by the researcher and two research assistants for data collection. Socio-demographic characteristics of the professional nurses were obtained, the challenges they faced during a consultation, their knowledge and degree of implementation of the RtHC, and the aspect of the RtHC most utilized were also determined. The data of this study was captured on a Microsoft excel spreadsheet and exposed to SPSS version 18.0 for analysis. The frequencies and percentages were used to interpret the data. The findings were displayed using tables, graphs, bar and a pie chart.

Results: Ninety-six (96) questionnaires were distributed, supervised and returned by research assistants, which brought the response rate to 100%. The results showed that 95% of the professional nurses were females and 5% were males with a female-to-male ratio of 19:1. About 9% of professional nurses were in the age group of 20 – 29 years old, 16.7% were in the age group of 30 – 39 years old, 41.7% were in the age group of 40 – 49, and also about 29.2% were in the

age group of 50 – 59 years old. Only 3.1% were in the age group of 60 years old and above. Among professional nurses, 19% had less than 5 years of experience, 26% had experience between 5 and 10 years, and 55% had 10 years of experience and above. More than 50% of professional nurses at hospital and PHC clinics, voiced their concerns that the challenges faced during a consultation were: shortage of staff, lack of equipment, work overload, and unequal distribution of professional nurses on duty per shift, with the degree of understaffing moderate to severe. The stock of vaccine was inadequate, the RtHC was often absence at the consultation, and parents' poor attendance at immunization sessions resulted in a high rate of missed opportunities of immunization.

The professional nurses (52.1%) knew the frequency of vitamin A supplementation and deworming, however their knowledge on the growth curve interpretation was poor, and less than 50% knew the meaning of the growth chart indices below the 3rd percentile. There was also poor identification of malnutrition by using the RtHC; only 21.4 % understood the direction of the dotted line on the growth chart against the growth curve reference. More than 50% of professional nurses did not complete important basic additional courses, and very few did courses on IMCI (12.5%), TB (13.5%), and PMTCT/HIV/AIDS (21.9%). Overall, the degree of the implementation of the RtHC programme was poor and the aspect of the RtHC utilized the most was the immunization programme (58% at hospital and 60% at PHC clinics). The study also point out that EPI is a key priority in the RtHC and child heath monitoring for the WHO and UNICEF globally and for the Limpopo Provincial government locally.

Conclusion: The hospital and the PHC clinics were facing the same problems. The years of experience or gender did not play a major role in the knowledge about the growth chart indices. The professional nurses voiced their concerns and need to be addressed. There is a need of improving the in-service training on the use of the RtHC. There is also a need of teaching, supporting, supervising professional nurses. The higher rate of Protein-Energy-Malnutrition in the community is the result of poor monitoring of the RtHC.

Key words: Road-to-Health Chart, primary health care, practice, nurses, immunization, growth chart, growth monitoring, vitamin A, IMCI, deworming.

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Chapter 1: Introduction

1.1. Background

The Road-to-Health Chart (RtHC) is a patient-held record chart that combines essential health information, such as birth details, immunization and notes of any clinic visits, with a composite graph of boys' and girls' percentile charts of weight-for-age, to allow visual comparison of the growth progress over time (Wittenberg D, 2007), and it is a useful summary of child health during the first five years of life (Crisp & Donald, 1987).

The RtHC is also a good source of information required at primary health care and community-based health care for the diagnostic of children at risk of malnutrition (Visagie J, 1995). The RtHC provides a simple, cheap, practical and convenient method in the monitoring of child health and assists in improving health through vaccination compliance and early identification of growth patterns (De Villiers FPR & Tarwa C, 2007).

The purpose of introducing the RtHC by the World Health Organization (WHO) was to allow early and more rapid detection of deviation from the growth curve reference and also to be able to identify whether the child is growing well or not (Crisp G & Donald P, 1987). This means that the direction of the line in the growth curves indicating whether it is rising in parallel to the reference curve as good or remaining flat to indicate an early warning sign or whether it is falling to indicate a danger sign (Ashworth et al, 2008). The purpose of the RtHC was also to make low-cost, effective and simple technology available in the monitoring of the health of children at risk (Grant, 1984).

The RtHC has been primarily developed for the assessment of nutritional status of children in the developing countries before it is was used all over the world. It is also considered to be an important tool for global child surveillance, child survival, and monitoring of physical growth (De Onis, 1997). The physical growth and development of children are sensitive indicators of the health of a child. Development and learning are most rapid in the early stages, during which the child is vulnerable to adverse environmental

influences such as infections or deficiencies in nutrition and stimulation. Growth and development need to be monitored closely in children so that early corrective steps can be taken to ensure normal growth (De Villiers & Tarwa C, 2007).

A strategy was put in place for the monitoring of the RtHC programme and has been implemented in many countries worldwide for many decades as a successful international effort towards child health. The so-called ''child survival'' strategies developed by the WHO as child preventable diseases programme, comprises the Expanded Programme of Immunization (EPI) and the control of diarrhoeal diseases programme. The United Nations Children's Fund (UNICEF) endorsed a strategy known by the acronym GOBIFFF and chose five specific interventions on which to focus on (Claeson & Waldman, 2000), namely: growth monitoring, oral rehydration therapy, breastfeeding promotion, immunization programme, food, family planning, and female education.

GOBIFFF is considered to be a cost-effective strategy that could strengthen child health and reduce infant mortality and morbidity. The effects of prevention and intervention strategies to address infant mortality should be measurable, monitored and recorded on a regular basis to ensure progress or improvement in the growth and health-related issues of the child (DoH of South Africa, 2001; Kibel & Wagstaff, 2003, Selina, 2010). Four important indicators are considered in the use of the RtHC by professional nurses to monitor and measure the child's growth at every visit in order to (Department of Health, 2003): to ensure that the child received necessary immunizations, vitamin A supplements, monitor the growth of the child, and the management of any other illnesses

Globally the under-five mortality rate has fallen from 89 deaths per 1,000 live births in 1990 to 60 in 2009. But the rate of decline namely a one-third reduction over 20 years is insufficient to meet the Millennium Development Goal number 4 (MDG4), particularly in Sub-Saharan Africa, Southern Asia and Oceania. A country such as Nigeria alone had a child mortality rate ranging from 120 to 240 deaths per 1,000 live births over 20 years (1980– 2000). In South Africa the under-five mortality rate is 62 deaths per 1,000 live births and no reduction observed over the past 20 years; (1990 – 2009) (Black, 2008).

In 1996, the Integrated Management of Childhood Illness (IMCI) project was also put in place by the WHO and the UNICEF as the principal strategy to improve child health, especially in poor communities. IMCI has been implemented in Primary Health Care (PHC) facilities in more than 100 countries, including South Africa. This strategy was focused on:

- improving the case management skills of first-level health professionals and the quality of the services they provide;
- tackling the millions of preventable under-5 deaths that occur each year in poor countries and thereby reaching the 4th Millennium Development Goal of reducing these deaths by two-thirds by 2015.
- addressing the comprehensive health and development needs of children under 5 years old in an integrated way and concentrating on the accurate identification and management, in outpatient and home settings, of the medical conditions that most frequently cause morbidity and mortality; and also
- focusing on preventive measures, immunization, good nutrition and health promotion by improving the performance of health workers and community care practices, as well as the provision of careful counselling of caregivers and appropriate referral of seriously ill children. IMCI has been expanded to include the care of newborn and young infants and children less than 5 years old infected with HIV (Saloodgee, 2007).

The GOBIFFF and IMCI strategies are both the integrated part of the Road-to-health chart. The RtHC is internationally accepted as a backbone tools surveillance of the growth of the child and serves as anthropometric reference based on inclusive data of infants and children of diverse ethnic backgrounds and cultures. The RtHC reference curve has been generated for assessing the growth and development of all children worldwide. The RtHC is also called the standard growth chart; it may be used elsewhere all over the world, regardless of ethnicity, socio-economic status or type of feeding (De Onis M et al, 2007 & WHO, 2007).

1.2 Problem statement

The problem was identified while the researcher was allocated for clinic visits in the community of Makhado, in the Tshilwavhusiku local area, South Africa. It was identified that the RtHC was not often asked for by the professional nurses at consultation, not completed properly and interpreted wrongly. The growth chart trajectory does not show a regular weight plotting and dots in the growth chart and are not connected to each other to indicate the direction of the line in order to detect the growth patterns against the reference curve. Clinical notes and related history of previous illnesses or previous consultations are not recorded. In addition to this, the data entered in the RtHC is often inaccurate; furthermore, many RtHCs reflect missed opportunities of immunization. This practice jeopardizes the purpose, the norms and standards of the use of the RtHC, leading to delayed detection of children in need of extra-care.

Hence, the researcher felt that there was a need to know the current practices of professional nurses in the monitoring of the RtHC towards child health and to provide appropriate information in this regard. This would help in understanding the context in which unattended and undiagnosed children are missed, and remain with poor growth, malnutrition, vitamin A deficiency and other micronutrients as well as missed opportunities for immunization. Also, there is a need to reinforce the usage of the RtHC by the professional nurses at the hospital and the PHC clinics in Tshilwavhusiku local area. There is also a need to reinforce the implementation of protocols, guidelines, and recommendations required by the Department of Health regarding the growth monitoring programme.

The researcher decided to assess the current usage of the RtHC at PHC clinics and Louis Trichardt Memorial Hospital with the view of formulating recommendations and to determine the challenges faced by professional nurses at consultation. The researcher hopes that this study will achieve the following:

- This study is aimed to contribute to the body of knowledge of professional nurses on growth monitoring and promotion and the use of the RtHC at local clinics and at Louis Trichardt Memorial Hospital, a level 1 district hospital.

- The researcher also hopes that the Department of Health of Vhembe district in Limpopo Province will reinforce and provide support with the necessary equipment, enough health personnel, and organize a system of supervision in order to achieve the goal of child surveillance, monitoring, and of the child survival programme

- The researcher hopes that children will benefit a full usage of the RtHC by guidelines being implemented and protocols and recommendations put in place by the Department of Health on the promotion of a growth monitoring programme.

1.3. Justification of the study

The decision to embark on this study was made after identifications of common children illnesses which are manageable and preventable at primary health care settings in the community of Makhado. Preventable diseases comprise health conditions related to malnutrition, poor growth, vitamin A deficiency, and non-compliance with immunization; also to reinforce the prevention and management of protein-energy malnutrition (PEM), this including kwashiorkor, marasmus, and marasmic-kwashiorkor, diarrheal diseases or zinc deficiency, and others illnesses.

Many studies conducted previously in this area, have addressed problems concerning mothers; their level of knowledge, or their attitudes towards the effectiveness in the use of the RtHC. Also previous studies are more addressed more issues around mothers' education, level of understanding, and investigated retaining the RtHC at home. In contrast, no study has been undertaken to examine professional nurses' ability to understand and interpret correctly the RtHC data, and furthermore to be able to explain to mothers the information contained in the RtHC. Also, no study has been conducted to determine what professional nurses are looking for into the RtHC when they have requested for it. In addition to this, no current study emphasizes the challenges faced by professional nurses in the monitoring of the RtHC at the PHC clinics and the level one district hospital in this area of my study. In view of the fact that no study has been done in this area, the researcher decided to conduct this study.

Chapter 2: Literature review

2.1 Method of searching and sources of information

A literature search was conducted on the monitoring of the Road-to-Health Chart. The following sources were used:

Direct Internet searches using Google and Pub Med

Some search engines: South African Bibliographic Information Network (sabinet) (www.Sabinet.co.za), Ebsco (search.epnet.com), Science Direct (www.sciencedirect.com), Emerald (www.emeraldinsight.com), National Research Foundation (www.nrf.ac.za/nexus) and the SA ePublications.

Dissertations and books relevant to the present study,

Others articles were obtained from the resource center of the department of Family Medicine, University of Limpopo, Medunsa Campus.

The following key words were used for Internet searches: Road-to-Health Chart, growth monitoring, immunization, undernutrition, vitamin A administration, health workers practices, and primary health care. Most of the references on materials of the research topic were sought using the sites linked to the Google and Yahoo search engines.

2.2. Epidemiology of child mortality

The number of children dying before their fifth birthday globally is estimated to have been 8.8 million in 2008. The children mortality rate is in decline during the past 35 years globally. The absolute number of deaths of children under the age of 5 years has fallen from an estimated 15 million in 1980 to about 11 million in the 1990s. This provides evidence of an important success story in international development (Claeson & Waldman, 2000).

The most recent report by the United Nations (UN) Inter-agency Group for Child Mortality Estimation (IGME) shows that nearly 8.1 million children under age five died in 2009. Still, these figures reflect substantial progress. Globally, the under-five mortality rate has fallen from 89 deaths per 1,000 live births in 1990 to 60 in 2009 with an average of 22.000 deaths per day worldwide. About some 40% of under-five deaths occur within the first month of life, and some 70% occur within the first year of life. (Danzhen et al, 2010).

Of the 24 million children born each year in Africa, 4 million (16.6%) will not survive to see their fifth birthday, even though over 50% of these deaths are largely preventable through immunization, growth monitoring and timely interventions (Centre for Disease Control and Prevention [CDC], 1998); Adenike & Adeyele, 2011).

Developing countries account for almost 70% of all early child mortality worldwide (Shirimpton et al, 2001). The highest rates of child mortality continue to be in sub-Saharan Africa, where one child in 8 dies before age five - nearly 20 times the average figure, which is 1 in 167 for developed regions. Southern Asia has the second highest rates, with 1 child in about 14 dying before age five. The highest proportions of deaths among the under-fives in 2009 occurred in only five countries in sub-Saharan Africa and South Asia: India, Nigeria, the Democratic Republic of the Congo, Pakistan, and Afghanistan, which collectively accounted for half (52%) of global deaths among under-five worldwide. Countries, like Nigeria and India alone, with 10% and 21% respectively together account for nearly one-third of under-five deaths worldwide (Danzhen et al, 2010; Black et al, 2010).

The mortality rates among Nigerian children remain unacceptably high with infant and under five mortality rates of 87 per 1000 and 171 per 1000 respectively, in addition to this; the World Health Organization (WHO), also reports that 38.3% and 28.7% of under-five children in Nigeria are stunted and underweight respectively (Adenike & Adeyele, 2011).

Child mortality has been declining worldwide as a result of socio-economic development and implementation of child survival interventions. It has fallen by a third in all regions and has seen reductions of at least 50%;-except in sub-Saharan Africa, Southern Asia and Oceania. The aim of UN Millennium Development Goal number 4 (MDG4) is to reduce mortality of children younger than 5 years by two-thirds between 1990 and 2015, but many countries, especially in southern Asia and sub-Saharan Africa, are not on track to meet this target (WHO & UNICEF report, 2010).

Under-nutrition, including stunting, severe wasting, deficiencies of vitamin A and zinc, and sub-optimum breastfeeding has been found to be underlying causes in a third of deaths in children younger than 5 years. Child mortality is reported to be caused by malnutrition or by major infectious diseases that often precipitate severe wasting. Successful implementation of interventions to prevent the development of under-nutrition and micronutrient deficiencies and to treat severe acute malnutrition would substantially reduce child mortality and improve the health and development of surviving children (Black et al, 2010). Stunting affects 182 million (33%) and being underweight affects 150 million (27%) of the world's children. These are associated with over half of the 10 million annual deaths of children under 5 years (Shirimpton et al, 2001).

Changes in child survival appear to be strongly associated with changes in malnutrition. Subsequently great hopes were placed in the RtHC to achieve the goals of the ''Child Survival and Development Revolution'' through early detection and prevention of malnutrition. However, several authors have pointed out that, despite important international efforts, there is little evidence of having achieved these goals. This is due to a lack of rigorous implementation of the programme guidelines or the common logistic and financial difficulties of all health programmes in developing countries (Robertfroid, 2005).

2.3 History and dissemination of the RtHC in the world

The name "Road-to-Health Chart" originated from Malawi, but much of the pioneering work and advocacy was done by Morley and colleagues at Ilesha, Nigeria (Cuthbertson & Morley, 1962). A retrospective search indicated that the RtHC has a very long history. Already in 1850, in Nuremberg, the pioneer Guillot advocated on regular weighing for the assessment of the adequacy of lactation in neonates. Cnorp, in 1870, advocated the ideas of weighing infants systematically beyond the perinatal period. In Saint Petersburg, Russo advocated on growth standard the idea that growth reflects the infant's well being (Ashworth, 2008). The RtHCs have been used in South Africa since 1973 (Crisp & Donald, 1987).

The dissemination and spread of the RtHC in the world was started in Western Africa in 1950 by Morley, where weighing and charting of the weight-for-age was initiated. Two important innovations were introduced: a calendar which including the birth month of a child against which the weights were plotted, and the RtHC which was home based and kept by the mother of the child. The practice of the RtHC became known and spread to other parts of the African continent, and also became available worldwide following the adoption by all governments of developing countries, with the support of the World Health Organization (WHO), the United Nations Children Fund (UNICEF), and by the Non-Governmental organizations who made large investments in the RtHC programme (Morley, 1998).

The implementation of the RtHC programme in the world was not only a successful history of the "Child Survival and Development Revolution", but is also a history of failure of a programme, as reported in 1978 by the WHO. A study was conducted on the use of the RtHC practice worldwide and it indicated that challenges were reflected in all 178 developing and developed countries: 50 countries in Africa, 41 in Asia, 34 in Europe, 30 in Latin-America and the Caribbean. Numerous problems were reported in the study. That there was poor interpretation of the growth curve in 48% of countries, inaccurate plotting in 40%, and poor understanding of the reference curve in 29% of countries throughout the world (Robertfroid et al, 2005). Maternal and child health has been an area of concern for governments, non-governmental organizations, and international donors for a long time, despite a lot of investments in this area, no major change in the indicators is not observed in developing countries (De Onis M, 2009).

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2.4 Benefits of the RtHC

The RtHC programme is a backbone tool for developing countries, and promotes the reduction in under-nutrition, morbidity and mortality among infants and children under five years old. The following statements show the benefits of the Road-to-Health Chart (De Villiers & Tarwa, 2007):

- The RtHC can be seen as a mobile data bank and the only reliable source of information regarding an infant's or child's progress.
- The RtHC contains relevant records of the child's important health events and developmental skills achieved at specific ages.
- The RtHC is an important tool of child surveillance by monitoring and assessing both current weight and the trend of growth.
- The RtHC allows professional nurses to identify early non-achievement of growth patterns.
- The RtHC allows space for immunization records, the dates they should be administered, supplementary information and appointments.

The RtHC assists in evaluating the impact of other health and development activities in indentifying geographical areas or population groups in need of special health attention (Brownlee, 1990). It makes the dynamic process of growth visible to both professional nurses and caregivers, promoting positive action in the improvement of a child's health, and maintains the child's nutritional status. The RtHC is also used as an educational tool, a promotional and screening tool to allow the early detection of growth abnormality in children and targeting of appropriate intervention (Ruel, 1991).

The RtHC plays a role in prevention, but most importantly promoting the normal healthy growth of millions of children and those vulnerable early years. The result of this visible symbol, this record and reminder; is the more involvement of the mother in the struggle for the child health (Grant, 1984 & Garner, 2000). As a result of RtHC monitoring actions, the child nutrition improves; the child receives appropriate social and medical support, where professional nurses and doctors are able to diagnose early serious disease; and it helps specifically to detect problems of feeding difficulties, chronic ill health, and social deprivation (Panpanich & Garner, 2009).

2.5. Measurements

2.5.1. Why measure the growth of a child?

- Growth monitoring can greatly strengthen preventive health programmes;
- Growth is the best general index of the health of an individual child, and regular measurements of growth permit the early detection of malnutrition;
- Malnutrition is frequently associated with diarrhoea and other illnesses, when remedial action is relatively easy;
- Although acute signs of malnutrition are easily noted by health workers, it is often too late, and always more expensive, to help the severely malnourished child;
- For early detection of children with growth retardation and high risk of malnutrition and mortality, health workers need special tools and training in growth monitoring;
- The growth status of children is a measure of the health and well-being of the whole community;
- Birth weight is of particular significance in determining the nutritional status of a community: low birth weight is a strong indicator of subsequent illness and death in children.

2.6 Components of the RtHC

2.6.1 Growth monitoring programme (GMP)

Growth monitoring has been promoted by international agencies and local governments as one of the principal activities to combat malnutrition among young children in developing countries (Ruel et al, 1991). It has been intensively promoted to improve children's health, with the hope that regularly weighing children would result in the early detection of growth falterers, and that the growth chart would serve as an educational tool to make that state apparent to both professional nurses and caregivers in order to trigger improved caring practice (Robertfroid et al, 2005).

Paul Garner (2000), defined growth monitoring as a regular measuring the weight (height) of children by plotting the information on a growth chart to make growth faltering visible and where growth is abnormal, professional nurses do something in concert with the family. This means that there are four conditions which are necessarily important for growth charts to be useful for either educational or screening purposes (Ruel et al, 1991):

- Firstly, the child's age and weight data must be reasonably accurate.
- Secondly, professional nurses must be able to understand and interpret growth charts properly.
- Thirdly, once growth faltering is detected, professional nurses must be able to identify the appropriate actions that need to be taken.
- Fourthly, mothers must also be able to understand the growth charts and the messages provided by professional nurses, and to evaluate the child's response.

For screening purposes, the process of the growth of the child is based on the following anthropometric indicators: the Weight-for-age (W/A), The Height-for-age (H/A), and the Weight-for-height (W/H) of a child. These indicators may be compared to the expected parameters for children of the same age and sex, to determine whether the child is growing appropriately. This is a powerful tool for identifying those children and groups of children for whom particular nutrition intervention is needed (Grant, 1984).

Growth monitoring can also be used to predict the expected adult weight and height of a child because, in general, children maintain a fairly constant growth curve. When a child deviates from his/her previously established growth curve, investigation is generally warranted. Growth charts are different for boys and girls due in part to pubertal difference and disparity in final adult weight (WHO, 2010).

A study by Ashworth et al (2008) underlined that growth monitoring and promotion had a successful child revolution history before the 1990s. The programme shows the initial enthusiasm, and was influenced by an impressive reduction in child morbidity and mortality, and improved child nutritional status. The following are the benefits of the growth monitoring programme (GMP):

- Reduction in under-nutrition, morbidity and mortality among young children;
- Early intervention when growth faltering is more easily remedied;
- Improved knowledge about the effect of diet and illness on growth;
- Families motivated and enabled to take effective action;
- Nutrition and health counselling oriented to individual needs;

- Opportunity to assess remedial actions, greater self-reliance and self-esteem, and greater utilization of preventive health-care services; and
- Fewer referrals for curative care; cost savings; and communities mobilized to address underlying socio-economic causes of poor health.

In 1990, UNICEF initiated the evaluation of growth monitoring programme activities in seven selected countries. The study revealed that there were low coverage of growth monitoring, poor understanding of the causes of malnutrition, and few growth-promotion actions, and also that growth monitoring activities were ineffective. The emphasis in expenditure in the nutritional programme was notably shifted away from community-based growth monitoring towards breastfeeding promotion, immunization and micronutrients, especially vitamin A, zinc, and iodine. This implied poor quality of implementation of the GMP programme (Ashworth et al, 2008).

Difficulties in quality of implementation in the five main activities of the GMP abound, namely weighing accurately, plotting on a chart, interpreting the growth chart, discussing options with the caregiver and agreeing on future action, and then also evaluating the child's response - even though these actions seems to be simple in concept, those difficulties were observed during a UNICEF evaluation: only 35 of 178 countries (20%) contacted in 1998–2000 reported having no problems with the use of growth charts (De Onis et al, 2004), which was similar to the proportion (22%) in 1978 among health personnel contacted in 50 countries (O'Brien, 1978).

A study in Papua New Guinea showed that malnourished children who presented with marasmus or kwashiorkor were often detected too late. The problem was that children brought to the clinic were not considered to be ill or frequent loss of the RtHC, no weighing session could take place due to the unavailability of the scale or the lack of time; the child's weight was not plotted at the curative clinic, because it was considered that it was a well baby clinic job to plot the chart. Weighing was inaccurate because the scales were faulty or poorly calibrated; the weighing technique was poor: age calculation and chart reading errors often occurred. Professional nurses were unable to decide when the growth chart was

'flat'; difficulties were also due to infrequent plots and previous plotting errors. When the growth chart line was flat, they were not sure what to do about it (Edward, 2000).

The WHO reviewed the global experience in the utilization of growth charts for promoting child nutrition, and also experiences of large-scale programmes in developing countries: it was concluded that data was often inaccurate due to deficiencies in the aspects of weighing and charting. The greatest difficulties lay in the interpretation of growth charts and in the initiation of an appropriate action. The effectiveness of GMP programme activities were not easily implemented due to local realities which were often not taken into consideration when decisions were made for into under-resourced and poorly managed health systems. Basic infrastructures for remedial or promotive measures are non-existent or inadequate. There was no time to teach mothers and the GMP was conducted programme conducted in isolation, instead of being part of an integrated package of this low-cost practice for nutritional interventions and counselling (Gopalan & Chatterjee 1985; Nabarro & Chinnock 1988; Ashworth et al, 2008).

