AN EVALUATION OF THE IMPLEMENTATION OF VITAMIN A SUPPLEMENTATION PROTOCOL IN HEALTH ISTITUTIONS IN MOOKGOPHONG MUNICIPALITY: A Case Study of Waterberg District

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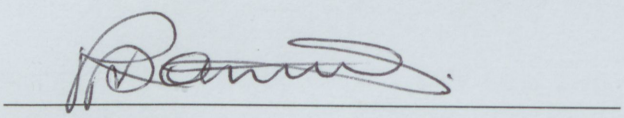
DECLARATION

I, DIHLOLELO VIVIAN MAMAREGANE, hereby declare that the work in this dissertation is based, is original (except were acknowledgements indicate otherwise) and neither the whole work nor part of it has been, or shall be submitted for another degree to this or any other institution for tertiary education or examining body.



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DEDICATION

I dedicate this to my late father Madiki, my mom Annie, my husband, my daughters Mokgethwa & Onalerena and my siblings.

Abstract

Aim: The main purpose of this study was to evaluate the implementation process of the Vitamin A Supplementation Protocol in institutions in the Mookgophong sub-district of Waterberg, Limpopo Province.

Design: Multi-stage sampling was used.

Setting: The study was conducted in 6 clinics in Mookgophong sub-district and in one hospital in Mogalakwena which supports the clinics with resources.

Subjects: There were 13 nurses, 2 pharmacists and 1 medical doctor. These health professionals served as informants.

Methods: Self-reported questionnaires were used to collect data. The researcher did observations during data collection using a checklist. Descriptive statistics were used to analyse the data.

Results: The results indicated that Vitamin A supplements were not always available at the health institutions studied. Most of the health workers were not trained on the Vitamin A Protocol although they could describe it. The staff said they adhered to the protocol.

Conclusions: The Vitamin A Protocol was not well implemented because most staff was not trained and the capsules were not always available.

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LIST OF ABBREVIATIONS

VAD	Vitamin A Deficiency
MRDR	Modified Relative Dose Response Test
RBP	Retinol Binding Protein
RE	Retinol Equivalent
CIDA	Canadian International Development Agency
WHO	World Health Organisation
Unicef	United Nations Children Fund
HKI	Hellen Keller International
MI	Micronutrient Initiative
WHA	World Health Assembly
IMCI	Integrated Management of Childhood Illnesses
NIDs	National Immunisation Days
EPI	Extended Programme on Immunisation
SAVACG	South African Vitamin A Consultative Group
IVACG	International Vitamin A Consultative Group
DHIS	District Health Information System
VAD	Vitamin A Deficiency

CHAPTER 1

INTRODUCTION

1.1 BACKROUND AND MOTIVATION

Vitamin A deficiency is widely prevalent, particularly in the developing world. The World Health Organization estimates that as many as 228 million children are affected sub clinically at a severe or moderate level by Vitamin A deficiency, and that deficiency is a problem in more than 75 countries (WHO, 1995).

The International Conference on Nutrition and the World Summit has identified the elimination of Vitamin A deficiency as a public health problem and as a high priority (WHO, 2002). Control of Vitamin A deficiency in many areas of the world will lead to the substantial and lasting improvement in childhood survival (Sommer et.al, 1996).

At the United Nations Millennium Summit in 2000, African and other world leaders made a commitment to reduce mortality rates in children by two- thirds between 1990 and 2015. A stronger political commitment and a more appropriate level of investment in the effective control of vitamin A deficiency have the promise to be among the most cost-effective and high-impact policy and programme actions towards the achievement of the Millennium Development Goal for the reduction of child mortality in sub-Saharan Africa. Among the many challenges that Africa needs to face in the coming years, the control of Vitamin A deficiency is one that can be accomplished (Aguayo *et al.*, 2005). By geographic region, the greatest number of countries adding Vitamin A supplements to national immunization days (NIDs) was in 1998 in sub-Saharan Africa, where 18 countries included Vitamin A with polio NIDs and another five countries combined it with measles campaigns. This represents an increase of almost 50% over 1997, when only 16 African countries added Vitamin A supplementation to NIDs (Sommer *et al.*, 1996). The result is that Vitamin A supplementation coverage rates for a single dose in sub-Saharan Africa have more than doubled.

Many countries have already incorporated Vitamin A supplementation into their Extended Programme on Immunisation (EPI) and many have adopted policies calling for therapeutic administration of Vitamin A as part of the treatment of a number of childhood illnesses, especially in countries introducing the Integrated Management of Childhood Illness (IMCI) (Beaton *et al.*, 1993) for children from six to five years of age. Experience from a growing number of countries indicates that the twice yearly delivery of Vitamin A supplements through synchronized, pulsed distributions yields excellent results (Beaton *et al.*, 1993). This positive result can be translated into a replicable model for other developing countries (Beaton *et al.*, 1993).

According to the United Nation Children Fund's (UNICEF's) 1999 ranking, South Africa was one of the countries that still needed a major push with regard to the implementation because Vitamin A deficiency is still a public health problem and/or high under-five mortality exists (ACC/SCN, 2000). Present coverage is inadequate through routine systems. Vitamin A supplementation is not added to NIDs or other campaigns, nor any plans been made to do so therefore is it is unlikely that the World Summit goal will be met in the near future in these countries.

The 1994, South African Vitamin A Consultative Group (SAVACG) study, conducted with the support from the Department of Health and UNICEF, concluded that the national prevalence of Vitamin A was 33% of marginal Vitamin A status; this is an indication of a serious public health problem for the country (SAVACG,1999).

1.2 PROBLEM STATEMENT

It has been observed that some children are not given the Vitamin A supplement as part of the Extended Program on Immunization (EPI). This pattern was observed in the road to health chart of children who are admitted in hospitals diagnosed with illnesses like gastroenteritis and respiratory tract infections. This was observed by the health professionals treating those children during their admissions in the hospitals.

Witten (2004) did an assessment of the Vitamin A Supplementation Programme in the Eastern Cape Province. It was concluded that the Vitamin A protocol was not implemented accordingly and more than a third of the children received wrong doses for their age and there was a need in that province for on-site training, support and supervision of the Vitamin A Supplementation Protocol.

This problem of many children especially after their nine months immunization not receiving a prophylactic Vitamin A twice yearly was also seen in the District Health Information System (DHIS) data of the uptake of Vitamin A. All these factors prompted the need to investigate whether the implementation process is being implemented according to protocol.

1.3 RESEARCH QUESTION

Is the Vitamin A Supplementation Protocol implemented appropriately in the institutions i.e. hospitals and clinics in Mookgophong Municipality of Waterberg, Limpopo Province?

1.4 PURPOSE OF THE STUDY

The main purpose was to evaluate the implementation process of the Vitamin A Supplementation Protocol in institutions in the Mookgophong municipality of Waterberg, Limpopo Province.

1.5 OBJECTIVES OF THE STUDY

The objectives of the study include the following:

- To determine the availability of the Vitamin A capsules at the health institutions.

- To determine the health workers' knowledge on Vitamin A supplementation protocol.
- To evaluate adherence to prescribed Vitamin A supplementation protocol.
- To identify the constraints experienced by the health workers when implementing Vitamin A supplementation protocol.

1.6 SIGNIFICANCE OF THE STUDY

This process analysis aims to investigate how this programme is implemented and how it functions in actual operation and if the protocol is practical and functional in the settings designed for its implementation i.e. hospitals and clinics.

Problems with the implementation process will also be identified and this will enhance the process. Therefore, this process analysis is aiming at improving the programme implementation. The Vitamin A Supplementation Programme is one of the national strategies to reduce the rate of Vitamin A deficiency in children under 5 and their mothers require evaluation for its main goal to be reached and improve the health of children.

1.7 THEORETICAL FRAMEWORK AND ASSUMPTION

Vitamin A supplementation protocol, is supposed to be implemented in all health institutions and an assumption, is that all hospitals and clinics in the study area are implementing the protocol and that the personnel are trained. The supplementation is for children under six and postpartum women.

There are two specific Vitamin A schedules in the program, the preventative (Table 1) and the therapeutic (Table 2) schedules. The preventative schedule is supposed to be given routinely when children are taken for immunization at the primary health care

(PHC) level and the therapeutic schedule is given with treatment of diseases like measles and malnutrition. The researcher therefore has made the following assumptions:

- That the health institutions are implementing the protocol as prescribed, and
- That the mother of the child has been advised on the importance of vitamin A supplementation.

Table 1.1: Vitamin A preventative schedule

	DOSAGE	SCHEDULE
Non- breast-fed Infants 1-5 months	500000 IU White capsules	A single dose at the age of 6 weeks
All infants 6-11 months	100000 IU Blue capsules	A single dose at the age of 6 months or up to 11 months
All children 12-60 months	200000IU Red/yellow capsules	A single dose at 12 months Then every 6 months until 60 months
All post-partum women	200000 IU Red/ yellow capsules	A single dose at delivery. Not later than 6 weeks after delivery

Source: Department of Health, Nutrition directorate, (2001)

Table 1.2: Therapeutic dosage schedule

This only applies to children diagnosed of Vitamin A deficiency or a disease related to it.

Target group	Immediately on diagnosis
Infants 0-5 months	50 000 IU (1 white capsules)
Infants 6-11 months	100 000 IU (1 blue capsules)
Children 12-60 months	200 000 IU (1 red or yellow capsules)

Source: Department of Health, Nutrition directorate, (2001)

Vitamin A supplementation to the mother is given within six weeks of delivery of the child, a dose of 200 000 IU should be given to all mothers irrespective of the mode of feeding. Children who are not breastfed should be given 50 000 IU at six weeks. However, the breastfed children will only be given 100 000 IU at 6 months and continue according to the schedule below.

Recording is very important for the service provider to be able to see the periods it was given because it should not be given too soon after the last dose. A minimum interval between doses is one month and under exceptional circumstances, the interval should be reduced in cases of clinical Vitamin A deficiency (Department of Health, Nutrition Directorate, 2001).

According to Leedy and Ormrod (2004), the strategy for conducting evaluation research consists of four phases:

1. Determination of the objectives of the program;
2. Developing a means of measuring the attainment of those objectives;
3. Collecting the data; and
4. Interpretation of data against the objectives of the program.

CHAPTER 2

LITERATURE REVIEW

2.1 OVERVIEW

The literature review focused on the following:
Vitamin A definitions and metabolism, deficiencies, consequences and strategies to combat the deficiencies, lessons from other countries and the situation in South Africa. The ultimate goal of vitamin A prophylaxis is to restore normal Vitamin A status to deficient children. The most effective means for accomplishing this depends on the vagaries of local culture, the available foods, and the local health system.

2.2 VITAMIN A: DEFINITION AND METABOLISM

Vitamin A is a group of compounds that play an important role in vision, bone growth, reproduction, cell division, and cell differentiation (in which a cell becomes part of the brain, muscle, lungs, blood, or other specialized tissue.) (Institute of Medicine, Food and Nutrition Board, 2001). Vitamin A helps regulate the immune system, which helps prevent or fight off infections by making white blood cells that destroy harmful bacteria and viruses (Ross,1999). Vitamin A also may help lymphocytes (a type of white blood cell) fight infections more effectively.

Vitamin A promotes healthy surface linings of the eyes and the respiratory, urinary, and intestinal tracts (Semba, 1998). When those linings break down, it becomes easier for bacteria to enter the body and cause infections. Vitamin A also helps the skin and mucous membranes function as a barrier to bacteria and viruses (Ross, 2002).

In general, there are two categories of vitamin A, depending on whether the food source is an animal or a plant.

Vitamin A found in foods that come from animals is called preformed Vitamin A. It is

absorbed in the form of retinol; one of the most usable (active) forms of Vitamin A. Retinol can be made into retinal and retinoic acid (other active forms of Vitamin A) in the body (Institute of Medicine, Food and Nutrition Board, 2001).

Vitamin A is a fat-soluble substance stored in the body organs, principally the liver. It is released as needed into the blood stream, becoming available for use by the cells throughout the body including the eyes. It is important for growth, health and good eyesight and it also protects the body from infections and illnesses. The body cannot produce Vitamin A; it is found from food or Vitamin A supplements. If there's not enough Vitamin A in the body stores the results is Vitamin A deficiency. This deficiency can be caused by sicknesses such as measles and diarrhea and if a person does not eat enough foods rich in Vitamin A, such as liver, kidneys, yellow and green leafy vegetables and fruits (i.e. carrots, mangoes, spinach, morogo).

