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DETERMINANTS OF VITAMIN A ADHERENCE IN CHILDREN AGED 6-59 MONTHS IN MUREHWA DISTRICT, ZIMBABWE

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PUBLIC HEALTH IN THE COLEEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

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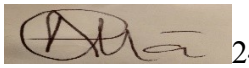
Abstract

Control of Vitamin A Deficiency (VAD) is one of the listed essential nutrition actions by the Lancet series and Vitamin A Supplementation (VAS) is one of the most cost effective and proven intervention in the fight against child mortality. Zimbabwe has since 2005 incorporated VAS in is primary health care package as recommended by the World Health organization and UNICEF for all countries with high child mortality rates. Despite years of investments, uptake remains sub-optimal in Zimbabwe and this study aimed to investigate the determinants of vitamin A adherence individual, household, community and health system and enabling environment at large in Murehwa District, Mashonaland East Province, Zimbabwe. Murehwa was purposively selected as it has since 2018 launched a Vitamin A task-sharing delivery strategy where Village Health Workers (VHW) have a shared responsibility to supplement and report, together with Health Care Workers based at static facilities. An analytic cross-sectional design which employed quantitative data collection methods was applied in 11 Enumeration areas randomly selected from the 2012 Zimbabwe Statistics Agency (ZIMSTAT) master sample through probability proportional to size. A multistage cluster sampling approach was used to select the 11 EAs, and at second stage, the VHW register was used to create a line list of children in the age range of 6-59 months. Simple random sampling techniques were applied to select 201 primary caregivers where interviews were conducted at household level. Data collection was conducted through interviewer administered questionnaires programmed in android based hand-held devices and delivered in local language. The proportion of children who had received the recommended dose of VAS was 36.7% while another 70% has received at least one dose in the previous 12 months. Independent factors associated with low uptake of VAS were the caregivers' level of education (POR=1.5; 95% CI: 1.4-2.0; p=0.046), the age of the child (POR=1.6; 95% CI=(1.3-2.0; p=0.012)), presence of functional difficulties (POR=0.3, 95% CI: =(0.1-0.8; p=0.027)) and distance to health facilities (POR=3.1; 95% CI: =(1.2-4.2; p=0.042)). Despite a high coverage of VHW support activities, and a good supply of vitamin A capsules, findings show suboptimal coverages, and therefore recommendations suggested here are to address both the service delivery and the demand aspects of VAS.

Keywords: Coverage; Task-sharing; Vitamin A Supplementation

Declaration

I declare that this dissertation is my original work and where other Authors have been cited, full references have been included. This work has not been and will never be submitted to another University or Institution for the award of a degree.

ANNASTANCIA CHINEKA  24.02.2022

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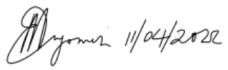
Main Supervisor's Full Name Main Supervisors' Signature (Date) 

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Dedication

This work is dedicated to all caregivers who have experienced the death of a child under five years. Too many children have died due to preventable deaths, while often the solutions are known. I truly believe that every child deserves an equitable chance in life.

List of acronyms and abbreviations

AUREC:	Africa University Research and Ethics Committee
DA	District Administrator
DHE	District Health Executive
DHIS 2	District Health Information System
FGDs	Focus Group Discussions
HCW	Health Care Worker
MICS	Multiple Indicator Cluster Survey
MND	Micronutrient Deficiencies
MoHCC	Ministry of Health and Child Care
NIDs	National Immunization Days
PHC	Primary Health Care
PMD	Provincial Medical Director
SP	Strategic Plan
UHC	Universal health Coverage
UN	United Nations
UNICEF	United Nations Children's Fund
VAD	Vitamin A Deficiencies
VAS	Vitamin A Supplementation
VHMAS	Vital Health and Medicines Availability Survey
VHW	Village health Worker(s)
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization

ZEPI	Zimbabwe Expanded Program on Immunization
ZIMSTAT	Zimbabwe National Statistics Agency

Definition of key terms

Primary	The person responsible for providing direct care and support

caregiver:	for the child to live successfully.
Malnutrition:	Deficiencies, excesses or imbalances to a person's energy and nutrient intake
Micronutrients:	Vitamins and minerals required by the human body in very small amounts
Mixed Methods:	A procedure for collecting and analysing data that relies both on quantitative and qualitative research methods
Simple Random Sampling:	A basic sampling technique which gives every individual an equal chance of selection
Stunting:	Short stature for the child's age
Wasting:	Low weight for the child's height

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CHAPTER 1 INTRODUCTION

1.1 Introduction

Chapter 1 introduces the scope of this masters' thesis, which seeks to investigate the determinants of vitamin A adherence in children aged 6-59 months in Murehwa district, Mashonaland East, Zimbabwe. This study aims to contribute to knowledge in the field of nutrition and document caregiver motivators and barriers associated with uptake of vitamin A in a rural setting. Vitamin A deficiency (VAD) is a global public health concern and vitamin A supplementation (VAS) is one of the proven strategies in the control of this phenomena. It is therefore critical that implementors understand the underlying factors associated with poor coverages and inform future strategies and funding priorities.

This chapter will describe the global and Zimbabwean epidemiology of Vitamin A deficiencies (VAD). This is followed by the description of the context, Murehwa district in Zimbabwe where this study was conducted, and articulate the purpose and objectives outlining the key research questions that will help to answer the objectives.

Micronutrients are essential for optimal growth and physiological function of the human body yet globally widespread micronutrient deficiencies still exist (Bailey, West & Black, 2015). Highest at risk are children under the age of five years, women, and girls. The most common deficiencies occur in the form of iron, iodine, vitamin A, zinc and folate, and such deficiencies rarely occur in isolation. In pregnancy and early childhood, multiple micronutrient deficiencies are associated

with poor growth and development, intellectual impairment, perinatal challenges and increased risk of morbidity and mortality (Bailey *et al.*, 2015).

Vitamin A is a fat-soluble essential micronutrient responsible for cell growth and differentiation and immunity. In its natural form, vitamin A occurs as preformed, found in animal source foods, including fish and dairy, and pro-vitamin A in plant sources, the most important being beta-carotene (World Health Organization [WHO], 2009). Poor diets are the leading cause of micronutrient deficiencies (MND) and globally, an estimated two billion people are currently affected by one or more forms of MNDs with a disproportionately higher burden in low income countries (WHO, 2009). Vitamin A deficiency (VAD) is one of the major public health concerns especially in low- and middle-income countries. From the latest Cochrane reviews, VAD globally affects more than 190 million children, predisposing them to a range of infections including respiratory and diarrheal diseases, measles, vision problems and death (Imdad, Yakoob, Sudfeld, Haider, Black & Bhutta, 2011). WHO also estimates that every year 250,000 to 500,000 children who are vitamin A deficient end up blind, and half of these will die within twelve months after losing their sight (Imdad, Mayo-Wilson, Herzer & Bhutta, 2017). The latest data available shows that overall, the world is off-track in achieving global nutrition targets by 2025 (Micha, Mannar, Afshin, Allemandi, Baker, Battersby, & Grummer-Strawn, 2020). The epidemiology of VAD is a vicious cycle, as it is also associated with poor pregnancy outcomes (Almansour, 2018).

Specifically, vitamin A deficiency is the world's leading cause of blindness and impairs the optimal functioning of the immune system increasing risk of measles

infection and severity of common diarrheal disease. Vitamin A supplementation is a proven intervention in the control and prevention of measles and infections (WHO, 2009), yet coverages remain poor even in context where the supplementation is mandated by public health acts.

1.2. Background of the study

The Zimbabwe National Micronutrient survey of 2012 reports a 21% prevalence of VAD in children under five with clear disparities between rural (25%) and urban areas (11%) (Ministry of Health and Child Care [MoHCC], 2015). The country is classified as having a severe public health problem when it comes to VAD according to WHO cut-off thresholds for public health significance.

Vitamin A supplementation (VAS) is one of the most extensively researched, safe and cost-effective strategies in the control of VAD (Ross, 2002). Ross (2002) proposes that in a context where VAD is a challenge, periodic supplementation among children aged 6-59 months should be a national priority and programs need to aim for at least 80-percent minimum coverage.

Murehwa district is situated in Mashonaland East Province, north east of the capital Harare in Zimbabwe. According to the Zimbabwe population projections of 2021,the district has a total population of 254,792 people of which 34,226 are children aged 6-59 months (Zimbabwe National Statistics Agency [ZIMSTAT], 2012). The estimated annual growth rate is 1.8% (ZIMSTAT, 2012) and the Zimbabwe poverty atlas mentions that 71-percent of the Murehwa population lives in poverty (ZIMSTAT & UNICEF, 2015). The district comprises 30 wards, served by 29 health facilities of which three are hospitals (MoHCC, 2020).