Low coverage and limited counselling were reported in large-scale, growth monitoring programmes in India and also in programmes supported by UNICEF in China, Ecuador, Indonesia, Malawi, Thailand, the DRC and Zambia. In Burkina Faso, Niger and Mozambique, fewer than 30% of mothers received counselling. In Costa Rica, a lack of essential supplies and an unsupportive health system were said to demotivate professional nurses and community health workers, leading to unsatisfactory growth-monitoring practices (Gopaldas et al 1990; Pearson 1995; Jelley & Madeley 1983; Hampshire et al 2004; Valadez et al, 1995).

The limited time available for interaction with caregivers continues to constrain effective action in many countries: Children were misdiagnosed and interaction with mothers was rare. In Zambia, the average contact time was 30 seconds, in the DRC mothers received 2 minutes consultation time, no advice at all, and lacked nutritional knowledge and communication skills. Inadequate training of professional nurses, especially in equipping and enabling them to provide effective counselling, the poor quality of implementation, poorly addressing the specific needs of each mother and child, the lack of necessary knowledge, skills and insight to analyze the situation and to deduce appropriate action were all important

factors. In a survey of training courses in Lusaka, weighing, plotting and interpreting the growth curve were adequately taught, but none taught counselling or follow-up action (Msefula 1993; Gerein & Ross 1991; Cape 1988; Cowan, 1988).

A study by Hendricks (2003) on the evaluation of nutrition supplementation in the Northern Cape Province of South Africa, using a protein-energy-malnutrition (PEM) scheme in children under 5 years old, in pregnant women, and in lactating women, found a lack of training of nursing staffs, inappropriate targeting of certain groups, incorrect application of PEM scheme especially on discharge criteria, inadequate assessment of nutrition-related disease, inadequate counselling and no standardized monitoring. This probably limited professional nurses in comprehensively managing malnourished children.

A study by Adenike and Adeyele (2011) showed that professional nurses had poor knowledge of growth monitoring procedures and growth chart interpretation. The majority did not understand that a plotted line that deviates upwards and above the upper limit of normal means the child is gaining excess weight, that a plotted line that deviates downward below the lower limit of normal means inadequate weight gain, that a plotted horizontal line means failure to grow. Neither did they understand that intervention is necessary when the dotted line is outside the reference lines, this despite their level of awareness of the RtHC and their positive attitude towards growth monitoring and using the growth chart. Also, most of professional nurses did not know the lower limit of normal for birth weight to be 2, 5 kg.

In South Africa, a study by De Villiers and Tarwa (2007) showed that professional nurses often did not ask to see the RtHC during consultation, and rarely plotted the child's weight in the growth chart. Sometimes the weight plotted was inaccurate or interpreted wrongly. Furthermore professional nurses failed to identify children with poor growth, who urgently needed interventions. The RtHC was not often brought along by mothers to the consultation, because it was not requested previously, and mothers also believed that the RtHC was needed only for the "Well Baby Clinic" visits and not for consultation. This means that professional nurses were unable to complete the growth chart even when they had the relevant data. Overworked professional clinic nurses were omitting to plot the weight on the growth chart. The skill of

accurately measuring and plotting weight was not matched by an ability to interpret it and act appropriately. The study showed that the RtHC was not used effectively as a curative, preventive and promotive tool in monitoring child health in public hospitals of South Africa.

In a similar study by Schoeman et al (2006), it was revealed that professional nurses were performing poorly in practice as a result of failure to plot weight in the growth chart and poor utilization of the RtHC. Another recent study by Schoeman et al (2010) indicated that a report from a national survey determined a strong link between maternal education and the anthropometric status of children, illustrating the importance of education, which many mothers in rural communities of South Africa are deprived of. These factors remain as obstacles in the transformation of the South African rural population from one of the vicious cycle of poverty, malnutrition and disease into one of wealth, growth and health.

Most Primary Health Care services in South Africa are provided by registered professional nurses working in clinics. The workload and scope of practice of these professional nurses have increased in recent years, and this has been exacerbated by widespread staff shortages. However, PHC professional nurses often receive little support and supervision, particularly in relation to clinical practice. Generally, many PHC facilities suffer a lack of equipment and drugs which limiting the value of parents visiting the clinic in the future. This could explain the cause of frequently inappropriate referral. Professional nurses have expressed concern with the heavy workload at the clinic (Nkosi, 2009).

2.6.2 Weighing and measurement equipment (Cogill, 2003; Nabarro, 1986)

An adjusting mechanism should allow the scale to be tared (i.e. to adjust the needle to zero). If the needle rests on one side or the other of zero, the reading will be inaccurate. When something like a basket to hold the child is hung on the scale, this weight needs to be subtracted before the child is weighed. If the scale can be tared it is not necessary to subtract from the indicated weight. In addition, the reading point of the scale should be at eye level so that it can be read more accurately (Nabarro, 1986).

Nabarro (1986) identified important criteria for choosing measuring equipment, including:

- Standardization with consistent results using an instrument for a known measure;
- Ability to maintain accuracy (reliability), ease of use, readability and portability;
- Low cost, durability, ease of repair;
- Local availability of equipment and cultural acceptability of the method.

2.6.3 Weighing scales (Nabarro, 1986)

In choosing scales the following criteria should be considered:

- The accuracy of the scale to the nearest 250 grams, preferably 100 grams for small infants;
- A total weight capacity of at least 25 kg for programmes weighing children under five years, although the majority of critical weightings will be in children under 15 kg and it should not lift the baby too high off the floor;
- Ease of reading numbers, with no confusion. A direct transfer to growth charts and interpretation of the result should be possible without mathematical calculations.

(1) Beam scales: A beam balance scale is easily used and maintains and remains accurate over time. It is a floor or table type of scale in which the child can sit or lie, and problems of having to suspend the child to weigh it are eliminated. This variety of scale has the disadvantages, however, of being hard to transport, and being more expensive than most types of scales. The second type of beam scale is called a bar scale and has a free hanging beam. If made from light materials this type of scale is easily transported. One general problem with beam scales is that of keeping the child still.

(2) Spring hanging scales*:* These are usually spring scales which have either a dial face or are tubular. Dial-faced scales are light, easily transportable, durable, fairly accurate and easy to use. There have been problems with the internal parts of the scale rusting, and this type of scale is one of the most expensive of the dial models.

(3) Tubular spring scales: These scales are light to transport, but are less durable and more difficult to read than the dial-faced variety. The problem of reading the scale is accentuated if the child is restless. The diagrams show a variety of methods of suspending a child to weigh it. Considerations include the ages of the children to be weighed and cultural acceptability.

(4) Bathroom-type scales: Although these are widely used, they are not accurate, and become unreliable but they are portable and cheap.

(5) Digital scales: These electronic scales, a recent development. Although quick and easy to use, they are still relatively expensive. The scale displays the exact weight so that the health worker does not need to read the number from a continuous scale. This comprise the electronic weighing scale with measuring road for height, electronic infant scale, electronic bathroom scale, and infant measuring board for height. Due to advanced technology, they are the most used in modern hospital and clinics.

(6) Electronic Scales: UNICEF and others have found electronic scales to be durable and flexible especially given the option of weighing the mother with the child. The mother can be weighed with the child. The mother is then weighed without the child. The difference between the two measures is the child's weight. This technique is useful in situations where the child struggles and use of a sling or weighing pants causes stress for the child. An additional advantage is that the weight of the mother is also available. The scale is manufactured by SECA and is a floor scale for weighing children as well as adults (capacity 150 kg). Weighing capacity from 1 kg to 150 kg in 100 g divisions, accuracy +/- 100 g. Weight of adult on scale can be stored (tared) in memory, allowing the weight of baby or small child held by adult to show on scale indicator. The portable scale, weighing 4 kg, includes a solar cell on-switch (light sensitivity 15 lux) and is powered by long-life lithium battery good for one million weighing cycles.

(7) TALC Weighing Scale: The TALC scale can be used like any other hanging scale, with the advantage that a growth chart can be put in it, and the child's weight is marked directly from the pointer on the spring.

The TALC scale can be made locally from a TALC starter kit. This includes three springs, instructions and three specimen growth charts. The scale can also be made from local materials with the purchase of the TALC scale spring and instructions.

(8) Suspended Infant weighing scale: This scale was developed in conjunction with the US Centers for Disease Control (CDC). It is a dial scale made of durable plastic with an easy to read face. It is capable of weighing up to 25 kg in 100 gram increments. The one-kilogram pack includes a sling, weighing trousers, a detachable handle for weighing larger children and a vinyl shoulder bag.

2.6.4 Length/ Height board measurement (Cogill, 2003)

(1) UNICEF model: An infant/ child height measuring board measuring both recumbent length and standing height. This board is made of smooth-finish wood with all parts glued and screwed; height is 130 cm (collapses to 75 cm); width 30 cm; with an estimated weight of 10 kg. The board comes with a shoulder strap. Illustrated instructions for assembly and use are included, as well as guidelines and plans for local construction.

(2) Infant/child height/length measuring board: This board has 130 cm capacity (collapses to 75cm) and has 0.1 cm increments. The board weighs 6 kg, is portable, water resistant and has an adjustable, removable nylon shoulder strap. It is easy to assemble and dismantle, with the sliding head-foot piece stored in the base of the board for transport or storage.

(3) Infant Recumbent Length Board: This board is lightweight, durable and capable of measuring recumbent length up to 100 cm.

(4) Infant measuring board: This measuring board is designed to be especially lightweight and extremely portable. It can measure up to 100 cm, is collapsible and comes with a vinyl plastic tote bag.

(5) Portable adult/Infant measuring board: This is an adjustable measuring board which has been extensively used by World Health Organization (WHO) and CDC, with a vertical aluminum post. It can measure the height of adults and then by taking off its vertical extension it can be adapted to measure infants. When collapsed, it is approximately the length of two briefcases laid end to end. It also has an optional vinyl carrying case.

(6) MUAC Tape: This arm circumference insertion tape measures mid-upper arm circumference of children, up to 25 cm. Color-coded in red/yellow/green, non-tear, and stretch-resistant plasticized paper.

(7) Estimating the age of the child: Where a child's age is unknown the table shows some methods that may be useful in estimating the approximate age of the child. A local events calendar which includes harvest time, religious festivals, or natural disasters, is most valuable. Also useful, is comparing the child with other children in the village whose ages are known.

Age estimation (Nabarro, 1986)

Child conditions	Age estimation
No teeth, cannot sit alone	0 -5 months
Has 1-6 teeth, can sit alone, cannot walk alone	6 -11 moths
Has 6-18 teeth, can walk, knows a few words	12 – 23 months
Has 18-20 teeth, walks well, starting to talk well	24 – 35 months
Walks and run well, talks well, has not yet lost baby teeth	36 – 59 months

Age estimation in a child (Adapted from Nabarro, 1986)

2.7.2 Anthropometric indicators

Nutritional status can be assessed using clinical signs of malnutrition, biochemical indicators and anthropometry. Anthropometry has an important advantage over other nutritional indicators; whereas biochemical and clinical indicators are useful only at the extremes of malnutrition, body measurements are sensitive over the full spectrum. In addition, anthropometric measurements are non-invasive, inexpensive and relatively easy to obtain (De Onis, 2000; WHO & De Onis, 2000).

The variables age, sex, height (length) and weight are important as they are going together hand-in-hand with measurement techniques, instruments used, and professional nurses who are taking the measurements. Three nutritional conditions namely: underweight, stunting and wasting are used in the

following indices below in the identification of malnutrition (Cogill, 2003): Weight-for-age, Length-for-age or Height-for-age, Weight-for-length or Weight-for-height, and mid-upper arm circumference (MUAC). These three anthropometric indices were also identified by Waterlow (1972) and the advantages and disadvantages were also described and interpreted by Nabaro (1986), Cogill (2003) & De Onis (2006), as followed:

2.7.1 Weight-for-height (W/H)

Low weight-for-height helps to identify children suffering from current or acute undernutrition or wasting and is useful when exact ages are difficult to determine. Weight-for length (in children under 2 years of age) or weight-for-height (in children over 2 years of age) is appropriate for examining short-term effects such as seasonal changes in food supply or short-term nutritional stress brought about by illness. Wasting is the result of a weight falling significantly below the weight expected of a child of the same length or height. Wasting indicates current or acute malnutrition resulting from failure to gain weight or actual weight loss. Causes include inadequate food intake, incorrect feeding practices, disease, and infection or, more frequently, a combination of these factors. Wasting in individual children and population groups can change rapidly and shows marked seasonal patterns associated with changes in food availability or disease prevalence to which it is very sensitive (Cogill, 2003).

W/H measures body weight relative to height, and has the advantage of not requiring age data. Weight-for-height is normally used as an indicator of current nutritional status, and can be useful for screening children at risk and for measuring short-term changes in nutritional status. Low W/H relative to the child of the same sex and age in a reference population is referred to as "thinness". Extreme cases of low W/H are commonly referred to as "wasting". Wasting may be the consequence of starvation or severe disease (in particular diarrhoea), but it can also be due to chronic conditions. It is important to note that a lack of evidence of wasting in a population does not imply the absence of current nutritional problems such as low height-for-age (Waterlow, 1972).

Advantages of weight-for-height as a monitor of child growth:

- It identifies the very thin or wasted child with definite malnutrition who requires immediate attention.
- It is a good indicator to distinguish children who are well-proportioned from those who are thin for their height.
- It does not require age data.

Disadvantages of weight-for-height

- Stunted children with reasonable body proportions are classified as not malnourished, but children who are short (stunted) and also thin, will be classified as wasted, rather than stunted.
- Two pieces of equipment are required: a height as well as a weighing scale.
- Taking two measures takes longer, and this is a problem for a busy clinic; more training is also required and there is more chance of error.
- Some mothers may be reluctant to have their children weighed.
- Measuring height or length requires two people.
- It is more difficult for unskilled, busy professional nurses to learn to take accurate measurements of length and height than to weigh a child (Nabarro, 1986).

2.7.2 Height-for-age (H/A)

Low height-for-age index identifies past undernutrition or chronic malnutrition. It cannot measure short term changes in malnutrition. For children below 2 years of age, the term is length-for-age; above 2 years of age, the index is referred to as height-for-age. A deficit in length-for-age or height-for-age is referred to as stunting. Low length-for-age, stemming from a slowing in the growth of the fetus and the child and resulting in a failure to achieve expected length as compared to a healthy, nourished child of the same age, is a sign of stunting. Stunting is an indicator of past growth failure. It is associated with a number of long-term factors including chronic insufficient protein and energy intake, frequent infection, sustained inappropriate feeding practices and poverty (Cogill, 2003).

H/A reflects cumulative linear growth. H/A deficits indicate past or chronic inadequacies in nutrition and/or chronic or frequent illness, but cannot measure short-term changes in malnutrition. Low H/A relative to a child of the same sex and age in the reference population is referred to as "shortness". Extreme cases of low H/A, where shortness is interpreted as an abnormality, is referred to as "stunting". H/A is primarily used as a population indicator rather than for individual growth monitoring (Waterlow, 1972).

Advantages of height-for-age as a monitor of child growth:

- It can indicate past nutritional problems and illnesses.
- A board for measuring length and height can be made locally at low cost and easily transported and is easily usable for outreach professional nurses.
- Mothers are rarely unhappy about a child being measured with a measuring board.

Disadvantages of height-for-age

- Changes in height occur relatively slowly compared with weight changes.
- It is not recommended as an independent measure.
- It is more difficult for unskilled professional nurses to learn to take accurate measurements of length and height than to weigh a child.
- Two people may be required to measure height/length and accurate age data is also required.

2.7.3 Weight-for-age (W/A)

Low weight-for-age index identifies the condition of being underweight, for a specific age. The advantage of this index is that it reflects both past (chronic) and/or present (acute) undernutrition (although it is unable to distinguish between the two). Underweight, based on weight-for-age, is a composite measure of stunting and wasting and is recommended as the indicator to assess changes in the magnitude of malnutrition over time (Cogill, 2003).

W/A reflects body mass relative to age. W/A is, in effect, a composite measure of height-for-age and weight-for-height, making interpretation difficult. Low W/A relative to a child of the same sex and age in the reference population is referred to as "lightness", while the term "underweight" is commonly used to refer to

severe or pathological deficits in W/A. W/A is commonly used for monitoring growth and to assess changes in the magnitude of malnutrition over time. However, W/A confounds the effects of short- and long-term health and nutritional problems.

Advantages of weight-for-age as a method of monitoring child growth:

- It is considered to be a useful indicator for growth monitoring in general terms.
- A child's nutritional status, as reflected by weight and age is a good indicator for detecting growth faltering.
- It is sensitive to small changes and the only tools needed are weighing scale and charts.
- Weighing is a fairly easy and quick task for an inexperienced professional nurse.

Disadvantages of weight-for-age:

- Weighing should be done regularly and this is not always possible;
- It is necessary to know a child's age to the nearest month and this information is not always available;
- Mothers may object to their children being weighed with scales, in some cultures, and many children feel frightened and insecure.
- Malnourished children - aged over one year - who have oedema or ascites may not be classed as malnourished when in fact they are.

Federico Gomez and colleagues (1956) described the clinical picture preceding death and the apparent cause of death in malnourished children. They relied on the average "theoretical weight" they had found among Mexican children; on this basis, classifications of varying degrees of malnutrition were developed. Patients were classified into three groups according to severity of malnutrition, namely: first degree (76–90% of the "theoretical weight" average for the child's age), second degree (61–75%), and third degree (60% or less). With time, the so-called "Gomez classification" (using the Harvard reference values and different cut-off points (80%, 70% and 60% of median) was used widely both to classify individual children for clinical referral and to assess malnutrition in communities.

A study by Abdul-Fadl (2010) was conducted in the countries of the Eastern Mediterranean Region on the effectiveness of the utilization of the growth chart. The weight-for-age growth chart was used in 9/16 (56.3%) of the countries; the weight-for-height standard for growth was used in 3/16 (18.8%) of the countries: and the height-for-age and head circumference-for-age combined was also used in 9/16 countries (56.3%).   Mid-upper arm circumference was used in 2/16 countries (12.5%). The classification system in use was reported to be based on the percentile system in 13/16 (81.3%) of the countries; and 3/16 (18.8%) of the countries, used the z-score. The common problems or constraints encountered in child growth monitoring programmes were:

- Lack of adequate training of personnel (reported by 6/16 countries, 37.5%);
- Followed by poor understanding of the risk of overweight (5/16 countries, 31.3%) and inaccurate plotting of growth data (5/16 countries, 31.3%);
- Also, difficulties with understanding and interpretation of growth reference curves were frequently reported (4 /16 countries, 25.0%);
- Tangible constraints included poor condition of weighing scales: lack of maintenance, standardization and timely replacements (in 4/16 countries, 25.0%);
- Attitudinal constraints were less common, but still a problem and included poor understanding by health care workers of the risk of underweight and the importance of identifying and referring these children (3/18 countries, 18.8%);
- The measurement of height and the use of weight-for-height charts was agreed to be an important measurement which needed to be added to growth assessment by all countries;
- Problems that might be faced if height measurement was introduced were: lack of trained personnel (in 8/16 (50%) of countries), lack of equipment (8/16 (50%) of countries and lack of time during the growth monitoring session in (6/16 (37.5%) of countries).

A study by Qayad (2005) in Somalia, following the assessment of the competence of professional nurses in detecting malnourished children under 5 years old, was divided into two groups: the weight-for-age percentage median index considered as the gold standard according to Waterlow's classification, and nutritional status determined by professional nurses as the screening measures. Children who registered

>75% median weight-for-age were categorized as normal, and those <75% median weight-for-age as malnourished. From this study the following problems was emerged:

- Seventeen percent (17%) of the children were malnourished based on the gold standard, whereas 13.5% were malnourished in the screening measure;
- Girls showed higher prevalence of malnutrition than boys for both measures;
- Professional nurses underestimated the prevalence of malnutrition by 21%;
- The positive and negative predictive values of the weight-for-age percentage median of professional nurses screening measure were 76% and 92% respectively;
- Around 24% of the children classified by professional nurses as malnourished were actually normal, and 8% of the children classified as normal were actually malnourished; and
- The number of malnourished children misclassified as normal was higher than the number of normal children misclassified as malnourished, namely 33 and 16 respectively.

A study by Harrison (1998), conducted in South Africa, showed that there was inaccuracy and poor completeness of recorded data in the RtHC by professional nurses, and also indicated that the weight-for-age was measured and plotted incorrectly in the growth chart. The study addressed the four sections of the RtHC, namely neonatal data, immunization schedules, measurements and a weight-for-age graph. The following problems were identified:

- Most professional nurses (80%) supported the concept of the RtHC but many (43%) felt that its significance was not stressed adequately;
- The majority (80%) recommended that it be replaced with a notebook to be retained by the mother as her baby's personal health record, and the new book should be in the parents' home language;
- Reasons for this suggestion included offering more information on health matters (17%); adequate space to record weight (56%), and infectious diseases (11%);
- The provision of an illustrated milestone chart (74%) and an improved schedule for immunizations (33%);

- Half the nurses interviewed considered that they were too busy to fill in details, and a significant proportion (37%) did not know how to use the weight-for-age chart, while for some (11%) the centiles were a mystery;

- Many professional nurses (22%) lacked interest in the RtHC card, 11% considered it to be confusing, and 33% thought that the plotting area was cramped;

- About 43% of professional nurses believed that immunizations were a valuable measure of health, and 31% considered adequate nutrition to be important, although no advice on the latter features on the RtHC.

2.7.4 Mid - Upper Arm Circumference (MUAC):

This is a relatively easy to measure and a good predictor of immediate risk of death. It is used for rapid screening of acute malnutrition from the 6-59 month age range (MUAC) overestimates rates of malnutrition in the 6-12 month age group). MUAC can be used for screening in emergency situations but is not typically used for evaluation purposes. MUAC is recommended for assessing acute child undernutrition and for estimating prevalence of undernutrition at the population level (Cogill, 2003).

2.8 Protein-Energy-Malnutrition

Protein-energy malnutrition (PEM), the most widespread pattern of malnutrition, occurs most frequently in infants and young children as a result of a coincident lack of protein and calories, and it is commonly associated with infection. Most authors have described the disease as occurring in three clinical types, with marasmus at one end of the spectrum kwashiorkor at the other end, and marasmic kwashiorkor as an intermediate form (Dulger et al, 2002).

In children, protein–energy malnutrition is defined by measurements that fall below two standard deviations under the normal weight for age (underweight), height for age (stunting) and weight for height (wasting). Wasting indicates recent weight loss, whereas stunting usually results from chronic weight loss. Of all children under the age of five years in developing countries, about 31% are underweight, 38% have stunted growth and 9% show wasting. Protein– energy malnutrition usually manifests early, in children between 6

months and 2 years of age, and is associated with early weaning, delayed introduction of complementary foods, a low-protein diet and severe or frequent infections (Muller & Krawinkle, 2005).

Marasmus and kwashiorkor are the two primary clinical manifestations of diets deficient in energy and protein. The factors determining whether kwashiorkor or marasmus develops remain unknown. Marasmus has been described as an adaptation to inadequate energy and protein intake, and kwashiorkor as a dysadaptation (Manary et al, 1998).

Severe malnutrition, typified by wasting, oedema or both, occurs almost exclusively in children. Marasmus is defined as severe wasting; marasmic kwashiorkor as severe wasting in the presence of oedema; and kwashiorkor, as malnutrition with oedema. The word *kwashiorkor* originates from the Ga language in Ghana; it implies "the disease that the young child developed when displaced from his mother by another child or pregnancy (Muller & Krawinkle, 2005).

Kwashiorkor is an acute form of childhood protein-energy malnutrition characterized by oedema irritability, anorexia, ulcerating dermatoses, and an enlarged liver with fatty infiltrates, skin dyspigmentation, hair changes and reduced hepatic export proteins. The presence of oedema caused by poor nutrition defines kwashiorkor (Brewster, et al, 1996). Marasmus is characterized by wasting and decreased physical activity, but with stimulation, mental status and appetite are relatively normal (Manary et al 1998).

Malnutrition is a common cause of preventable morbidity and mortality among children in developing countries and is a risk factor for illness and death in an estimated 60% of the almost 10 million deaths from preventable causes for children aged below five years. Clinically severe malnutrition is also an important problem in hospitals in economically poor countries and is associated with very poor outcomes. Despite an improved understanding in the pathophysiology of this condition over the last five decades, hospital mortality rates of severe malnutrition have remained high, with rates of up to 50% being reported. Much of this high inpatient mortality has been attributed to outdated and inappropriate clinical care (Nzioki et al, 2010).

Malnutrition continues to be one of the world's most serious development problems. Exacerbating the consequences of infectious disease, malnutrition contributes annually to about 6 million deaths annually of children under 5. Malnutrition can take the form of under-nourishment or over- nourishment, characterized by a shortage or surplus of calories and/or specific nutrients. Child under-nutrition is measured as low height-for-age (stunting), low weight-for-age (underweight), and low weigh-for-height (wasting). Stunting, or chronic malnutrition, is the failure to reach one's biological potential for growth, and indicates long-term under-nutrition. Wasting indicates significant recent or current weight loss, often resulting from severe disease or emergency conditions. Underweight can imply stunting or wasting. Each of these can be categorized as mild, moderate, or severe. Worldwide, 2 billion people suffer from deleterious effects of micronutrient deficiencies. Deficiencies in key vitamins and minerals, especially iron, vitamin A, zinc, and iodine are associated with disease prevalence and severity (Levinson & Basset, 2007).