2.3 VITAMIN A DEFICIENCY

People who are most at risk of the deficiency are:

- Babies who are not breastfed ;
- Babies and children from 6 months –5 years of age (both breastfed and non-breastfed);
- Pregnant and lactating mothers; and
- Children with measles, persistent diarrhea and those who suffer from malnutrition.

Vitamin A deficiency can cause increased morbidity and mortality of infants, children, and possibly increased morbidity and mortality of infants infected with HIV. It also contributes to anemia, by interfering with iron transport and utilization for hemoglobin synthesis.

Vitamin A deficiency (VAD), often in association with protein-energy malnutrition, principally affects preschool children. It is estimated that almost 250 million children in developing countries are at risk, of whom at least 2.8-3 million are clinically deficient (WHO, 1995). SAVACG study in 1995 found that 33.3% of children aged 6-71 months in South Africa were having VAD and 43.5 % of those children were from Limpopo Province. VAD causes night blindness and may lead to Xerophthalmia and eventually total blindness. Every year 250 000-500 000 children lose their sight because of VAD; two-thirds of these children are likely to die (Beaton *et al.*, 1992). An estimated 1 million additional children die each year of infectious diseases because VAD impairs their resistance to infection. Commonly available, low-cost foods such as green leafy vegetables and certain yellow fruits and vegetables are rich in provitamin A, regular consumption of these foods in adequate amounts could prevent VAD. However, an adequate intake of fat and energy is required for Vitamin A metabolism.

Deficiency of Vitamin A has long been identified as a serious and preventable nutritional disease. A survey first published by Oomen *et al.* (1964) formed the basis for WHO's 1976 estimates of an incident of some several hundred thousand children going blind each year due to the deficiency. More recently, awareness has broadened the extent of the population affected by the deficiency and of the seriousness of the effects.

In 1984, the thirty seventh World Health Assembly (WHA) adopted a resolution requesting the director general of the World Health Organization (WHO) to give all possible support to member states in the prevention of Vitamin A deficiency and Xerophthalmia, and to co-ordinate with other inter-governmental and non-governmental organizations the launching and management of programmes for this purpose (Mason *et al.*, 1993).

In 1985 WHO proposed a coordinated 10-year plan of action for the prevention and control of Vitamin A deficiency and Xerophthalmia. The overall strategy included a mixture of long term, medium, and short-term measures. Long-term measures were those designed primarily to increase the availability and consumption of foods rich in Vitamin

A, which include Vitamin A fortified foods. Medium and short measures are employed until dietary changes or food fortifications have checked the problem and include the administration of Vitamin A supplements (WHO, 1995).

In 2005 a regional meeting was held in Ouagadougou, in Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Cote d'Ivoire, DR-Congo, Gambia, Guinea, Guinea-Bissau, Mali, Niger, Senegal, Sierra Leone and Togo. The 17 countries invited to the Regional Meeting are implementing the 3 year project called Vitamin A Supplementation for Child Survival: Accelerating Progress towards High and Sustained Coverage (2005-2007).The project was implemented by the Ministries of Health with support by the United Nations Children's Fund (UNICEF) and Hellen Keller International (HKI) and financial assistance by the Canadian International Development Agency (CIDA) and the Micronutrient Initiative (MI).

2.4 PREVALENCE OF VITAMIN A DEFICIENCY IN AFRICA

More than ever before, countries are trying to address the problem of Vitamin A deficiency and its elimination as a public health problem, a goal which was set in the World Summit for Children in 1990, and reaffirmed at the International Conference on Nutrition in 1992. African countries are particularly, adversely and uniformly affected by Vitamin A deficiency as outlined at the Congress. Marginal Vitamin A status of public health importance and/or overt Vitamin A deficiency has been reported, apart from South Africa (33%), in Ethiopia (3.5 – 7% - Bitot's spots), Ghana (27 – 34%), Lesotho (13%), Malawi (27%), Mali (93%), Mozambique (clinical 0.7%), Namibia (20%), Nigeria (56%), Senegal (57% low breast milk retinol), Swaziland (50%) and Zambia (66% in under-fives and 22% in mothers (IVACG, 1996).

2.5 CONSEQUENCES OF VITAMIN A DEFICIENCY

Night blindness is one of the first signs of Vitamin A deficiency. In ancient Egypt, it was known that night blindness could be cured by eating liver, which was later found to be a rich source of the Vitamin A (Gester, 1997). Vitamin A deficiency contributes to blindness by making the cornea very dry and damaging the retina and cornea (Sommer, 1982).

Vitamin A deficiency is in fact the leading cause of preventable childhood blindness - many are unaware that even before blindness occurs, Vitamin A deficient children face a 23% greater risk of dying from ailments such as measles, diarrhea or malaria (Sommer, 1982).

2.6 VITAMIN A DEFICIENCY PREVENTATIVE STRATEGIES

A combination of interventions is usually needed to prevent Vitamin A deficiency. Therefore, the strategies mentioned below are usually used together. Periodic situation analysis and the evaluation of program cost–effectiveness provide a basis for adjusting strategies, especially in relation to population responses to intervention activities, and provide the opportunity for phasing out programme components (ACC/SCN, 1993).

Programmes to control Vitamin A deficiency enhance a child's chances of survival, reduce the severity of childhood illnesses, ease the strain on health systems and hospitals, and contribute to the well-being of children, their families and communities. Three major deficiency control strategies currently exist, all meant to complement ongoing public health measures for the prevention and control of infectious diseases (ACC/SCN, 1993).

2.5.1 Vitamin A Supplementation

Vitamin A supplementation was found to be low cost, acceptable and clinically effective within a relatively short term, providing coverage of the population was also good. According to West and Sommer (1987), on average a 75-80% reduction in mild xerophthalmia prevalence among 1-3 year-olds with at least 61% coverage was observed.

While the measurements of levels of sub-clinical deficiency is expensive and time consuming, surveys indicating high levels of sub-clinical deficiency in children have, invariably occurred in countries with high infant and child mortality. Therefore, infants and child mortality rates can safely be used as proxies for clinical Vitamin A deficiency.

WHO, UNICEF, USAID, other development organizations and governments responded to these findings by adding Vitamin A supplement distribution to the NIDs in more than fifty (50) developing countries (WHO, 1997)? This made sense because:

- The target population of under-five year olds was similar for both polio and Vitamin A;
- Nationwide campaigns reached the unreached and those at highest risk;
- Limited financial and human resources were used efficiently; and
- Cost effectiveness and impact were increased.

This resulted in high coverage for Vitamin A supplementation and substantial, immediate public health impact. Field staff found that integration of Vitamin A with NIDs met with widespread acceptance and appreciation by parents and other child caretakers. Building on this culture of prevention and strong community support is critical to continuing high levels of Vitamin A to children under five (Ching *et al.*, 2000).

2.5.2 Dietary Diversification

Dietary diversification is the process that aims to increase the dietary availability, regular access and consumption of mineral and vitamin rich foods. This entails the use of a variety of foods including indigenous fruits and vegetables.

Its advantages is that it can be used as a long term approach to control VAD, relies on availability of Vitamin A foods but it's not covering a large population since in most cases it is only small scale projects used to produce those vegetables and fruits (Department of Health, 2001).

2.5.3 Food Fortification

Food fortification means the addition of one or more micronutrients by means of a fortification mix to a foodstuff, whether or not it is normally contained in the foodstuff for the purpose of preventing or correcting a demonstrated deficiency of one or more nutrients in the general population or specific population group (DOH, 2001).

Public health and public nutrition authorities can work with the food industry to increase the amount of Vitamin A population consumes through fortifying foods with Vitamin A. Many countries have fortified margarine, oil and other products consumed by infants and young children for the past 70 years. On average 20-50 % of Vitamin A supply in Europe comes from fortified foods (Department of Health Nutrition directorate, 2001). In S.A fortified maize meal and bread flour are fortified with Vitamin A, thiamine, riboflavin, niacin, Vitamin B6, folic acid, iron and zinc (Department of Health Nutrition directorate, 2001). This became compulsory in September 2003 as legislated by section 15 (1) of the FOODSTUFFS, COSMETICS AND DISINFECTANTS ACT, 1972 (Act no.54 of 1972) as amended and published (government Notice No R7634, 7 April 2003) (DOH, 2003)

In view of the challenges to rapid and large-scale implementation of food-based interventions, supplementation is currently the primary strategy to control Vitamin A deficiency and among the key interventions for improving the survival of young children. Countries carrying out two annual rounds of Vitamin A supplementation reaching at least 70% coverage among children 6-59 months - considered "effective coverage" - is on track to meet international development goals. Coverage at this threshold also ensures the full child survival benefit of Vitamin A supplementation, which will be critical to attaining the fourth Millennium Development Goal. While guidelines do not yet exist for the phase-out of supplementation, it is expected that priority countries will need to continue Vitamin A supplementation at effective coverage levels for the foreseeable future in order to realize international goals for child survival and Vitamin A deficiency control (www.childinfo.org, 2006).

2.7 VITAMIN A SUPPLEMENTATION AROUND THE WORLD

2.7.1 The effect Of Maternal Vitamin A Supplementation on Breast Milk Retinol and Maternal and Infant Vitamin Status.

A multicenter randomized, double-blinded, placebo-controlled trial was conducted in Ghana, India, and Peru to determine the effect of maternal Vitamin A supplementation on breast milk retinol and of maternal and infant supplementation on infant vitamin status. Mothers in the intervention group received 60 mg Vitamin A at 18-42 d postpartum; their infants were given 7.5 mg three times, at 6, 10 and14 weeks of age diphtheria-pertussis-tetanus (DPT) and oral polio vaccine (OPV) immunizations. Mothers in the comparison group received a placebo. Maternal supplementation resulted in higher breast milk retinol at 2 months postpartum and lower proportion of mothers with breast milk retinol ≤28 nmol/g fat. At 6 months and 9 months, maternal supplementation did not affect breast milk retinol or the proportion of mothers with low breast milk retinol (Bahl *et al.*, 2002).
An evaluation of Vitamin A supplementation regiments in Ghanaian postpartum mothers with the use of the modified relative dose response test was conducted. The objective of the study was to determine the length of time mothers are protected post-partum against Vitamin A depletion after receiving either 400,000IU Vitamin A in 2 divided doses or 200,000IUas a single dose plus a placebo 24 hours apart. The results showed that a significant improvement in Vitamin A status occurred after Vitamin A treatment as assessed by the MRDR test. The study concluded that the mothers had the basis of MRDR test results. Liver reserves of Vitamin A significantly improved in both the treatment groups, and the improvement was maintained for > or = 5 months (Tchum *et al.*, 2006).

The effects of maternal postpartum Vitamin A supplementation on the maternal and infant serum retinol concentrations, modified relative dose ratios and breast milk Vitamin A concentrations were assessed during a community based trial in Matlab, Bangladesh. This study concluded that while the both interventions were beneficial, neither was sufficient to correct the underlying sub clinical Vitamin A deficiency in these women nor to bring their infants into adequate Vitamin A status (Rice *et al.*, 1999).

2.7.2 Effect of Periodic Vitamin A Supplementation on Mortality and Morbidity.

Rosales (2002) published findings of posteriori analysis of previous data which assessed whether improving Vitamin A status resolved the measles-related pneumonia. At baseline, marginally VA deficient patients had significantly lower serum retinol and higher serum C-reactive protein than VA- sufficient children. The results showed that at the 2 weeks follow-up visit serum retinol and the RBP/TTR ratio were significantly greater in marginally VA- deficient measles patients receiving placebo.

The effect of periodic Vitamin A on mortality and morbidity of human immunodeficiency virus infected children was assessed in a controlled clinical trial in Uganda. One-hundred-and-eighty-one (181) HIV-infected children were enrolled at 6 months, every 3 months until 15-36 months they received 60mg RE or placebo. Vitamin A supplementation had no significant effect on modified point prevalence of fever, ear discharge, bloody stools, or hospitalizations but it did decrease mortality rate in HIV infected children (Semba *et al.*, 2005).