Chronic malnutrition rates in the district are high, at 36% (Food and Nutrition Council [FNC], 2018) and the situation has deteriorated from 30% reported in 2010. While district specific data is unavailable for mortality, child under five mortality in Mashonaland East province is 77 per 1,000 live births, way above the national average of 73 per 1,000 live births (ZIMSTAT, 2019). The province is off-track in achieving the Global Sustainable Development Goal (SDGs) target of reducing child under five mortality below 25 per 1,000 live births.

Diets are poor in the district with only 9% of children under the age of two years receiving the minimum acceptable diet in terms of quantity and quality (FNC, 2018). The diets are mostly based on maize with very little variety and diversity more so for small children (FNC, 2018). Feeding practices remain sub-optimal in the district, only 34% of children under the age of two years are initiated on breastmilk within an hour after birth, while 50% are breastfed exclusively on breastmilk (FNC, 2018).

Apart from dietary based interventions to improve the nutrition situation of children in the district, the Zimbabwe Government commissioned vitamin A supplementation through available primary health service delivery platforms in 2005. The service is offered at static sites in all public health facilities, integrated with the Expanded Program on Immunization (EPI) at no cost to the caregivers. Routine health information reports show that only 29% of children in the age range of 6-59 months in Murehwa received the recommended dose of vitamin A supplementation in 2020 (MoHCC, 2020).

While VAS is a proven lifesaving intervention among children under the age of five years, coverages remain unacceptably low despite close to twenty years of

implementation in many countries. From research, non-supplemented children are more susceptible to malnutrition and multiple socio-economic deprivations (Semba, de Pee, Sun, Bloem & Raju, 2008). Therefore, this study aims at examining those factors associated with low vitamin A supplementation among children aged 6-59 months in Murehwa district, Zimbabwe.

The study was based on quantitative methods with primary data collection through a household survey targeting caregivers of children 6-59 months.

1.3. Statement of the problem

Vitamin A supplementation in Zimbabwe is incorporated into primary health care. The service is available for free for all children in the age range of 6-59 months as part of the national health strategy. Supplementation is available at all static and mobile outreach sites and integrated into campaigns. The National Health Strategy (NHS) 2016-2020 aimed to improve VAS coverage to 80% but, by the end of 2020, only 29% of children had received the service in Murehwa (MoHCC, 2020). Vitamin A refusal is a threat to the fight against morbidity and mortality in young children.

This study aims to contribute to our understanding of the factors associated with vitamin A refusal, document motivators to key uptake and generate invaluable evidence to refine the vitamin A supplementation strategy in districts with similar context.

1.4. Objectives of the study

1.4.1. General objective

The purpose of the study was to determine the key barriers and motivators associated with vitamin A uptake in children aged 6-59 months in Murehwa district.

1.4.2. Specific objectives

The study specifically sought to:

i. to determine caregiver's barriers to access to vitamin A supplementation (socio-economic, demographic, etc.)in Murehwa district in since January 2021

ii. to identify factors contributing to uptake and utilization of vitamin A supplementation services in Murehwa district since January 2021

iii. to describe caregiver contextual and personal attributes associated with low coverage of vitamin A supplementation in Murehwa district in 2021

1.5. Research questions

i. What are the levels of knowledge, beliefs and practices around vitamin A supplementation in Murehwa district?

ii. What are the key factors influencing caregiver health seeking behaviors when it comes to vitamin A supplementation?

iii. What are the current delivery strategies for VAS and how acceptable are they to the caregivers?

iv. What are they key attributes, social, cultural, religious, and personal that are associated with vitamin A hesitancy?

1.6. Significance of the study

Vitamin A is a proven lifesaving intervention and despite decades of implementation, coverages remain low, and the country is off target in meeting SDG target for under 5 mortality. The Vitamin A Supplementation program (VAS) has been in existence since 2005 in Zimbabwe. Fully integrated in primary health care, the program is delivered through static sites, outreach, campaigns and recently through task-sharing with Village Health Workers (VHWs) at community level. The services are provided free of charge in all public health facilities which offer child health services.

While the country has done well to maintain the supply chain of vitamin A uninterrupted, and invested in service delivery platforms, utilization remains poor. This study sought to investigate the key factors associated with the low uptake of VAS in Murehwa district and document evidence to inform future programming, policy and planning.

1.7. Delimitations

This retrospective study was conducted in Murehwa district, in 11 Enumeration Areas (EAs) guided by the Zimbabwe National Statistics Agency (ZIMSTAT) census 2012 sampling frame. The participants were primary caregivers of children in the age range of 6-59 months, eligible to receive VAS according to WHO guidelines, in Murehwa rural district. The study was therefore confined only to rural wards of Murehwa, and findings cannot be generalized to urban populations.

1.8 Study Limitations

The main limitation was timing of the study, which coincided with the prolonged national lockdown measures to contain COVID-19. This therefore delayed data collection which was face to face. Data collection also coincided with the COVID-19 vaccination catchup, and some key informants were not available due to competing priorities. Triangulation of findings with secondary sources, and communication with the Supervisor and stakeholders was kept open at all times as mitigation.

CHAPTER 2 REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter shows reviewed literature related to determinants of vitamin A adherence in children aged 6-59 months. While there is a paucity of evidence on the subject matter in the context of Zimbabwe, literature from other low- and middle-income countries was reviewed here as well as literature from similar interventions.

The World Health Organization (WHO) recommends periodic vitamin A supplementation in children aged 6-59 in areas with high vitamin A deficiency prevalence to reduce child morbidity and mortality . Imdad et al. (2017*)* notes that VAS is associated with a clinically significant reduction in mortality by 12-percent to 30-percent. Periodic vitamin A supplementation is associated with a reduction in mortality and recommended for use in developing countries as part of regular measles treatment (Semba & Bloem, 2004). Likewise, Government of Zimbabwe has also adopted the WHO recommendations since 2005, but effective coverage of VAS remains a threat to the reduction of VAD.

2.2 Theoretical framework

The goal of the vitamin A supplementation program is to decrease morbidity and mortality in children below the age of five years through provision of high dose vitamin A capsules.

This study will examine predictors of vitamin A uptake among children in the age range of 6-59 months and will build on the literature available. It is envisaged that vitamin A uptake is influenced by multiple layers of factors, including household and

parental factors, community characteristics, service delivery platforms, supply related factors as well as the larger policy environment. These variables will be tested within the socio-ecological model, which considers the individuals and their affiliations to people and the community at large.

At individual level, the model will test specific vulnerabilities around the child, including orphanhood, access to health care, and availability of basic postnatal services including growth monitoring. The age of the child and sex will also be included in the model.

At household level, the model will test caregiver knowledge and awareness about vitamin A supplementation and possible consequences and perceived risk. At interpersonal level, the study will examine, the family dynamics, including caregiver health seeking behaviours as it is influenced by the family at large, access to basic services like water, sanitation and hygiene, and a few poverty indicators as they pertain to the household.

At community level, the study will examine the influence of the health system, and its extension into the community on uptake of vitamin A services. The supply side of the system as it influences coverage, including dissemination of information to caregivers will be an importation dimension of the analytical framework.

Finally, the framework will examine the supporting policy environment for vitamin A supplementation in the country. The study will analyse the extent to which supplementation is mandatory and the regulation of the supporting policy if any.

2.3 The vitamin A supplementation schedule for children 6-59 months in Zimbabwe

Vitamin A supplementation (VAS) is one of the most extensively researched, safe and cost-effective strategies in the control of VAD (Aguayo, Baker, Crespin, Hamani & MamadoulTaïbou, 2005) and recommended for low- and middle-income countries (Underwood, Howson, Kennedy & Horwitz, 1998). Regular VAS results in a 24-28% reduction in mortality and significant decrease in incidence of diarrhoea and measles in children (Imdad *et al*., 2017). In Zimbabwe, vitamin A is recommended for children 6-59 months as a prophylaxis and as a routine treatment for those with severe wasting and measles as per WHO guidelines. This study will focus only on prophylactic vitamin A supplementation and the MoHCC recommended dosages which are presented in table 2 below.

Table 1: Vitamin A supplementation schedule for Zimbabwe

Age group	**Dosage**	**Capsule Colour**	**Timing for the administration**
Below 6 months	Do not give	N/A	N/ A
6-11 Months	100,000 IU	Blue	Once at age 6 months
12-59 Months	200,000 IU	Red	Once every 6 months from age 6 months, till 5 years

**Table adopted from the MoHCC (2018), Implementation guidelines for vitamin A task-sharing*

While Zimbabwe has adopted the vitamin A supplementation guidelines, effective coverage remains a challenge in Murehwa district. In the first semester of 2020, only 29% of children aged 6-59 months in Murehwa district were reached with

prophylactic supplementation (MoHCC, 2020). This study is important to better understand the barriers behind effective supplementation and help strengthen implementation modalities in similar settings in the country.