A study by Nzioki et al (2010) in Kenya on the assessment by professional nurses, on the implementation of the WHO guidelines with 10 steps that need to be followed in the inpatient care of severe malnutrition, which is to treat or prevent the following conditions, including; to see the RtHC: hypoglycemia, hypothermia, dehydration, correct electrolytes in balance, treat infection routinely, correction of micronutrient deficiencies, initiate feeding, and catch up feed. The study showed that the most frequent type of severe malnutrition was marasmus (58%), marasmic-kwashiorkor (27%), and kwashiorkor (15%). The majority (85.1%) of the children were aged below 24 months. Children with marasmus were significantly younger than those with kwashiorkor and marasmic- kwashiorkor. The median weight-for-age Z-score was −3.5 with no significant difference between the clinical groups. Common co-morbid clinical conditions documented at admission were diarrhoea (70.3%) and pneumonia (51.5%). Furthermore, 38 patients died with a case fatality rate of 38% during the study period; however no ward had wall chart guidelines on the management of severe malnutrition.

A study by Puoane et al, (2001) in South Africa on the assessment and management of severe malnutrition, showed that professional nurses were facing challenges in the monitoring of the RtHC, including lack of resources, unavailability of scales or scales not in working condition, lack of staff, especially at night, contributing to inadequate care, and poor monitoring of children's intake, output, and

weight. Professional nurses also voiced their frustration about the lack of motivation, resulting in omission of certain nursing procedures.

2.9 Worm infestation

An estimation of worm infestation worldwide indicated that more than 1.2 billion people are infected with roundworms (Ascaris lumbricoides), almost 800 million with whipworms (Trichuris trichiura) and more than 700 million with hookworms (Necatoramericanus and Ancylostoma duodenale) (Reubenson, 2007).

Most of these nematodes are prolific egg layers; a single female Ascaris may deposit about 200,000 eggs per day. Globally about 1014 Ascaris eggs pass daily into the environment, where they may survive for up to 15 years. Ascaris eggs are sticky and may be found on many different places: on the door handles, fruit, vegetables, cooking utensils, or under fingernails. Poor living conditions and poverty are ideal conditions for worm infestation, which adversely impacts on nutritional status and cognitive development (Mascie-Taylor, 2003).

A study in Brazil showed that there was a relationship between PEM and vitamin A, and parasitozes in children, by using the Waterlow classifications of anthropometric indices. It was found that the majority of children were stunted; anemia detected in selected children was having worm infestation, namely; Ascaris lumbricoides, Giardia lamblia, and Hymenolepis nana. Ascaris lumbricoides was the most prevalent parasite; followed by cysts of Giardia lamblia which were also highly prevalent. The estimated load of Ascaris lumbricoides varied from 2 to 114 worms. In the percentage of parasitized children below -2 SD Z-score, only G. lamblia was observed more in the weight-for-age at 3/12 (25%) and 1/12 (8.3%) in the height-for-age. Only A. lumbricoides was more observed at 5/23 (21.7%) in the height-for- age. There was statistical no difference in retinol concentration in serum in the different age groups. The study also indicated that low and poor food intake was the major cause of protein-energy malnutrition among the children (Muniz-Junqueira & Queiroz, 2002).

A study in Lucknow, India; indicated that parasite infestation was highly prevalent in stunted, wasted, and underweight children. The main parasites detected in a single stool laboratory test on these children were Ascaris lumbricoides, cyst or trophozoites of Giardia lamblia, and hookworm infestation. The blood test also showed that the majority of these children were anaemic with hemoglobin of less than 10g/dl. The evidence for malnutrition comes from the fact that Ascaris- infested children showed better weight gain after intervention with anthelminthic treatment. Protein- energy malnutrition has been reported in 81.8% of children (Awasthi & Pande, 1997).

In 2004 in South Africa, only 6% of pre-school children received either albendazole or mebendazole. Clearly health professionals are not doing as well as they could. Cysticercosis, particularly neurocysticercosis (caused by Taenia solium) and schistosomiasis (*S.* haematobium and S. mansoni) are also of public health concern in South African children. Part of the problem with diagnosing and treating individuals infected individuals with worms, is that they are largely found in the least accessible and poorest areas of affected countries where there is absence of access to good sanitation and clean water. It is known that intestinal worm infections are associated with childhood malnutrition, growth stunting, adverse intellectual growth, as well as cognitive and educational deficits (Reubenson G, 2007).

2.10 Vitamin A supplementation

Micronutrient deficiency is worldwide considered as a public health concern. About 4.5 billion of people are suggested to be affected by deficiencies in iron, vitamin A, zinc and Iodine. Young children and pregnant women are most vulnerable to these deficiencies. Micronutrient malnutrition diminishes motivation and development of children, with the consequence of impaired mental and cognitive ability. These children are deprived of their full potential for mental and physical development, and become adults with lower intellectual and lower physical abilities (Dickinson, 2008).

Vitamin A deficiency is also a global public health problem affecting populations in more than 75 developing countries. Vitamin A deficiency is one of the major causes of childhood morbidity and mortality in economically deprived countries (Dairo & Ige, 2009). About 254 million preschool children worldwide are

suffering the consequences of vitamin A deficiency, includes growth failure, depressed immunity, high risk of xerophthalmia, and night blindness (Palafox, 2003).

Deficiency in vitamins may be primarily dietary in origin or secondary because of disturbance in intestinal absorption, transport in the blood or metabolic conversion. Important sources of vitamin A are animal-derived including liver, fish, eggs, milk, butter, yellow and leafy green vegetable such as carrots, squash and spinach which all supply large amounts of carotenoids (Kumar et al, 2005).

In the developed world, food fortification has proven sustainable because of the presence of large centralized food industries, packing and labelling that facilitate monitoring and enforcement, and well-educated consumers who are aware of the value of adequate nutrition and have sufficient income to purchase the products. In contrast, in poor countries; food is mainly based on cereals and legumes as poor sources of vitamin A. Even carotenoid-rich vegetables have low vitamin A bio-availability and bio-efficacy (Dary & Mora, 2002).

A study in Bengal and Bihar on knowledge, attitude and practice, indicated that about 60% of mothers did not know about the impact of green vegetables on anaemia, about 55% were not giving vegetables to a young child, 33% believed that they were not digestible, 6.4% believed that they would cause diarrhoea, 8.2% said that they were no use and 47.2% of the respondents did not know the reason for night blindness (Chakravarty & Sinha, 2002).

In Nigeria, a study by Ajaiyeoba and Samaila (2001) showed a high prevalence of vitamin A deficiency using serum retinol, in the north-east and north-western health zones with rates of 49.6% and 48.6% respectively. The national prevalence of Xerophthalmia is 1.1%. The highest prevalences were recorded in the south- western and north-west zones. Corneal xerosis (stage X2) was the commonest ocular presentation amongst vitamin A deficient children.

The study in the Western Cape indicated that, the main problems identified by health care staff in the two regions were lack of vitamin A capsules, inadequate training, and difficulties in implementing the Programme. Furthermore, staff forgetting to check the vitamin A protocol and to record the vitamin A given, and confusion over the indications for vitamin A supplementation; running out of vitamin A capsules at times and inadequate training. Rural clinics are less well resourced, staff member have less access to training and there is often less support for implementation of programmes, also rural children are worse off in terms of socio-economic status, access to health services and have been found to have worse under-nutrition and micronutrient deficiency (Hendricks et al, 2007).

A study in Cape Town indicated that missed opportunities of vitamin A were influenced by professional nurses' attitudes and behaviours in the interaction with parents. Some mothers had difficulties to address their concerns, to disclose their problems or to ask any questions because they feared the reactions from the professional nurses. Also, the professional nurses could be rude and shout at mothers, and impose unfair consequences on them. Mothers expressed their negative experiences; they had received no information, education or instructions, while busy professional nurses had shown no consideration for them. They were also discouraged by the long waiting time, and were not attended to until hours later. The issue of waiting time was a particular problem for mothers who had to go back to work (Andresen, 2009).

In another study by Hendricks et al (2006) on missed opportunities of vitamin A supplementation to children in different clinics of rural and urban regions of the Western Cape Province of South Africa, the following problems were identified:

- The lack of administration of vitamin A was not linked to an unavailability of vitamin A capsules at any of the clinics;

- Often in the same clinic there were children who were given vitamin A, while opportunities were missed in supplementing those in whom vitamin A deficiency was indicated;

- Problems identified included difficulties in implementing the Programme, which included staff forgetting to check the vitamin A protocol and to record the vitamin A given, and confusion over the indications for vitamin A supplementation
- Clinics were running out of vitamin A capsules at times, and professional nurses were inadequately trained.
- There was also suboptimal delivery of vitamin A capsules to the children who needed them, inadequate promotion and a lack of awareness of the Vitamin A Supplementation Programme among mothers and caregivers.

Vitamin A deficiency increases the severity of and mortality from measles and diarrhoea. Increased infectious morbidity and mortality are apparent even before the appearance of xerophthalmia. Improving the vitamin A status of deficient children aged 6 months to 6 years can dramatically reduce their morbidity and mortality from infection. Prompt administration of large doses of vitamin A to children with moderate to severe measles, particularly if they may be vitamin A deficient, can reduce individual mortality by 50% and prevent or moderate the severity of complications (Sommer, 1997).

2.11 Management of others illnesses through the Integrated Management of Childhood Illness (IMCI)

About 12 million deaths occur annually in children under-5 in developing countries. Seventy percent of these deaths are due to the common childhood illnesses (diarrhoea, pneumonia, measles, malaria, malnutrition) and often a combination of these conditions. The strategy of Integrated Management of Childhood Illness (IMCI) was developed by WHO and UNICEF and aims at reducing child mortality and morbidity in developing countries. It combines improved management of common childhood illnesses with proper nutrition and immunization. Studies have shown that the guidelines for the Integrated Management of Childhood Illness (IMCI) can lead to appropriate management of sick children by professional nurses in the primary health care facilities (Karamagi et al, 2004).

The IMCI challenge was to move from the vertical, disease-specific approach of traditional programmes to a more integrated and horizontal child approach, in line with the philosophy of primary health care. In South

Africa, the strategy has been expanding its influence for the past 8 years, with over 8 000 health professionals trained in IMCI and it being used at clinics in all 52 districts in the country (Saalooje et al, 2007).

2.11.1 Weaknesses identified in the delivery of IMCI

(1) Parent

• Inadequate knowledge of caregivers regarding medication or when to return to the health facility

(2) Health professionals

• Ignored some components, e.g. nutrition counselling and inconsistent prescribing of some medication, e.g. vitamin A.

(3) Health system

• Deficiencies in health facilities could not always be overcome, e.g. drug supply, unable to address impediments, e.g. staff rotation, policies on staff deployment and transfer.

• Lack of defined budget, logistic guidelines and tools, mechanisms for outcome monitoring, and a communication strategy. Current training approach is too time consuming, preventing quick rollout, and staff supervision is not sustainable.

• Equitable coverage of interventions not achieved.

• Perception that guidelines result in too many referrals.

• Community-based activities patchy and largely ineffectual.

• Few efforts to include non-public sector health professionals in strategy (Saalooje et al, 2007).

A study was done in Gambia on the detection and identification of reliably severe protein-energy malnutrition in children by professional nurses, using the WHO integrated management of childhood illness nutrition algorithm. It was found that professional nurses were able to identify easily only visible severe wasting or bipedal oedema. Primary diagnoses in the children, who were wrongly diagnosed by professional nurses and in those malnourished children missed by professional nurses, were similar to

those correctly identified. Using the IMCI nutrition algorithm, professional nurses did not identify malnourished children reliably (Hamer et al 2004).

A study in Uganda showed that counselling was poorly performed and that health providers found IMCI counselling the most difficult component to implement. The study aimed to determine factors that facilitate or constrain counselling. Professional nurses found that IMCI counselling was time consuming, and yet there were many patients that had to be attended to; that it was not possible to check whether mothers did what they were counselled to do; professional nurses were unhappy about frequent shortages of drugs and also complained that many planned visits never took place. Mothers complained of being delayed because of the long session of IMCI counselling; children were referred but most health facilities did not have pre-referral drugs for treatment of the children before they were referred (Karamagi et al, 2004).

A study by Schoeman et al (2010) in South Africa, on the assessment of primary health infrastructure, services and the nutritional status of 0- to -71 –months-old children and their caregivers in the Eastern Cape (EC) and KwaZulu-Natal (KZN), it was showed that more than 80% of the professional nurses reported infrastructural problems, insufficient resources, and the existence of potentially harmful cultural practices as problems influencing the quality of services. The following problems were also encountered: Many nurses were not aware which INP guidelines were used at the facility (EC: 30%; KZN: 50%), and disregarded the fact that they had received training in INP, IMCI, PMTCT, HIV, EPI and PEM programmes it was found that the professional nurses had received the very lowest scores for coverage and implementation of these programmes in both provinces. The question is whether they did not have malnutrition registers or whether those they had were incomplete.

2.12. Immunization programme

In 1974 the World Health Organization (WHO) launched the Expanded Programme on Immunization (EPI) to make vaccines available to all children worldwide (WHO, 1974). Vaccines are the most effective means of combating preventable and dangerous infectious diseases. Introduction of vaccines, particularly among infant and young children, had led to significant reduction in morbidity and mortality from these infectious diseases, thereby lowering infant mortality rate. Sub-Saharan Africa, despite the international effort on the accessibility of vaccines, missed many opportunities and the mortality rate for the under-five remained the highest in the world (Koumare et al, 2009).

Substantial efforts have been made by sub-Saharan African countries to reinforce their immunization programme. One of the major challenges facing immunization services is to achieve and sustain the high levels of performance necessary for complete and appropriate coverage of target populations (Bicaba, 2009). Studies in developing countries demonstrated that a significant number of children leave health facilities without their incomplete immunization having been detected. Opportunities for immunization are most likely to be missed in visits to curative health service (Harrison et al, 1993).

2.13 Missed opportunities of immunization

A missed opportunity is defined as an encounter of the patient with the health provider in which there was a failure to administer a required vaccine. These missed opportunities most often affect socio-economically disadvantaged children who may not visit a primary health care regularly. More missed opportunities to vaccinate occurred during sick visits because many health providers only immunize children during preventive well-child visits (Dodd D, 2003).

Unfortunately, the access to immunization and utilization of health care services by parents or caregivers remain poor in many countries. This means that immunization coverage and strategies put in place by the international organizations for the prevention and intervention efforts also remain poor. It is estimated that more or less 50% of children under five years in developing countries are currently vaccinated against preventable diseases (Loevinsohn & Loevinsohn, 1987).

A study by Gest et al (2000) also demonstrated that the combination of immunization, growth chart monitoring, nutritional programme and other preventive services were less than optimal, less than expected. Only 60% to 70% of such services are delivered in public clinics or in privates clinics. Several studies have assessed and identified reasons of missed opportunity of immunization by pointing out the failure of chart review and the failure in the implementation of the immunization programme.

Missed opportunities of immunization are also remarkably associated with parents, who are not producing the RtHC at immunization session, misconceptions about side effect of vaccines, and non-compliance with appointment dates and schedules of routine immunization programmes. Missed opportunities of immunization are also due to parents or caregivers with a lower level of formal basic education (Tugusimirize et al, 2002).

A study by Kabir (2004) conducted in Nigeria found that missed opportunities of immunization were due to failure to administer simultaneously all vaccines for which the child was eligible due to unavailability of vaccines. Mothers were asked to return at a later stage for immunization when vaccines would be available, or to wait for national immunization days. Other missed opportunities of immunization were due to false contra-indications. Failure of immunization was also due to poor knowledge of mothers on where or when the immunization would take place, and mothers had wrong ideas about immunization. This was also due to poor health promotion by health professionals with regard to the immunization programme.

Similarly, in Ghana professional nurses rarely asked questions about mothers' understanding of information provided with regard to immunization. During the process of health care service delivery, one side of the problem was that the professional nurses addressed their concerns about lack of materials and drugs for curative care, and the other side was caregivers complained about the long waiting time, lack of rapport with the professional nurses, and the higher cost of service rendered. The professional nurses played a minor role in the education effort (Cutts, 1990).

A study in India showed that the most important reasons for missed opportunity were false contraindication to immunization; the practice of not opening a multidose vial for a small number of children to avoid vaccine wastage; the failure to administer simultaneously all vaccines for which a child is eligible; immunization not offered at every health care contact; and logistic problems, poor clinical organization and inefficient clinic scheduling (Jagvir Singh J, Datta K, 1997).

In Canada Tarrant and Gregory (2001) reported that immunization uptake was influenced by four key factors: knowledge barriers, the influence of others, vaccine barriers, and missed opportunities. Vaccines barriers were due to children experiencing side effects of vaccines such as fever and irritability, and pain, swelling, or redness at the injection site. The main reason of missed opportunities of immunization was that frequently children were not vaccinated when mothers attended the clinic with their child for immunization. If children were sick at the time the immunization was due, mothers reported that health professionals would usually recommend that immunization be delayed until the child had recovered.

In Kenya a study by Borus (2004), reported that reasons of missed opportunities of immunization were the fact that vaccine was out of stock, vaccine was not scheduled to be given that day, a child being sick or underweight, a child not yet at age, and syringes being out of stock. A study in Swaziland also showed that missed opportunities of immunization were due to a lack of integration of health service, the professional nurses were not assessing the RtHC before the immunization, and poor knowledge about eligibility for a specific vaccine indicated in women of childbearing age who were not pregnant (Daly et al, 2003).

A study in Mozambique also showed a similar problem of missed opportunities of immunization that, being associated with poor service delivery, long waiting time, no personnel at health facility, and no vaccines available on the day. Missed opportunities of immunization were also due to lack of information about the day for vaccination, parents forgetting the day they were due for immunization. Other reasons were the condition of accessibility to the health facility was difficult, the mother was ill on the day of immunization, and often children with sickness were not vaccinated (Jani et al, 2008).

A study in KwaZulu-Natal indicated that the predominant reason of missed opportunities of immunization was that, the RtHC was not requested by the health worker; in the absence of RtHC, a derailed immunization history was not sought; health workers were reluctant to open a vial of vaccine unless they were sure it would all be used on the same day. Hence many opportunities were missed at the community hospital where numbers were small, and in busier clinics due to work overload, or the refrigerators containing the vaccines are situated far from the consultation area in the another building; often, the vaccine was not always available (Dyer J, 1993).

Similarly, a study in the Western Cape showed that the commonest reasons cited for having missed opportunities of immunization were lack of information and poor promotive activities, caregivers being unable to attend the clinic because the distances were located too far and there was also lack of motivation, immunization times were inconvenient because many parents had to returned back for another immunization session, or there was a shortage of vaccines on the due date, as vaccine was supplied in inadequate stock. The main reason cited under lack of information was the caregiver not being in their home area when the child's vaccination was due, and being unaware that they could take the child to any clinic. They had incorrect ideas about contra-indications that sick children should not be vaccinated and there was a lack of awareness of the need for a repeat dose of a vaccine (Corrigall, 2008).

2.14 Summary of the literature review

In the view of the above literatures and the problems identified by different authors globally, and locally and locally are also common in the primary health care setting in the Tshilwavhusiku local area, subdistrict of Makhado B. The level of knowledge of professional nurses about the four component of the RtHC was explored. The research focused on the problems related to the growth of the child, the measurement, immunization, vitamin A supplementation and deworming, the assessment of other illnesses, as well as the current in practice the use of the RtHC by the professional nurses were also explored. In the following chapter the methodology of this research is outlined.

Chapter 3: Methodology

3.0 Introduction

This study was undertaken from April to June, 2011. It looked at the challenges faced by professional nurses in the monitoring of the Road-to-Health Chart, the degree of its implementation, and the aspects of the Road-to-Health Chart which are being utilized the most in the line with the guidelines, norms and standard set by the Department of Health.

3.1 Aim of the study

The aim of the study was to determine the challenges faced by professional nurses in the monitoring of the Road-to-Health Chart at primary health care level at the Louis Trichardt Memorial Hospital and its surrounding peripheral clinics in the Tshilwavhusiku local area, subdistrict of Makhado B, Vhembe district, Limpopo Province, Republic of South Africa.

3.2 Objectives of the study

The objectives of the study were the following:

- To determine the challenges faced by professional nurses in the monitoring of the Road-to-Health Chart;
- To determine the degree of the implementation of the Road-to-Health Chart programme by professional nurses; and
- To determine which aspects of the Road-to-Health Chart are being utilized by professional nurses at every visit.

3.3 Research question

What are the challenges faced by professional nurses in the monitoring of the Road-to-Health Chart at primary health care level at the Louis Trichardt memorial hospital and its peripheral clinics?

3.4 Study design

This was a descriptive cross- sectional study.

This is a study design that collects data on subjects at one point in time (Brink, 2008). This design has been chosen because it is relatively easy, cheaper and economical to conduct. It is also cost effective, quick, and a wide range of information may be corrected. This design is useful for evaluating the relationship between exposures that are relatively fixed characteristic of individuals and outcome (Abdool Karim et al, 2007). Both exposure and outcome are determined simultaneously for each subject as a snapshot of the population at a certain point in time (Gordis, 2009).

3.5 Study setting

The study was carried out at the outpatient department and the paediatrics ward of Louis Trichardt Memorial Hospital (level-1 district hospital with 53 beds), and at all six peripheral clinics, where four of the clinics are rendering 24-hours health care services, namely; Madombidza clinic (MDC), Tshilwavhusiku Health Centre (THC), Kutama clinic (KMC), Vleifontein clinic (VFC) and the remained two rendering 12-hours health care services, namely; Louis Trichardt Primary Health Care clinic (PHC) and a mobile clinic (MC). The hospital and these peripheral clinics are all situated in the Tshilwavhusiku local area, Makhado B subdistrict, Vhembe district; Limpopo Province, South Africa.

3.6 Study population and sampling frame

The study population from which the sampling frame was derived included all Primary Health Care professional nurses serving in public health institutions, stationed and rotating at outpatient department (OPD) and paediatrics ward of Louis Trichardt Memorial Hospital (LTMH) and also those stationed at all six

peripheral clinics under LTMH located in the Tshilwavusiku local area, subdistrict of Makhado B, Vhembe district, Limpopo Province.

3.7 Sample size

The study population was one hundred and twenty-eight (128) Primary Health Care professional nurses. The sample size was ninety-six (96) using a 95% confidence level, study power of 50% and confidence interval of 5%. The sample size was calculated using the formula (1) of simple proportion through the sample size calculator tool. All inclusive method was used to select the sample.

$$SS = Z^2 * (\rho) * (1-\rho) / C^2 \qquad (1)$$

Z is the standard normal deviation, usually set at 1.96 which corresponds to a confidence level of 95%, **C** is the level of challenges (5% for this study), and **ρ** is the percentage of the degree of implementation of the RtHC.

3.7.1 Inclusion criteria

- Primary health care professional nurses stationed at outpatient department and pediatrics ward of Louis Trichardt Memorial Hospital and these at all six peripheral clinics.
- Public health care services.
- Registration with the Nursing Counsel.
- Primary Health Care professional nurses.

3.7.2 Exclusion criteria

- Primary health care professional nurses in administration.
- Primary health care professional nurses in Emergency Services.
- Auxiliary, Enrolled, and other categories of nurses.
- Professional nurses allocated in theatre.

3.8. Variables and measurement of variables

The researcher intends to measure the challenges faced by professional nurses in the monitoring of the RtHC, the degree of the implementation of the RtHC, and the aspect of the RtHC the most utilized. The level of knowledge, gender, age, and experience of Primary Health Care professional nurses may influence on the exposure (challenges) and the outcome (results) of the study.

3.9 Data collection

This study was conducted from the 27th of April to the 29th of June 2011. The data was collected using the questionnaire. The researcher trained two research assistants who are qualified primary health care professional nurses and proficient in both the local languages (Tshivenda) and English, also who administer the questionnaire. The questionnaire was designed by the researcher based on the Royal College of Paediatrics and child health guidelines (RCPCH, 2006), on the South African Department of Health guidelines (DoH, 2010), and on the modified existing questionnaire validated in the previous studies quoted in the literature review (de Onis, 2003; Schoeman, 2010; Hendricks, 2006; & De Villiers, 2007).

A pilot study was conducted at Waterval clinic in the neighbourhood subdistrict of Makhado A local area. For this purpose, eight primary health care professional nurses were interviewed and the results of the pilot study were not included, but improved the questionnaire of the main study. The result of the pilot study was used as the sole instrument of data collection for the main study. Questionnaire was administered in English by the research assistants. Explanations were given to questions to clarify unclear parts of the questionnaires.