A randomised study of the effect of different doses of Vitamin A on childhood morbidity and mortality was conducted in Guinea-Bissau, Africa. The objective of the study was to determine whether the dose of Vitamin A currently recommended by WHO or half this dose gives better protection against childhood morbidity and mortality. The participants were 4983 children aged 6 months - 5years. The results showed that mortality was lower in the children who took half the recommended dose of Vitamin A compared with a full dose at both six months (mortality rate ratio 0.69, 95% confidence interval 0.36 to 1.35) and nine months (0.62, 0.36 to 1.06) of follow-up. There was a significant interaction between sex and dose, the lower dose being associated with significantly reduced mortality in girls but not in boys. The lower dose of Vitamin A was consistently associated with lower hospital case fatality in girls. Paradoxically in children aged 6-18 months, the low dose was associated with slightly higher morbidity. It was concluded that half the dose of Vitamin A currently recommended by WHO may provide equally good or better protection against mortality but not against morbidity (Benn *et al.*, 2005)

An intervention study of the effectiveness of Vitamin A capsule distribution in preventing eye damage in Indonesia, gave crucial evidence of a direct effect of Vitamin A in reducing mortality (Sommer *et al.*, 1986).

Semba *et al.* (2001) conducted a randomized double-blind, placebo controlled trial to evaluate the impact of linking Vitamin A supplementation with the Expanded Program on Immunization: Lack of Impact on Morbidity or Infant Growth. In West Indonesia 467 six-week old infants were randomized to receive 7.5mg retinol equivalent (RE) , 15mg RE, or placebo with childhood immunization contacts at 6,10 and 14 weeks and 9 months of age. Child growth was assessed with anthropometry, morbidity histories were obtained. Vitamin A supplementation had no apparent impact upon linear or ponderal growth of infectious disease morbidity in the first 15 months of age when Integrated with the Expanded Program on Immunization (Semba *et al.* (2001).

In India a study was conducted with its objectives being to review all published randomized trials concerned with linkage of Vitamin A supplementation with reduction of mortality and morbidity in Indian children (Piyush, *.et al.*, 2002). The results indicated that out of 12 studies satisfying the inclusion criteria, the available 11 were examined. Two of the trials were concerned with mortality, 6 with morbidity, and 2 with both mortality and morbidity; 1 study assessed the impact of Vitamin A on pneumococcal colonization. Out of 4 mortality trials, only one could satisfactorily report a significant reduction (54%) in child mortality following Vitamin A supplementation. Of 8 morbidity studies, only 3 indicated some beneficial effect of Vitamin A supplementation. None of the studies was perfect in methodology. It was also reported that they couldn't locate any study that addressed the issue of cost-effectiveness or dietary modifications or process evaluation.

There is a clear need to undertake a comprehensive trial with adequate sample size and a standardized methodology that could give clear, unbiased, and convincing evidence on the role of routine Vitamin A supplementation (Piyush *et al.*, 2002).

A study on the impact of supplementing newborn infants with Vitamin A on early infant mortality was conducted in a rural district of Tamil Wadu, Southern India. The results showed that infants in a Vitamin A group had a 22% reduction in total mortality compared with those in the placebo group. This study concluded that supplementing new born infants with Vitamin A can significantly reduce early infant mortality (Rahmathullah *et al.*, 2003).

Hossain *et al.* (1998) also conducted a study in Bangladesh on children whereby the objective was to evaluate the efficacy of a single large oral dose of Vitamin A in treating acute shigellosis. The study concluded that Vitamin A reduced the severity of acute shigellosis in children living in areas where Vitamin A deficiency is a major public health problem.

Mahawithanage *et al.*, (2007) conducted a study on the impact of Vitamin A supplementation on health status and absenteeism of school children in Sri Lanka. The results showed that the reasons for absenteeism were non-health causes and supplemented children lost a fewer number of school days due to illness than placebo children. Vitamin A concentrations improved with each dose and the improvement was greater with better compliance. Vitamin A supplementation with 200,000IU every 4 months over 13 months improved Vitamin A status and school attendance but not anthropometric status of these children.

Idindili *et al.* (2007) conducted a study on safety and efficacy of 2 Vitamin A supplementation schedules in Tanzanian infants. The results showed that a high dose Vitamin A supplementation was well tolerated. The study concluded that doubling the doses of Vitamin A to mothers and their young infants is safe but unlikely to reduce short term morbidity or to substantially enhance the biochemical Vitamin A status of infants at age 6-months. Darlow *et al.* (2007) conducted a meta-analysis on Vitamin A supplementation to prevent mortality, short and long term morbidity in very low birth weight infants. It was concluded that supplementing very low birth weight infants with Vitamin A was associated with reduction in death or oxygen requirement at one month of

age. Meta-analysis of three, a study on retinopathy of prematurity suggests a trend towards reduced incidence in Vitamin A supplemented infants. Neurodevelopmental assessment of 85% of surviving infants participating in the largest trial showed no differences in outcome between supplementation and placebo groups.

Villamor *et al.* (2000) studied the implications of Vitamin A supplementation on mortality and morbidity in children. The results showed that Vitamin A supplementation trials were not consistent because it was seen that Vitamin A supplementation had resulted in significant reductions in mortality in several (but not all) large community-based trials among apparently healthy children. In Hospital–based studies, Vitamin A supplements were found to reduce the severity of measles infection, but not effect on non-measles respiratory infections was observed. In some cases, supplementation was associated with an increased risk of lower respiratory infection. Vitamin A supplements also reduced the severity of diarrhea in most trials. It was concluded that Vitamin A supplementation was effective in reducing total mortality and complications from measles infections.

2.7.3 Evaluation of Vitamin A Programme Implementation Work: And The Delivery of this through Integration with Epi

Esi Foriwa Amoaful from Ghana Health Services described an evaluation of the three years of a non-NIDs Vitamin A supplementation programme in Ghana (Frigg *et al.*, 2003). Mini-surveys were undertaken to evaluate and to validate coverage, to assess awareness levels and the implementation process (Frigg *et al.*, 2003).The findings were that the programme needed to be sustained by continuous communication, monitoring and community mobilizations. It was recommended that efforts should strengthen the twice-yearly distribution of Vitamin A capsules by integrating it with other services (Frigg *et al.*, 2003).

Because of the high under five mortality rate and low Vitamin A intake and rates of stunting in the four provinces of Mozambique, the ministry of health began universal

Vitamin A supplementation of children 6-59 months in 1999. The supplements were distributed during NIDs and attained a 100% of the target group (6-59 months). NIDs were phased out in 2001 and capsules were distributed during a Mother and Child Health Campaign. Supplementation coverage attained 79% in 2000 and 91% in 2001. However, because of cost, the Ministry of Health decided to integrate vitamin supplementation into routine child services and this achieved 41% coverage in the first 6 months of the programme (Khan, 2003) reducing the successes achieved earlier.

In 2002, a pilot project was started in Maputo to test the delivery of Vitamin A supplements to women in immediate post-partum period. Coverage after the first 5 months was 95% of estimated deliveries. Furthermore, multi-sectoral evaluation in drought-affected areas included an indication of receiving Vitamin A supplementation in the previous 6 months and over 5353 children monitored; 41% had received Vitamin A over the previous 6 months (Khan, 2003). This is an indication that the implementation may be different in the same country possibly influenced by resources, both human and physical.

In Mozambique, an estimated 2.3 million < 5 year-olds are Vitamin A deficient and it is estimated that VAD will be the attributable cause of death of 30 000 children in this age group annually. Most recently a Vitamin A coverage survey in Mozambique showed that only 46% of the children received a Vitamin A supplement in the 6 months preceding the survey (Aguayo *et al.*, 2005). These studies indicate that coverage is not consistent over years and also depends on the modalities of distribution.

A study by Demissie *et al.*, (1984) in Ethiopia evaluated the process of an EPI integrated Vitamin A capsule delivery programme whereby the results showed that institutions in the two districts received only 10.2% of their total requirement of 50 000 IU Vitamin A, and none of the 10 000 IU capsules whilst 50% was reported to have been delivered but without documentation. They reported that training materials and workshops were inadequate. Lack of resources especially lack of adequate health personnel and budget

was mentioned as a crucial problem. There was lack of awareness among the respondents and this could have been due to inadequate training.

USAID and UNICEF and many other agencies have come together to promote Vitamin A interventions in Zambia (OMNI Report, 1998). High-dose Vitamin A capsules were distributed in conjunction with the country's intensified polio eradication campaign. The 1996 polio campaign reached a reported 85% of all children aged 6-72 months, offering a unique opportunity to include Vitamin A capsules in the two remaining cycles of the campaign in 1997 and 1998. It was anticipated that Zambia's experience in combining Vitamin A capsule distribution with a polio eradication campaign could provide a model for use in other African countries.

Sugar is fortified with Vitamin A in Zambia (OMNI report, 1998). Zambia produces sugar in quantities sufficient to meet national needs. Production is primarily in the hands of a single producer, the Zambia Sugar Company, with distribution throughout the country. Household expenditure data suggests that both rural and urban populations in Zambia consume sugar in amounts that make fortification a good potential intervention. Therefore, it is expected that 100% coverage is attainable in Zambia.

In Tanzania, a study on the impact of change in programmatic delivery of strategy on coverage of Vitamin A supplementation through EPI was conducted. The study found that coverage of Vitamin A supplementation among 1-2 year-olds increased from 13% in 1999 to 76% in 2002. In 2002 knowledge of 2 or more child health danger signs was negatively associated with Vitamin A supplementation coverage (80% v/s 70%). It was concluded that change in programmatic delivery of Vitamin A supplementation was associated with a major improvement in coverage in Tanzania (Masanja *et al.*, 2006).

Pangaribuan *et al.* (1990) conducted another study in Indonesia on the effect of Vitamin A supplementation distribution to control Vitamin A deficiency in pre-school children and compliance with the programme. Their objective was to evaluate the effectiveness of a widespread Vitamin A supplementation programme and to describe indicators of

compliance with the programme in Indonesia. There was an association between compliance of the caregivers and their knowledge about the potential benefit of Vitamin A supplementation.

In Bangladesh, from 1973 to 1991, Vitamin A was given as a single intervention on a house-to-house basis but between 1991 and 1995, the strategy was changed to a centre-based administration during the EPI for children less than one year. From 1995, children aged 1-5 years were given Vitamin A capsules during NIDs and then in 2002, the government of Bangladesh introduced a National Vitamin A week for Vitamin A capsule distribution. In 2002 capsule administration with NIDs was continued and the National Vitamin A week was run as an innovative campaign based on sub-NIDs. It was concluded that intervention with NIDs and sub NIDs for 12-59 months olds was cost-effective but Bangladesh needed to establish medium and long-term strategies like food fortification and dietary diversification.

Vitamin A is a significant public health problem in Nepal. Three major research projects conducted in Nepal in the early 1980s each concluded that periodic dosing of children 6-60 months of age with high dose Vitamin A capsules resulted in significant reductions in child mortality, in the order of 25-30%. The findings of these three research projects were even discussed at the National Vitamin A Workshop held in Kathmandu in 1992 during which recommendations were made and then developed into formal guidelines for the implementation of the National Vitamin A deficiency Control Programme in Nepal which has served as the blue print for the development of the Nepal National Vitamin A Programme (NVAP) (Fiedler, 2000). An important strategy for this programme has been the empowerment of the Female Community Health Volunteers (FCHVs), which has been accomplished by organising, training and motivating community workers and other representatives from education, agriculture and other sectors, as well as political representatives, to support the FCHVs (Fiedler, 2000).

2.7.4 The Implementation Process of Vitamin A Supplementation

Hendricks *et al.*, (2006) conducted a study in the Western Cape rural and urban regions to determine missed opportunity and problems relating to implementation of the Vitamin A supplementation in those regions. The study showed that there were many indications for supplementation, mothers had previously heard of the Vitamin A Supplementation Programme and records were made in the road to health charts. The managers indicated their staff had been trained to implement the programme. This study concluded that opportunities to administer Vitamin A were underutilised in both regions.

Du Plessis *et al.*, (2007) evaluated the implementation of the Vitamin A Supplementation Programme in Boland/Overberg region of the Western Cape Province. The study was conducted at 14 randomly selected PHC clinics. All children aged 6 – 60 months attending on the day of surveying with their mothers/caregivers were selected, after they had been seen by the PHC nurse in the clinic. The manager of each clinic was also interviewed. Seventy-seven per cent of the study population (N=40) was eligible for high-dose Vitamin A supplementation protocol. However, 25% of these children (N=10) did not receive Vitamin A even though there was an indication to administer it. Only 39% of mothers (N=22) reported that they were aware of the supplementation programme. All the health facility managers of the clinics had received training in the programme. Staffing problems and stock shortages appeared to play a role in inadequate implementation of the programme at some clinics. In addition, health facility managers reported that many children failed to receive their Vitamin A dose because parents did not bring them regularly to clinics. The study concluded that the programme appeared to be reasonably successfully implemented in Boland /Overberg region.