2.4 Risk factors for low uptake of vitamin A supplementation from other studies

The literature below is a summary account of the factors associated with low vitamin A coverage from studies conducted in other contexts. It sets direction for the theoretical model that has been chosen to guide this study.

2.4.1 Demographic factors associated with low uptake of vitamin A

VAS coverage is not influenced by the sex of the child. There is no statistical difference in coverage of vitamin A supplementation in girls compared to girls (Dalymia & Palmer, 2007). This is true for MoHCC administrative VAS data collected routinely through the District Health Information System (DHIS 2). Application of vitamin A is therefore not affected by sex of the child.

Age is associated with VAS coverages, and as the child grows older, and their contact with the health system reduces, so does coverage of VAS (Mostafa, Islam, Mondal, Faruque, Ahmed & Hossain, 2019). Programs need to take differential approaches to ensure older children and younger children are exposed to equal opportunities for supplementation. Ordinarily, younger children have more contact with the health system compared to the older even in the context of Murehwa.

2.4.2 Geographic factors identified as barriers to uptake of vitamin A

In low resourced countries like Zimbabwe where the populations are mostly rural based, Governments need to pay deliberate effort to vitamin A coverage especially of

rural disadvantaged communities. Children residing in urban areas are more likely to receive better coverage of routine health services compared to those in rural areas. Children in urban areas were 10% likely to have been supplemented compared to their rural counterparts (Dalymia & Palmer, 2007) pointing towards an equity gap between rural and urban children. Thapa (2014) notes that VAS coverage is higher in urban children compared to the rural settings and this is influenced by the inequitable organization of health services especially in developing countries.

2.4.3 Parental factors associated with vitamin A supplementation

Low literacy among caregivers is a common contributor to poor maternal and child health outcomes and clearly articulated in the socio-ecological model (Mostafa *et al*., 2019). The father's education as the key decision maker in the household is also associated with better vitamin A uptake (Ayoya, Bendech, Baker, Ouattara, Diané, Mahy & Franco, 2007). Children from wealthier households are also likely to be supplemented compared to those from poorer households (Berde, Bester & Kruger, 2019). The convergence of evidence further affirms the position that governments should continue to reach the last mile and focus the supplementation program towards the poorest especially those with little to no education.

2.4.4 Service delivery platforms have a bearing on supplementation outcomes

VAS coverage is dependent on the model through which it is delivered. In many countries including Zimbabwe, delivery models for VAS are still hybrid, largely integrated with other programs. Where supplementation is delivered through campaign strategies compared to routine, coverages are likely to be higher (Dalymia & Palmer, 2007), but also expensive and not sustainable. Coverages are higher if

VAS is delivered door-to-door compared to fixed sites, and if the caregiver are well informed about VAS prior to national campaigns (Janmohamed, Klemm & Doledec, 2017).

2.5 Key recommendations for improving vitamin A uptake from literature

From reviewed literature, there is a need to focus the increase vitamin A coverage to meet the WHO guidelines of at least 80-percent coverage and conduct further research to understand barriers to access and caregiver level of understanding of vitamin A supplementation program. In addition, there is need to understand the social-economic and environmental determinants as well as social mobilization strategies currently used to promote VAS, and their effectiveness. This study is aligned to these recommendations and aims to contribute rich quantitative findings from interviews with caregivers.

2.6 Summary

Despite years of investment and integration with established service delivery platforms for vaccines, vitamin A coverage remains suboptimal in Zimbabwe (Chiromba, Ncube, Teta & Nyadzayo, 2020). Data from routine District Health Information System (DHIS 2) managed by the MoHCC show that in 2020, an estimated 29-percent of children 6-59 months received supplementation, against a target of 80-percent in Murehwa district. In agreement, an urban vulnerability assessment conducted by Government of Zimbabwe and partners in 2020 showed that only 43% of children in urban areas had received appropriate VAS in the last six months preceding the survey (FNC, 2020).

While there is a lot of rich evidence on factors associated with vaccine hesitancy in country, a little is documented on specific factors associated with low coverage of vitamin A in both urban and rural settings in Zimbabwe. This study documents this evidence for Murehwa district which will be used to inform strategies for improved VAS that will be useful for rural caregivers.

CHAPTER 3 METHODOLOGY

3.1 Introduction

This section discusses the study design, methods and approaches that were used for data collection, pretesting and data analysis. The design was further refined following preliminary consultations with the District Nutrition team and management of the nutrition program both at national and subnational levels.

3.2 Research design

An analytical cross-sectional design based on quantitative methods was used for this study. This ensured that the voices of key stakeholders at village level were incorporated in the findings. An analytical cross-sectional design allowed for the testing of associations to the outcome, vitamin A supplementation, and provide depth to the analysis.

3.3 Study setting

The study was conducted in Murehwa rural district, Mashonaland East Zimbabwe. The district was purposefully selected as one of the districts implementing community-based vitamin A supplementation as an option to improve coverage. The rationale was to assess factors associated with low vitamin A coverage, in a context where delivery platforms have been diversified beyond traditional static sites.

The major livelihoods in Murehwa is subsistence farming, with market gardening and livestock production considered important sources of income. The district has not been spared from the recurrent droughts, like the rest of the country and income

continue to be eroded by the COVID-19 pandemic (FNC, 2020). According to the MoHCC health profiles, the district has 29 health facilities, including two Mission hospitals which serve as referral sites. Chronic malnutrition rates are high at 36-percent (FNC, 2018) and this is one of the few districts where malnutrition is on the rise despite a national decline in trends.

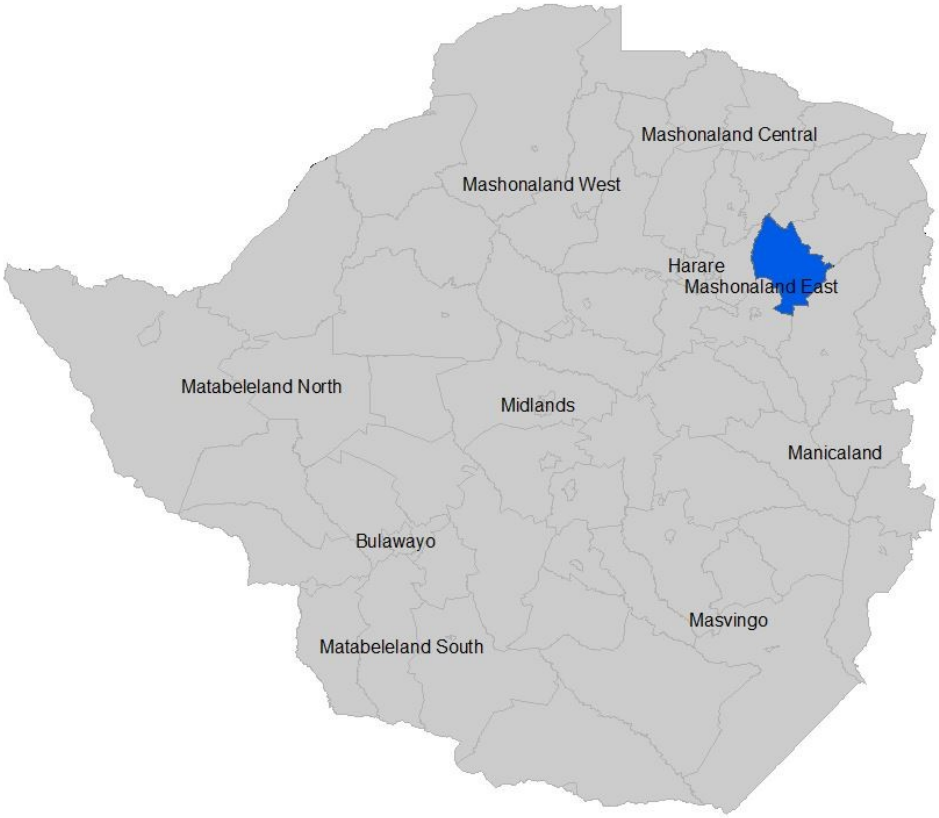

Figure 1: Location of Murehwa District, Mashonaland east, Zimbabwe

3.4 Study population

The primary target was primary caregivers of children aged 6-59 months residing in Murehwa rural district. According to the 2021 ZIMSTAT population projections, Murehwa district has an estimated 34, 226 children aged 6-59 months. Only caregivers of children aged between 6-59 months consenting to the study who were

available on the day of the interview were included. Only two callbacks were allowed before the household could be replaced from the listing. Again, the caregiver was required to have lived in the district for at least three months prior to the data collection.