Prior to the administration of the questionnaire, each professional nurse was given information on the aim and objectives of the study, and also allowed to decide about participation in the study. All the professional nurses selected agreed to participate in the study. The informed consent form was then signed by each professional nurse (see Appendix B).

Data collection was done on every Wednesday when nurses were changing shift, when there was a possibility of a greater chance to meet the professional nurses for gathering information and data collection. The questionnaire was divided into four sections: socio- demographic characteristics, challenges faced by the professional nurses, the degree of implementation of the RtHC, and the aspects of the RtHC the most utilized. After the research assistants Data was captured on excel spreadsheet by the researcher and sent to the statistician for analysis.

3.10 Data analysis

Data was captured on Excel spreadsheets and submitted to the Statistics Package of Social Science (SPSS) software (version 18.0) and analyzed by the statistician. A Simple descriptive analysis was done. Variables used in the analysis were age, gender, experience, challenges, degree of RtHC implementation, and the aspect of RtHC most utilized. Comparison of categorical measurements was done using Fisher's Exact Test. Statistical significance set at a $p = 0.05$.

3.11 Reliability and validity

Reliability is the consistency and dependability of a research instrument to measure a variable; types of reliability are stability, equivalence, and internal consistency (Brink H, 2008).

Validity is the ability of an instrument to measure the variable that is intended to measure (Brink H, 2008).

- This has been ensured by conducting a pilot study in the neighbourhood subdistrict in order - To investigate the feasibility of the study;

  - To test the research instrument before data collection for the main study; and

  - To identify errors that may prove costly during the data collection for the main study.

- Answers from participants in the pilot study were weighted against the standard guidelines, which are from:

  - The South African guidelines on the use of the RtHC.

  - The Royal College of paediatrics and Child Health; and

- The existing modified standardized questionnaire validated in similar studies quoted in the literature review of the present study.

- The sample size was 96 professional nurses, a homogeneous group and classified according to their experience in the field as less, moderate, and more experienced.
- The sample size was all-inclusive to ensure representativeness.
- A detailed description of the research process has been given.

3.12. Study bias

The term *bias* refers to any influence that produces a distortion in the results of a study or that strongly favours the outcome of a particular finding of a research study (Brink, 2008). It is also an effect at any stage of a research process, or an influence that tends to produce results that systematically depart from the true values (Ogunbanjo, 2001). Bias cannot be avoided or eliminated completely, but can be minimized. In this study, the following biases were identified:

- Sampling bias: This bias may be introduced when the member of the study population do not each have an equal chance of selection in the study. To minimize this bias, the researcher used an all-inclusive method in the sample size to ensure an equal chance of being selected in the study.

- Observer bias was reduced by making sure the true situation were recorded by research assistants, that professional nurses was not assisting each other, and also the presence of the researcher could influence negatively on the professional nurses answers. Perceptual influences and observer variations were minimized by making use of the trained research assistants who coordinated the data collection, gathering information and recording. The original language of the study population is Tshivenda and a number of PHC professional nurses were competent to communicate in English. To remove any language barrier, the research assistants who gathered information for data collection and recording helped to explain any unclear aspect of the questionnaire to PHC professional nurses.

- Bias of interpretation of the data: An error in analyzing the data and a failure by the researcher to interpret statistical language accurately by can introduce this bias. Also, as the researcher possesses basic computer skills, this bias can be introduced by irregularity in processing by poor techniques of measurements, incomplete data or technically poor standards. To minimize this bias, the researcher requested the help of a statistician.

3.13 Ethical considerations

The anonymity of the professional nurses and the confidentiality of data were maintained throughout the study by using only numbers on the questionnaires. The data was analyzed as a group data. A Comparison was made between the hospital and the clinics. The identities of the professional nurses were not included in the research dissertation.

Permission was obtained from:

- The School of Medicine, Research and Ethics Committee (SREC),

- The Medunsa Research and Ethics Committee (MREC) (Clearance Certificate Number: MREC/M01/2011: PG) of the University of Limpopo (see Appendix B),

- The Department of Health and Social Development of the Provincial Government of Limpopo,

- Signed informed consent was obtained from every patient who was included in the study,

- The Hospital Management of Louis Trichardt Memorial Hospital, prior to commencement of the study in the Tshilwavhusiku local area, Makhado B subdistrict; Vhembe district, Limpopo Province; South Africa.

Chapter 4: Results

4.0 Introduction

In the previous chapter, the methodology of the study was outlined. In this chapter, the results and the interpretation of the findings are presented. The chapter is subdivided into: socio-demographic information of the professional nurses, challenges in the monitoring of the RtHC, the degree of implementation of the RtHC, and the aspects of the RtHC utilized the most.

The researcher considered the following demographic data to define the profile of the professional nurses: age, gender, experience, station, and additional courses completed. Data relating to challenges such as human resources, equipment, knowledge and interpretation of the parameters of child growth surveillance (weight-for-age, height-for-age, and weight-for-height), and missed opportunities of immunization was considered. The professional nurses were further classified by years experiences to determine the degree of the implementation of the RtHC programme at Louis Trichardt Memorial Hospital (Level-1 district hospital) and its surrounding local PHC clinics. The aspects of the RtHC most utilized were further classified, such as the immunization programme (EPI), the growth monitoring programme and promotion (GMP), and integrated management of childhood illness (IMCI), for ease of analysis and description.

A Fisher's Exact Test method was used to determine the association between variables. Comparisons were made between the hospital and the clinics, and statistical significance was set at $p < 0.05$. In the following table (Table 1), it shows how the Primary Health Care professional nurses were selected at Louis Trichardt Memorial Hospital (LTMH) and at the peripheral Primary Health Care clinics in the Thsilwavhusiku local area, subdistrict of Makhado B, in the Vhembe district, Limpopo Province, South Africa.

4.1 Selection of Primary Health Care Professional nurses

Health facilities LTMH (Level-1 district hospital) and local Primary Health Care clinics	Population Nurses of all categories		Population study Professional nurses per each institution		Population selected PHC Professional nurses selected	
	n	%	n	%	n	%
LTM Hospital	155	59.0	68	53.1	36	37.5
Vleifontein clinic	12	4.6	8	6.2	8	8.3
Primary Health Care (PHC) clinic	10	4.0	9	7.0	9	9.3
Madombidza clinic	13	5.0	11	8.6	11	11.5
Tshilwavusiku clinic	44	17.0	18	14.1	18	19.0
Kutama clinic	11	4.0	7	5.5	7	7.2
Mobile clinic	17	6.4	7	5.5	7	7.2
Total	**262**	**100**	**128**	**100**	**96**	**100**

Professional nurses excluded in the study	LTM Hospital		PHC clinics	
	n	%	n	%
Non-Primary Health Care professional nurses	15	46.9	0	0
Maternity	5	15.6	0	0
Emergency Services	4	12.5	0	0
Theatre	4	12.5	0	0
Administration	4	12.5	5	100
Total	**32**	**100**	**5**	**100**

Table 1: Selection of Primary Health Care professional nurses by health facility in the Tshilwavusiku local area, subdistrict of Makhado B, Vhembe district, Limpopo Province

Table 1 reflects the selection of Primary Health Care professional nurses at LTM Hospital and at Primary Health Care clinics under LTMH. From these study settings, 165 professional nurses were identified. At the time of the study, all the identified professional nurses were employed in public health services by the Department of Health of Limpopo Province and were also all registered with the Nursing Council. Out of 165 professional nurses, thirty-seven [37/165 (22.4%)] professional nurses were excluded from the study: thirty-two [32/37(86.4%)] were excluded from the hospital and five [5/37(13.6%)] were excluded from the PHC clinics. From the LTMH alone, fifteen [15/32 (49.6%)] professional nurses were without a Primary Health Care qualification, four [4/32 (12.5%)] PHC professional nurses were involved in administration work, five [5/32 (15.5%)] were allocated to maternity, four [4/32 (12.5%)] were allocated to theatre and the remaining four [4/32 (12.5%)] were allocated to the Emergency Services. Primary Health Care clinics were had five [5/5 (100%)] PHC professional nurses involved in administration work (that is one PHC professional nurse per PHC clinic; one of the PHC professional nurses was administering two clinics: namely: - a PHC clinic and the mobile clinic). From this difference, both the hospital and the peripherals PHC clinics made a total number of one hundred and twenty-eight (128) PHC professional nurses maintained as a population study, and 96 was calculated as a sample size; all ninety-six of the PHC professional nurses were selected in the study sample.

From the hospital out of the sixty-eight [68/128 (53.1%)] professional nurses identified, thirty-six [36/68 (53.0%)] PHC professional nurses were selected after the inclusion criteria were met and thirty-two [32/68 (47.0%)] were excluded. From all the peripheral Primary Health Care clinics, sixty-five (65) PHC professional nurses were identified; out of this total number, sixty [60/65(92.3%)] met the inclusion criteria and were selected in the study and five [5/65(7.7%)] were excluded from the study. The total number of Primary Health Care professional nurses selected for the study was thirty-six [36/96 (37.5%)] at the hospital and sixty [60/96 (62.5%)] at all peripheral Primary Health Care clinics, which makes an overall total number of 96 PHC professional nurses.

4.2 Socio-demographic characteristics

4.2.1 Age
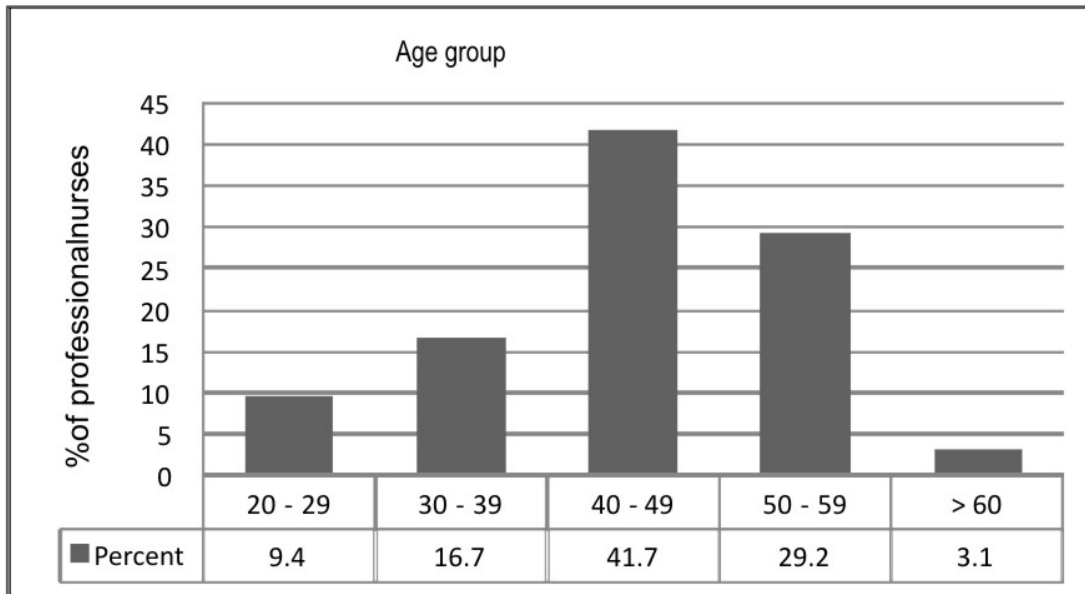
Figure 1: Distribution of professional nurses by age group at the hospital and PHC clinics in the

Tshilwavhusiku, subdistrict of Makhado B.

Figure 1 reflects the percentage of professional nurse by age groups. This figure shows that forty [40/96 (41.7%)] of the professional nurses were in the age group of 40-49 years, twenty-eight [28/96 (29.2%)] of the professional nurses were in the age group of 50-59 years old, sixteen [16/96 (16.7%)] of the professional nurses were in the age group of 30-39 years old, and nine [9/96 (9.4%)] of the professional nurses were in the age group of 20-29 years old. Only three (3/96 [3.1%]) of the professional nurses were in the age group of 60 years old and above.

4.2.2 Gender
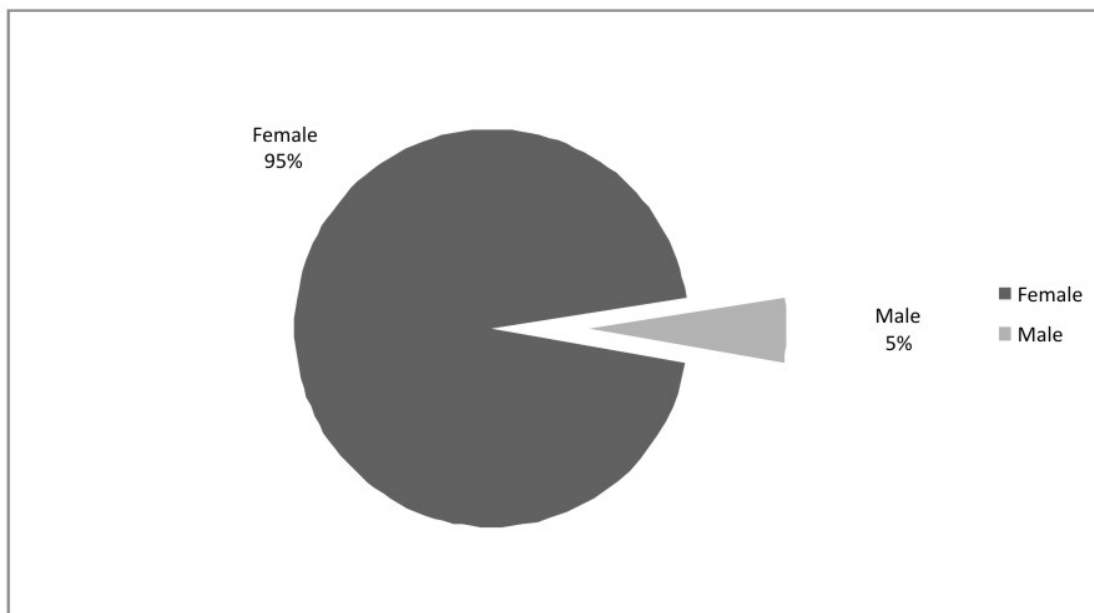
Figure 2: Distribution of professional nurses by gender (group data) at the hospital and PHC clinics in the Tshilwavhusiku local area, subdistrict of Makhado B.

Figure 2 reflects the percentage of professional nurses by gender. This figure shows that ninety-five per cent (95%) of professional nurses were females and five percent (5%) were male. The female-to-male ratio was 19:1.

4.2.3 Experience
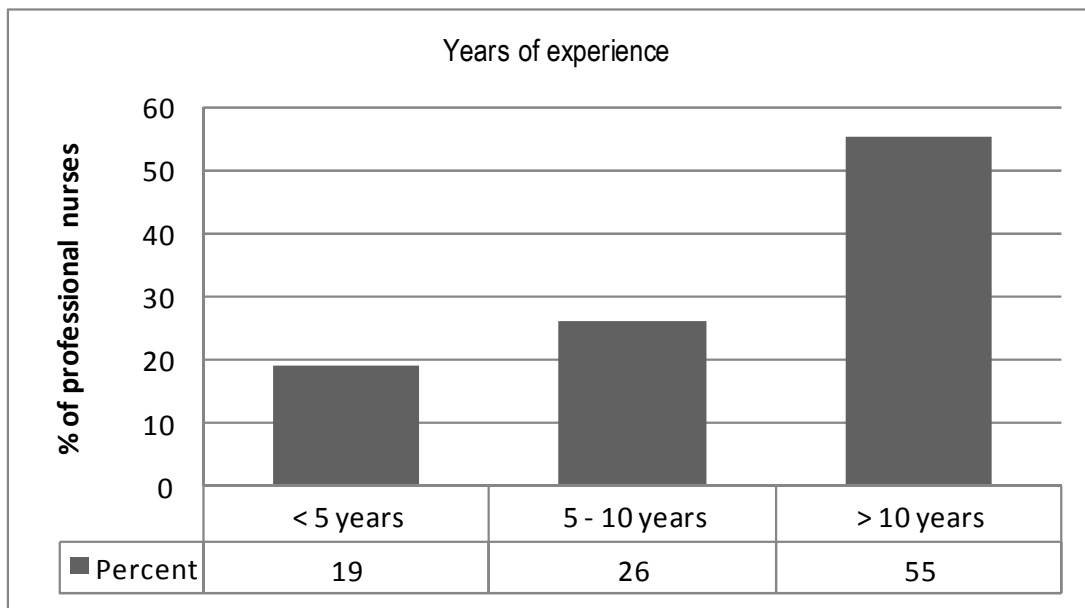
Figure 3: Distribution of professional nurses by years of experiences at the hospital and PHC clinics in the Tshilwavhusiku local area, subdistrict of Makhado B.

Figure 3 reflects the percentage of professional nurses by years of experience. This figure shows that eighteen [18/96 (19%)] of the professional nurses had less than 5 years experience, twenty-five [25/96 (26%)] had between 5 and 10 years of experience and fifty-three [53/96 (55%)] of the professional nurses had 10 years or more years of experience.

4.2.4 Demographic information of professional nurses by health facilities
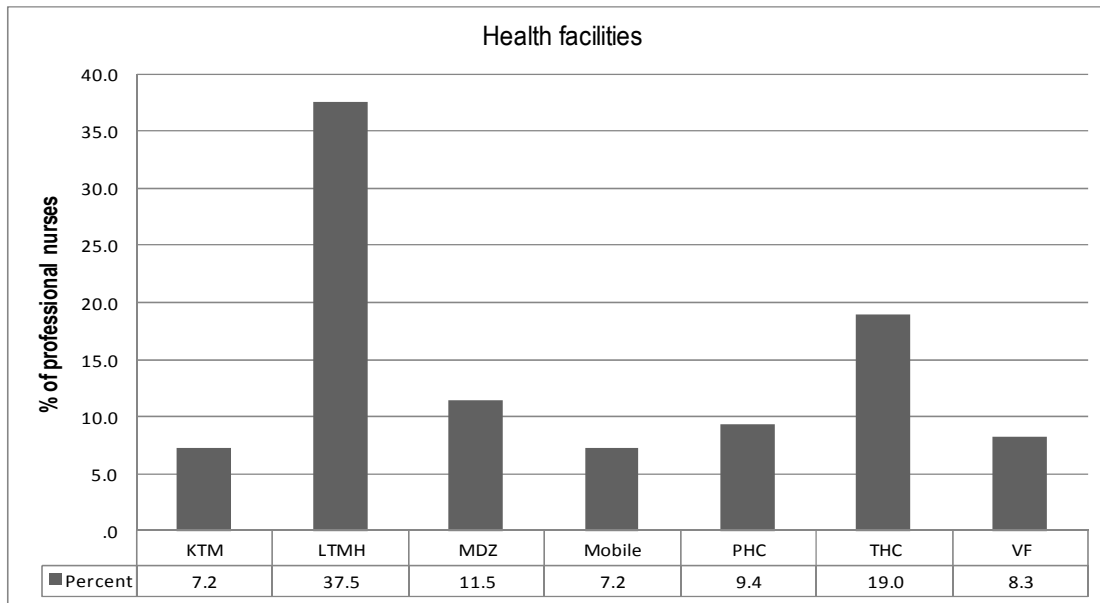
Figure 4: Distribution of professional nurses by health facility (Hospital and PHC clinics) in the Tshilwavhusiku local area, Makhado B.

Figure 4 reflects the percentage of professional nurses by their representation in each health facility, (LTM Hospital and PHC clinics). This figure shows that thirty-six [36/96 (37.5%)] of the professional nurses were from Louis Trichardt Memorial Hospital (LTMH), eighteen [18/96 (19.0%)] of the professional nurses were from Tshilwavhusiku Clinic (THC), eleven [11/96 (11.5%)] of the professional nurses were from Madombidza Clinic (MDZ), nine [9/96 (9.4%)] of the professional nurses were from the Primary Health Care Clinic (PHC), eight [8/96 (8.3%)] of the professional nurses were from Vleifontein Clinic (VF), seven [7/96 (7.2%)] of the professional nurse were servicing with a mobile Clinic (Mobile), and another seven [7/96 (7.2%)] of the professional nurses were from Kutama Clinic (KTM).

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4.2.5 Additional courses completed by the professional nurses

Courses	Achievement	No	%
IMCI	Completed	12	12.5
	Not completed	84	87.5
TB course	Completed	13	13.5
	Not completed	83	86.5
HIV course	Completed	21	21.9
	Not completed	75	78.1
Total		96	100

Table 2: Distribution of professional nurses by additional courses completed at the hospital and PHC clinics in the Tshilwavhusiku local area of Makhado B

Table 2 reflects additional courses completed by the professional nurses during their careers. The Table shows that eighty-four [84/96 (87.5%)] of the professional nurses did not complete the course on the Integrated Management of Childhood illness (IMCI), only twelve [12/96 (12.5%)] did complete the course. Concerning a Tuberculosis (TB) course, the Table also shows that eighty-three [83/96 (86.5%)] did not

complete this course, only thirteen [13/96 (13.5%)] did complete the TB course. For the HIV course, the Table indicates that seventy-five [75/96 (78.8%)] did not complete the course, only twenty-one [21/96 (21.9%)] did complete the HIV course.

4.3 Challenges faced by professional nurses

Challenges		LTMH (level-1 district hospital)		Primary Health Care clinics		p-value
		No	%	No	%	
Shortage of staff	Agree	25	69	46	77	0.477
	Disagree	11	31	14	23	
Total		**36**	100	**60**	100	
Lack of equipment	Agree	23	64	45	75	0.177
	Disagree	13	36	15	25	
Total		**36**	100	**60**	100	
Work overload	Agree	22	61	35	58	0.833
	Disagree	14	39	25	42	
Total		**36**	100	**60**	100	

p-value for Fisher Exact test

Table 3: Association between the hospital, PHC clinics and challenges faced.

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Table 3 reflects the relationship between the professional nurses at different health facilities and the challenges faced during a consultation. The Table shows that professional nurses were facing three main challenges: shortage of staff, lack of equipment, and work overload. This is described as followed.

4.3.1 Shortage of staff

In Table 3 it is shown that at hospital level, twenty-five [25/36 (69%)] of the professional nurses agreed that there was a shortage of staff, and only eleven [11/36 (31%)] disagreed, while at the peripheral PHC clinics, forty-six [46/60 (77%)] agreed and fourteen [14/60 (23%)] disagreed (p = 0.477). These results are not statistically significant.

4.3.2 Lack of equipment

Table 3 shows that at hospital level, twenty-three [23/36 (64%)] of the professional nurses agreed that there was a lack of equipment and thirteen [13/36 (36%)] disagreed, while at the peripheral PHC clinics, forty-five [45/60 (75%)] agreed and fifteen [15/60 (25%)] disagreed (p = 0.177). These results are not statistically significant.

4.3.3 Work overload

Table 3 shows that at hospital level, twenty-two [22/36 (61%)] of the professional nurses agreed that there was work overload and fourteen [14/36 (39%)] disagreed, while at the peripheral PHC clinics, thirty-five [35/60 (58%)] agreed that there was work overload and twenty-five [25/60 (42%)] disagreed (p = 0.833). These results are not statistically significant.

4.3.4 Number of professional nurses on duty per shift and the degree of understaffing

Number of professional nurses on duty per shift		LTTMH (Level-1 district hospital)		Primary health care clinics	
		No	%	No	%
1		4	11	0	0
2		1	3	7	12
3		5	14	14	23
4		16	44	11	18
5+		10	28	28	47
Total		**36**	**100**	**60**	**100**
Degree of understaffing					
	Mild	10	28	5	8
	Moderate	12	33	27	45
	Severe	14	39	28	47
Total		**36**	**100**	**60**	**100**

Table 4: Distribution of professional nurses by number on duty per shift and the degree of understaffing at the hospital and PHC clinics in the Tshilwavhusiku local area, subdistrict of Makhado B

4.3.4.1 Number of professional on duty per shift

Table 4 reflects the number of professional nurses on duty per shift and the degree of understaffing. It is shown that at hospital level, sixteen [16/36 (44%)] of the professional nurses said that they were four on duty per shift, ten [10/36 (28%)] of the professional nurses said that they were five or more, five [5/36

(14%)] professional nurses said they were only three on duty per shift, one [1/36 (3%)] said they were only two, and four [4/36 (11%)] professional nurses said that they were only one professional nurse on duty per shift. Table 4 also shows that at the peripheral PHC clinics twenty-eight [28/60 (47%)] of the professional nurses said that they were five or more professional nurses on duty per shift, eleven [11/60 (18%)] of the professional nurses said that they were four professional nurses, fourteen [14/60 (23%)] of professional nurses said that they were three professional nurses, seven [7/60 (12%)] of the professional nurses said that they were only two professional nurses, and none said there was only one professional nurse on duty per shift.

4.3.4.2 The degree of understaffing

Table 4 indicates that at hospital level, fourteen [14/36 (39%)] of the professional nurses said that the degree of understaffing of professional nurses was severe, twelve [12/36 (33%)] of the professional nurses said that it was moderate, and ten [10/36 (28%)] of the professional nurses said that the degree of understaffing of professional nurses was mild. Table 4 also shows that at the peripheral PHC clinics, twenty-eight [28/60 (47%)] of the professional nurses said that the degree of understaffing of professional nurses was severe, twenty-seven [27/60 (45%)] of the professional nurses said that the degree of understaffing of professional nurses was moderate, and five [5/60 (8%)] reported that the degree of understaffing was mild.