2. 8 THE SOUTH AFRICAN VITAMIN A SITUATION

In South Africa, Vitamin A deficiency is suspected to be responsible for as many as one out of every 4-childrens' deaths (Department of Health, 2001). The WHO cut-off points used to classify the severity of Vitamin A deficiency in a country are based on the prevalence rates of Vitamin A deficiency (Department of Health, 2001). The cut off points classify the Vitamin A deficiency problem as mild, moderate or severe as follows:

Mild: Prevalence of 2-10%

Moderate: Prevalence of 10-20%

Severe: Prevalence > 20%

The 1994 South African Vitamin A Consultative Group (SAVACG) survey revealed a national prevalence of Vitamin A deficiency among children in S.A of 33%. The food consumption survey, which was conducted in 1999 among children under 1-9 years found that 1 out of 2 children, had vitamin A intake of less than half the recommended levels.

In South Africa, the government came up with strategies to control the Vitamin A deficiency. The strategies are:

- Promotion of the production of Vitamin A rich foods;
- Dietary diversification emphasizing the consumption of Vitamin A rich foods;
- Promotion of breastfeeding;
- Food fortification of maize and bread flour with vitamin A and other nutrients; and
- Supplementation with the vitamin A capsules as per protocol described in section 1.7. (Department of Health, 2001).

Studies have shown that supplementing children aged 6-59 months with Vitamin A capsules dramatically increases their survival by:

- Reducing measles mortality rate by 50%;
- Reducing diarrhea diseases mortality by 33%; and
- Reducing all-cause mortality by 23% (Department of Health, 2001).

Providing Vitamin A supplements to children who need them improves their Vitamin A status; increases their resistance to diseases; reduces the severity of illnesses and the length of hospital stays; and improves their chances of survival, growth and development.

For the short-term, the department of health will focus on supplementation as part of the routine activities of maternal health, IMCI and EPI to directly and efficiently decrease the severity of the problem of Vitamin A deficiency in S.A. For the longer-term, the department of Health will use a combination of the different strategies to prevent and control Vitamin A deficiency in a sustainable manner. A prophylactic Vitamin A supplementation was started and the target groups are:

- All children aged 6 months to 5 years; and
- All post-partum women in the 6-8 weeks.

The Eastern Cape is one of the poorest provinces in South Africa and has the worst health and socioeconomic indicators in the country. It has been found that amongst the under 5 year-olds in the province, 28% is stunted and 40% have sub-clinical Vitamin A deficiency (Rohde, 2002). With this prevalence of Vitamin A deficiency the department of health in the Eastern Cape made Vitamin A supplementation a central component of its micronutrient strategy and has identified the mode of delivery to be the routine child health services provided by the extensive clinical health system thereby integrating it into the EPI programme and treat it like a vaccine (Rohde, 2002).

In October 2003, a rapid assessment was conducted in the Eastern Cape and 5 districts were purposefully selected. Observations and interviews were conducted. The findings were as follows:

- 65% of children had Vitamin A dosage written as proof of intake on their clinic card but less than a third of the caregivers could identify the Vitamin A capsule;
- The vitamin A supplementation programme was not implemented according to the protocol and more than a third of the children got the wrong doses for their age;
- Clinic audits indicated that 87% of clinics did not have sufficient stock of 100 000 IU;
- The majority of the professional nurses expressed frustration at the lack of integration and coordination amongst child health services and the pressure of other PHC programmes like TB, STI, HIV; and
- The majority of the managers lacked technical skills and capacity to use health information data effectively to make decisions (Witten, 2004).

VITAMIN A COVERAGE CHILDREN 12-60 MONTHS in the different provinces of South Africa from 2002-2004

	EC	FS	GP	KZN	LP	MP	NC	NW	WC	ZA
2002	15.6	29.5	-	-	-	-	18.4	8.5	-	[1] 9.8
2003	20.9	47.3	-	-	16.8	39.2	38.6	14.2	-	[2] 25.0
2003 SADHS	57.3	46.1	32.2	42.3	44.6	46.7	49.3	30.2	29.5	[3] 39.1
2004	61.7	26.8	7.1	41.3	33.5	39.8	33.0	34.9	-	[4] 30.9

From: District Health Information System Database, National Department of Health.

This table shows that children between 12 and 60 months of age given Vitamin A are less than 31 % in SA with only 2 provinces being able to provide over 50 %.

2. 9 TRAINING AND EDUCATION ON VITAMIN A

WHO (1998) reports that health staff at all levels of the health system as well as others involved in the control of Vitamin A deficiency and its consequences should be trained on the treatment and prevention schedules for the successful implementation of the programme. The report also recommended that training on Vitamin A should be integrated with EPI programme managers' courses on immunization, IMCI and other

curricula including medical and nursing. Job aids should be developed for providers and supervisors, advocacy materials should be developed for various target audiences.

2. 10 SUMMARY OF THE LITERATURE

The literature indicates that VAD is a significant problem among children and pregnant women in many countries. WHO estimates that 60 countries have VAD of public health significance. The MI/UNICEF/Tulane study estimates that 78 countries are affected. The available data suggests that there is an opportunity and need to target major Vitamin A control programmes, including Vitamin A supplementation in EPI to particular countries and to particular groups within the affected countries.

It is clear from the literature reviewed that there are still many problems with the implementation process and very few countries seem to have constant process and impact evaluation on the reduction of VAD. SA National Department of health is having Vitamin A coverage as part of the District Health Information System (DHIS) but still the coverage in most provinces is not improving and in some the data is not available for utilization.

CHAPTER3

STUDY DESIGN AND METHODOLOGY

3.1 STUDY DESIGN

The study design was evaluative, descriptive and quantitative. The researcher aimed to evaluate the implementation process of the Vitamin A Protocol in the health institutions. Evaluative research is applied research, which involves finding out how well a programme, practice, procedure, or policy is working (Leedy and Ormrod, 2004). In evaluation research there is process or outcome analysis and impact analysis. Process or outcome analysis is descriptive whereas impact analysis attempts to identify the impacts of an intervention that can be attributed exclusively to the intervention (Polit and Hungler, 2004). This study focused on process or outcome analysis. This study will at the end describe adherence to the process of implementing the Vitamin A Protocol.

3.2 POPULATION AND AREA

Mookgophong municipality is in Waterberg district in Limpopo Province. The population of this district is 623354 while the population in this sub-district is 30758 (Statistic SA, 2001). The municipality is +/-45 KM from Mokopane town (former Potgietersrus). It has mobile clinics which services the rural areas and farms. There is one health centre in Mookgophong municipality and two clinics, one in town and another in the township. There's also a clinic in Roedtan. All these clinics were being serviced by Voortrekker hospital in Mokopane at the time of the study. The health institutions in Waterberg especially the health centre and the clinics were managed by a District Manager at the Offices in Modimolle. The resources for the institutions are provided for by the district e.g. Human, Financial.

Adherence by health institutions to the Vitamin A Protocol was studied. Health workers were the informants. All the clinics and the district hospital (Voortrekker) in the sub-district were purposefully selected. These were Mookgophong health centre,

Mookgophong township clinic, Mookgophong TLC clinic, Roedtan clinic, Mookgophong farms mobile and Roedtan farms mobile. The health workers provided information on the implementation process of the Vitamin A Programme. The municipality was selected because it's the only one with all levels of implementation unlike the others. There is a Hospital, a Health Centre, Fixed Clinics and Mobile Clinics.

3.3 SAMPLING METHOD

Sampling design and size are discussed in this section.

3.3.1 Sampling Design

Multi-stage sampling was used. Multi-stage sampling is when different sampling methods are used at the different stages of sampling (Leedy and Ormrod, 2004). All the clinics, health centre and hospital in the municipality were included in the study. Purposive method of sampling was used to select the institutions. Categories of the informants were professional nurses, enrolled nurses, medical practitioners and pharmacists. These health workers were responsible for the implementation of this protocol hence they were purposefully selected and participated in the study.

The professional nurses and enrolled nurses were selected as informants because they were responsible for implementing the protocol. Pharmacists were included because they were responsible for the availability of the capsules. Medical practitioners were responsible for the prescription of the Vitamin A capsules for curative purposes at the district hospital. Purposive sampling was also used to select the medical practitioners, nurses and pharmacists. Convenience sampling entails the use of the most conveniently available persons or object for use as subjects in a study (Leedy and Ormrod, 2004). This design is used when experts are required for a specific purpose (Leedy and Ormrod, 2004). Convenience sampling was used to select the health professionals on duty on the day the researcher visited the health facility.

3.3.2 Sampling Size

All the clinics (five) including mobile clinics, health centre and one hospital (Voortrekker) in the municipality were included in this study. Two pharmacists, one medical practitioner working in the maternity and pediatrics wards on duty in the hospital during data collection participated in the study. Nine professional nurses and two enrolled nurses from the clinics participated in the study. The enrolled nurses were working at the mobile clinics and they also were implementing the protocol in the mobile clinics because of the shortage of professional nurses. Two professional nurses working in pediatric and maternity wards during data collection participated in the study. The total number of informants was sixteen (16) instead of seventeen because at Mookgophong location clinic there was only one instead of two professional nurses on duty during data collection. The total number of the health institutions studied was seven. Only seven institutions were selected because the process of implementation at these institutions was the one evaluated. The process of implementation should be according to a protocol and this protocol requires human resource, training of staff, educational materials to create awareness to communities and the different dosages capsules of Vitamin A. All this required resources are provided for by the District Manager in the whole Waterberg district especially the health centre and clinics not by the institutions themselves, therefore the situation will be the same in the other sub districts hence the selection of only one than all or more.

3.4 DATA COLLECTION

3.4.1 Measurements

The adherence to Vitamin A Supplementation Programme Protocol in health institutions described in section 1.8 was measured. The availability of Vitamin A capsules in the health institutions was measured using observation and questioning methods. Knowledge of the Vitamin A by health workers was determined using questionnaires.

Constraints to the implementation of Vitamin A protocol were determined using questioning method.

3.4.2 Instruments Used

A questionnaire (Appendix A) was used at both the clinic and hospital for collecting data. Quantitative methods were used for collecting data. It was a self-reported questionnaire that was filled in the presence of the researcher; it had both the close- ended and open-ended questions. The questionnaire (see appendix A) was designed to determine the availability of the dosage capsules, the knowledge of the health workers on the administration of Vitamin A, and to identify the constraints experienced by the health workers during the implementation. Demographic data on participants was also included in questionnaires. Most demographic factors can be confounders or modifiers and are required to explain observations and to describe the sample characteristics.

The advantages of a self-reported questionnaire are that it saves time and it yields more information; especially if it's sensitive information (Leedy and Ormrod, 2004). However, some people can omit certain parts which they don't understand or not submit them back to the researcher hence with this study the researcher was present to clarify and collect them immediately after completion. English was used as the language for collecting data since the sample comprised of professionals.

An observation check list was also used by the researcher to validate some of the information in all the clinics and the hospital except the mobile clinics within the study. The check list was designed to check compliance with the protocol. When using both the questionnaire and the observation the researcher will be able to validate the information given. The observation checklist also assessed if there was any communication with the community by use of pamphlets or posters about Vitamin A.

3.5 DATA COLLECTION PROCEDURES

Each clinic was visited twice. The first time was for introduction and requesting permission for data collection and the second time was for the actual data collection. The three clinics in Mookgophong were visited on the same day for introduction and since the mobile personnel and their supervisor were based at the health centre, they were also seen

at the same time with those at the health centre. The permission for the clinics was communicated with the Chief Community Liason Officer who was stationed at the Health Centre and responsible for all the clinics and health centre on the first day and also informed all the clinics and health centre of the date for data collection. Roedtan clinic was visited on its own after Mookgophong clinics, during the first visit the nurse manager of the clinic was the one communicated with and the date of the next visit was discussed and agreed upon. Two days was used for the staff in the hospital. On the first day the researcher met with the Chief Executive Officer of the hospital to request permission to conduct data in the hospital, while the second day was used for data collection.