3.5 Inclusion and exclusion criteria

The study only included primary caregivers of children in the age range of 6-59 months who had been residing in Murehwa for at least three months. No visiting caregivers were included in the study.

3.6 Sample size

Sampling is the process of selecting a statistically representative group of individuals to represent the study population. In this study, it was not be possible to conduct a census of all the children in the age range of 6 to 59 months, as it was not financially and logistically feasible.

3.7 Sampling procedure

A multi-stage cluster sampling was used to identify respondents. This was preferred as the district did not have a line list of all children in the age range 6 to 59 months from which simple random sampling could be conducted. Cluster sampling was also cheaper than simple random sampling and results could still be generalized to the population under study.

3.7.1 Stage 1: Selection of enumeration areas from master sampling frame

The Zimbabwe Statistics Agency (ZIMSTAT) 2012 Census was used to provide the master sample frame for the district. Probability Proportional to Size was used to randomly select the clusters (Enumeration Areas (EAs)) that were visited. Eleven

EAs were selected in total.

3.7.2 Stage 2: Selection of households

At the second stage, households per EA were identified through simple random sampling. Using the Village Health Workers registration lists for children under 5, a line list of children was produced for each EA. Simple random sampling was used to select the children that were included in the sample. Using the principles of PPS, 201 children were selected to participate in the assessment, and the total number of children per EA was determined by the total population size.

3.7.3 Sample size calculation

The Cochrane equation was used to calculate the total number of interviews to be conducted at community level that was representative of the district. This is acceptable for immunization coverage and related studies. The formula below was used to calculate sample size.

$$n = Z^2\left(\frac{pq}{e^2}\right)$$

where

n is the sample size

Z2 is the abscissa of the normal curve that cuts off an area α at the tails (1 - α equals the desired confidence level is 95%)

e is the desired level of precision

p is the estimated proportion of an attribute that is present in the population

and **q** is 1-p

Assuming a 95% confidence interval (Z= 1.96), a 5% desired level of precision and a

vitamin A coverage of 29%; $n = \frac{1.96^2 0.29(1-0.29)}{0.05^2} = \frac{0.7909}{.0025} = 316.4$

Therefore, 317 interviews were to be conducted in the district. However, due to limitations in resources, 201 interviews were conducted in total basing on historical samples for similar food and nutrition assessments conducted in the districts routinely.

3.8 Data collection Instruments

Data collection can be defined as a process of gathering information from all the relevant sources to find a solution to a research problem . Various techniques were used in this study, including observations, face to face interviews using interviewer administered questionnaires. For the household survey, a closed questionnaire was developed and translated into local language. The questionnaire was administered by trained Enumerators using computer based personal interviews (CAPI) through hand-held android devices. Data was directly transmitted to a password secured cloud-based server for security.

The tools were translated into Shona, to improve validity.

3.9 Data sources

Primary data was collected from caregivers of children aged 6-59 months, using a closed household questionnaire.

3.10 Variables

3.10.1 Dependent Variables

The dependent variable was the outcome related to coverage of vitamin A supplementation in children aged 6-59 months.

3.10.2 Independent Variables

The independent variables included household and individual characteristics such as mother's age, education, access to basic water and sanitation, access to health services (including community health services), type of dwelling and access to information.

3.11 Data collection procedure

Comprehensive Enumerator training was conducted over 3 days, from the 4th to the 6th of October 2021. The Enumerators were District Nutritionists from the Mashonaland East province, well familiar with the context and the VAS programme. The trainings were participatory to ensure maximum standardization and technical support was provided by the Provincial Nutritionist. A field test was conducted in ward 17 of Murehwa covering 20 households, which had not been included in the list

of EAs and findings were used to further improve the tools. Data collection was computer based using android handheld devices.

Primary data was collected using interviewer administered face-to-face household survey. Due to the COVID-19 pandemic, no Focus Group Discussions (FGDs) were conducted to adhere to infection prevention and control measures and limit risk of infection.

3.11.1 Household survey with caregivers of children under 5

To determine the coverage of Vitamin A supplementation and associations, a household survey was conducted with caregivers of children 6-59 months at community level. Survey findings gathered information on caregiver knowledge, attitudes and practices, among other factors identified from literature. Computer Assisted Personal Interviews (CAPI) was used to collect data, using Android based handheld devices. Questions were closed and administered in local language (Shona). Data was synchronised with the online secured server managed by the MoHCC on a daily basis and this allowed for real-time supervision and provision of feedback.

3.12 Pretesting of instruments

Pretesting of the household questionnaire was conducted in ward 17 in Murehwa District reaching twenty respondents (10-percent of the final sample). The ZIMSTAT map of the pretesting centres was used to ensure that enumerators were exposed both to the sampling and interview techniques. All pretesting was conducted prior to data collection and findings used to improve the methodology and tools.

3.13 Validity and reliability

The following controls were put in place to ensure quality data was collected

i. A three-day enumerator training was conducted prior to data collection to ensure standardization of information collected.

ii. A field test was conducted to ensure standardization and expose the enumerators to realistic field settings and challenges.

iii. Translation of tools was conducted so that interviews were conducted in the local language (Shona) which the participants were able to comprehend. All interviews were conducted in vernacular.

iv. Computer assisted personal interviews with built in data validation rules was used. The built-in rules ensured improved data quality. In addition, CAPI allowed for daily data uploading in a web-based secured server, which allowed for provision of daily feedback during data collection.

v. Daily data synchronization and data quality checks were used to provide comprehensive feedback to the Enumerators.

vi. Comprehensive supervision of the process was conducted. The Provincial Nutritionist provided daily technical supervision oversight of the work in solidarity.

3.14 Data analysis and organization

After data collection, a mixed-method approach was be used to organize and analyse the data. Triangulation of quantitative findings with DHIS 2 and district key programme foal persons was also conducted before conclusions could be made.

3.14.1 Quantitative data analysis

On a daily basis, data collected through CAPI was synchronized and uploaded on a web-based server to ensure real time quality assurance and safety. Data was assessed for completeness and accuracy as part of the pre-analysis process. Data was analysed in Stata version 16 and presented in simple tables and associations were tested using Logistics regression. Crosstabulations with variables of interest such as sex, age, caregiver education among other information were conducted.

3.15 Ethical consideration

The fieldwork ensured that ethical standards were maintained through respect of ethical principles of confidentiality, do no harm, respect for diversity, fairness, independence, impartiality, credibility, honesty, integrity and accountability. The research protocol was presented to the Africa University Research Ethics Committee (AUREC) for approval before data collection could be conducted. Permission to collect data was granted by the Provincial Medical Director of Mashonaland East and upon entering into the district, inception meetings were held with the District Medical Officer (DMO), the District Development Coordinator (DCC) and the President's office to safeguard transparency.

Data collection approaches were sensitive to the culture of the respondents, and all data was collected during the peak of the lean season when most caregivers were available.

3.15.1 Informed consent

Respondents were given enough information about the research and there was no explicit or implicit coercion so that respondents made an informed and free decision on their involvement in the fieldwork. A written form was signed off by research participants to indicate consent and filed safely by the researcher.

3.15.2 Confidentiality and anonymity

Given that research respondents share considerable amounts of information, the responsibility to ensure confidentiality was maintained, and information was protected. All datasets were anonymized, all names of people were removed, and the data was secured on a password secured server. In addition, only two people had access to the raw data during the process, the programmer and the researcher.

3.15.3 Ensuring that people understand what is happening at all times and Infection prevention and control measures

The study was administered by experienced Nutritionists, drawn from Mashonaland East province. These are the team leaders who participate in nutrition assessments conducted annually in the province.

Due to the risk of COVID-19, Enumerators were provided with face masks and hand sanitizers, for them and the participants. In addition, each responded was sanitised,

provided a mask for use during the session, and a new pen for signing of consent forms which was not returned to the interviewer.

CHAPTER 4 DATA PRESENTATION, ANALYSIS, DISCUSSION, AND INTERPRETATION

4.1 Introduction

In this chapter the results and findings of the study will be presented and analysed in order to determine the factors associated with low Vitamin A coverage in children aged 6-59 months in Murehwa district. The first section will cover demographic description of the study participants, followed by presentation of frequency tables showing unadjusted proportional odds ratios of the associations.