4.3.5 Basic equipment

		LTTMH (Level-1 district hospital)		Primary Health Care clinics	
		No	%	No	%
Functioning scale to measure the weight of children	Yes	12	33	11	18
	No	24	67	49	82
Functioning scale to measure the height of infants and children	Yes	5	14	2	3
	No	31	86	58	97
Functioning fridge for vaccine storage	Yes	32	89	59	98
	No	4	11	1	2
Cooler box for vaccine transportation	Yes	28	78	48	80
	No	8	22	12	20
Functioning scale to measure the weight of infants	Yes	26	72	45	75
	No	10	28	15	25
Total	100	36	100	60	100

Table 5: Distribution of availability of necessary basic equipment by health facilities: PHC clinics and hospital in the Tshilwavhusiku local area, subdistrict of Makhado B

Table 5 indicates the availability of basic equipment at hospital and at the peripheral PHC clinics, including; a scale to measure the weight of children, a scale to measure the height of children and infants, a fridge for

storage of vaccines, a cooler box for transportation of vaccines, and a scale to measure the weight of infants. This is described as follows:

4.3.5.1 Scale for measuring the weight of children

Table 5 reflects the professional nurses' responses on the availability of a scale for children's weight measurement at hospital and at the peripheral PHC clinics. At the hospital level, twenty-four [24/36 (67%)] of the professional nurses said that the weighing scale for children was not available, and twelve [12/36 (33%)] of the professional nurses disagreed. At the peripheral, forty-nine PHC clinics, forty-nine[49/60 (82%)] said that the weighing scale was not available, and eleven [11/60 (18%)] reported that the scale was available.

4.3.5.2 Scale for measuring the height of infants and children

Table 5 indicates that at the hospital thirty-one [31/36 (86%)] of the professional nurses reported that the scale for measuring the height of infants and children was not available, but five [5/36 (14%)] of the professional nurses said that the height scale was available, while at the peripheral PHC clinics, fifty-eight [58/60 (97%)] of the professional nurses reported that the scale for measuring the height of infants and children was not available, and two [2/60 (3%)] of the professional nurses said that the height scale was available.

4.3.5.3 Fridge for vaccine storage

Table 5 shows that at the hospital, twenty-two [32/36 (89%)] of the professional nurses indicated that the fridge for vaccine storage was available, but four [4/36 (11%)] of professional nurses said that the fridge was not available, while at the peripheral PHC clinics, fifty-nine [59/60 (98%)] of the professional nurses reported that the fridge for vaccine storage was available, and one [1/60 (2%)] of the professional nurses said that the fridge was not available.

4.3.5.3 Cooler box for vaccine transportation

Table 5 indicates that at the hospital, twenty-eight [28/36 (78%)] of the professional nurses reported that cooler boxes were available, but eight [8/36 (22%)] of the professional nurses disagreed. At the peripheral PHC clinics, forty-eight [48/60 (80%)] of the professional nurses indicated that the cooler boxes were available, and twelve [12/60 (20%)] of the professional nurses reported that cooler boxes were not available.

4.3.5.4 Scale for measuring the weight of infants

In Table 5 it shows that twenty-six [26/36 (72%)] of the professional nurses said that the infants' weighing scale was available, but ten [10/36 (28%)] said that the scale was not available. At the peripheral PHC clinics, forty-five [45/60 (75%)] reported that the infants' weighing scale was available, and fifteen [15/60 (25%)] reported that the scale was not available.

4.4 Missed opportunity of immunization

		LTTMH (Level-1 district hospital)		Primary Health Care clinics	
		No	**%**	**No**	**%**
Vaccines supplied in inadequate stock	Agree	35	97	59	98
	Disagree	1	3	1	2
No vaccines available for the day	Agree	33	92	58	97
	Disagree	3	8	2	3
Irregular attendance at immunization session	Agree	33	92	54	90
	Disagree	3	8	6	10
Absence of RtHC on the day of immunization	Agree	35	97	49	82
	Disagree	1	3	11	18
	Agree	12	33	22	37
Side effect of vaccines	Disagree	24	67	38	63
	Agree	31	86	51	85
Child sickness	Disagree	5	14	9	15
	Agree	23	64	29	48
Multiple vaccines	Disagree	13	36	31	52
Total		**36**		**60**	

Table 6: Distribution of professional nurses by reasons for missed opportunities of immunization at the hospital and PHC clinics in the Tshilwavhusiku local area, Makhado B

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Table 6 reflects reasons for missed opportunities of immunization at hospital and at the peripheral PHC clinics. The main reasons for missed opportunities of immunization were inadequate stock in vaccine supply, no vaccine on the day of immunization session, irregular attendance; absence of the RtHC on the day of immunization, side effects of vaccine, child sickness, and simultaneous (multiple) vaccine.

4.4.1 Vaccine supplied in inadequate stock

Table 6 indicates that thirty-five [35/36 (97%)] of the professional nurses at hospital agreed that missed opportunities of immunization were due to vaccine supplied in inadequate stock, and one [1/36 (3%)] of the professional nurses disagreed that it were not, while at the peripheral PHC clinics, fifty-nine [59/60 (98%)] of the professional nurses also agreed that missed opportunities of immunization were due to vaccine supplied in inadequate stock, and only one [1/60 (2%)] of the professional nurses disagreed.

4.4.2 Unavailability of vaccine on the day of immunization session

Table 6 shows that thirty-three [33/36 (92%)] of the professional nurses at hospital agreed that missed opportunities of immunization were due to the unavailability of vaccine on the day of immunization session, and only three [3/36 (8%)] disagreed that it were not, while at the peripheral PHC clinics fifty-eight [58/60 (97%)] of the professional nurses agreed that missed opportunities of immunization were due to the unavailability of vaccine on the day, and one [1/60 (3%)] of the professional nurses disagreed.

4.4.3 Irregular attendance of parents at immunization session

Table 6 indicates that thirty-three [33/36 (92%)] of the professional nurses at the hospital agreed that missed opportunities of immunization were due to parents irregular attendance at the immunization sessions, but only three [3/60 (8%)] disagreed, while at the peripheral PHC clinics, fifty-four [54/60 (90%)] of the professional nurses also agreed that missed opportunities of immunization were due to parents' irregular attendance at the immunization sessions, and only six [6/60 (10%)] of the professional nurses disagreed.

4.4.4 Absence of RtHCs on the day of immunization

Table 6 shows that thirty-five [35/36 (97%)] of the professional nurses at the hospital agreed that missed opportunities were due to the absence of RtHCs on the day of immunization, but one [1/36 (3%)] professional nurse disagreed, while at the peripheral PHC clinics, forty-nine [49/60 (82%)] also agreed that missed opportunities were due to the absence of RtHCs on the day of immunization session, and only eleven [11/60 (18%)] of the professional nurses disagreed.

4.4.5 Side effects of vaccine

Table 6 indicates that twelve [12/36 (33%)] of the professional nurses agreed that missed opportunities of immunization were due to the side effects of immunization, and twenty-four [24/36 (67%)] of the professional nurses disagreed, while at the peripheral PHC clinics, twenty-two [22/60 (37%)] of the professional nurses agreed that missed opportunities of immunization were due to side effects of immunization, and thirty-eight [38/60 (63%)] of the professional nurses disagreed.

4.4.6 Child sickness

Table 6 shows that thirty-one [31/36 (86%)] of the professional nurses agreed that missed opportunities of immunization were due to child sickness, while five [5/36 (14%)] of the professional nurses disagreed. At the peripheral PHC clinics, fifty-one [51/60 (85%)] of the professional nurses also agreed that missed opportunities of immunization were due to child sickness, but only nine [9/60 (15%)] of the professional nurses disagreed.

4.4.7 Simultaneous (multiples) vaccines injection

Table 6 indicates that twenty-three [23/36 (64%)] of the professional nurses agreed that missed opportunities of immunization were due to multiples vaccines injection, while thirteen [13/36 (36%)] of the professional nurses disagreed. At the peripheral PHC clinics, twenty-nine [29/60 (48%)] of the professional

nurses also agreed that missed of opportunities of immunization were due to multiples vaccines, and only thirty-one [31/60 (52%)] of professional nurses disagreed.

4.5 Caregivers' responses in the absence of the RtHC

Reasons in the absence of the RtHC

	Lost	burnt	Forgot at home	Immigrant	Left in taxi
■ percent	19.8	13.5	38.5	17.8	10.4
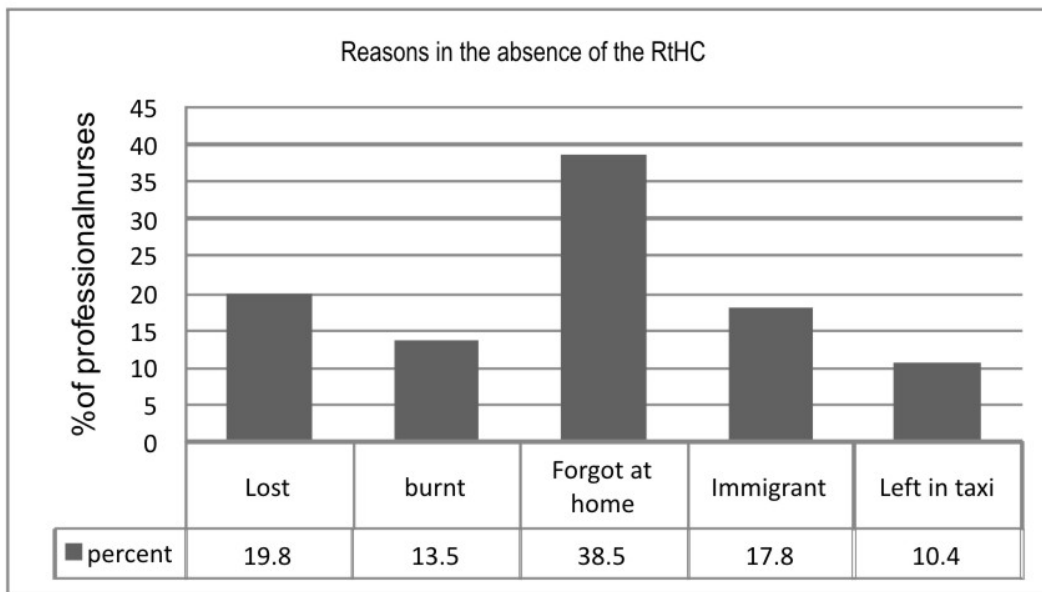
Figure 5: Distribution of caregivers' responses in the absence of the RtHC during a consultation

Table 5 reflects caregivers' responses on the absence of RtHCs during a consultation at all health facilities. It shows in the Table that thirty-seven [37/96 (38.5%)] of the professional nurses reported that caregivers' explanation of the absence of the RtHC at consultation was for instance that the parents had forgotten the RtHC at home, nineteen [19/96 (19.8%)] of the professional nurses reported that caregivers response on the absence of the RtHC at consultation was that the RtHC was lost; seventeen [17/96 (17.8%)] of the professional nurses reported that caregivers' response at consultation was that parents were immigrant at the place, thirteen [13/96 (13.5%)] of the professional nurses reported that caregivers' response at consultation was that the RtHC had been burnt, and ten [10/96 (10.4%)] of professional nurses reported that caregivers' response in the absence of the RtHC at consultation was that parents had left the RtHC in the taxi.

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4.6 Knowledge of growth curve direction on the RtHC
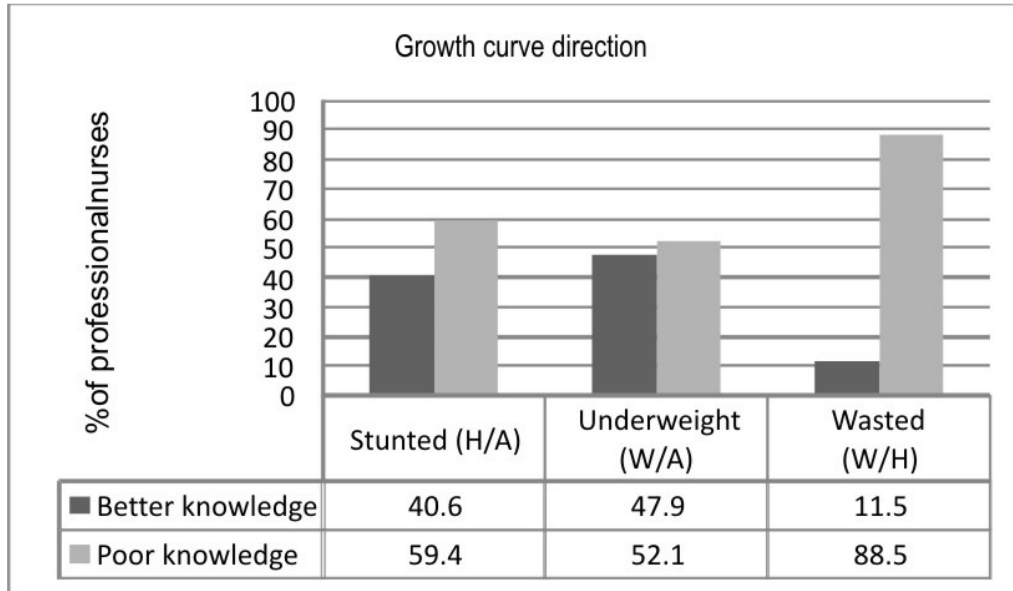
Figure 6: Distribution of professional nurses by level of knowledge of growth curve direction at the hospital and the PHC clinics in the Tshilwavhusiku local area, subdistrict of Makhado B.

4.6.1 Knowledge of the height-for-age

Figure 6 reflects the level of knowledge of professional nurses on the growth curve direction. The figure shows that thirty-nine [39/96 (40.6%)] of the professional nurses had a better knowledge that stunted was a growth curve direction below the 3rd percentile for a height-for-age (H/A) measurement, while fifty-seven [57/96 (59.4%)] of the professional nurses had a poor knowledge.

4.6.2 Knowledge of weight-for-age measurement

Figure 6 shows that forty-six [46/96 (47.9%)] of the professional nurses had a better knowledge that underweight was a growth curve direction below the 3rd percentile for a weight-for-age (W/A) measurement and fifty [50/96 (52.1%)] of the professional nurses in this category, had a poor knowledge.

4.6.3 Knowledge of weight-for-age measurement

Figure 6 indicates that eleven [11/96 (11.5%)] of the professional nurses had a better knowledge that wasted was a growth curve direction below the 3rd percentile for a weight-for-height (W/H) measurement, and eighty-five [85/96 (88.5%)] of the professional nurses in this category, had a poor knowledge.

4.7 Identification of malnutrition in a child
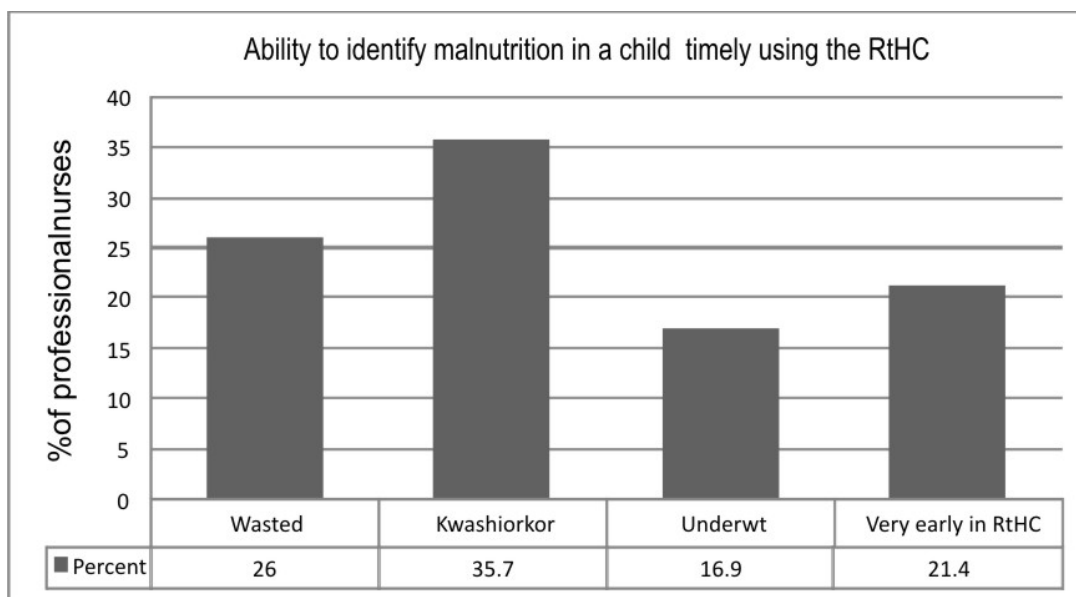
Figure 7: Distribution of professional nurses by ability to identify malnutrition timely in a child using the RtHC at the hospital and PHC clinics in Tshilwavhusiku local area, subdistrict of Makhado B

Figure 7 reflects the ability of professional nurses to identify malnutrition in a child timeously, using the RtHC. The table shows that thirty-four [34/96 (35.7%)] of the professional nurses reported that they were able to identify malnutrition in a child only when there was clinical manifestation of Kwashiorkor, twenty-six [26/96 (26%)] said that only when the child was wasted, and sixteen [16/96 (16.9%)] said they were able to identify malnutrition in a child only when the child was underweight. Only twenty-one [21/96 (21.4%)] knew that malnutrition in a child may be identified very early from the RtHC, before any clinical manifestations become apparent.

4.8 The degree of implementation of the RtHC programme

Programme Implementation	Degree	LTMH (level-1 district hospital)		Primary Health Care clinics		p-value
		No	%	No	%	
EPI programme	Good	17	47	41	68	0.053
	Poor	19	53	19	32	
W/A chart	Good	10	28	21	35	0.502
	Poor	26	72	39	65	
H/A chart	Good	11	31	17	28	0.821
	Poor	25	69	43	72	
W/H chart	Good	12	33	20	33	1.000
	Poor	24	67	40	67	
Growth chart interpretation	Good	13	36	20	33	0.827
	Poor	23	64	40	67	
IMCI programme	Good	11	31	12	20	0.324
	Poor	25	69	48	80	
Guidelines and protocols	Good	7	19	24	40	0.044*
	Poor	29	81	36	60	
Total		36	100	60	100	

p- Value for Fisher Exact Test   *** statistically significant**

Table 7: Distribution of professional nurses by the degree of implementation of the RtHC programme at the hospital and the PHC clinics in the Tshilwavhusiku local area, subdistrict of Makhado B

Table 7 reflects the degree of implementation of the RtHC programme. The programme is includes: the Expanded Programme of Immunization (EPI), Integrated Management of Childhood Illness (IMCI), Growth Monitoring Programme and Promotion which includes: the weight-for-age chart, the height-for-age chart, and the weight-for-height chart; also the growth chart interpretation, problems with basic equipment, and the implementation of protocols and guidelines.

4.8.1 The Expanded Programme of Immunization (EPI)

Table 7 indicates that at the hospital, seventeen [17/36 (47%)] of the professional nurses reported that the EPI programme was well implemented, while nineteen [19/36 (53%)] felt that the implementation was poor. At the peripheral PHC clinics, forty-one [41/60 (68%)] of the professional nurses reported that the implementation of the EPI programme was good, while nineteen [19/60 (32%)] of the professional nurses reported that the implementation was poor (p = 0.053). These results are not statistically significant.

4.8.2 The Integrated Management of Childhood Illness (IMCI) programme

Table 7 shows that twenty-five [25/36 (69%)] of the professional nurses at hospital reported that the implementation of the IMCI programme was poor, while eleven [11/36 (31%)] reported that the programme was well implemented. Professional nurses at the peripheral PHC clinics, forty-eight [48/60 (80%)] also reported that the implementation of the IMCI programme was poor, and only twelve [12/60 (20%)] reported that the implementation of the IMCI programme was good (p = 0.324). These results are statistically significant.

4.8.3 Growth monitoring program and promotion (GMP)

Table 7 shows the degree of implementation of GMP and the ability to interpret three principal parameters of growth monitoring surveillance of child health, namely: the weight-for-age chart, the height-for-age chart, and the weight-for-height chart.

4.8.3.1 Weight-for-age chart

Table 7 shows that ten [10/36 (38%)] of the professional nurses at hospital reported that the implementation of the weight-for-age chart programme was good, while twenty-six [26/36 (72%)] reported that the implementation was poor. Professional nurses at the PHC clinics, twenty-one [21/60 (35%)] reported that the weight-for-age chart programme was well implemented and thirty-nine [39/60 (65%)] reported that the programme was poor (p = 0.502). These results are not statistically significant.

4.8.3.2 Height-for-age chart

Table 7 indicates that eleven [11/36 (31%)] of the professional nurses at the hospital reported that the height-for-age chart programme was well implemented, while twenty-five [25/36 (69%)] of the professional nurses reported that the programme was poorly implemented. At the PHC clinics, seventeen [17/60 (28%)] of the professional nurses reported that the implementation of the height-for-age chart programme was good. At the PHC clinics, forty-three [43/60 (72%)] reported that the implementation of the height-for-age chart programme was poor (p = 0.821). These results were not statistically significant.

4.8.3.3 Weight-for-height chart

Table 7 shows that twelve [12/36 (33%)] of the professional nurses at the hospital reported that the implementation of the weight-for-height programme was good, while twenty-four [24/36 (67%)] of the professional nurses reported that the implementation of the programme was poor. At the PHC clinics twenty [20/60 (33%)] of the professional nurses reported that the implementation of the programme was good, while forty [40/60 (67%)] reported that the implementation was poor (p = 1.000). These results are not statistically significant.

4.8.3.4 Growth chart interpretation

Table 7 indicates that thirteen [13/36 (36%)] of the professional nurses at the hospital reported that the interpretation of the growth chart was good, while twenty-three [23/36 (64%)] of the professional nurses

reported that the interpretation of the growth chart was poor. At the PHC clinics, twenty [20/60 33%)] of the professional nurses reported that the interpretation was good, while forty [40/60 (67%)] reported that the interpretation was poor (p = 0.827). These results are not statistically significant.

4.8.3.5 Guidelines and protocols

Table 7 also shows that seven [7/36 (19%)] of the professional nurses at the hospital reported that the implementation of guidelines and protocols was good, while twenty-nine [29/36 (81%) reported that the implementation was poor. At PHC clinics twenty-four [24/60 (40%)] of professional nurses reported that the implementation of guidelines and protocols was good, and thirty-six [36/60 (80%)] of the professional nurses reported that the implementation was poor (p = 0.044). These results were statistically significant.

4.9 Ability to use the RtHC at consultation
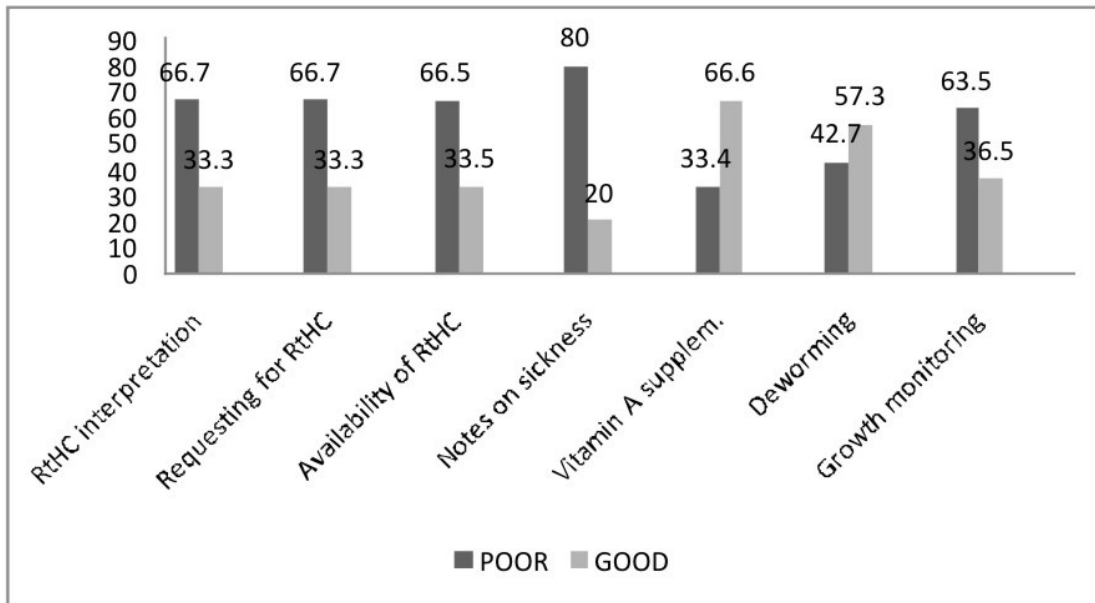
Figure 8: Distribution of professional nurses' abilities to use the RtHC during a consultation according to the guidelines and protocols at the hospital and PHC clinics in the Tshilwavhusiku local area, subdistrict of Makhado B

Figure 8 shows the ability of the professional nurses in the use of the RtHC during a consultation. The figure indicates that sixty-four [64/96 (66.7%)] of the professional nurses reported that the ability to interpret the RtHC during a consultation was poor and thirty-two [32/96 (33.3%)] reported that the ability to interpret the RtHC was good. About sixty-four [64/96 (66.7%)] of the professional nurses reported that the ability of asking to see the RtHC at consultation was poor, while thirty-two [32/96 (33.3%)] reported that the ability of asking to see the RtHC at consultation was good. Furthermore, sixty-four [64/96 (66.5%)] of the professional nurses reported that the ability of parents to bring along with them the RtHC during a consultation was poor, while thirty-two [32/96 (33.5%)] reported that it was good, that parents were able to bring the RtHC at consultation. In addition, seventy-seven [77/96 (80%)] of the professional nurses reported that the ability of recording an illness event in the RtHC during a consultation was poor, and nineteen [19/96 (20%)] reported that the recording of an illness event was good. At least, sixty-four [64/96 (66.6%)] of the professional nurses reported that the ability of supplying vitamin A to children during a consultation was good, and thirty-two [32/96 (33.4%)] reported that the ability of vitamin A supplementation was poor.