The informants completed the questionnaires while the researcher was at the institution i.e. clinics and hospital. When they were filling in the questionnaire the researcher conducted observations of how the protocol was implemented to validate the information. The observation checklist (Appendix B) was used to record the findings. The observation check list was done at all the health institutions studied except the mobile clinics. The observation check list was used to check the stock from the clinic and hospital pharmacy, the consulting rooms and on the walls of the institutions if there were any pamphlets or posters about Vitamin A.

3.6 ETHICAL CONSIDERATIONS

The proposal was submitted to the University of Venda's Senior Degree's Committee for approval and the ethics committee for ethical clearance. An approval was requested from the Department of Health and Social Development (Appendix C) to conduct the research in their institutions whereby the researcher presented the proposal to the Department of Health and Social Development's Research and Quality Control Committee. The permission to conduct a pilot study was granted by the Chief Community Liaison Officer for the Mogalakwena local area. The district manager, the manager of the Primary Health Care and the manager for Mother Child Health, Women and Nutrition in the Waterberg district (Appendix D) were also requested for permission and co-operation before going

to the clinics for data collection. The Chief Community Liaison Officer for the municipality granted permission and communicated with all the clinics about the study. The professionals at both the clinics and the hospital completed a consent form for agreeing to participate in the study. The study details were explained to them and confidentiality was maintained. Codes were allocated to participants to ensure anonymity, the health institutions were coded then the participants per institution were also given codes and no name of the institutions or names of the health workers were used.

3.7 MEASURES OF RELIABILITY AND VALIDITY

Validity is the extent to which the instrument measures what it is supposed to measure (Leedy and Ormrod, 2004). Internal validity is attained in a study when the findings can be shown to result only from the effect of the independent variable of interest and cannot be interpreted as reflecting the effects of extraneous variables (Polit and Hungler, 1991). External validity is attained when the results can confidently be generalized to situations outside of the specific research setting.

Reliability is the degree of consistency or dependability, with which an instrument yields a certain result when the entity being measured has not changed. The researcher being there during data collection will improve validity because the questionnaires will be checked if completely filled. The observations that will be done by the researcher will also ensure reliability and validity since the researcher will observe what is practiced in relation to what they have reported in the questionnaire.

3.8 PILOT STUDY

The questionnaire was tested at one of the clinics in Mogalakwena sub-district in the Mogalakwena TLC clinic. The data collection methods and the questionnaire were tested on two of the nurses on duty that day of piloting. The clinic was chosen for convenience

but it was having the same characteristics as those of the sample. The questionnaire had only one addition which was to instruct the informants to tick only one of the questions where applicable after piloting. There were no changes made on the observational checklist.

3.9 DATA ANALYSIS

The questionnaires were coded with the institution and participants codes. During analysis the close-ended questions were captured first since they had codes already. The open-ended questions were then pre-coded by grouping the responses into themes and thereafter coding. The data was then put on excel to be analyzed. The information from observations was arranged into tables and listed some of the observations from different institutions into themes.

Descriptive statistics was used. Descriptive statistics is used for information that can be organised and presented in simple and direct ways. Percentages, ratios, proportions, frequencies, charts, tables, and graphs are some of the ways used to organise, summarise and describe the data (Leedy and Ormrod, 2004). The vitamin A supplementation schedule described in section 1.8 was used as a standard to determine adherence by comparing the practices of the health institution to the prescribed protocol. The observation checklist responses were compared with expected protocol procedures for adherence.

CHAPTER 4

RESULTS

4.1 INTRODUCTION

The results of the study are presented in this chapter. Section 4.2 is sample description; 4.3 is about the availability of the dosage capsules in the health institutions; 4.4 is about the knowledge of the participants; and 4.5 is about the constraints encountered by the participants in implementing the protocol. The data will be reported in tables.

4. 2 SAMPLE DESCRIPTION

A total of seven health facilities were the sample for this study, these institutions were one hospital, one health centre, three fixed clinics and two mobile clinics. The 16health professionals participated in the study as informants most of them were from clinics. At the hospital level, the staff members were from various disciplines while at the clinic level only the nursing professionals were found. The enrolled nurses were only at the mobile clinics because they were responsible for implementing the programme. The total nursing staff was more than other categories of health professionals at 68.7 %.Table 4.1 summarises the sample description. Du Plessis *et al* ,2007 conducted a study at the 14 PHC centres in Western Cape Province whereby the managers of all the 14 clinics were interviewed also.

Table 4.1: Summary of sample description

Name of health institutions	Medical practitioners	Professional nurses	Enrolled nurses	Pharmacist	Total
Roedtan Clinic	0	2	0	0	2
Mookgophong Health Centre	0	2		0	2
Mookgophong Township Clinic	0	1		0	1
Mookgophong TLC	0	2	0	0	2
Mobile Clinics	0	2	2	0	4
Voortrekker Hospital	1	2	0	2	5
Total	1	11	2	2	16
%	6.3	68.7	12.5	12.5	100

Further, they were asked about their experience in years. Most of the participants didn't answer this question and the experiences for those who answered were between 3 and 26 years. The nurses had the most experience. Table 4.2 presents their experiences.

Table 4.2: The health workers had the following experience in their field

Health workers experience in the field	%	Number(n)
3years	12.5	2
5years	6.3	1
6years	6.3	1
10years	6.3	1
16years	6.3	1
22years	6.3	1
24years	6.3	1
26years	6.3	1
No answer	43.8	7

When the participants were asked to recall the number of years spent in institutions, 56.4% worked in the same institution for less than 5 years while 25.1 % worked for 10 years or more. The duration of employment is indicated in Table 4.3.The average years of experience were 3.

Table 4.3: The participants' experience

Duration of employment in the institution	%	Number(n)
1year	31.3	5
2years	18.8	3
4years	6.3	1
5years	6.3	1
6years	6.3	1
9years	6.3	1
10years	18.8	3
12years	6.3	1

Most of the participants were professional nurses because this programme is at primary health care level which is implemented by the nurses in the clinics, and even in the hospitals the nurses are responsible. Most of the participants were females because nursing is a female dominated profession. Table 4.4 tabulates gender distribution.

Table 4.4: The participant's occupational ranks and genders

	Rank	Gender	
		Male	Female
Professional nurses	68.8 (n=11)	12.5(n=2)	56.3(n=9)
Enrolled nurse	12.5 (n=2)	6.3(n=1)	6.3(n=1)
Pharmacist	12.5(n=2)	6.3(n=1)	6.3(n=1)
Medical officer	6.3(n=1)	6.3 (n=1)	0
Total		31.3%	68.9%

The participants obtained their qualifications from various institutions. Participants studied at the University of Limpopo, Groothoek, George Masebe and at the University of Pretoria. Table 4.5 Summarises qualifications by institution.

Table 4.5: Summary of qualification by institution

Institution of qualification	%	Number(n)
UNISA	6.3	1
University of Limpopo MEDUNSA Campus	6.3	1
University of Limpopo Turfloop Campus	12.5	2
Groothoek Nursing School	12.5	2
George Masebe Nursing School	12.5	2
University of Venda	6.3	1
SG Lourens College of Nursing	6.3	1
PotchefstroomUniversity	6.3	1
Sovenga Campus Nursing School	6.3	1
Baragwanath Nursing School	6.3	1
University of Pretoria	12.5	2

The participants had a variety of qualifications but most of them a diploma in general nursing and midwifery, because most of them were the nursing personnel. Table 4.6 tabulates the qualifications of the participants.

Table 4.6: The qualifications of the participants

Qualifications	%	Number(n)
B.Pharm	12.5	2
MBCHB	6.3	1
BACUR	18.8	3
Enrolled nursing	12.5	2
Diploma in General Nursing and Midwifery	31.3	5
BA Nursing and Midwifery	6.3	1
Nursing Admin & Education	12.5	2

Note: B.Pharm-Bachelor of Pharmacy

B.Cur-Bachelor of Nursing Science

MBCHB- Bachelor of Medicine and Surgery

4.3 AVAILABILITY OF THE DOSAGE CAPSULES IN THE HEALTH INSTITUTION

The availability of capsules in health institutions was assessed through observations and also self-administered questionnaires. The 200,000IU was mostly available but the 50000IU and the 10000IU were not available at most of the clinics (See Table 4.7). Only 31.3% had all the dosage capsules in stock. This shows that availability of the capsules was poor in most of the institutions. In the hospital and most of the clinics the 200,000IU was available. In the maternity ward of the hospital they mainly issued them to the post natal women; that is why they were available. The shortage of stock was also found in the Western Cape Province by Du Plessis *et al* in 2007.

Table 4.7: Availability and types of capsules (by observation)

Type of capsules available	% availability	Number(n)
Yellow 200,000 IU	43.8	7
Blue 50,000IU	6.3	1
White 10,000IU	12.5	2

Yellow & Blue	6.3	1
Yellow &White	-	-
Blue & White	-	-
All	31.3	5

When participants were asked if all types of capsules were available, 43.8 % reported that they were not available even though 56.3 % said they were available (See Table 4.8). The researcher observed 31.3%; and this contradicts what they said. Some were available but not all the different dosages. This lack of other capsules shows inadequate supply for those in need. This can lead to children not accessing them.

Table 4.8: Availability of all types of capsules (participants' response)

Availability of all types of capsules	%	Number(n)
Yes	56.3	9
No	43.8	7
Not sure	0	0

When the participants were asked about the capsules which were not available they reported that not all the types of capsules were available. However the 50000IU and the 20000IU were reported not to be available most and only one reported non availability of all. See Table 4.9 below.

Table 4.9: Capsules not available

N	%	Number(n)
50,000IU and 100,000IU	43.8	7
200,000IU and 50,000IU	6.3	1
50,000IU	6.3	1
N/A	37.5	6
None	6.3	1

The participants were asked to give reasons for non-availability of capsules. The reasons varied but some didn't answer. The reason for their unavailability in the maternity wards is understandable because they can only keep what they use (the 200000 IU) for lactating postnatal women and the formula fed infants get their dose at 6 weeks at the clinics. The other reasons given were not adequate because all the other institutions had to provide the different capsules. Table 4.10 outlines the reasons given by participants for non availability of capsules.

Table 4.10: Reasons for unavailability

Reasons	%	Number(n)
The capsules available in the ward are only for post natal women	6.3	1
There's only a demand for 200000IU	12.5	2
Amalgamated (Supplier) not supplying the capsules.	12.5	2
Not applicable	43.8	7
No answer	25.0	4

When participants were asked what they did to substitute for the unavailable capsules, 37.5 % of the participants said they divided the 200,000IU dose to suit the required dose and one reported that they never had to substitute. The problem with dividing the capsule is that it is not known if one drop is definitely 50000IU which can lead to giving the children less or too much. Table 4.11 describes the participants' responses to substitution of unavailable capsules. Witten ,2004 found that more than a third of the children were given wrong doses and this could be caused by the substitution.

Table 4.11 Substitution of unavailable capsules

Substitutes	%	Number(n)
They requested from other institutions	18.8	3
They divide the dose of the 200,000IU to give 100,000IU and give 2 x 100,000IU for the 200,000IU	25	4
Divide the 200,000IU into drops and give 1 drop for 50,000IU	12.5	2
Not applicable	18.8	3
No answer	12.5	2
None	6.3	1
Never	6.3	1

When they were asked how often they ran short of the capsules, 31.3% said they never ran short while others said the capsules were not there at some point in time. This shows that the availability of these capsules was poor in those health institutions. Table 4.12 shows the frequency of unavailability of capsules.

Table 4.12: Frequency of unavailability of capsules

Frequency of unavailability	%	Number(n)
Sometimes	12.5	2
Many times	6.3	1

Long time for blue and white	6.3	1
Always	6.3	1
Not applicable	12.5	2
No answer	18.8	3
None	6.3	1
Never	31.3	5

The majority (62.6%) of the participants reported both suppliers and pharmacies as being the responsible people for the availability of capsules (See Table 4.13). The nurses are the people who order from the pharmacists and the suppliers. Therefore, if a poor ordering system prevails then they cannot receive the stock. In Limpopo Province, during data collection, other capsules were not in the order list the clinics used. This indicated that the problem was at systems level.

Table 4.13: Responsible person for the availability of the capsules

Responsible person	%	Number(n)
Amalgamated (distributor)	31.3	5
Pharmacy	31.3	5
Nurse	18.8	3
Amalgamated and nurse	6.3	1
No answer	12.5	2

Most of the participants didn't have any additional information on the availability of Vitamin A capsules but the others reported that not all capsules were available. See Table 4.14.