4.2 Demographic description of study participants

4.2.1 Demographic description of caregivers

A total of 201 participants consented to be interviewed in Murehwa District across 31 villages in 11 Enumeration Areas (EAs). The mean (SD) age of study participants was 34 years the age range [min-max] was 15-91. The demographic characteristics of the study participants are summarized in table 3 below.

Table 2: Demographic description of study participants

Variable	Category	Frequency n(%)
Age of the Caregiver	15-25	44(21.8)
	26-35	71(35.3)
	36-45	64(31.8)
	46-55	9(4.5)
	56-65	7(3.5)
	66-75	5(2.5)
	76-85	0(0)
	86-95	1(0.8)
Teen Mothers	15-19	12(9.8)
	20-35	63(51.6)
	Above 35	47(38.5)
Marital Status	Single	4(1.99)
	Married	181(90.1)
	Widowed	6(3.0)
	Divorced	10(5.0)
	Prefer not to say	0(0)
Educational Level	Primary	91(45.7)
	Secondary	92(46.2)
	Higher	5(2.5)
	None	11(5.5)
Religion	Christians	167(80.1)
	Protestant	19(9.5)
	African Traditional	0(0)
	Muslim	0(0)
	No Religion	15(7.5)
Distance to the nearest health facility	Less than 5 Km	76(37.8)
	5Km-10Km	68(33.8)
	More than 10 Km	45(22.4)
	Don't Know	12(6.0)

A greater proportion of the participants were below 45 years 179 (89.1%) whilst 181(90.1%) were married. The educational level of the study participants was high with 11 (5.5%) having no form of education. In terms of religion Christians were a majority constituting 167 (80.1%) and these were distributed fairly across different denominations like Catholics, Pentecostals, Zion and Apostolic. Most participants stayed within 10 Km radius of the nearest health facility 144(71.6%). A small proportion of 45(22.4%) stayed more than 10 Km away from the nearest health facility.

4.2.2 The child's background characteristics

The table below is a summary of the details of the children's background.

Table 3: Children's background characteristics

Variable	Category	Frequency n(%)
Sex	Male	99(49.3)
	Female	102(50.7)
Relationship	Mother	181(90.1)
	Father	3(1.5)
	Grandmother	15(7.5)
	Aunt	1(0.5)
	Sister	1(0.50
Age in months	6-11	28(14.5)
	12-24	49(25.4)
	25-36	34(17.6)
	37-48	45(23.3)
	49-59	37(19.2)
Currently Going to school	No	171(85.1)
	Yes	30(14.9)
Experience Functional Difficulty	No	196(97.5)
	Yes	5(2.5)
Type of Functional Disability	Mentally Challenged	1(20.0)
	Difficulty Walking	1(20.0)
	Difficulty Communication	1(20.0)
	Other	2 (40.0)

The mean (SD) age of the children was 31(16.2) months and there were more girls compared to boys 107(50.7%) although the difference was not statistically significant (X=-4.25, p-value=0.54). Most children were under the care of their mothers 181(90.1%) and were of pre-school going age. A greater proportion of children 196(97.5%) did not experience any functional disabilities with only 5(2.5%) reported to be having functional difficulties. The challenges experienced were mental, walking and communication with 1(20%) child in each category whilst the other 2 children had other functional challenges.

4.3 Coverage of vitamin A supplementation in Murehwa

4.3.1 Absolute coverage of VAS according to sex and age group by the number of doses taken

Data on Vitamin A supplementation was collected from 193 participants where 137(71.0%) took Vitamin A supplements at least once during the previous twelve months, 48(24.9%) did not take the supplement and 8(4.1%) did not know whether they took the supplement or not. The table below shows coverage disaggregated by sex, age group and number of doses taken. The grand totals in each category are shown in the last two rows and the last column.

Table 4: Vitamin A supplementation coverage

	Received Vitamin A Supplement					
	Did Not Receive	One Dose	Two Doses	Don't Know No of Doses	Don't Know	Total n(%)
Age Group (Months)						
6 to 11	11	15	n/a*	2	0	28(14.5)
12 to 23	7	16	14	5	1	43(22.3)
24 to 59	30	31	26	28	7	122(63.2)
Total N (%)	48(24.9)	62(32.1)	40(20.7)	35(18.1)	8(4.1)	193

*Children 6 to 11 months are eligible to receive only one dose

It can be observed that in the youngest age group 6-11 months, 17/28 (60.7%) received Vitamin A supplement with more females 9/17(52.9%) compared to males. In the middle age group 13-23 months, 35/43(81.4%) of the children received vitamin A supplement of which there were more males 18/35(51.4%). A similar pattern can be discerned in the 24-59 months age group where 85/122(69.7%) received vitamin A supplement of which 53/85(62.4%) were males. Also comparing across age groups the middle age group of 13-23 months had the highest proportion of children who received Vitamin A supplement followed the oldest age category of 24-59 months. The youngest age group therefore had the least proportion of children who received vitamin A supplements. Overall a total of 137/193(71.0%) of the

children received vitamin A supplements first dose. When disaggregated by sex more males received vitamin A supplement 79/137(57.7%) compared to females. Overall, the proportion of children who received the recommended dose of VAS (one dose for children aged 6-11 months, and two doses for children aged 12-59 months) was adjusted to 28.5% (55/193).

Of the 137 children who were supplemented, 35(25.5%) were not sure exactly how many times the child had received because there was no record in the child health card.

4.4 Vitamin A supplementation and caregivers' demographic characteristics

4.5 Vitamin A supplementation and caregivers' demographic characteristics

The table below shows the unadjusted proportional odds ratios (POR) which measures the association between care givers' demographic characteristics and Vitamin A supplementation.

Table 5: Caregivers' demographic characteristics and vitamin A supplementation

Variable	Category	VAS Supplementation		POR 95% CI	P value
		Yes	No		
Age	35 and more	82	34	2.0	0.652
	Less than 35	45	32	(0.9-2.2)	
Education	Secondary and above	71	26	1.5	0.046*
	Primary and Below	56	46	(1.4-2.0)	

Religion	Christians	102	85	0.4	0.761
	Other religions	25	9	(0.1-2.2)	
Marital status	Married	115	66	1.9	0.029*
	Single	12	12	(1.4-2.0)	
Distance from Health facility	Less than 10 Km	85	29	3.1	0.042*
	More than 10 Km	42	45	(1.2-4.2)	

**statistically significant at 5 % level of significance*

Vitamin A supplementation was significantly associated with care givers' educational level (p=0.046), marital status (p=0.029) and distance from the nearest health facility (p=0.042). Care givers with secondary education or higher had 50% higher odds of vitamin A supplementation (POR=1.5, 95% CI=(1.4-2.0)) compared to those with primary education or less. The odds of vitamin A supplementation in married care givers were 1.9 times that of single guardians (POR). There was no statistically significant association between caregivers' age and Vitamin A supplementation as well association between religion and vitamin A supplementation (p-values> 0.05).

4.5.1 Mother's age and vitamin A supplementation

The study also tested for associations between the mother's age and the outcome vitamin A supplementation, and the following were the findings.

Table 6: Mother's age and Vitamin A supplement

Variable	Category	Vitamin A supplementation	POR (95% CI)	P value

		Yes	No		
Mother's age	20-35	40	19	1.1 (1.0-2.0	0.023*
(Years)	Above 35	35	10	1.8 (1.5-2.0)	0.044*
	Below 19 years	8	4		

**statistically significant at 5 % level of significance*

Mothers in the age category 20-35 years 1.1 times odds of children's Vitamin A supplementation compared to teen mothers below 19 years (POR= 1.1, 95% CI = (1.0-2.0)). Also, Mothers above 35 years were 80% more likely to afford their children Vitamin A supplementation compared to teen mothers (POR = 1.8, 95% CI = (1.5-2.0)).

4.5.2 Caregiver's knowledge of vitamin A supplementation

Table 7: Knowledge of vitamin A supplementation

Demographic Variable	**Category**	**Knowledge of vitamin A supplementation**		**POR (95% CI)**	**P value**
		Yes	No		
Age	Less than 35	78	38	1.9(1.3-2.6)	0.026*
	35 and more	44	41		
Education	Secondary and above	66	31	1.7(1.2-2.0)	0.014*
	Primary and below	56	46		
Religion	Christians	87	80	3.0(0.8-3.5)	0.134
	Other religions	9	25		
Marital status	Married	94	87	0.8(0.3-1.7)	0.789
	Single	12	8		

Distance from nearest Health facility	Less than 10 Km	75	39	2.1(1.9-4.0)	0.031*
	More than 10 Km	42	45		

*significant at 5% level of significance level

There was significant association between age, educational level and distance from nearest health facility and knowledge on vitamin A supplementation. The odds of having knowledge on vitamin A supplementation for care givers aged less than 35 years were 1.9 times that of older care givers above 35 years (POR= 1.9, 95% CI=(1.3-2.6)). Similar to vitamin A supplementation, educational level was associated with knowledge on vitamin A and its importance.