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About fifty-five [55/96 (57.3%)] of the professional nurses reported that the ability of giving deworming medicine to children during a consultation was good, and forty-one [41/96 (42.7%)] reported that the ability of giving deworming medicine was poor. About sixty-one [61/96 (63.5%)] of the professional nurses reported that the ability of performing growth monitoring measurement during a consultation was poor, and thirty-five [35/96 (36.5%)] reported that it was good.

4.10 Knowledge of frequency interval of vitamin A supplementation and deworming

What is the frequency of vitamin A supplementation and deworming?

	Every month	Every three months	Every six months	Every nine months
■ Percent	16	12.5	52.1	20
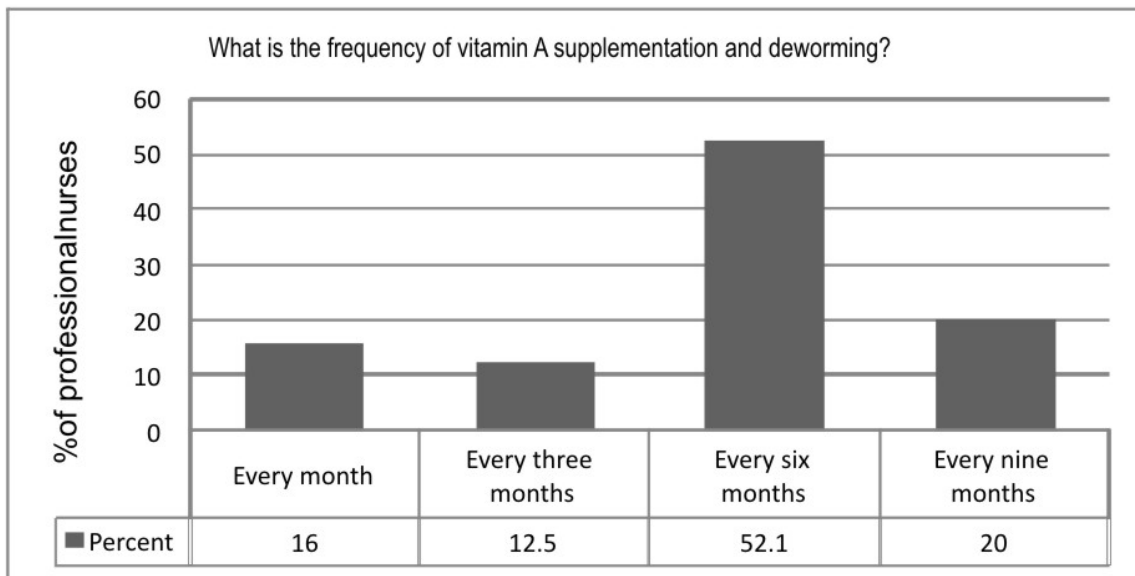
Figure 9: Distribution of professional nurses by knowledge of frequency interval of vitamin A supplement and deworming.

Figure 9 shows that fifty [50/96 (52.1%)] of the professional nurses reported that the frequency interval of vitamin A supplement and deworming was every 6 months, nineteen [19/96 (20%)] of the professional nurses reported that the frequency interval was every nine months, fifteen [15/96 (16%)] of the professional nurses reported that the frequency interval was every month, and twelve [12/96 (12.5%)] of the professional nurses reported that the frequency interval was every three months.

4.11 Aspects of the RtHC the most utilized at consultation

Aspects of the RtHC utilized the most at consultation		LTMH (level-1 district hospital)		Primary Health Care clinics		p-value
		No	%	No	%	
Expanded programme of immunization (EPI)	Agree	21	58	36	60	1.000
	Disagree	15	42	24	40	
Growth Monitoring Programme and Promotion (GMP)	Agree	6	17	17	28	0.226
	Disagree	30	83	43	72	
Integrated Management of Childhood Illness (IMCI) guidelines	Agree	9	25	7	12	0.100
	Disagree	27	75	53	88	
Total		36	100	60	100	

p-value for Fisher Exact Test

Table 8: Distribution of professional nurses by choice on the aspect of the RtHC utilized the most at consultation

4.11.1 The Expanded Programme of Immunization (EPI)

Table 8 shows that at the hospital, twenty-one [21/36 (58%)] of the professional nurses agreed that the expanded programme of immunization was the aspect of the RtHC that was utilized the most at consultation, and fifteen [15/36 (42%)] disagreed. At the PHC clinics, thirty-six [36/60 (60%)] of the

professional nurses agreed that the EPI programme was utilized the most at consultation, while twenty-four [24/60 (40%)] disagreed (p = 1.000). These results are not statistically significant.

4.11.2 The Growth Monitoring Programme and Promotion (GMP)

Table 8 indicates that at the hospital, six [6/36 (17%)] of the professional nurses agreed that the Growth monitoring Programme and Promotion was the aspect of the RtHC that was utilized the most at consultation, but thirty [30/36 (83%)] of the professional nurses disagreed. At the PHC clinics, seventeen [17/60 (28%)] of the professional nurses agreed that GMP was the aspect of the RtHC utilized the most at consultation, while forty-three [43/60 (72%)] of the professional nurses disagreed that GMP was the aspect of the RtHC utilized the most at consultation (p = 0.226). These results are not statistically significant.

4.11.3 The Integrated Management of Childhood illness (IMCI) guidelines

 Table 8 shows that at the hospital, nine [9/36 (25%)] of the professional nurses agreed that the Integrated Management of Childhood Illness guidelines was the aspect that was utilized the most at consultations, while twenty-seven [27/36 (75%)] of the professional nurses disagreed. At the PHC clinics, seven [7/60 (12%)] of the professional nurses also agreed that the IMCI guidelines was the aspect utilized the most at consultations, while fifty three [53/60 (88%)] of the professional nurses disagreed (p = 0.100). These results are not statistically significant.

4.11.4 Reason for choosing aspects of the RtHC utilized the most
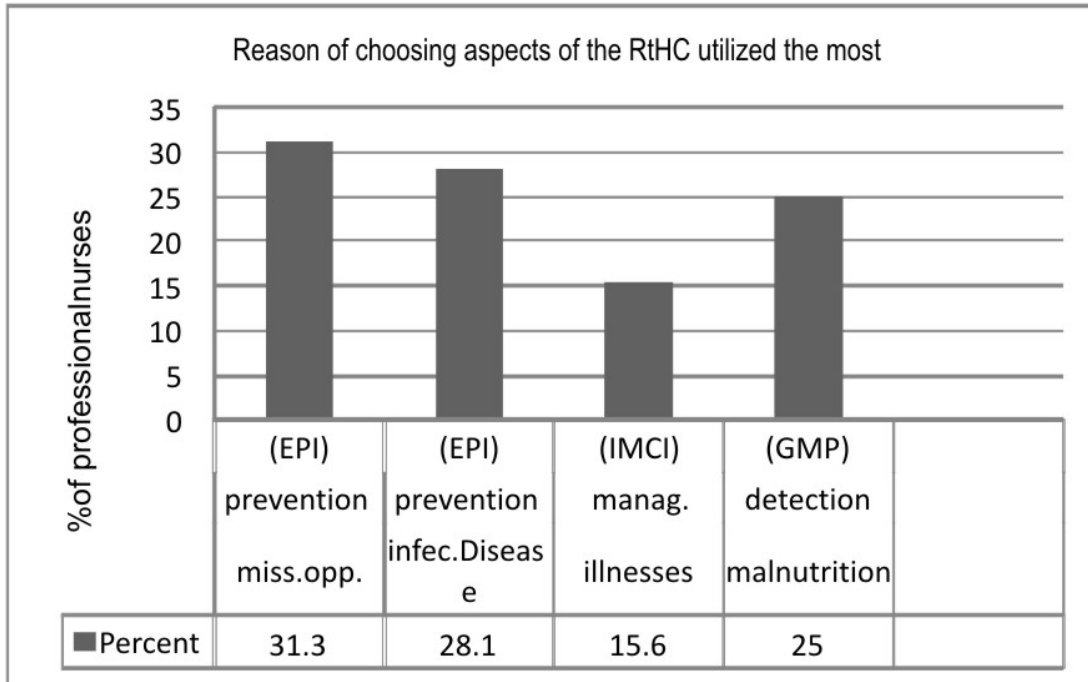
Figure 10: Distribution of professional nurses by reason for choosing aspects of the RtHC utilized the most

Figure 9 shows that thirty [30/96 (31.3%)] of the professional nurses chose the Expanded Programme of Immunization (EPI) as an aspect of the RtHC utilized the most for the reason that it would assist them to avoid missed opportunities of immunization; twenty-seven [27/96 (28.1%)] of the professional nurses also chose the EPI, but for another reason, namely that it would help them in the prevention of infectious diseases. Twenty-four [24/96 (25%)] of the professional chose the Growth Monitoring Programme and Promotion (GMP), for the reason that it would help them in the detection of malnutrition. Only fifteen [15/96 (15.6%)] of the professional nurses chose the Integrated Management of Childhood Illness (IMCI), for the reason that it would help them in the management of other illnesses.

Chapter 5: Discussion

5.0 Introduction

In the previous chapter the findings and the interpretation of the results were presented. In this chapter the results of the study are discussed. The main purpose of this study was to determine the challenges faced by professional nurses in the monitoring of the RtHC at consultation.

5.1 Socio-demographic characteristics

In this study, the professional nurses were a predominantly female population aged between of 20 and 60 years old, with a female-to-male ratio of 19:1. Similar findings relating to a similar population and the same age category (15-60 years) with female predominance (82.8%) in primary health workers was reported by Adenike and Adeyele (2011) in Nigeria. The study showed that 19% of professional nurses had experience of less than 5 years, 26% of professional nurses had experience of between 5- and 10 years, and 55% of professional nurses had experience of 10 years an above. In a similar study figure of 14.3% (2-4 years), 14% (5-10 years) and 71.4% (above 10 years) were reported by Selina (2010) in the utilization of the RtHC to improve the health of children younger than five years.

5.2 Additional courses completed by professional nurses

The results of this study revealed that most of the professional nurses did not complete any additional courses. About eight-four [84/96 (87.5%)] did not complete the IMCI course, eighty-three [83/96 (86.5%)] did not complete the TB course, and seventy-five [75/96 (78.1%)] did not complete HIV/PMTCT courses. Similar findings were reported by Selina (2010), in a study relating to the additional short course training; it was found that professional nurses who completed short courses did not use this knowledge and skill towards a-more comprehensive child care and better utilization of the RtHC; their care still showed the following shortcomings: ninety-two percent 92.9% did not assess the children's nutrition and breastfeeding, and seventy-eight percent 78.6% did not do a follow up with in these children.

TB is associated with poverty and malnutrition and is by far the most common disease in South Africa. South Africa was classified as a high-TB burden country and was ranked seventh in the world by the WHO. The combined burden of TB and HIV/AIDS co-infection is immense; the global burden of TB is increasing, largely due to the spread of HIV/AIDS. It is highly probable that this will contribute to the increasing number of TB cases. So far, not a single province of South Africa has reached the 85% target cure set by the WHO. Protein-energy malnutrition (PEM) can be regarded as one of the risk factors in the development of TB. A vicious cycle is known to exist between tuberculosis, HIV; and malnutrition, in much as that one is promoting the other (Nutrition Information Centre University of Stellenbosch (NICUS), 2005). The most vulnerable individuals to this burden are children, and as a matter of fact, professional nurses' knowledge on TB, HIV and IMCI guidelines has a positive impact in the monitoring of child health, in the monitoring of the RtHC and management of others illnesses. Knowledge about HIV is also incorporated in the IMCI programme course (WHO, 2010).

5.3 Challenges faced by professional nurses

In this study more than half of the professional nurses reported that the challenges faced at consultation were shortage of health personnel (staff) 25/36 (69%) of the professional nurses at the hospital and (46/60 (77%) at PHC clinics), lack of equipment (23/36 (64%) at the hospital and 45/60 (75%) at the PHC clinics, and work overload (22/36 (61%) at the hospital and (35/60 (58%) at the PHC clinics). The study revealed that scales at most of the clinics and even at the hospital were either not functioning and were never repaired, or were broken and were never replaced or stuck in the-back orders for a very long-time or were simply just-not available. The degree of understaffing was graded as moderate to severe due to an unequal number of professional nurses on duty per shift in the busiest PHC clinics. A similar finding relating to the evaluation of the clinical management of severely malnourished children was reported by Puoane et al (2001), namely that resources were lacking; scales were unavailable or not in working condition; and there was a lack of staff, especially at night, contributing to inadequate care. In a similar study by Schoeman et al (2010) it was also reported that the majority (80%) of professional nurses voiced their frustrations that problems with basic resources negatively influenced the quality of services. Nkosi et al (2009) reported that in South Africa, professional nurses were stressed with work overload, widespread shortages of staff, and received very little support and supervision related to clinical practice. Nkosi also emphasized that many public PHC clinics lack important equipment.

5.4 Missed opportunities of immunization

The study showed that missed opportunities of immunization are a major public health problem in the study setting. More than half of the professional nurses voiced their concerns that fridge for vaccine storage and cooler boxes for vaccine transportation were available in most of the clinics and the hospital. However, the main reasons for missed opportunities of immunization reported by professional nurses was that the vaccine was supplied in inadequate stock (35/36 (97%) of the professional nurses at hospital and 59/60 (98%) at PHC clinics), or that vaccines were not available on the day of immunization session (33/36 (92%) of the professional nurses at the hospital and 58/60 (97%) at PHC clinics), or the absence of the RtHC at consultation (35/36 (97%) of the professional nurses at the hospital and [49/60 (82%) at the PHC clinics), child sickness (31/36 (86%) of professional nurses at hospital and 51/60 (85%) at PHC clinics), and irregular attendance (33/36 (92%) of professional nurses at hospital and 54/60 (90%) at PHC clinics). Caregivers' responses in the absence of the RtHC were that the RtHC was either forgotten at home [37/96 (38.5%)] or lost [19/96 (19.8%)], or that the parents were immigrants [17/96 (17.8%)], or the RtHC was burnt [13/96 (13.5%)], or left in the taxi [10/96 (10.4%)].

Missed opportunities of immunization were reported in other similar studies: In Canada, a study by Tarrant and Gregory (2001) showed that missed opportunities of immunization were due to side effects of vaccines, such as fever and irritability, pain, swelling and redness at the injection site. In Nigeria, a study by Kabir et al (2004) showed that missed opportunities of immunization were due to failure to simultaneously administer all the vaccines for which the child was eligible due to unavailability of vaccines. In Mozambique, a study by Jani et al (2008) showed that missed opportunities of immunization were also due to a lack of information about the day for vaccination. In India, a study by Singh and Datta (1997) showed that immunization was not offered at every health care contact, sometimes due to logistic problems. In Kenya, a study by Borus (2004) showed that missed opportunities of immunization were due to a lack of integration of health services. Corrigall et al (2008) reported that reasons for missed opportunities of immunization were lack of information, the caregiver being unable to attend the clinic, and lack of motivation; parents were told by clinic staff to return at another time but were given incorrect vaccination dates, and the distance to the clinic was practically too far. In a study by De Villiers and Tarwa (2007) in South Africa, it was reported that of the children seen at primary, secondary, and tertiary health care levels 32%, 70% and 42% respectively did not have their RtHCs. The parents of these children, who attended the same sites of

primary, secondary and tertiary health care, reported that 62.5%, 75.7%, and 78.8% respectively thought that the RtHC was necessary only at the well-baby clinic and not at a curative consultation. Reasons for the absence of the RtHCs were that some did not have access to the RtHC, the child's mother was not at home, the child became ill, they forgot to collect the RtHC, the RtHC has been lost, burnt in the house or they never had one before.

5.5 Knowledge about the growth curve direction on the RtHC

Knowledge about the correct interpretation of the growth chart especially of the growth curve direction was poor, with more than half of the professional nurses not knowing that parameters of under-nutrition (underweight, stunted, and wasted) was the meaning of anthropometric indicators (weight-for-age, height-for-age, and weight-for-height below the 3rd percentile). Their knowledge about the identification of malnutrition in using the Road-to-Health Chart was also poor. The professional nurses did not know that the purpose of the Road-to-Health Chart was to detect earlier any abnormality in the growth pattern, with the help of the deviation of the plotted direction line against the reference growth curve. In a similar study by Adenike and Adeyele (2011) in Nigeria, the majority of professional nurses did not know the lower limit of normal for birth weight to be 2.5 kg. In a study by Harrison et al (1998), about 37% did not know how to use the weight-for-age. A similar study by Robertfroid et al (2005) also showed that at least 29% of the developing countries throughout the world had a poor understanding of the growth curve reference. According to De Villiers and Tarwa (2007), health workers seldom asked to see the RtHC during a consultation; this was 13% at primary, 16% at secondary and 50% at tertiary health institutions, and the RtHC was not asked for at previous visits at all three centres. It was shown that 56%, 32% and 50% respectively of parents were not asked for the RtHC by health care workers during the previous consultation. Similar studies have also suggested that professional nurses' poor understanding of the growth chart and its purpose was a major reason for the growth monitoring programme falling into disrepute (Adenike, 2010; Ashworth et al, 2008; Roberfroid et al, 2005). De Villiers and Tarwa (2007) also reported that health workers seldom plotted the child's weight during the consultation, and poorly identified children with malnutrition whose weight remained below the 3rd percentile. Studies by De Onis et al (2004) and O'Brien (1978) showed that more than half (>50%) of countries evaluated by the UNICEF in 1978 and in 1999-2000 were having difficulties in the use of the growth chart.

This study has shown that the professional nurses' knowledge in the identification of malnutrition in a child was poor, only when there was a visible clinical sign. About [36/96 (35.7%)] of professional nurses were able to identify malnutrition only when the child was having kwashiorkor; [25/96 (26%)] of professional nurses able to identify malnutrition only when the child was wasted, and [16/96 (16.9%)] of professional nurses were able to identify malnutrition only when the child was underweight. Only [21/96 (21.4%)] of professional nurses knew that malnutrition should be detected earlier on the RtHC when the growth chart direction of the dotted line is compared to the reference curve, i.e. when the line is flat or below the 3rd percentile. A study by Hendricks et al (2003) reported that professional nurses were not able to follow the PEM scheme, poor comprehensive managing of malnourished children, inadequate assessment of nutrition-related disease, inadequate counseling and no standardized monitoring. A study by Edward K (2000) reported that in Papua New Guinea, professional nurses were unable to decide When the growth chart was "flat"; difficulties also due to infrequent plots and previous plotting errors. When the growth chart line was flat, professional nurses were not sure what to do about it.

5.6 The degree of implementation of the RtHC programme

There was a-poor implementation of norms and standard in the utilization of the RtHC. The results showed that there was poor knowledge in the interpretation of the RtHC [64/96 (66.7%)], poor recording notes on diseases events in the RtHC [77/96 (80%)], usually no requesting of the RtHC [64/96 (66.7%)] , and also poor implementation of the growth monitoring programme and promotion [61/96 (63.5%)] due to the low level of knowledge about the growth chart indicators, including: the weight-for-age (W/A) chart, the height-for-age (H/A) chart, and the weight-for-height (W/H) chart. More than half of the professional nurses did not know that stunting [57/96 (59.4%)], underweight [56/96 (52.1%)], and wasted [85/96 (88.5%)] were respectively the meanings of H/A, W/A, and W/H below the 3rd percentile. Also more than half of professional nurses [26/36 (75%)] at the hospital and [(53/60 [88%)] at the PHC clinics did not know the implementation of IMCI revealed in the study being poor. A study by Qayad (2005) in Somalia reported that around 24% of children classified by professional nurses as malnourished were in fact normal, and 8% of children classified as normal was in fact malnourished. The problem observed in the study was caused by a-poor skills and incorrect plotting of the weight in the growth chart. A study by Ruel (1991) in Lesotho also showed that professional nurses had poor knowledge and skills in using the growth chart. A study by Hamer (2004) on the detection of protein-energy malnutrition in Gambia, reported that professional nurses

did not identify malnourished children reliably, many severely malnourished children were not detected, under-diagnosed, or wrongly diagnosed, and did not received appropriate treatment regimes. Professional nurses were correctly identifying the signs of severe malnutrition only when they were more apparent (severe wasting, bipedal edema, very low weight for age.

5.7 Vitamin A supplementation

Based on the findings of this study, professional nurses had a good knowledge on the frequency interval of vitamin A supplementation and deworming, more than half of the professional nurses [50/96 (52.1%)]; knew the frequency interval of vitamin A supplementation and deworming. The challenge faced by the professional nurses was the implementation of the programme. Dairo and Ige (2009) reported that vitamin A deficiency is one of the major causes of childhood morbidity and mortality in economically deprived countries. A study by Hendricks et al (2007) showed that the challenges were a lack of vitamin A capsules, inadequate training and difficulties in implementing the programme, professional nurses forgetting to check the vitamin A protocol and to record the vitamin A given, and confusion over the indications for vitamin A supplementation. A study by Anderson et al (2009) showed that missed opportunities of vitamin A supplementation were influenced by professional nurses' attitudes and behaviours in the interaction with parents. The study by Berry and Hall (2010) reported that a marked increase in the prevalence of inadequate vitamin A status in children aged 1 – 5 years is evident: the national rate has nearly doubled between 1994 (33%) and 2005 (65%). Children aged 3 to 5 years are most affected. According to the data suggested by Keith and West (2002), there are 127.2 million vitamin A-deficient preschool-aged children. This number represents 25% of preschool-aged children in high-risk regions of the developing world. Forty-four percent (44%) of vitamin A-deficient children live in South and Southeast Asia, whereas 26% and 10% live in the African and eastern Mediterranean regions, respectively. The largest numbers of vitamin A-deficient children live in India (35.3 million), Indonesia (12.6 million), China (11.4 million), and Ethiopia (6.7 million). Approximately (-8.2 million-) live in the region of the Americas.

5.8 The aspect of the RtHC utilized the most

The study revealed that the aspect of the RtHC most utilized was the Expanded Programme of Immunization (EPI). This accounts for more than half of the professional nurses, namely twenty-one [21/36 (58%)] at the hospital and thirty-six [36/60 (60%)] at the PHC clinics. The study also revealed that the reason for utilizing the EPI most was to reduce the incidence of missed opportunities of immunization [30/96 (31.3%)], and prevention of infectious diseases [56/96 (28.1%)]. A study in the Western Cape (WC) by Corrigall et al (2008) reported that immunization coverage was higher than 76.8% when using the RtHC. The WC has met its target of 90% immunization coverage on specific vaccines. Of the sample, 75% were in possession of a RTHC. This was the strongest predictor of immunization coverage; children with RTHCs were 39.5 times more likely to be vaccinated compared with those without these RtHCs. A study by Selina (2010) showed that the immunization status was recorded in the provided space of the RtHC by 64.3% of cases, by professional nurses being accurate and complying with the norms, 72.7% of the RtHC was also compliant with norms, in 78.6% of the cases accurately recorded. A study by De Villiers and Tarwa (2007) also showed that the immunization coverage was high, namely 82% at primary health care and 80% at secondary level of health care.

5.9 Summary of the discussion

The Road-to-Health Chart is a powerful tool used by professional nurses throughout the world to assess the health of a child. In developing countries the tool is mostly used for the assessment of nutritional status, immunization compliance, and growth monitoring. The success of the RtHC monitoring goes hand-in-hand with the knowledge guidelines and protocol implementations, and interaction between professional nurses and parents or caregivers, in terms of counselling, communication and information. Growth monitoring is an integrated part of the RtHC which necessitates also an adequate knowledge and an accurate interpretation of anthropometric indicators, including: weight-for-age, height-for-age, and weight-for-height. Necessary conditions for screening or education purposes comprise regularly measuring the weight (or height) of a child, and plotting the information on a growth chart to make abnormal growth visible where growth is abnormal. The professional nurse has to do something, in concert with the family; then, as a result of these actions, and the child's nutrition improves, the child receives appropriate social or medical support. Or after appropriate investigation, a serious condition is diagnosed earlier and followed up on the progress of the

child. The IMCI logarithm and guidelines are almost nonexistent; more than half of the professional nurses had not done the course.