Table 4.14: Additional information about the availability of Vitamin A capsules

Additional information	%	Number(n)
We are only supplied with 200000IU and 100000IU	12.5	2
We are never out of stock of the 200000IU but the other doses are rarely available	6.3	1
When we are out of stock of others we substitute them by using the 200000IU	12.5	2
The 50000IUis available at the clinics but not in the hospital.	18.8	3
No answer	18.8	3
None	31.3	5

4. 4 KNOWLEDGE OF THE VITAMIN A PROTOCOL

Participants were asked if they knew the protocol (See Table 4.15). Most (93.8%) of the participants knew about the protocol. But the expectation was for all of them to know about it because this is one of the programmes implemented by all the health professionals within the primary health care setting.

Table 4.15: Knowledge of Vitamin A protocol

Knowledge	% knowledge	Number(n)
Yes	93.8	15
No	6.3	1
Not sure	0	0

Most of the participants (62.5%) were never trained on the Vitamin A protocol; this is not good because most of the people in this study had been working in the respective institutions for more than a year. This also indicates that training is not one of the priorities for this area. Table 4.16 indicates the number of participants trained on the protocol.Witten,2004, Hendricks *et al*,2006 and Du Plessis *et al* ,2007found a different situation to this study in eastern Cape and Western Cape Province respectively with regard to training . The staff was trained in those provinces.

Table 4.16: Training on the protocol

Training	%	Number(n)
Yes	31.3	5
No	62.5	10
Not sure	6.3	1

When the participants were asked who trained them, 18.8% of those who were trained reported that they were trained by other nurses. Table 4.17 indicates the training sources.

Table 4.17: Training Sources

Trainer	%	Number(n)
Nutrition department	6.3	1
Nurse	18.8	3
Not applicable	68.8	11
No answer	6.3	1

All of those who were trained had at least a year since they were trained with most having been trained 2 years prior to the study. This data is presented in Table 4.18.

Table 4.18: Date of training

Duration of training	%	Number(n)
2004	12.5	2
2005	6.3	1
2006	6.3	1
Not applicable	68.8	11
No answer	6.3	1

The participants were asked if the protocol was adhered to at their clinics and 93.8% said that the Vitamin A protocol was followed at their institutions. It is good that the majority of respondents said the protocol was adhered to. Table 4.19 illustrates responses to adherence to protocol. Witten in 2004 in the Eastern Cape found that the protocol was not implemented accordingly because more than a third (3^{rd})of the children got the wrong doses for their age, but du Plessis *et al* in the Western Cape Province concluded that the programme appeared to be reasonably successfully implemented in Boland /Overberg region. Even though they also had challenges like shortage of stock of the Vitamin A.

Table 4.19: Adherence to protocol

Adherence to the protocol	%	Number(n)
Yes	93.8	15
Not sure	6.3	1

All the participants had an idea of the Vitamin A protocol. However, a few who were trained reported on general knowledge and not like someone who had been trained. At least 50 % of them knew the preventative schedule but most of them did not know about

the treatment schedule. The 4.20 tabulates responses on brief descriptions of the Vitamin A protocol. Similar responses have been grouped.

Table 4.20: Brief description of the Vitamin A protocol

Description of the protocol	%	Number(n)
Given to all children not breastfed at 6 weeks ,breastfed at 6months interval until 5years and to mothers postpartum who breastfeed until /before 8 weeks and for prophylaxis in Gastroenteritis and during deficiency	6.3	1
Given to children at 0-5 months who were breastfed, 0-5 months non breastfed infants single dose at 6 weeks, at 6-11 months 100000IU dose, 12-60 months 200000IU dose, curative is for the children with severely malnutrition, Gastroenteritis, measles and xerophthalmia	12.5	2
Postnatal women given 200000IU, 6 weeks infants not breastfed - 50000IU , 6-11 months infants breastfed -10000IU, 12-60 months- 200000IU.	50.0	8
50000IU given to children before 6 months, 6-11 months infants' breastfed -10000IU, 12-60months- 200000IU on 6 months interval.	18.8	3
50000IU given to children with measles, malnutrition, therapeutic protocol depends on the age and clinical signs	6.3	1
Varies from birth to 11 months, used in cases of measles, malnutrition, Gastroenteritis, TB/HIV/AIDS and eye signs of clinical VAD.	6.3	1

Participants were asked about the importance of administering Vitamin A capsules. All the participants mentioned at least one reason for administering Vitamin A capsules, with most of them mentioning its role in prevention of the blindness. Table 4.21 tabulates data on importance of administering Vitamin A capsules.

Table 4.21: The importance of administering Vitamin A capsules

The importance of administering the vitamin A capsules.	%	Number(n)
To prevent xerophthalmia; For severe under nutrition; To prevent infant morbidity and mortality.	50.0	8
To improve sight, to reduce the risk of measles, the development and maintenance of epithelial tissue	31.3	5
To prevent eye problems.	6.3	1
For good vision; Boost immune system.	6.3	1
Prevent blindness; Important for bone formation.	6.3	1

Participants were asked to list the dangers or consequences of not administering Vitamin A. They mentioned at least one correct danger for not administering Vitamin A. Most of

them knew that Vitamin A prevents blindness. Table 4.22 tabulates the dangers of not administering Vitamin A capsules listed by participants.

Table 4.22: The dangers of not administering Vitamin A capsules

The Dangers of not administering Vitamin A capsules.	%	Number(n)
Risk of contracting serious illness and higher risk of becoming blind.	56.3	9
Infant mortality and severe malnutrition, blindness and difficulty in growing.	6.3	1
Blindness and general body weakness.	6.3	1
Blindness.	18.8	3
Mild to moderate Vitamin A deficiency is a critical factor in child health survival.	6.3	1
Blindness and osteoporosis.	6.3	1

Most of the participants mentioned that the mothers at their institutions were taught about the importance of Vitamin A, but still others were not sure and this could be those who were not in contact with mothers like the doctors and the pharmacists. Data on education to mothers on Vitamin A is in Table 4.23 below.

Table 4.23: Education of mothers on Vitamin A

Teaching mothers about the importance of vitamin A	%	Number(n)
Yes	81.3	13
Not sure	18.8	3

Further, they were asked if they taught mothers about Vitamin A. Most of the participants said they taught mothers about the dangers of Vitamin A. See Table 4.24 below.

Table 4.24: Teaching mothers about the dangers

Teaching mothers about the dangers of vitamin A	%	Number(n)
Yes	68.8	11
No	6.3	1
Not sure	25.0	4

Participants who said they taught mothers were asked if they had a programme for lessons. Most of the participants said they didn't have any programme for teaching the mothers who came to their institution. They just gave information as the clients came. See Table 4.28 below.

Table 4.25: Availability of the programme for lessons.

Availability of a program for the lessons	%	Number (n)
Yes	18.8	3
No	56.3	9
Not sure	18.8	3
No answer	6.3	1

The participants described the preventative schedule but only three of them could describe the schedule in full. The others could only describe parts of the schedule. The participants' description of the protocol is tabulated in Table 4.26.The response in the first column and the interpretation of response is provided in column 2. Similarly, responses have been grouped.

Table 4.26: Description of the preventative schedule

Response	**Interpretation**
Non breastfed infants 1-5months given 50000IU at 6 weeks (n=1).	The participants described only the dosage for non-breastfed infants and this cannot indicate that they know the preventative schedule.
All infants 6-11months given 50000IU at 6-11 months (n=1).	The participants described the dosage for children in the 1st year only.
All children 12-60 months single dose 200000IU every 6 months until 60 months (n=1).	The participants only described the doses given to children 12-60 months nothing is mentioned of the other ages.
All postpartum women given a single dose at delivery up to 6weeks (n=2).	The participants only described the part about the postpartum women nothing about the children and the dosage is also not mentioned.
Non breastfed infants 1-5months given 50000IU at 6 weeks, All infants 6-11months given 50000IU at 6-11 months, (n=1).	Nothing on postpartum women was described; only the children under a year old were described.
Non breastfed infants 1-5months given 50000IU at 6 weeks, All children 12-60 months single dose 200000IU every 6 months until 60 months (n=1).	Nothing on postpartum women was described only the children were described and how often the children are given what dosages.
Non breastfed infants 1-5months given 50000IU at 6 weeks, All postpartum women given a single dose at delivery up to 6weeks (n=1)	Nothing on children from 12-60 months was described.
Non breastfed infants 1-5months given 50000IU at 6 weeks, All infants 6-11months given 50000IU at 6-11 months, All postpartum women given a single dose at delivery up to 6weeks, All children 12-60 months single dose 200000IU every 6 months until 60 months(n=3).	The participants described the schedule in full.

All infants 6-11months given 50000IU at 6-11 months, All children 12-60 months single dose 200000 every 6 months until 60 months(n=2).	Nothing on postpartum women and non-breastfed infants was mentioned.
All infants 6-11months given 50000IU at 6-11 months, All postpartum women given a single dose at delivery up to 6weeks(n=1).	Nothing on how much dosage to be given and when for children 12-60 months;
Non breastfed infants 1-5months given 50000IU at 6 weeks, All children 12-60 months single dose 200000 every 6 months until 60 months,(n=1).	Nothing on postpartum women was described; only the children under 5months and non-breastfed and over 12 months were described;
No answer (n=1)	

The participants described the curative schedule in short but none could fully describe it. They only described parts of the schedule. The participant's description of curative schedule is tabulated in Table 4.27 with interpretation.

Table 4.27 Description of the curative schedule

Response	Interpretation
Give 50000IU at 0-5months immediately on diagnosis.	The participants only described the dosages given to children below 5 months.
Give 100000IU at 6-11 months immediately on diagnosis.	The participants only described the dosage for children 6-11 months nothing on children 0-5 months and 12-60 months old.
Give 200000IU 12-60 months to children.	The participants only described the dosage for children 12-60 months and they didn't mention when they are given.
No answer.	They didn't report anything.

Participants did not mention any other information on Vitamin A when asked to do so.

4. 5 CONSTRAINTS ENCOUNTERED

Some participants reported different constraints but others reported nothing. Constraints to implementation of Vitamin A protocol as reported were:

- Availability of some of the capsule doses;
- Lack of training of staff;
- Health education not given to mothers with regard to the importance;
- Parents not bringing children to the clinic to get it; and
- Doses given not written in the children's cards making it difficult to know if the child was given or not.

Some participant made three recommendations on improving the implementation of the protocol. The recommendations were as follows:

- Make all doses available in all clinics all the time (n= 5).
- Train health care workers (n= 8).
- Educate caregivers and mothers about Vitamin A (n= 1).
- No answer (n= 2).

4. 6 SUMMARY OF RESULTS

Seven health institutions were studied and they were one hospital, one health centre three fixed and two mobile clinics. Sixteen health professionals participated in the study as informants: 69% were professional nurses, 38, 6% had a degree qualification. Yellow (200000IU) capsules were the most available at 43.8% while only 31.3% had all the different dosages (50000IU, 10000IU).The hospital mentioned that they only kept the 200000IU for the post-partum women because the other dosages were for children and they were mainly given at the clinic. Others mentioned poor supply from the distributor. Witten, 2004 and Du Plessis *et al* ,2007 also evaluated the implementation of Vitamin A supplementation in Eastern Cape and Western Cape Provinces of South Africa and found that there were shortages of Vitamin A capsules in those Provinces .

About 93.8% of the health workers had knowledge of Vitamin A protocol, 62.5% were never trained on the protocol. Furthermore, 93.8% indicated that they adhered to the protocol but only 50% knew the importance of administering Vitamin A. About 56.3% indicated blindness as a risk of not administering Vitamin A. Most participants were able to describe the preventative dosage even though not in full; only three could describe it in full. None of the participants could describe the curative schedule. Hendricks *et al*, 2006 and Du Plessis *et al*, 2007 in the Western Cape Province found that staff was trained but still some children who had indications for Vitamin A supplementation were not given. This shows that the health workers may say they know about the protocol but still not implement it accordingly.

The participants had constraints of mothers and caregivers not bringing children to the clinic to get Vitamin A; especially after the immunization schedule of 18 months. They recommended that Vitamin A capsules be available at all times in all the dosages and that the health professionals be trained on Vitamin A protocol.