Caregivers within 10 km radius distance from the nearest health facility had 2.1 times odds of having knowledge on vitamin A supplementation compared to those who reside more than 10 km from the nearest health facility (POR=2.1, 95% CI=(1.9-4.0)). Christians had higher odds of having knowledge on vitamin supplementation compared to care givers from other religions although this association was not statistically significant. On the contrary to vitamin A supplementation single care givers had 0.8 times odds of having knowledge of vitamin A supplementation compared married care givers (POR=0.8, 95% CI=(0.3-1.7)).

4.5.3 Caregivers' attitudes towards vitamin A supplementation

Table 8: Caregivers' attitudes towards vitamin A supplementation

Demographic Variable	Category	Attitude towards Vitamin A supplementation		POR (95% CI)	P value
		Positive	Negative		
Age	Less than 35	78	38	2.2(1.5-3.8)	0.021*
	35 and more	41	44		
Level of Education	Secondary and above	60	37	1.2(1.0-1.8)	0.013*
	Primary and below	59	43		
Religion	Christians	80	87	2.5 (1.0-3.2)	0.768
	Other religions	9	25		
Marital status	Married	90	91	1.4(0.6-2.2)	0.45
	Single	8	12		
Distance from nearest Health facility	Less than 10 Km	70	44	1.7(1.2-2.0)	0.034*
	More than 10 Km	42	45		

**significant at 5% level of significance*

Positive attitude towards vitamin A supplementation was significantly associated with age, level of education and distance of care giver from the nearest health facility. Younger care givers aged less than 35 years were significantly 120% more likely to have positive attitude towards vitamin A supplementation compared to older care givers above 35 years(POR=2.2, 95% CI=(1.5-3.8)). Care givers with secondary level of education or more were significantly 20% more likely to have a positive attitude towards VAS compared to those with primary level of education or less(POR=1.2, 95% CI=(1.0-1.8)). Care givers staying close to a health facility within 10 km radius had 1.7 times odds of having a positive attitude towards vitamin A supplementation (POR=1.7, 95% CI=(1.2-2.0)).

4.6 Vitamin A supplementation and child's demographic characteristics

4.6.1 Child's characteristics and vitamin A uptake

Table 9: Child Characteristics

Child's Demographic Variable	Category	Vitamin A Supplementation		POR (95% CI)	P value
		Yes	No		
Age	Less than 25 Months	64	35	1.6(1.3-2.0)	0.012*
	25 More or more	55	47		
Functional Disability	Yes	1	4	0.3(0.1-0.8)	0.027*
	No	83	113		
Sex	Male	90	8	1.1(1.0-1.2)	0.075
	Female	96	9		

**significant at 5 % level of significance*

Younger children below 25 months of aged were significantly 60 % more likely to get vitamin A supplementation compared to older children aged more than 25 months (POR = 1.6, 95% CI =(1.3-2.0)). Children with functional disability were significantly 70% less likely to receive Vitamin A supplementation (POR = 0.3, 95% CI = (0.1-0.8)). Sex of the child was not a predictor of vitamin supplementation (POR =1.1, 95% CI = (1.0-1.2)).

4.6.2 Children's schooling status and Vitamin A supplementation

Table 10: Schooling status and vitamin A supplementation

Demographic Variable	Category	Vitamin A Supplementation		POR (95% CI)	P value
		Yes	No		
Currently in School	Yes	10	8	0.4(0.2-1.5)	0.078
	No	127	40		
Father Alive	Yes	189	0	-	-
	No	0	3		
Mother Alive	Yes	187	2	46.8(45.6-54.1)	0.011*
	No	2	1		

**significant at 5% level of significant*

A greater proportion of children were not in school 173(89.6%) and 127(65.8%) received vitamin A supplement. On the other hand, 10/18(55.5%) of those in school received supplementation. Children in school were 60% less likely to receive vitamin A supplementation compared those out of school although this was not statistically significant (POR=0.4, 95% CI= (0.2-1.5)).

There was no association between vitamin supplementation and the biological father being alive. However, there was significant association between vitamin

supplementation and mother being alive (POR =46.8, 95% CI =45.6-54.1). The confidence interval was too wide therefore this result may be spurious since there was no fair balance between children with their mothers alive and those who did not have.

4.6.3 Vitamin A dietary practices of the child

The vitamin A dietary practices were assessed through a twenty-four hour recall of the foods taken by the child on their own or as part of the meal. The classes of foods taken include animal source foods, orange-coloured vegetables, green leafy vegetables as well as orange coloured fruit apart from citrus.

Table 11: Vitamin A dietary practices in children 6-59 months

Demographic Variable	**Category**	**Vitamin A Diet Consumed**		**POR (95% CI)**	**P value**
		Yes	No		
Mother's Age	Less than 35	75	41	0.9(0.5-1.0)	0.047*
	35 and more	52	25		
Education	Secondary and above	72	28	2.2(2.0-3.1)	0.037*
	Primary and below	55	46		
Religion	Christians	115	66	1.2(0.5-2.0)	0.621
	Other religions	12	8		
Marital status	Married	114	62	1.7(1.5-2.0)	0.0174*
	Single	13	12		
Distance from	Less than	75	39	1.3(0.8-1.9)	0.067

nearest Health facility	10 Km More than 10 Km	52	35

**significant at 5% level of significance*

Consumption of vitamin A rich diet was significantly associated with age of the caregiver, education and marital status. Although young caregivers in the less than 35 years age category had significant higher odds of having knowledge on vitamin A supplementation the reverse is significantly true on actual consumption of vitamin A diet. Young caregivers were significantly 10% less likely to provide children under their care with vitamin A diet (POR = 0.9, 95% CI=(0.5-1.0)). However, care givers with secondary level of education and above had 2.2 times odds of providing their children with vitamin A diet compared to those with primary level of education or less (POR=2.2, 95% CI =2.0-3.1).

Religion and distance from nearest health facility were not significantly associated with consumption of vitamin A diet. Married care givers were significantly 70% more likely to provide their children with vitamin A diet compared to single care givers (POR = 1.7, 95% CI =(1.5-2.0)).

4.7 Service delivery related factors associated with Vitamin A supplementation

4.7.1 VAS service delivery models

The bar chart below shows where children received Vitamin A capsules from.

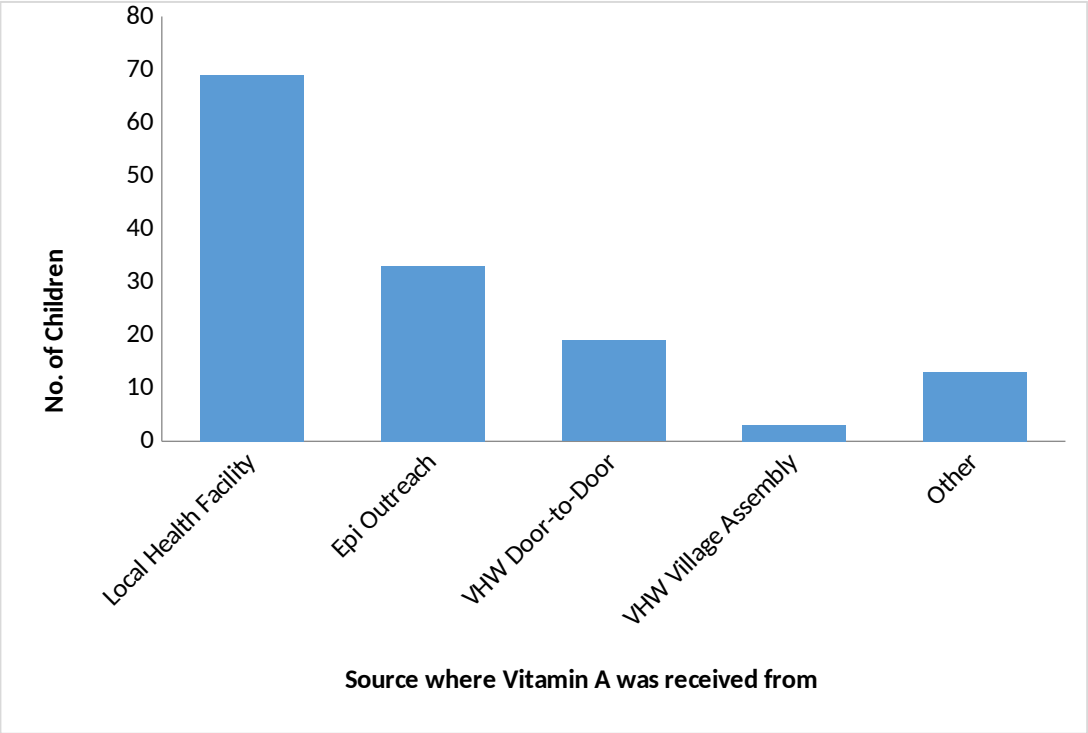

Figure 2: Source of Capsules

The greatest proportion of children received their vitamin A capsules from the local health facilities 69(50.4%) followed EPI outreach 33(24.1%). The least number of children received their vitamin capsules from their VHW through village assemblies 3 (2.2%), while VHW door-to-door strategy contributed to 13.9%.