Professional nurses play an important role in the service delivery at primary health care clinics in the management of child health. The failure of early detection of malnutrition, increased rate of missed opportunities of immunization, poor growth monitoring procedures, and poor management of other illnesses are all a reflection of the poor monitoring of the Road-to-Health Chart. In this study, age and experience did not play a major role in the outcome.

5.10 Study limitations

The following are limitations in this study:

- The findings may not be generalizable due to the relatively small sample size and the fact that the study was restricted to health facilities in the Thsilwavhusiku local area of Makhado B subdistrict only

- Professional nurses were not observed using the Road-to-Health Chart; results were based on their perception concerning the monitoring of the RtHC towards child health.

- Mothers were not interviewed in order to understand the complexity of the problem to assess the efficacy of primary health services offered to them by professional nurses.

- Managers responsible and in charge of primary health care clinics and those in charge of the hospital were not interviewed on the issues of human resources, equipments or about the chronic complaints by the professional nurses with regard to shortage of staff and others concerns.

- Recently the RtHC has been extremely improved in design by the "Road –to-Health Booklet" (RtHB), which was printed in 2010 by the Department of Health and it-is already in use. The RtHB was not included in the study, but one could probably safety assume that the challenges encountered in the use of the Road-to-Health Chart (RtHC) by professional nurses will be the same difficulties and challenges when using the Road-to-Health Booklet (RtHB).

- The cross-sectional study design which measures both outcome factors (poor knowledge) and exposure factors (challenges) did not allow for a full and detailed exploration of causation. A further prospective research study will be more suitable for this purpose.

5.11 Contribution of the study

This study has addressed the importance of in-service training for nurses of all categories at primary health care clinics and at hospital level. It has also highlighted the visible evidence and gaps in the implementation of protocol and guidelines in the utilization of the RtHC. The study demonstrated that the substandard scope of practice of professional nurses at all health facilities in the utilization of the RtHC needs a particular attention. The study also showed challenges faced during a consultation and also clarified the value of the RtHC as a powerful tool, which should go hand-in-hand with the necessary basic resources in order to achieve the goal to the benefit of child survival. The success in the implementation of the EPI programme, the GMP, and the IMCI programme lies in improving in-training service with the aim of controlling preventable diseases and reducing morbidity and mortality among children under five years old in the Tshilwavhusiku local area, Makhado B subdistrict.

Chapter 6: Conclusion and recommendations

6.1. Conclusion

The study demonstrated that the actual practice in the monitoring of the RtHC was not within the margins of the norms and standard. The knowledge of the growth chart interpretation was poor. More than half of professional nurses did not know that stunting, underweight and wasted were the meaning of height-for-age, weight-for-age, and weight-for-height respectively:- a figure below the third percentile. Professional nurses were able to identify malnutrition only if there was a visible clinical sign, only few knew that malnutrition may be identified earlier by the direction of a plotted line of dots on the growth chart, checked against the growth chart reference. The degree of implementation of the RtHC component was poor; the professional nurses seemed to be more interested in the EPI programme than in the GMP. The main reason for missed opportunities of immunization was vaccine being supplied in inadequate stock. The principal challenges faced by the professional nurses were lack of resources, including shortage of staff, lack of equipment, and work overload. Despites these challenges the professional nurses did seem to have good knowledge about the frequency interval of vitamin A supplementation and deworming. However, in comparison between the hospital and the PHC clinics; they were all facing the same problems in terms of resources, skills, and in the implementation of guidelines and protocols. The actual clinical practice in the monitoring of the RtHC is far below the norms and standard.

6.2. Recommendations

Based on the findings of this study, the following recommendations may be made

1. In-service training needs to be improved;

2. Workshops in the integrated management of childhood illness need to be improved;

3. The implementation of guidelines, protocols, norms and standard need to be reinforced; and

4. The RtHC should be introduced at all levels of nursing schools, and also the knowledge of protein-energy malnutrition, Anthropometric indicators (weight-for-age, height-for-age, and weight-for-height), and also the understanding of parameters of child health surveillance (stunting, wasted, and underweight).

References

Abul-Fadl A, Bagchi K, Ismail L. (2010): Practices in child growth monitoring in the countries of the Eastern Mediterranean Region. Eastern Mediterranean Health Journal 2010; 16 (2): 194-201.

Abdool-Karim S, Joubert G, Katzenellenbogen. Epidemiology: a manual for South Africa, Oxford University press of South Africa, Cape Town 2007; pp. 67.

Adenike I, Adeyele A. Primary health care workers'role in monitoring children growth and development in Nigeria, West Africa. Global Journal of Health Science. 2011; 3(1): 30-39.

Ajaiyeoba A, Samaila E. Use of Bitots' spot in screening for vitamin A deficiency in Nigerian children. African journal biomed. Res. 2001; (4): 155-157.

Andresen E, Wandel M, Eide W, Herselman M, Iversen P (2009): Delivery of the Nutrition Supplementation Programme in the perspective of mothers of under 5s: A qualitative study. South African Journal of Child Health. 2009; 3 (3): 90-95.

Ashworth A, Shrimpton R, Jamil K. Growth monitoring and promotion: Review of evidence of impact. Maternal and child Nutrition. Blackwell Publishing. 2008; (4): 86-117.

Awasthi S, Pande V. Prevalence of malnutrition and intestinal parasites in preschool slum children in Lucknow. Indian Peadiatrics. 1997; (34): 599-605.

Berry L, Hall K (2010): Nutrition – Vitamin A deficiency in children: Statistics on children in South Africa 2010; 1 – 3 Available from: // www.childrencount.ci.org.za.

Bicarba A, Haddad S, Kabore M, Taminy E, Feletto M, Fournier P. Monitoring the performance of the Expanded Program on Immunization: The case of Burkina Faso. BMC International Health and Human Rights. 2009; 9 (1): S12.

Black R, Allen L, Bhutta Z, Caulfield L, De Onis M, Ezzati M, Rivera J. Maternal and child undernutrition: Global and regional exposures and health consequences. Series 2008; (1): 5-22.

Black R, Cousens S, Johnson H, Lawn J, Rudan I, Bassani D, Jha P, Campbell H, Walker C, Cibulskis R, Eisele T, Liu L, Mathers C. Global, regional, and national causes of child mortality in 2008: A systematic analysis. Child Health Epidemiology reference Group of WHO and UNICEF. 2010; 1-25.

Borus P. Missed opportunities and inappropriately given vaccines reduced immunization coverage in facilities that serve Slum areas of Nairobi. East African Medical Journal. 2004; 81 (3): 124-129.

Brewster D, Manary M, Graham S (1997): Case management of kwashiorkor: An intervention project at seven nutrition rehabilitation centres in Malawi. European Journal of Clinical Nutrition 1997; (51): 139-147.

Brink H. Fundamentals of research Methodology for health care professionals, 2nd ed Juta (2) South Africa 2008; (2): 207 – 209.

Brownlee A. Growth monitoring and promotion: The behavioral issues in child survival programme. 1990; Monography 6.

Cape N. Growth charts: help or hindrance? Health Policy Plan 1988; (3): 167-170

Centre for disease control and prevention (CDC). Recommendations for prevention and control of communicable diseases. MMWR. 1988; (47): 1-39.

Chakravarty I, Sinha R. Prevalence of micronutrient deficiency based results obtained in the national pilot programme on control of micronutrient malnutrition. Nutritional review 2002; (60): S53 – S58.

Claeson M, Waldman R. The evolution of child health programmes in developing countries: From targeting diseases to targeting people. Bulletin of the World Health Organization 2000; (78): 1234–1245.

Corrigall J, Coetzee D, Cameron N. Is the Western Cape at risk of an outbreak of preventable childhood diseases? Lessons from an evaluation of routine immunization coverage. South African Medical Journal 2008; (98): 41-45.

Cowan B. Growth monitoring as a critical means to provide primary health care. Indian Journal of Paediatrics 1988; (55)**:** S74–S77.

Crisp N, Donald D. The 'Road to Health' card and immunization records. South African Medical Journal. 1987; (72): 331-333.

Cuthbertson W, Morley D. A health and weight chart for children from birth to five. West African Medical Journal. 1962; (11): 237–240.

Cutts F, Glik D, Gordon A, Parker K, Diallo S, Haba F, Stone R (1990): Application of multiple methods to study the immunization programme in an urban area of Guinea. Bulletin of the world health organization. 1990; 66 (6): 769-776.

Dairo M, Ige O. Supplementation of micronutrients in community micronutrient deficiency prevention programmes. Annals of Ibadan Postgraduate Medicine 2009; 7 (1): 6 – 9.

Daly A, Nxumalo M, Biellik R. Missed opportunities for vaccination in health facilities in Swaziland. South African Medical Journal 2003; (93): 606-610.

Danzhen Y, Wardlaw T, Boerma T, Suzuki E, Pelletier F, Faijer D, Hill K, Jones G. Levels and trends in child mortality: Estimates developed by the United Nation inter-agency group for child mortality estimation unit. Report from the UNICEF, WHO, WORLD BANK, UN/DESA/Population division 2010; 1-18.

Dary O, Mora J (2002): Food Fortification to Reduce Vitamin A Deficiency: International Vitamin A Consultative Group Recommendations. American Society of Nutrition Journal of Nutrition. 2002; (132): 2927S–2933S.

De Onis M (2009): Growth curves for school age children and adolescents. Indians Paediatrics 2009; 46(17): 463 – 465.

De Onis M. WHO Global Database on Child Growth and malnutrition: Geneva: World Health Organization; (1997 Compilation): 1-67.

De Onis M, Blossner M. The World Health Organization (WHO) global database on child growth and malnutrition: methodology and applications: International Journal of Epidemiology 2003; (32): 518-526.

De Onis M, Edward A, Blossner M. Is malnutrition declining? An analysis of changes in levels of child malnutrition since 1980. Bulletin of the World Health Organization. 2000; (78): 1222-1233.

De Onis M, Gazza C, Onayango W, Borgh G. Comparison of the WHO Child Growth Standards and the CDC 2000 Growth Chart: Journal of Nutrition 2006; (137): 144-148.

Department of Health of South Africa. Department of Health. Road to Heath Chart. Pretoria. Government Printers. 2001.

Department of Health of South Africa. The Road-to-Health Booklet. Guidelines. Government printers. 2010.

Department of Health of South Africa (2003): Road-to-Health Chart guidelines (updated) Directorate Nutrition Department of Health Pretoria: Government Printers. 2003; 1-5

De Villiers F, Tarwa C (2007): The use of the Road-to-Health Card in monitoring child health. South African Family Practice. 2007; 49(1): 15.

Dickinson N, Macpherson G, Hursthouse S, Atkinson J. Micronutrient deficiencies in maternity and child health: a review of environmental and social context and implications for Malawi. Environ Geochem Health 2009; (31): 253-272.

Dodd D (2003): Benefits of Combination Vaccines: Effective vaccination on a simplified schedule. American Journal of Management Care 2003; (9):S6-S12.

Dulger H, Arik M, Sekeroglu M, Tarakçioglu M, NoyanT, Cesur Y, Dyer J. Pro-inflammatory cytokines in Turkish children with protein-energy malnutrition. Mediators of Inflammation. 2002; (11): 363–365.

Edward K (2000): Detection and treatment of childhood malnutrition in Papua New Guinea. PNG Mededical Journal. 2000; 43(1-2): 38-53.

Garner P, Panpanich R, Logan S (2000): Is routine growth monitoring effective? A systematic review of trials. Arch Dis Child. 2000; (82): 197–201.

Gerein N, Ross D. Is growth monitoring worthwhile? An evaluation of its use in three child health programmes in Zaire. Social Science and Medicine. 1991; (32): 667–675.

Gest K, Margolis P, Bordley W, Stuart J. Measuring the process of preventive service delivery in primary care practices for children. *Paediatrics.* 2000; 106 (3): 879 -885.

Gomez F, Galvan R, Frenk S, Cravioto-Munoz J, Chavez R, Vasquez J. Mortality in second and third degree malnutrition. Journal of Tropical Paediatrics. 1956; (2): 77–83.

Gopaldas T, Christian P, Abbi D. & Gujral S. (1990): Does growth monitoring work as it ought to in countries of low literacy? Journal of Tropical Paediatrics1990; *(*36): 322–327.

Gordis L. Epidemiology 4th Edition, Saunders Elsevier, Philadelphia; United States of America 2009; (4): 195 - 197

Grant J (1984): The State of the world's children 1984: New York: Oxford University Press, United States of America. 1984; 77-81.

Hamer C, Kvatum K, Jeffries D, Allen S (2004): Detection of severe protein-energy malnutrition by nurses in the Gambia. Arch Dis Child (2004); (89):181–184.

Hampshire R, Aguayo V, Harouna H., Roley J, Tarini A, Baker S. Delivery of nutrition services in health systems in sub-Saharan Africa. Opportunities in Burkina Faso, Mozambique and Niger. Public Health Nutrition. 2004; (7): 1047–1053.

Harrison D, Hees H, Harker H, Mann M. An assessment of the road to health card based on perception of clinical staff and mothers. South African Medical Journal 1998; (88): 1424-1428.

Hendricks M, Beardsley J, Bourne L, Mzamo B, Golden B. Are opportunities for vitamin A supplementation being utilized at primary health-care clinics in the Western Cape Province of South Africa? Public Health Nutrition. 2006; 10(10): 1082–1088.

Hendricks M, Bearsdley J, Bourne L, Mzamo B, Golden B. Are opportunities for vitamin A supplementation being utilized at primary health – care clinics in the Western Cape Province of South Africa. Public Health Nutrition. 2007; 10 (10): 1082- 1088.

Hendricks M, Roux M, Femandes M, Irlam J. Evaluation of a nutritional supplementation programme in the Northern Cape province of South Africa: Public Health Nutrition. 2003; 6(5): 431 -437.

Jani J, Jani V, Barreto J, Sahay S. The role of recorded and verbal information in health information system: A case study of the Expanded Program on Immunization in Mozambique. Ethiopian Journal of health and development. 2007; 21(2): 136-141.

Jani J, Schacht C, Jani I, Bjune G. Risk factors for incomplete vaccination and missed opportunity for immunization in rural Mozambique. BMC Public Health. 2008; (8): 161.

Jelley D, Madeley R. Preventive health care for mothers and children: A study in Mozambique. Journal of tropical medicine and hygiene. 1983; (86): 229–236.

Kabir M, Iliyasu Z, Abubakar I, Nwosuh J (2004): Immunization coverage among children below 2 years of age in Fanshekara, Kano, Nigeria. Nigerian journal of basic and clinical sciences. 2004;

 (1): 10 – 13.

Karamagi C, Rosalind G, Lubanga R, Kiguli S, Ekwaru P, Heggenhougen K (2004): Health providers' counselling of caregivers in the integrated management of childhood illness (IMCI) programme in Uganda. African health sciences 4(1): 31- 39.

Kibel M, Wagstaff L. Child health for all. A manual for Southern Africa; 3rd ed. Cape Town, South African Oxford University Press; 2003.

Koumare A, Traore D, Haidara F, Sissoko F, Traore I, Drame S, Sangare K, Diakite K, Coulibaly B, Togola B, Maiga A. BMC International Health and Human Rights 2009; 9 (1): S13

Kumar V, Abbas A, Fausto N, Robbin S, Cotran R (2004): Pathology basic of disease, 7th Edition, elseviewer Saunders, Philadelphia, Pennsylvania, United States of America. 2004; (7): 450-452.

Levinson F, Basset L. Malnutrition is still a major contributor to child deaths. Malnutrition is the leading killer of children. 2007; 1 – 8.

Loevinsohn B, Loevinsohn M. Well child clinics and mass vaccination campaigns: An evaluation of strategies for improving the coverage of primary health care in a developing country. Amemrican journal of public health. 1987; (77):1407-1411.

Manary M, Broadhead R, Yarasheski K (1998): Whole-body protein kinetics in marasmus and

Kwashiorkor during acute infection. American journal of clinical nutrition. 1998; (67):1205-1209.

Mascie-Taylor C, Karim R, Karim E, Akhtar S, Ahmed T, Montanari M (2003): The cost-effectiveness of health education in improving knowledge and awareness about intestinal parasites in rural Bangladesh. Economics and Human Biology. 2003; (1): 321–330.

Morley D. A medical service for children under five years of age in West Africa. Transactions of the royal society of tropical medicine and hygiene. 1962; (57): 79–93.

Morley D, Meegan M (1998): Growth monitoring a forgotten subject. (Access 2010 Dec.). Available from: http:// www. Fao.org/DOCREP/003/X8576m03.htm.

Msefula D. How can growth monitoring and special care of underweight children be improved in Zambia? Tropical Doctor.1993; (23): 107–112.

Muhe L, Crowley S, Graham S, Falck-Ytter Y, Wittenberg D, Mwinga K, Krishnaswami J. WHO recommendations on the management of diarrhea and pneumonia in HIV-infected infants and children: Integrated Management of Childhood Illness (IMCI). World Health Organization, 2010.

Muller O, Krawinkel M. Malnutrition and health in developing countries. CMAJ. 2005; 173(3): 279-286.

Muniz-Junqueira M, Queiroz E. Relationship between protein-energy malnutrition, vitamin A, and parasitizes in children living in Brasília. Brazilian Society of Tropical Medicine. 2002; 35(2): 133-141.

Nabarro D. Health basics: Growth monitoring. Produced by Dialogue on Diarrhoea AHRiAG; 1986.

Nabarro D, Chinnock P. Growth monitoring – inappropriate promotion of an appropriate technology. Social science and medicine.1988; (26): 941–948.

Nkosi P, Horwood C, Vermak K, Cosser C, Hanskis J. The role of doctors in provision of support for primary health care clinics in KwaZulu-Natal, South Africa. SA Fam Pract. 2009; 51 (5):408-412.

Nzioki C, Irimu G, Musoke R, English M (2010): Audit of care for children aged 6 to 59 months admitted with severe malnutrition at Kenyatta National Hospital, Kenya. Int Health. 2010; 1(1): 91–96.

O'Brien H.B. Communication of innovation in health care. MSc Thesis. London School of Hygiene and Tropical Medicine: London; 1978.

Ogunbanjo GA. Type 2 diabetes: An evidence-based approach to its management by the family practitioner. CME. 2006; 24 (10): 568-572.

Palafox N, Gamble M, Dancheck B, Ricks M, Briand K, Semba R. Vitamin A deficiency, iron deficiency, and anaemia among preschool children in the Republic of the Marshall Islands: Elsevier Nutrition. 2003; (19): 405 – 408.

Panpanich R, Garner P. Growth monitoring in children: Review: Cochrane Database of Systematic Review. 2009; (4): 1 – 13.

Pearson R. Thematic evaluation of UNICEF support to growth monitoring. Evaluation and research working paper series (2). New York: UNICEF, 1985.

Practical guidelines on practice of health professional in the monitoring of child health, Royal College of Pediatrics and Child Health, June, 2006.

Puoane T, Sanders D, Chopra M, Ashworth A, Strasser S, McCoy D, Zulu B, Matinise N, Mdingazwe N. Evaluating the clinical management of severely malnourished children – A study of two rural district hospitals. SAMJ 2001; (91): 137-141.

Qayad M. Competence of maternal and child health clinic workers in detecting malnutrition in Somalia. African Health Sciences. 2005; 5(4): 319 – 321.

Reubenson G. Worm infestations in children: Professional Nursing Today. 2007; 11 (5): 32-36.

Roberfroid D, Kolsteren P, Hoeree T, Maire B. Do growth monitoring and promotion programs answer the performance criteria of a screening program? A critical analysis based on a systematic review. Tropical Medicine and International Health. 2005; 10(11): 1121-1133.

Ruel M, Pelletier D, Habicht J, Mason J, Chobokoane C, and Maruping P. Comparison of two growth charts in Lesotho: health workers' ability to understand and use them for action: American Journal of Public Health. 1991; (81): 610-616.

Saloodgee H. Integrated management of childhood illness- traditional versus new approaches to clinical care. SAMJ. 2007; 25 (4): 172 – 175.

Schoeman S, Hendricks M, Hattngh S, Benade A, Laubscher J, Dahnsay M. The targeting of nutritionally at-risk children attending a primary health care facility in the Western Cape Province. Public Health Nutrition. 2006; 9 (8): 1007-1012.

Schoeman S, Smut s C, Faber M, Van Stuijvenberg M, Oolofse A, Laubscher J, Benade A, Dhansay M. Primary health facility infrastructure and services and the nutritional status of children 0 to 71 months old and their caregivers attending these facilities in four rural districts in the Estern Cape and KwaZulu-Natal province, South Africa. SAJCN. 2010; 23 (1): 21 – 27.

Selina M. Utilization of the road to health chart to improve the health of children under five years of age. Master Dissertation, University of South Africa; 2010.

Shrimpton R, Victora C, De Onis M, Costa Lima R, Blossner M, Clugston (2001): Worldwide timing of growth faltering: Implications for nutritional interventions: American Academy of Paediatrics. 2001; 107(5): 1-7.

Singh J, Datta K (1997): Measles control in India: Additional immunization strategies. Indian paediatrics. 1997; (34): 621 – 626.

Sommer A. Vitamin A prophylaxis. Arch Dis Child. 1997; (77): 191-194.

Tarrant M, Gregory D (2001): Mothers' perceptions of childhood Immunizations in first nation's communities of the Sioux Lookout zone. Canadian Journal of Public Health. 2001; 92(1): 42-45.

Tugusimirize F, Tumwinw J, Morozi E. Missed opportunities and caretaker constraints to childhood vaccination in a rural area of Uganda. East African medical journal. 2002; 79(7): 347 – 354.

University of Stellenbosch. Tuberculosis (TB) and Nutrition. Nutrition Information Centre University of Stellenbosch (NICUS), Eastern Cape, South Africa. Web site: www.sun.ac.za/nicus (Web access 28 November 2011).

Valadez J, Brown L, Vargas W, Morley D. Using lot quality assurance sampling to assess measurements for growth monitoring in a developing country's primary health care system. International journal of epidemiology. 1995; (25): 381–387.

Visagie J. Road-to-Health card guidelines. Department of Health South Africa Epidemiological Comment. 1995; 22(7): 0-1.

Waterlow J. Classification and definition of protein-calorie malnutrition. British medical journal. 1972; (3): 566-569.

Wittenberg D (2007): Assessing and managing the child with poor weight gain. SAFPJ. 2007; 25 (4): 176-180.

World Health Organization (WHO). Growth chart standard. 2010 (accessed on 2010 Dec. 7th) Available form: http: // www.cdc.gov/growthcharts/ 2010: (Accessed December, 7th 2010).

WHO, De Onis M (2000): Measuring nutritional status in relation to mortality. Bulletin of the world health organization 78(10): 1271 – 1274.

WHO, UNICEF (2010): Levels of trends in child mortality. Estimates developed by the United Nation inter-agency group for child mortality estimation. Report. 2010; 1-22.

RESEARCH PROTOCOL

TITLE:

Monitoring of the Road to Health Chart by nurses in the public services at the primary health care level in the community of Makhado, Limpopo Province; South Africa**.**

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July 2011

1. INTRODUCTION

When allocated for clinics visits, several times the researcher observed with concern that many road-to-health charts (RTHC) are not filled in properly. The growth chart trajectory does not show a regular weight plotting, children with acute or long term illnesses do not have appropriate notes recorded in the RTHC from previous consultations. Data entered in the RTHC were inaccurate and did not correspond to the clinical condition of the child. Many RTHC reflected missed opportunities of immunizations.

Professional nurses are missing standard practices and guidelines on the use of the RTHC at clinics, even at the level 1 hospital. This is a contributing factor to the increasing rate of protein-energy malnutrition, poor growth monitoring, vitamin A deficiency and others micronutrients. The researcher observed also that the use of the RTHC in the management of other illnesses was not appropriate, especially with poor socio-economic conditions and those infected with HIV and AIDS.

The challenge on the use of RTHC and growth monitoring practices was reflected in all most 178 developing countries with a numerous of problems in interpreting the growth curve, inaccurate plotting in the chart, poor understanding of reference curve, lack of professionals training and luck of equipments.[1]

In Somalia, the study by Mohammed G. demonstrated that, health professionals using RTHC were unable to correctly identify malnourished children[2], while in South Africa the study by Tarwa and De Villiers indicated that health worker seldom asked to see the RTHC and not plotting the child weight in the RTHC at consultation and missed immunization opportunities were detected.[3] This has been also found in a similar study by Schoeman et al where practically professional nurses were poorly performing as a result of failure to plot weight in the growth curve and poor utilization of the RTHC.[4]

The RTHC is a cost effective; it provides a simple, cheap, practical, and convenient method of monitoring child health, a good record keeping considered as a data bank.[3] In addition to this, it is all together, an educational, promotional, preventive and informative tool.[5] Furthermore, it is a communicative document between professional nurses, doctors and others health personnel, such as social workers and dieticians; including parents. In one word, it is a simple technology and easy to use.[6]

This study is important since may highlight the awareness of challenges encountered by professional nurses on their practices on the use of RTHC in monitoring child health at district level. The study will also have an impact on the Department of Health; in planning, providing resources effectively for the well being of younger children at primary care clinics and level 1 hospital in Makhado municipality.