CHAPTER 5

DISCUSSION OF RESULTS

5.1 SAMPLE CHARACTERISTICS

Seven health institutions were studied and they were one hospital, one health centre three fixed and two mobile clinics. Health workers including nurses, pharmacists and medical practitioners involved in the implementation of the Vitamin A protocol participated in this study as informants. The participants were a total of 16 health workers from the clinics, the health centre and the hospital. They had experience of between 3-26 years and were educated in the different institutions i.e. universities and nursing schools; therefore they had degrees and/or diplomas. Du Plessis *et al.* (2007) in a study conducted in the Boland/Overberg region of the Western Cape Province evaluated the implementation of Vitamin A supplementation programme by the health workers (Nurses) at the clinics and children 6-60 months. Hendricks *et al.* (2006) also conducted a study to determine missed opportunity and problems relating to the implementation of Vitamin A supplementation in those regions using health workers as informants at the PHC centres. This study used the medical practitioner, pharmacists and nurses due to their different responsibilities with regard to implementation of the protocol (DOH, 2001).

5.2 AVAILABILITY OF VITAMIN A CAPSULES

According to WHO (1999) the capsules should always be available at the health institutions. Furthermore, the health professionals should also be trained on the protocol to understand the importance of Vitamin A and the extent of the VAD as a public health problem. Vitamin A capsules were available at all the health institutions but not all had all the different dosages. Only 31.3% reported to have all the dosage capsules in stock. The most available of the dosages was the 200 000IU as indicated in T**able 4.8. where**

43.8 % are reported not to have had all the different dosage capsules. The mostly unavailable doses were the 50000IU and 100000IU. This is not a good indicator of good implementation process because the supplements should be available at different dosages at all times as the protocol is for different age groups which require different dosages. Clinic outlets audits in Eastern Cape revealed that 87% did not have sufficient stock of 100000IU (Witten, 2000). The findings in these studies are similar. The important thing observed was that those who didn't always have stock reported that they devised strategies like requesting from other health institutions, divided the dosage dose of 200000IU to give 2x 100000IU, divided the 200000IU into drops which gave 1 drop as 50000IU, or gave 2x100000IU for 200000IU. This practice has also been described in a report by WHO (1998) on the distribution of Vitamin A during national immunization days. However, this researcher did not establish whether the participants in this study were aware of the WHO report or had been trained on it.

The nurses and pharmacists are responsible for ordering the vitamin A capsules from the government distributors. The participants reported that the distributor supplied them with 200000IU and 100000IU but not the 50000IU. The other information provided was that the hospital was not supplying other doses except the 200000IU in maternity ward for the postpartum women and the rest of the children were given at the clinics. The nurses in the maternity ward thought that it was acceptable not to have other dosages because they could only keep what they used. The nursing staff in pediatric ward should have had the stock of other dosage capsules too because the children who are sick are seen by them and they should be given Vitamin A (DOH, 2001).

International partners primarily UNICEF and CIDA in the 1990's came up with mechanisms to provide Vitamin A capsules for delivery to under five children, twice yearly (WHO, 1998). Donor support has also brought technical and financial assistance for initiating and maintaining programmes in the developing countries. Ministries of Health in the different countries had to face increasing pressure to incorporate these costs into their health budgets. In SA, since 2006, government is procuring Vitamin A capsules. The poor availability of capsules at the health institutions observed in this study

is not because of the budgets but maybe due to lack of proper ordering systems and lack of knowledge.

The availability of capsules in this study was not satisfactory because not all dosage capsules were available in some clinics. All three dosage capsules were only available in one health institution - the health center. This was also observed by the researcher on the sites.

5.3 KNOWLEDGE ON VITAMIN A SUPPLEMENTATION PROTOCOL BY HEALTH WORKERS

The staff was trained as pharmacists, medical doctor, enrolled nurses and professional nurses with the experience of more than three years in their fields. Most of the participants (93.8%) knew about the Vitamin A Protocol but not all of them were trained; only 31.3 % were trained. The high percentage of untrained personnel is problematic because for people to have a clear understanding of the importance of the implementation and how to implement the protocol they need competence. When they are not trained they can end up implementing the way their colleagues are implementing without knowing whether it is the right way or not. Posters that had information of the Vitamin A Protocol were not sufficient for imparting knowledge. Demissie *et al.* (1984) also reported inadequate training in Ethiopia. Almost all reported to be using the Vitamin A protocol in their health institutions; hence even without training they still issued the supplement. In Western Cape Province, Du Plessis *et al.* (2007) found that training was done well because all health facility managers were trained in Vitamin A Protocol. This indicates that it's possible to train health professionals in S.A.

Most of the participants (93.8%) said the protocol was adhered to at their health institution and managed to describe the protocol in brief even though only 50% of them could describe all the components of the preventative schedule. During observations the researcher noticed that at most of the health institutions there was a poster with the preventative schedule on it. None of the participants could describe the curative schedule

in full; only two talked about when to give Vitamin A as curative. When the participants described the protocol in full, not all could describe the curative in full and this might lead to children who were sick to miss the opportunity at the health institutions due to lack of knowledge by the health care worker. According to WHO (1998) health staff at all levels of the health system as well as others involved in the control of Vitamin A deficiency and its consequences should be trained on the treatment and prevention schedules. The report also recommended that training on Vitamin A should be integrated with the EPI programme managers' courses on immunization, IMCI and other curricula including medical and nursing. Du Plessis *et al.* (2007) found that 10 out of 40 children eligible to get the supplements didn't receive them and concluded that the protocol was reasonably implemented successfully mainly because the staff was trained and the mothers were aware of it.

The staff in the hospital especially those in pediatric ward should be able to describe in full the curative schedule because they deal with children with conditions that require them to be given Vitamin A as part of their treatment. Semba *et al.* (2005) reported that supplementation decreased mortality rate in HIV infected children even though it didn't have any significant effect on modified point prevalence of fever, ear discharge, bloody stools and hospitalization. This was also reported by Benn *et al.* (2005) in Guinea-Bissau.

All the participants could give at least one importance of administering Vitamin A but the information was more of general knowledge than from training especially because the majority was not trained. About 50% said Vitamin A was given to prevent xerophthalmia, for severe under nutrition, and to prevent infant morbidity and mortality. Most of the professional nurses reported that they told mothers about the benefits of the administration while those who were not sure about educating mothers about the benefits were the pharmacists and the medical doctors because they mainly ordered and prescribed respectively. Sommer *et al.* (1986) in Indonesia gave crucial evidence of a direct effect of Vitamin A in reducing mortality. In 2000 Villamor reported that supplementation has resulted in significant reductions in mortality in several but not all large community–based trials among healthy children. In hospital- based studies, Vitamin

A supplements were found to reduce the severity of measles infection. Darlow *et al.* (2007) conducted a meta-analysis on Vitamin A supplementation to prevent mortality and short and long term morbidity in very low birth weight infants. It was concluded that supplementing very low birth weight infants with Vitamin A is associated with reduction in death or oxygen requirement at one month of age.

The participants (68.8%) reported to be teaching the mothers about the dangers of Vitamin A but they didn't have any formal programme of teaching mothers at the clinic. They just gave education individually during consultation. The mothers and caregivers should be taught about the benefits of Vitamin A for their children. This will improve their knowledge and they'll be able to bring their children twice yearly even after the first year of life when they bring them for other immunizations. Frigg *et al.* (2003) in Ghana also found that the programme needed to be sustained by continuous communication, monitoring and community mobilizations. Du Plessis *et al.* (2007) found that mothers were aware of the programme and that made a difference in the successful implementation.

Pangaribuan *et al.* (1990) reported an association between compliance of caregivers and knowledge about the potential benefit of Vitamin A supplementation.

5.4 IMPLEMENTATION OF VITAMIN A SUPPLEMENTATION PROTOCOL

The participants reported unavailability of the capsules, as a constraint and this was also observed during data collection. Hendricks *et al.* (2006) in the Western Cape Province also reported it as a challenge. The budgets are available for purchasing the capsule; the health institutions should make orders from the government distributors. The government distributors should also make sure all dosage capsules are available at all times so that the clinics can order.

Lack of training on Vitamin A Protocol was also reported as a constraint. The 62, 5% of the participants were never trained, hence they listed training as a constraint for them. But

Du Plessis *et al.* (2007) and Hendricks *et al.* (2006) found that the PHC nurses in the Western Cape were trained on the protocol. Therefore training should be prioritised so that the implementation becomes uniform and correct. Training should include all stakeholders including those in hospital. Lack of training impacts negatively on the implementation process. In S.A the IMCI training package, compulsory for all PHC nurses includes content on Vitamin A (DOH, 2001). All nurses working in clinics should have this training.

Parents not bringing their children to the clinics for the preventative schedule was also reported as a constraint because children should be brought to the health institutions to get Vitamin A. WHO (1999) developed a document on distribution of Vitamin A during national immunization days implementation and many countries like Tanzania, Senegal, Guinea have already done it (Bendech *et al.* 2007). In this study, 81.3% reported educating mothers about the benefits of administering Vitamin A. But still, the children were not brought to the clinics. In Nepal, Fiedler (2000) found that the strategy of empowering Female Community Health Volunteers (FCHVs) has improved coverage. In Bangladesh they improved coverage by having a national Vitamin A week and the National Immunization Days where by the 12-59 months old children are targeted for supplementation. This same strategy was launched in SA in 2008 and has improved the coverage for children 12-59 months (DOH, 2008).

Capsules given but not recorded on the road to health charts was also reported as a challenge. The dosages should be written in the charts so that the next person can see when last the child got the Vitamin A and at what dosages (WHO, 1998). Failure to record in the road to health charts impacts negatively on the implementation and can put a child in danger if someone else gives a high dose of Vitamin A within the same month because it's not supposed to be repeated within the same month.

The constraints encountered by the health workers are genuine and could have a negative impact on the implementation of the protocol. Therefore, there should be monitoring and

evaluation of the programme so as to continuously address these challenges in order to ultimately have a programme that's well implemented.

5.5 COMPLIANCE TO PRESCRIBED VITAMIN A SUPPLEMENTATION PROTOCOL

The protocol prescribes to health workers how it should be implemented. In this study there was poor compliance due to capsules not always available. Availability in all dosages is required at all times; unavailability has an impact on the adherence by health workers. A pilot project in Mozambique (Aquayo *et al.*, 2005) concluded that coverage was not consistent and depended on modality of distribution. They further indicated that implementation was variable and was possibly influenced by resources.

Most of the staff responsible for the implementation of the protocol in this study were not trained. They also listed lack of training as a constraint. The lack of training affected the knowledge and this would affect the implementation of the protocol. Lack of training also has a negative impact on compliance because the health workers need training to be able to adhere to the protocol. Demissie *et al.* (1984) reported that training materials and workshops on Vitamin A were inadequate. The caregivers must also bring children to the clinic and the hospital for Vitamin A supplementation and if they don't understand the importance thereof, they will not bring them and this will affect compliance. Pangaribuan *et al.* (1990) reported an association between compliance by caregivers and knowledge. Du Plessis *et al.* (2007) reported that the staff was trained and the implementation was successful.

Lack of resources affects compliance. In this study shortage of professional nurses at some clinics, especially the enrolled nurses who were implementing the protocol was also observed. Similarly Du Plessis *et al.*, (2007) reported the same. This shows that for adherence to be good, there should be many factors involved i.e. Resources (human, physical), training and monitoring (Fiedler, 2000; Sonia-Khan 2003). Monitoring and evaluation of the implementation process is also crucial. Every programme must have

clear monitoring and evaluation tools which will be done continuously and communicated to all those who are implementing. In this study it was not clear how the PHCs and the hospitals were monitored for adherence to implementation.

Community involvement is also important for the implementation of the Vitamin A programme. In the first 18 months, EPI helps with distributing the Vitamin A, but after that it's a challenge if mothers are not informed to bring children every 6 months till 5 years. In a study by Pangaribuan *et.al.* (2002) who evaluated the effectiveness of a widespread Vitamin A supplementation programme and described indicators of compliance with the programme, they concluded that to increase compliance and coverage in the programme communication is important. Fieldler (2000) recommended the empowerment of female community workers and other representatives from education, agriculture as well as political representatives.