4.7.2 Growth Monitoring and Promotion

The pie chart below represents the number (%) of children with a child health card.

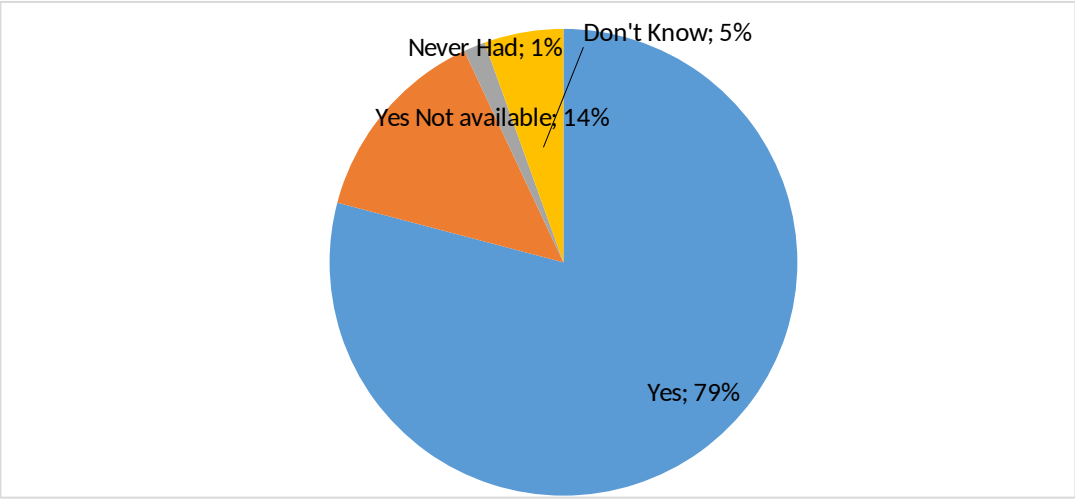

Figure 3: Children with child health cards

The Growth Monitoring Cards (GMC) were assessed and 82(50.6%) of the children had not been weighed in the last month. The table below shows where the children were weighed.

Table 12: Place where the children were weighed

Place Weighed and by who	**Frequency n(%)**
By VHW in the Village	48(29.6)
By VHW at the Clinic/Facility	16(10.8)
By VHW at outreach point	16(10.80)
By Health Worker at Facility	22(13.6)
By Health Worker at outreach	7(4.30)
Other	53(32.7)

Children were weighed mainly by VHWs in the village, outreach points and also at health facility.

4.7.3 Vitamin A supplementation and attendance of growth monitoring

Caregivers' growth monitoring and promotion practices were evaluated by eliciting their responses on whether they have a health card and whether their children were weighed in the last month.

Table 13: Vitamin A supplementation and attendance of growth monitoring

Variable	Category	Vitamin A supplementation		POR (95% CI)	P value
		Yes	No		
Health Card	Yes	100	59	1.9(1.3-2.0)	0.031*
	No	20	22		

**significant at 5% level of significance*

Care givers possessing health cards for their children were 90% more likely to provide vitamin A supplementation compared to those with no cards (POR= 1.9, 95% CI =(1.3-2.0)).

4.7.4 Participation in care/support group activities

Participation in care/support group activities involved visits paid by VHW and attending community-based sessions on child health and nutrition. The table below shows association between vitamin A supplementation and participation in care/support group activities.

Table 14: Participation in care/support groups

Variable	Category	Vitamin A supplementation		POR (95% CI)	P value
		Yes	No		

Attended community-based session on child health and nutrition	Yes	78	32	1.6(1.3-2.1)	0.021*
	No	55	36		

** significant at 5% level of significance*

All care givers were visited by village health workers hence no odds ratio could be computed. Attending community-based sessions on child health and nutrition increased the odds of vitamin A supplementation by 60% (POR= 1.6, 95% CI = (1.3-2.1)).

4.8 Household background characteristics and vitamin A supplementation

The study investigated further, the household factors and related them with uptake of VAS, guided by the socio-ecological model. Findings are presented in the next section in detail.

4.8.1 Vitamin A supplementation and household background characteristics

A multivariate logistic regression model was fitted to control for potential confounders. The forward stepwise regression technique was used to select risk factors that were finally included in the model. The main outcome was dichotomous variable indicating whether VAS was taken coded Yes=1 and not taken coded No=0). The table below shows the association of some independent factors and vitamin A uptake.

Household background factors associated with vitamin A uptake in Murehwa District 2020.

Table 15: Household background characteristics and vitamin A supplementation

Risk Factor	AOR (95% CI)	P-value
Total household size	0.6(1.3-1.9)	0.011*
Number of rooms used for sleeping	2.3(1.8-3.1)	0.034*
Main Material of dwelling floor	1.4(1.5-2.5)	0.042*
Good Quality		
Poor Quality		
Main Material on exterior wall		
Good Quality	1.1(1.0-1.2)	0.087
Poor Quality		
Electricity availability		
Yes	2.2(2.1-2.8)	0.024*
No		
Ownership of car, truck or van		
Yes	1.8(2.1-2.8)	0.016*
No		
Ownership of agriculture land		
Yes	1.9(1.5-2.1)	0.001*
No		

**significant at 5% level of significance*

An increase in total household size of one member was significantly associated with 40% lower odds of receiving vitamin A supplementation (AOR=0.6, 95% CI = (1.3-1.9)). A unit increase in the number of sleeping rooms for a household significantly increased the odds of getting vitamin A by 130% (AOR =2.3, 95% CI =(1.8-3.1)).

Households with good quality material on dwelling floors had significant 1.4 times odds of having vitamin A supplementation compared to households with poor quality material (AOR=1.4, 95% CI =(1.8-3.1)). However, the quality exterior wall material was not a significant predictor of vitamin A supplementation. The logistic regression model also showed that availability of electricity is significantly associated with vitamin supplementation (AOR=2.2, 95% CI =(2.1-2.8)). Ownership of car, truck or

van was significantly associated with vitamin A supplementation (AOR=1.8, 95% CI = (1.3-2.1)). Household members owning agricultural land had significant 1.9 times odds of having vitamin A supplementation (AOR =1.9, 95% CI = (1.5-2.1)).

4.8.2 Vitamin A supplementation and Water, Sanitation and Hygiene (WASH)

Table 16: VAS and WASH

Variable	**Category**	**Knowledge on Vitamin A supplementation**		**POR (95% CI)**	**P value**
		Positive	Negative		
Household has special hand washing place	Yes	79	36	1.5(1.0-1.8)	0.564
	No	50	34		
Share toilet facility with households	Yes	12	13	1.2(0.8-1.5)	0.096
	No	76	100		
Child had Diarrhoea	Yes	16	35	0.4(0.2-0.9)	0.039*
	No	78	72		

**significant at 5% level of significance*

There was no significant association between having special place for washing hands and knowledge on vitamin A supplementation (POR= 1.5, 95% CI = (01.0-1.8)). Sharing toilet facility with another household was also not associated with knowledge of vitamin A supplementation (POR=1.2, 95% CI =(0.8-1.5)). However, the odds of having knowledge of vitamin A supplementation for children who had

experienced diarrhoea were significantly 60% lower than that of those not having diarrhoea (POR = 0.4, 95% CI =(0,2-0.9)).

4.9 Discussion

The aim of this study was to document child and caregiver determinants of uptake of VAS, household as well as health system characteristics. In this study data on vitamin A supplementation was collected from 193 participants where 137(71.0%) took vitamin A supplements at least once during the previous twelve months. However, only 36.7% of the children in the age range of 6-59 months had received the recommended dose of VAS in the previous 12 months (one dose for children aged 6-11 months and two doses for children aged 12-59 months).

CHAPTER 5 SUMMARY CONCLUSIONS AND RECOMMENDATIONS

5 Introduction

This chapter summarizes the findings of the study and provides recommendations at policy and implementation levels for the improvement of VAS programmes in similar settings.