The purpose of the study is to determine challenges faced by professional nurses in the monitoring of the road to health chart (RTHC) at primary care clinics and outpatient department of Louis Trichardt hospital in The Tshilwavhusiku local areas, in Makhado B subdistrict, Vhembe district; Limpopo province.

2. LITERATURE

The RTHC is a patient-retained record and includes perinatal information, growth, immunization, development, Vitamin A supplementation, and a summary of illness or diseases events.[7]
According to Morley, the RTHC is a layout of home-based medical record and good source of child health information required in the community as user-friendly for as many mothers and as many health care professional as possible.[8]

Regular weighing has throughout the world been demonstrated to benefits child health. Long before malnutrition is clinically visible; it presence may be detected by deviation of a child weight from his or her previously established patterns of growth. A graphic display of weight change allows more rapid detection of deviation from the normal pattern. The RTHC was developed for this purpose and become widely used as a home based medical record for children under five, to benefit parents to detect whether the child is growing well or not.[9]

Growth monitoring consists of routine measurements to detect abnormal growth, combined with some actions when this is detected. It aims to improve nutrition, reduce the risk of death or inadequate nutrition, helps educate parents and leads to early referral for conditions manifest by growth disorder as health professionals worldwide are investing their time in this activity toward its benefits.[10]

The RTHC helps professional nurses to know when children need more nutritious food, when they need special attention, to recognize and better understand the needs of children and their family.[11]
It is also describes the physiological growth in children and providing identification on how the child should grow during a specific time period when provided optimal conditions, also it is based on high-quality study designed explicitly for creating growth chart, furthermore, the RTHC is constructed using longitudinal length and weight data measured at frequent intervals for easy assessment of child health.[12]

The expected benefits are also extended to the reduction in undernutrition, morbidity and mortality among young children, early intervention when growth faltering is easy remedied, improved knowledge about the effect of diet and illness on growth, families motivated and enable to take effective action. The growth charts is for a greater self reliance and for greater self- esteem. In addition to this, fewer referrals for curative care; cost saving and communities mobilized to address underlying socio-economic causes of poor health.[13]

The Road –to-Health Chart (RTHC) has served for several decades as a tool of monitoring nutrition and vaccination status for individual child worldwide.[14] It has been disseminated throughout the world by the world health organization (WHO), endorsed by the United Nation of Children Fund (UNICEF) and by different multitudes of international agencies, all together in collaboration with different health services of different countries throughout the world, especially in developing countries of Africa, Asia, Latin America and Caribbean, including the Near East.[15]

Malnutrition is acknowledged as an important factor associated with children under 5 years' morbidity and mortality rate observed in developing countries. The leading causes of death are basically of infectious nature, undernutrition, Deworming, and Vitamin A deficiency or Zinc deficiencies. Changes in child survival appear to be strongly associated with changes in

malnutrition. Great hopes were put in the RTHC worldwide providing growth monitoring and promotion programme to achieve the goal of child survival, development and prevention. Despite important international efforts, there is little evidence of having achieved these goals. The challenges reside in lack of rigorous implementation of the programme guidelines in the common logistic and financial difficulties in all health programmes in developing countries.[1]

In 1978, the WHO study showed RTHC practice in 50 countries in Africa, 41 in Asia, 34 in Europe, 30 in Latin America and Caribbean. Numerous problems were however reported: That there were poor interpretations of the growth curve in 48% of countries, inaccurate plotting in 40% and poor understanding of the reference curve in 29% of countries throughout the world.[1]

In South Africa, the RTHC has been introduced since 1973, first in Cape Town, than in others provinces.[16] All provinces are using the same RTHC which is the WHO standard. The Department of Health (DoH) is responsible for designing, printing and distribution the RTHC countrywide.[8]

The study by Ruel at al indicated that, in practices; four conditions are necessary for the RTHC to be useful for either educational or screening purposes. Firstly the child's age and weight data must be plotted reasonably accurate. Secondly, health professionals must be able to understand and interpret the growth curve properly. Thirdly, once growth chart faltering is detected, health professionals must be able to identify the appropriate interventions that need to be taken and Fourth, health professionals must be able to discuss the finding with mothers, therefore, to make the mother able to understand the growth charts and to interpret the message provided by health professionals.[17]

The RTHC in South Africa is considered as a cornerstone of preventive and promotive of child health. The child health chart is incorporating weight for age chart. Satisfactory weight gain not only signifies adequate protein-energy nutrition, but serves as a general indicator of child health. Catch up of growth after illness associated with weight loss is reassuring evidence of recovery and failure signals indicates the need of further action.[18]

3. AIM

The aim of the study will be to determine the challenges faced by professional nurses in the monitoring of the Road-to-Health Chart during a consultation at primary health care level of Louis Trichardt Memorial hospital and its peripheral clinics in the Tshilwavhusiku local area, subdistrict of Makhado B community, Vhembe district, Limpopo province, Republic of South Africa.

4. OBJECTIVES

- To determine the challenges faced by professional nurses in the monitoring of the Road-to-Health Chart.
- To determine the degree of the implementation of the Road-to-Health Chart programme by professional nurses.
- To determine which aspects of the Road-to-Health Chart are being utilized by professional nurses at every visit.

5. QUESTION

What are the challenges faced by professional nurses in the monitoring of the Road-to-Health Chart at primary care level of Louis Trichardt Memorial Hospital and its peripheral clinics?

6. METHODOLOGY

6.1 Study design: Cross-Sectional study.

6.2 Setting: The study will be carried out at the outpatient department and paediatrics ward of Louis Trichardt Memorial hospital (level 1 district hospital with 53 beds) and at all six peripheral clinics, where four are rendering 24 hours health care services and two 12 hours (**Louis Trichardt Primary Health Care clinic (PHC), Madombidza clinic (MDC), Tshilwavhusiku Health Centre (THC), Kutama clinic (KMC), Vleifontein clinic (VFC), and a mobile clinic**) situated in the Tshilwavhusiku local area, Makhado B subdistrict, Vhembe district; Limpopo province, South Africa.

6.3 Study population: The study population will be comprised of all professional nurses allocated at outpatients department and paediatrics ward of Louis Trichardt Memorial hospital and also those allocated at all local clinics in the Tshilwavhusiku local area. The study sample was selected from all nurses allocated at the hospital and at all local clinics.

6.4 Inclusion criteria:
All professional nurses allocated at outpatient department and paediatrics ward of Louis Trichardt Memorial hospital and at all local clinics in the Tshilwavhusiku local area. All were registered with the Nursing Council of South Africa and employed by the Department of Health of the Limpopo provincial government of South Africa.

6.5 Exclusion criteria:

- Professional nurses who declined to participate in the study.
- Professional nurses involved in administrative works.
- Professional nurses working in emergency service.
- Professional nurses working in privates' clinics.
- Nurses of other categories (enrolled, auxiliaries, junior and students nurses).

6.6 Sampling: All inclusive sample method will be used to select professional nurses for the inclusion in the study. The total number of professional nurses is known from the staff establishment list of professional nurses provided by the clinic and hospital management (Human resources).

6.7 Sample size: A sample size will be selected from 128 professional nurses, using the sample size calculator tool at confidence level of 95% and confidence interval to the sample proportion equal to 5%. The sample size calculated is 96. The following formula was used to calculate the sample size.

$$SS = Z^2 \times (\rho) \times (1\text{-}\rho) / C^2$$

6.8 Study variable: The socio-economic characteristic will be as follows: sex, age, and years of experiences.

6.9 Data collection: Before data collection the researcher will conduct a pilot study for verification of questionnaire (appendix A), which will be done at Waterval primary care clinic (appendix E) in the neighboring subdistrict, in Vhembe. Once the tool is validated, the researcher will seek consent from professional nurses as per Ethical consideration.

Questionnaire was designed in English by the researcher using standard guidelines on the practice of health professionals in the monitoring of child health as outlined by the Royal College of Pediatricians and Child Health (RCPCH 2006 [21]) due to its adequacy and relevancy.

Two professional nurses will be trained as researcher assistants for the purpose of gathering information from the participants. Objectives and aim of the study will be disclosed and fully explained to the participants for consent seeking (appendix C) before data collection. Four week times will be allowed for data collection. The language that will be used for data collection will be English. Professional nurses who will be identified uninformed will be re-informed following the whole process. This also addressed to those who will have received inadequate information.

6.10 Data analysis: Data will be captured on the excel spreadsheet and exposed to the Statistics Package of Social Science (SPSS) 18.0 will be used to analyze the data received. These will be inclusive of the following variables: age, sex, and years of experiences. The HOD of the Department of Statistics, University of Limpopo; Medunsa Campus was contacted for assistance (appendix F). The analysis presentation will be in form of frequency, percentage, mode, mean and standard deviation and in form of graph, table and chart. The Fisher Exact Test will be used to compare the association between variables.

6.11 Reliability: In this study, reliability will be achieved by using standard guidelines validated by the Royal College of Pediatrician (RCPCH), in their adequacy and relevancy of standard practice and adapted to the present study. The tool will be re-evaluated by a pilot study.

6.12 Validity: Reliability is the pre-requisite for validity and this has been ensure as described above. The questionnaires are both closed ended and open ended question. The purpose of open ended question is to validate the information given by pilot study respondents and their answers will be weighted against the standard guidelines as outlined in the methodology.

6.13 Bias: Bias is a systematic error that is built into a study design. It is referring to the researcher and participants effects in computing, reporting and interpreting the results. Bias cannot always be eliminated, but must be recognized and if possible to be minimized. The following biases are likely to be encounter:

6.14 Sampling bias: This will be minimized by all inclusive sample method sampling, in order to allow every professional nurse from different sites to have the same chance of participation in the study.

6.15 Information bias: This will be minimized by two trained research assistants, who are professional nurses and will be delegated for gathering information, to prevent the researcher influence on the professional nurses' answers to questionnaire. Data will be collected on the spot to prevent missing of information and avoiding nurses helping each other in answering questions as the researcher is expecting that, experienced professional nurses may have more knowledge than lesser experienced or newly appointed professional nurses.

7. ETHICAL CONSIDERATION

Permission to conduct research will be obtained from the School of Research and Ethics Committees (SREC) and from the Medunsa Research Ethical Committee (MREC). Upon approval, permission will be sought from the Department of Health and Social Development of Limpopo Provincial Government (appendix D). Thereafter permission will be obtained from the CEO and clinical manager where the research will take conducted (appendix E).

Consent form (appendix B) will be completed by each participant who agrees to take part in the study after full information and detailed explanation on aim and objective of the study. The participant's identification will remain anonymous and confidentiality will be maintained. Participants have the right to decline the invitation of participating in the study. Participation in the study is voluntary and even though they accept to take part in the study, they still have the right to withdraw at anytime they wish to do so.

Professional nurses will not be penalized or given any inferior treatment if he/she declines to participate in the study. Professional nurses will be informed that the results of this study may be published in a scientific journal.

8. TIME FRAME AND IMPLEMENTATION BUDGET

STATIONERY	R 5000,00	MREC APPROVAL	January 2011
STATISTICIAN	R 2000,00	SUBMISSION HOD	Feb. 2011
PAYMENT OF RESEARCH ASSITANTS	R 2000,00	DATA COLLECTION	April-May 2011
TOTAL	R 9000,00	DATA ANALYSIS	May - June 2011
		FINAL WRITE UP	June -July 2011

9. REFERENCES

1. Roberfroid D, Kolsteren P, Hoeree T, Maire B (2005): Do growth monitoring and promotion programs answer the performance criteria of a screening program? A critical analysis based on a systematic review. Tropical medicine and international health 10(11): 1121-1133.

2. Qayad M (2005): Competence of maternal and child health clinic workers in detecting malnutrition in Somalia. African Health Sciences 5 (4): 319-321.

3. De Villiers FPR and Tarwa C(2007): The use of the road to health chart in monitoring child health. SA Fam. Pract. 49(1): 15.

4. Schoeman .S, Hendricks M, Hattingh S, Benade A, Laubscher J, Dhansay M (2006): The targeting of nutritionally at-risk children attending a primary health care facility in the Western Cape Province of South Africa. Public Health Nutrition 9 (8): 1007-1012.

5. Elana P, Dowshen S, Izenberg N (2007): Public understanding of growth charts: A review of the literature. Patients education and counselling (65): 288-295.

6. Jani J, Jani H, Barreto, and Sahay S (2007): The role of recorded and verbal information in health information systems: A case study of the Expended Program on Immunization in Mozambique. Ethiop. J. Health Dev. 21(2): 1-6.

7. Coovadia H, Wittenberg D (2006): Paediatrics and child health: A manual for health professionals in developing countries. Oxford Southern Africa, 5th Edition, South Africa pp 16.

8. Visagie J (1995): Road to Health card guidelines. Department of health South Africa. Epidemiological comment 22(7): 1.

9. Grisp N, Donald P (1987): The road to health card and immunization records. South African Medical Journal (72): 331-333.

10. Garner P, Ratana P, Logan S (2000): Is routine growth monitoring effective? A systematic review of trial. Ach. Dis. Child (82):197-201.

11. Kellerman F. (1992): Road to health chart showing a child's progress. GOBIFFF (1): 8.

12. World Health Organization (WHO). Growth chart standard website: www.cdc.gov/growthcharts/ 2010 (access online June 2010).

13. Ann A, Roger S, Kazi J (2008): Growth monitoring and promotion: review of evidence of impact; Maternal and Child Nutrition (4): 86-117.

14. Simba D (2009): Towards a sustainable community databased: taking advantage of the Road-to-Health cards to monitor and evaluate health interventions targeting under fives. Tanzania Journal of Health Research 11 (1): 46-50

15. Ashworth A, Roger S, Kazi J (2008): Growth monitoring and promotion: review of evidence of impact; Maternal and Child Nutrition (4): 86-117.

16. Harrison D, Hees H, Harker H, Mann M (1998): An assessment of the road to health card based on perception of clinical staff and mothers. SAMJ (88): 1424-1428.

17. Ruel M, Pelletier D, Habicht J, Mason J, Chobokoane C, Maruping P (1991): Comparison of two growth charts in Lesotho: health workers' ability to understand and use them for action. American Journal of Public Health (81): 610-616.

18. Wagstaff L, Gillian D (1986): Children's growth charts in theory and practice. SAMJ (70): 426-427.

19. A practical guidelines on practice of health professional in the monitoring of child health, Royal College of Pediatrics and Child Health, June, 2006.

Appendix B

QUESTIONNAIRE

PART I : SOCIO-DEMOGRAPHIC CHARACTERISTICS						
1. Please answer to questions below by ticking where appropriate.						
1.1. Age						
1.2. Gender						
1.3. Experience						
1.4. Health facility						
1.5. Additional courses	IMCI		TB		HIV	
PART II: CHALLENGES FACED BY PROFESSIONAL NURSES						
2. How many professional nurses allocated in your clinic per category						
2.1. Number of auxiliary nurses						
2.2.. Number of enrolled nurses						
2.3. Number of professional nurses						

3. Challenges	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	NOT SURE
3.1. Shortage of stuff					
3.2. Lack of equipment					
3.3. Workload					

4. What is the number of professional nurses on duty in your shift in your health facility?	
4.1. None on duty	
4.2. One professional nurse on duty	
4.3. Two professional nurses on duty	
4.4. Three professional nurses on duty	
4.5. Four professional nurses on duty	
4.6. Five professional nurses or more	
5. Indicate the degree of understaffing	
5.1 Mild	
5.2. Moderate	
5.3. Severe	

6. Indicate whether Yes or Not the following of equipments are available and well functioning in your health facility					
6.1. Functioning weighing scale for children	Yes			No	
6.2 Functioning weighing scale for infant	Yes			No	
6.3. Functioning height scale for infants & children	Yes			No	
6.4. Functioning fridge for vaccines storage	Yes			No	
6.5. Availability of cooler box	Yes			No	

7. What are reasons of missed opportunity of vaccines in your health facility? Please tick only one for each statement from					
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	NOT SURE
7.1. Vaccines supplied in inadequate stock					
7.2. Vaccines not available on the day of immunization session					
7.3. Irregular attendance of immunization session by parents					
7.4. Absence of the RtHC on the day of immunization					
7.5. Side effects of vaccines					
7.6. Child sickness					
7.7. Multiple vaccines					

8. What are answers from parents in the absence of the RtHC during the consultation in your health facility? Please tick only one.	
8.1. RtHC get lost	
8.2. RtHC get burned in the house	
8.3. RtHC forgot at home	
8.4. Immigrant with no RtHC	
8.5 RtHC left in the taxi	

9. What is the meaning of the growth curve characteristics below? Please write down your answer for each characteristic.	
9.1. Weight – for – age below the 3rd centile	....
9.2. Height – for – age below the 3rd centile	....
9.3. Weight – for- age below the 3rd	....
9.4. When do you recognize malnutrition in a child using the RtHC at consultation? Please choose only one.	
9.5. When the child is wasted	
9.6. When the child has Kwashiorkor	
9.7. When the child is under weight	
9.8. Very early before clinical manifestation	

PART III: THE DEGREE OF THE IMPLEMENTATION OF THE ROAD – TO – HEALTH CHART					
10. Please score the degree of the implementation of the RtHC in your health facility. Please tick only one.					
	VERY POOR	POOR	GOOD	VERY GOOD	NOT SURE
10.1. EPI programme					
10.2. Weight – for – age chart					
10.3. Height – for – age chart					
10.4. Weight – for – height chart					
10.5. Growth chart interpretation					
10.6. Availability of equipments					
10.7. IMCI programme					
10.8. RtHC guidelines					

11. Please score the implementation of the RtHC guidelines in your health facility. Choose only one.					
11.1.RtHC interpretation					
11.2. RtHC asked for at consultation					
11.3. RtHC presence at consultation					
11.4. Clinical notes in RtHC					
11.5. Completion of RtHC					
11.6. Drawing a slop in the RtHC					

	STRONGY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	NOT SURE	REASONS
PART IV: ASPECT OF THE RtHC PROGRAMME MOST UTILIZED AT HEALTH FACILITIES						
12. Which aspect of the RtHC are you the most utilize in health facility? Please tick only one and give reason for your choice						
12.1. EPI programme						
12.1. GMP programme						
12.3. Management of other illnesses						

13. What is the frequency of Vitamin A administration and Deworming according to EPI programme? Please tick only one.

13.1. Every month	
13.2. Every three months	
13.3. Every six months	
13.4. Every nine months	

End of questionnaire.

CONSENT FORM

Statement concerning participation in a Research Project

Name of Research Project

Monitoring of the Road to Health Chart by nurses in the public services at the primary health care level in the community of Makhado, Limpopo Province; South Africa.

I have read the information on /heard the aims and objectives of the proposed study and was provided the opportunity to ask questions and given adequate time to rethink the issue. The aim and objectives of the study are sufficiently clear to me. I have not been pressurized to participate in any way.

I understand that participation in this Research Project is completely voluntary and that I may withdraw from it at any time and without supplying reasons. This will have no influence on the regular treatment that holds for my condition neither will it influence the care that I receive from my regular doctor.

I know that this Project has been approved by the Research, Ethics and Publications Committee of Medunsa. I am fully aware that the results of this Project will be used for scientific purposes and may be published. I agree to this, provided my privacy is guaranteed.

I hereby give consent to participate in this Project.

....
Name of professional nurse   Signature of professional nurse

....   ………..........   ....
     Place.   Date.   Witness
_____
Statement by the Researcher
I provided written information regarding this Project
I agree to answer any future questions concerning the Project as best as I am able.
I will adhere to the approved protocol.

....   ……………
Dr. Kitenge T.G.   Signature   Date   Place

INFORMATION LEAFLET FOR PARTICIPANTS

Title:

Monitoring of the Road to Health Chart by nurses in the public services at the primary health care level in the community of Makhado, Limpopo Province; South Africa.

Introduction

You are invited to volunteer for a study/research. This information leaflet will assist you in deciding if you would like to participate, before you agree to take part in this study you should fully understand what is involved. If you have any questions which are not fully explained in this leaflet, do not hesitate to ask the research assistants.

Dr. KITENGE T.G. Cell: 0762486273

Purpose and objectives of the study

The aim of this study is to determine the challenges faced by professional nurses in monitoring the Road to Health Chart at primary care clinics and level-1 hospital. The following are objectives of the study:

- To determine the challenges faced by professional nurses in the monitoring of the Road-to-Health Chart.
- To determine the degree of the implementation of the Road-to-Health Chart programme by professional nurses.
- To determine which aspects of the Road-to-Health Chart are being utilized by professional nurses at every visit.

The Rights as a Participant

The following rights will be observed
- Rights not to be harmed
- Voluntary participation
- Right to confidentiality
- Right to anonymity
- Right to informed consent

Risks involved

There are no foreseeable risks

All information obtained will be strictly confidential. The data collected for the study will not be linked to your name. The study may be published in the scientific journal.

Appendix E

School of Medicine
Administration Office

P O Box 210
Medunsa Campus

☎ (012) 521 4307
Fax: (012) 521 5811
e-mail: henrico@ul.ac.za

Office of the Director:
School of Medicine
Medunsa Campus

MEMORANDUM

TO : Prof GA Ogunbanjo
Chairperson of MREC
Box 163
University of Limpopo
Medunsa Campus
0204

FROM : Dr S Mda
Chairperson : SREC
Box 210
University of Limpopo
Medunsa Campus
0204

DATE : 24 January 2011

SUBJECT : CONSIDERATION OF PROTOCOL BY MREC : DR G KITENGE

Please note that the research protocol of **Dr G Kitenge** has been reviewed and approved by SREC dated 13 September 2010.

Title: Monitoring of the road to health chart (RTHC) by nurses in the public services at the primary health care level in the community of Makhado, Limpopo Province.

MREC to review and consider the protocol for approval.

Yours sincerely

Appendix F

UNIVERSITY OF LIMPOPO
Medunsa Campus

MEDUNSA RESEARCH & ETHICS COMMITTEE

CLEARANCE CERTIFICATE

P O Medunsa
Medunsa
0204
SOUTH AFRICA

Tel: 012 - 521 4000
Fax: 012 - 560 0086

MEETING: 01/2011

PROJECT NUMBER: MREC/M/01/2011: PG

PROJECT :

Title: Monitoring of the road to health chart (RTHC) by nurses in the public services at the primary health care level in the community of Makhado, Limpopo Province

Researcher:	Dr G Kitenge
Supervisor:	Dr I Govender
Co-supervisor:	Dr N Ndwamato
Hospital Superintendent:	Dr Kazaji
Department:	Family Medicine & PHC
School:	Medicine
Degree:	MMed Family Medicine

DECISION OF THE COMMITTEE:

MREC approved the project.

DATE: 10 February 2011

PROF GA OGUNBANJO
CHAIRPERSON MREC

Note:
i)   Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee.
ii)   The budget for the research will be considered separately from the protocol.
PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.

Appendix G

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH & SOCIAL DEVELOPMENT

Enquiries: Selamolela Donald
Ref: 4/2/2

09 March 2011
Dr Kitenge T.G
Department of Health
Louis Trichardt hospital
Vhembe District

Dear Madam

Re: Permission to conduct the study titled: Monitoring of road to health by nurses in the public health service at the primary health care level in the community of Makhado, Limpopo Province, South Africa

1. The above matter refers.

2. The permission to conduct the above mentioned study is hereby granted.

3. Kindly be informed that:-

   - Further arrangement should be made with the targeted institutions.

   - In the course of your study there should not be any action that will disrupt the services

   - After completion of the study, a copy should be submitted to the Department to serve as a resource

   - The researcher should be prepared to assist in the interpretation and implementation of study recommendation where possible

Your cooperation will be highly appreciated

Head of Department

Private Bag x 9302 Polokwane.
18 College Str. Polokwane 0700. Tel.: (015) 293 6000 Fax: (015) 293 6211 Website: http/www.limpopo.gov.za

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Appendix H

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
HEALTH & SOCIAL DEVELOPMENT
ELIM HOSPITAL

Enq: Mrs. E. Vosloo
Date: 19 April 2011

To: Dr. T.G. Kitenge

RE: PERMISSION TO CONDUCT PILOT STUDY AT WATERVAL CLINIC

1.   The above matter referrers to;

2.   Your application to conduct a pilot study in the catchment area of Elim Hospital.

3.   You are hereby given approval to continue with the pilot study at Waterval Clinic as requested.

4.   This is based on the approval from the Head of Department, Health, in Limpopo province.

5.   It will be appreciated if you can furnish this office with the results of your study to assist with improving of service delivery.

Yours in service delivery!

....
Acting Chief Executive Officer

DEPARTMENT OF HEALTH & SOCIAL DEVELOPMENT
OFFICE OF THE CHIEF
EXECUTIVE OFFICER
19 APR 2011
PRIVATE BAG X312
ELIM HOSPITAL, 0960
LIMPOPO PROVINCE

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