Compliance to the protocol is crucial for proper implementation. Health workers should have an interest and advocate for resources. Even though many studies are in conflict on the impact of Vitamin A on mortality and morbidity it is important to implement the protocol accordingly. The participants in this study recommend that capsules should be available at all times in all dosages as well as training of all stakeholders. This programme should be supported by health authorities. Even though coverage was not evaluated in this study, according to the district health system in 2004 the coverage in Limpopo Province was only 33% DHIS (2004). The same poor implementation could be happening in other districts due to lack of training, unavailability of the capsules and lack of community awareness.

CHAPTER 6

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

The following conclusions and recommendations were arrived at based on the findings:

This study evaluated the implementation of the Vitamin A Supplementation Protocol at the clinics, health centre and hospital in the sub-district studied. The first objective was to determine the availability of Vitamin A capsules at the health institutions. It was revealed that the protocols were available on the walls for the personnel to refer and 93.8% reported that they adhered to it. The availability of the capsules was poor because only 31.3% had all the dosages.

The second objective was to determine the knowledge on the Vitamin A Supplementation Protocol by the health workers. Knowledge levels were unsatisfactory since they did not know the dangers of not giving Vitamin A. Most staff (62.5%) was not trained. This could have a major impact on knowledge of health workers for implementation and for those who were responsible for ordering. The health care professionals couldn't describe the curative schedule even though they could describe the preventative schedule not all could describe it fully.

The third objective was to evaluate adherence to the Vitamin A Supplementation Protocol. The study has identified that there was poor compliance in implementing this programme, because the capsules were mostly unavailable. The caregivers were still not very aware because the professionals mentioned that children were not brought to the health institution for supplementation. The caregivers were also not informed about the protocol. The health workers just gave the Vitamin A without explanation. They were not even recording in the road to health charts for those children who did receive the Vitamin A supplements.

The health workers also identified constraints to implementing the Vitamin A Supplementation Programme. Training, availability of capsules and poor clinic attendance were identified. The health workers recommended that training should be enforced, capsules be available all the time and education for mothers and caregivers.

In conclusion, the Vitamin A Supplementation Programme was not implemented as per protocol (DOH, 2001) in the sub-district studied.

6.2 LIMITATIONS

The participants at the clinics were supposed to be only the professional nurses but during data collection the mobile clinics were found to be serviced by the Enrolled Nurses who were also responsible for the implementation of the Vitamin A Supplementation Protocol. They were included as informants.

6.3 RECOMMENDATIONS

The implementation of this protocol involves many stakeholders who play different important roles; therefore they should all be involved and training of all of them is very important. The pharmacists must have an understanding of why the capsules in their different dosages should be made available; medical doctors and nurses should know both the preventative and curative schedules so that they could be able to prescribe and issue the right dosage capsule at the right age and circumstances. The community should also be informed about the importance of Vitamin A so that they would be able to bring their children to the health institutions to prevent the deficiency and to treat it when there's a need.

Therefore the following is recommended:

- The Department of Health through hospitals and the distributors should support the clinics with the availability of all Vitamin A dosage capsules at all times.
- The staff should avoid the manipulation of the lesser doses e.g. 100000IU being given as two drops from the 200000IU because this can be more or less for the age of the child like it was seen in a study by Witten, 2004 in Eastern Cape Province.
- The training programmes on Vitamin A supplementation should be in place for all staff, especially for the new employees who come to work in the health institutions so that people will be able to implement the protocol in totality.
- Training of the clinic managers currently known as Operational Managers on Vitamin A has been shown to improve the implementation of Vitamin A in other parts of the country therefore is recommended for this district.
- The training should also emphasise on the curative part of the protocol because the health professionals in this study couldn't describe it even those in a treatment area like a hospital.
- The district need to develop the Job Aids which the health workers will refer to when in the clinics and hospitals as part of prevention and treatment of Vitamin A deficiency.
- The district should make resources available and include other health care providers such as other categories of nursing, dieticians, nutritionist in the implementation of this protocol so that a child seen by any health care worker will not miss an opportunity of supplementation while they were being seen by the health worker.
- The health institutions should be monitored and evaluated on the implementation process not just coverage, because when the whole process is evaluated a lot of

factors which may lead to poor coverage will be identified together with compliance.

- Further studies should focus on evaluation of monitoring and impact on nutritional status of children. A bigger study for assessing the Vitamin A implementation for the Province is recommended.
- Giving of vitamin A at the preschools by the community health professionals twice a year will also improve the coverage for children 24-60months therefore the district can also look in how to implement this.

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Appendix A

Subject Institution

CODE

EVALUATION OF THE VITAMIN A SUPPLEMENTATION PROTOCOL AT HEALTH INSTITUTIONS IN THE MOOKGOPHONG SUB-DISTICT,WATERBERG LIMPOPO PROVINCE.

Researcher: DV Mamaregane

Good morning

Thank for making time to participate in this study. I hope we'll work well together.

This is a questionnaire for you to fill. It is aiming at finding information from you. The information is about the implementation process of vitamin A supplementation protocol in your sub-district. You are welcome to ask me questions where you don't understand how to fill this. Your name or identity will not be used; a code will be used instead.

Please follow the instructions below.

QUESTIONAIRE

Date: _____

Instructions:

All questions must be answered. If a question is not well understood please ask the researcher but don't leave it un answered

Tick one desired answer unless stated otherwise

Tell us more in your own words where necessary.

Codes

A Demographic information

1. Name of the clinic, health centre or hospital _____

_____

2. Heath workers experience in the field_____

3. How long have you been working in this institution

_____

4. Rank_____

5. Gender

Male	1
Female	2

6.Institution of qualification _____

_____

7. Qualifications_____

_____

B Availability of the dosage capsules in the health institution.

8. Which capsules do you have at your institution?

(More than 1option can be ticked)

Yellow 200,000 IU	1
Blue 50,000IU	2
White 10,000IU	3
Yellow & Blue	4
Yellow &White	5
Blue& White	6
All	7

9. Are they all available today.
(Tick only 1 answer)

Yes	1
No	2
Not sure	3

10. If no which capsules are not available and why?

11. How do you substitute for the unavailable capsules?

12. How often does it happen that there are no capsules in the institution?

13. Who is responsible for the availability of the capsules?

14. Any other information you like to share about the availability of the capsules?

C. Knowledge

14. Do you know about the vitamin A protocol?
(Tick only 1 answer)

Yes	1
No	2
Not sure	3

15. Have you ever been trained on the protocol?

(Tick only 1 answer)

Yes	1
No	2
Not sure	3

16. IF yes, by whom? _____

17. When were you trained? _____

18. Is the vitamin A protocol followed at your clinic / hospital?

(Tick only 1 answer)

Yes	1
No	2
Not sure	3

19. Describe briefly the vitamin A protocol.

20. What is the importance of administering the vitamin A capsules?

21. What are the dangers of not administrating vitamin A capsules?

22.1. Are mothers being taught about this importance of vitamin A?

(Tick only 1 answer)

Yes	1
No	2
Not sure	3

22.2 Are mothers being taught about the dangers of vitamin A?

(Tick only 1 answer)

Yes	1
No	2
Not sure	3

23. If yes, is there a programme for these lessons?

(Tick only 1 answer)

Yes	1
No	2
Not sure	3

25. What is the vitamin A preventative schedule? Describe it in short.

26. What is the vitamin A treatment schedule? Describe it in short.

24. What else do you know about the vitamin A protocol and its importance in health?

D. Constraints encountered

27. What are the problems encountered with the implementation of the protocol.

26. What are your recommendations to remedy the situation?

Appendix B

Institution Code

OBSERVATION CRITERIA

For the clinics, health centre and the hospital

Availability of the dosage capsules

1. The dosage capsules available are

Yellow 200,000 IU	1
Blue 50,000IU	2
White 10,000IU	3

2. The amount in stock is

Yellow 200,000 IU	
Blue 50,000IU	
White 10,000IU	

3. What dose is given in case of the required one not available

_____

_____

_____

4. If 3 does not apply what happens if required dose is not available

_____

_____

Knowledge

5. Are there any posters / pamphlets of vitamin A protocol

_____

_____

6. Are they displayed in the clinic

_____

7. Do mothers/ caregivers get informed by the health worker about vitamin A when is given to a child?

_____

_____

8. Is the vitamin A dose given recorded in the road to health chart?

_____

_____

_____

9. Any other observations relating to vitamin A supplementation protocol

_____

EVALUATION OF THE IMPLEMENTATION OF THE VITAMIN A SUPPLEMENTATION PROTOCOL AT HEALTH INSTITUTIONS.

CONCENT FORM

I (name of participant) ----------agree to participate in the above-mentioned study (research).
I will give the correct information needed for the study and co-operate fully with the researcher.

The study is about the evaluation of the vitamin A supplementation protocol, which is supposed to be implemented by health institutions. The information needed is on how you as health workers in the district implement this protocol and background information on yourself. The information is confidential. Information will be used to evaluate the protocol not your performance.

I was told that I should feel free to disqualify myself from the study if I'm no longer interested. I was assured that my information will be kept confidential.

_____ _____
Signature of the interviewee **Date**

_____ _____
Signature of the interviewer **Date**

_____ _____
Signature of the witness **Date**

Thank you,

PRIVATE BAG X 5050
THOHOYANDOU
0950

THE MANAGER RESEACH AND QUALITY IMPROVEMENT
DEPARTMENT OF HEALTH AND
SOCIAL DEVELOPMENT (Provincial office)
P/BAG X 9302
POLOKWANE
0700

Sir /Madam

Re: Application for approval of data collection for a vitamin A research in the Waterberg district.

I hereby request permission to conduct a vitamin A study in the Waterberg district. The study will be evaluating the implementation of vitamin A within the district. The purpose of the study is to evaluate the implementation process of the vitamin A supplementation protocol by health workers in institutions in the Mookgophong-Roedtan sub-district of Waterberg, Limpopo province.

The clinics (all including mobiles) in Mokgoophong –Roedtan sub-district will be studied and the district hospital Voortrekker will also be included. The nurses, doctor and pharmacists will be the participants for the study.

The study has been given ethical clearance and approval by the University of Venda. The participants will consent before participating in the study. The study proposal is hereby attached together with the ethical clearance letter.

Your co-operation will be highly appreciated

Yours truly,
D.V. Mamaregane (Researcher)

Prof XG Mbhenyane
Supervisor

APPENDIX E

UNIVERSITY OF VENDA
PRIVATE BAG X 5050
THOHOYANDOU
0950

THE MANAGER
DEPARTMENT OF HEALTH AND
SOCIAL DEVELOPMENT
MODIMOLLE DISTRICT OFFICE
MODIMOLLE

Sir /Madam

Re: Application for approval of data collection for a vitamin A research in the Mookgophong-Roedtan sub-district.

I hereby request permission to conduct research in the Waterberg district, Mookgophong Roedtan subdistrict. The study will be evaluating the implementation of vitamin A within the sub-district. The clinics in Mokgoophong –Roetan sub-district will be studied and the district hospital Voortrekker will also be included, the nurses, doctor and pharmacists will be the participants. The study has been given ethical clearance and approval by the University of Venda. The study proposal is hereby attached.

Your co-operation will be highly appreciated

Yours truly,
D.V. Mamaregane (Researcher)

Prof XG Mbhenyane
Supervisor

DISTRIBUTION OF VITAMIN A CAPSULES

CURATIVE SUPPLEMENTATION SCHEDULE

To be applied in cases where children are suffering from **xerophthalmia** or **measles.**

Target groups	Immediately on Diagnosis	The Following Day
Infants 0 – 5 months	50 000 IU (1 white capsules)	50 000 IU (1 white capsules)
Infants 6 – 11 months	100 000 IU (1 blue capsule)	100 000 IU (1 blue capsule)
Children 12 – 60 months	200 000 IU (1 red or yellow capsule)	200 000 IU (1 red or yellow capsule)

To be applied in cases where children are suffering from **persistent diarrhoea or severe undernutrition.**

Target groups	Immediately on Diagnosis
Infants 0 – 5 months	50 000 IU (1 white capsules)
Infants 6 – 11 months	100 000 IU (1 blue capsule)
Children 12 – 60 months	200 000 IU (1 red or yellow capsule)

Note: *Children with clinical VAD, measles, severe undernutrition are high-risk cases.*

Note: *Respiratory tract infections are not included in the treatment schedule as studies have been inconclusive on the impact of vitamin A supplementation on the outcome of the infections.*

Note *Children who received a preventive dose within the previous months should not receive high-dose vitamin A supplementation for treatment, and vice versa.*