5.1 Discussion

Vitamin A deficiency (VAD) is one of the major public health concerns especially in low- and middle-income countries. From the latest Cochrane reviews, VAD globally affects more than 190 million children, predisposing them to a range of infections including respiratory and diarrheal diseases, measles, vision problems and death (Imdad *et al*., 2017). WHO also estimates that every year 250,000 to 500,000 children who are vitamin A deficient end up blind, and half of these will die within twelve months after losing their sight. The latest data available shows that overall, the world is off-track in achieving global nutrition targets by 2025 (Micha *et al*., 2020). The epidemiology of VAD is a vicious cycle, as it is also associated with poor pregnancy outcomes (Almansour, 2018).

The Zimbabwe National Micronutrient survey of 2012 reports a 21-percent prevalence of VAD in children under five with clear disparities between rural (25%) and urban areas (11%) (MoHCC, 2015). The country is classified as having a severe public health problem when it comes to VAD according to WHO cut-off thresholds for public health significance .

Vitamin A supplementation (VAS) is one of the most extensively researched, safe and cost-effective strategies in the control of VAD (Ross, 2002). Ross (2002) recommends that in context where VAD is a challenge, periodic supplementation among children aged 6-59 months should be a national priority and programs need to aim for at least 80-percent minimum coverage.

Vitamin A supplementation in Zimbabwe is incorporated into primary health care. The service is available for free for all children 6-59 months as part of the national health strategy. Supplementation is available at all static and mobile outreach sites and integrated into campaigns (Chiromba *et al*., 2020). The Zimbabwe National Health Strategy 2016-2020 aimed to improve VAS coverage to 80-percent but, by the end of 2020, only 29% of children had received the service in Murehwa (MoHCC, 2020).

The purpose of the study was to determine the key barriers and motivators associated with vitamin A uptake in children aged 6-59 months in Murehwa district and document evidence to inform future programming, policy and planning. From reviewed literature, low maternal literacy, delivery platforms of VAS, maternal age and place of residence in relation to access to health services were among some of the key barriers associated with low uptake and compliance with the VAS schedule.

An analytical cross sectional design which employed quantitative data collection methods was used to conduct this study. Murehwa district was purposefully selected as it delivered VAS through hybrid approaches; routine delivery through the health care system, campaigns and task-sharing with VHWs. The primary target were caregivers of children aged 6-59 months, HCWs and VHWs. Caregiver interviews

were conducted through computer assisted personal interviews administered through trained and experienced enumerators, translated in vernacular and data was transmitted directly to an online password secured server.

Multi-stage cluster sampling was used to select households where interviews were conducted. At stage one, the ZIMSTAT 2012 master sample was used to randomly select 11 Enumeration areas where interviews were conducted. Probability Proportion to Size (PPS) was used to select these EAs. At second stage, a line list of children residing in the EAs was produced and a random number assigned to select the first of the 200 children that were required as minimum sample. Simple random sampling was used to select the rest of the children.

Ethical clearance was received from the AUREC, and permission to conduct interviews granted by the PMD of Mashonaland East. At District level, courtesy calls were made to the DMO, the DCC and the President's Office, who also informed the Councilors and Village Heads of the data collection exercise. Data collection was conducted through four trained interviewers, from the 7th to the 16th of October 2021 and data analysis conducted in STATA version 16.

The study identified a number of factors associated with low uptake of VAS in Murehwa. At individual level, the age of the child was one such key factor, younger children between 6-11 month had very low coverages and as the child reached 36 months, compliance began to drop sharply. This is true of the current COVID-19 context which sees more shielding from the virus by caregivers especially for younger children. At caregiver level, supplementation rates were higher in mothers with secondary education compared to those with primary or preprimary education.

Married caregivers were also likely to get their children supplemented compared those that were not married. Religion of the primary caregivers did not show any association to the uptake of VAS. Significant across the themes was the socioeconomic standing of the caregiver. Those who resided in households with electricity, and lived in houses with better quality internal material were most likely to get their children supplemented. This association were independent of each other. Interestingly, children living in large households were also less likely to receive supplementation services.

At health system level, children who lived closer to a health facility had 2 times chances of supplementation compared to those who lived far out showing the importance of contact. Those with child health cards were also likely to be compliant and this is was agreement with literature. VHWs also reported that they were comfortable to deliver VAS and did not perceive it as additional work

Prior to 2021, the DHIS 2 report was not configured to report VAS efforts from the community separately from routine facility based data. This data flow challenges could explain the discrepancy between the DHIS 2 reported coverage of only 29% and the coverage of 36.7% reported in this study.

5.1.1 Individual factors associated with VAS uptake

The aim of this study was to document child and caregiver factors associated with uptake of VAS, household as well as health system associated characteristics. In this study data on vitamin A supplementation was collected from 193 participants where 137(71%) took vitamin A supplements at least once during the previous twelve months. However, only 28.5% of the children in the age range of 6-59 months had

received the recommended dose of VAS in the previous 12 months (one dose for children aged 6-11 months and two doses for children aged 12-59 months).

At individual level, the sex of the child was found not to be associated with VAS uptake, however age of the child was significantly associated with VAS uptake. In contrary, Adamu and Muhammad (2016), found that girls have 1.34 odds of not receiving VAS in comparison to boys ($P < 0.06$).

Younger children aged below 25 months were significantly 60 % more likely to get vitamin A supplementation compared to older children aged more than 25 months (POR = 1.6, 95% CI =(1.3-2.0)). This is explained by the reducing contact with the health system as the child grows older. From findings from the key informant interviews, most health care workers reported that most children lose contact with the health system at 18 months, when they complete their vaccination schedule. This is also consistent with 2019 routine data for coverage from the DHIS 2 report for Murehwa. However, on a more detailed level, it can be observed that in the youngest age group 6-12 months, 17/28(60.7%) received Vitamin A supplement with more females 9/17(52.9%) compared to males. In the middle age group 13-23 months, 35/43(81.4%) of the children received vitamin A supplement of which there were more males 18/35(51.4%). A similar pattern can be discerned in the 24-59 months age group where 85/122(69.7%) received vitamin A supplement of which 53/85(62.4%) were males. Semba et al. (2008) found similar results where supplementation was lowest in younger children between 6 and 12 months of age. VAS coverage then gradually improves from 12 months and again begins to decline at 36 months of age (Semba *et al.,* 2008).

Presence of functional disability was another significant factor associated with uptake of VAS. Children with a functional disability were significantly 70% less likely to receive vitamin A supplementation (POR = 0.3, 95% CI = (0.1-0.8)). Of the one billion people living with disabilities, children with disabilities (CwD) make up about 150 million (UNICEF, 2007). Children with disabilities are often left behind and a large number of CwD in Sub-Saharan Africa have limited access to health care services. This is mostly due to a combination of chronic poverty, low education, lack of awareness, poor attitudes towards disability and poor health systems, which substantially lower these children's quality of life (Adugna, Nabbouh, Shehata & Ghahari, 2020). Caregivers are often concerned about stigma about their child's condition, and therefore make efforts to keep disabled children away from the health system (Cameron, Nixon, Parnes & Pidsadny, 2005). All VHWs interviewed in this study reported that they offer VAS services equally across all groups including those with functional difficulties.

A thorough secondary analysis of minutes from previous quarterly nutrition planning and review meetings revealed that as children grow older, there is a missed opportunity on VAS as children begin to attend pre-school. Harare City Health services has responded by introducing scheduled VAS in pre-schools. This study found that a greater proportion of children were not in school anyway, 173(89.6%) and 127(65.8%) received vitamin A supplement. On the other hand, 10/18(55.5%) of those in school received supplementation. Children in school were 60% less likely to receive vitamin A supplementation compared those out of school although this was not statistically significant (POR=0.4, 95% CI= (0.2-1.5)).

5.1.2 Caregiver factors influencing VAS outcomes

At caregiver level, several associations were affirmed by this study. Vitamin A supplementation was significantly associated with caregivers' educational level. Care givers with secondary education or higher had 50% higher odds of vitamin A supplementation (POR=1.5, 95% CI=(1.4-2.0)) compared to those with primary education or less. Likewise, there was a significant association between caregiver's educational level and knowledge of VAS. Educated caregivers were 70% more likely to have knowledge on VAS compared to those with pre-primary to no education. Apart from opportunity cost related to access to health centres, VAS is provided for free in all public health facilities in Murehwa district with support from GoZ, UNICEF and funding partners. Caregivers with primary or pre-primary education were less likely to perceive VAS as important and therefore exhibited poor demand attitudes towards VAS. In other words, caregivers with little to no education were less likely to receive VAS services even though these were provided free of charges. Berde et al. (2019) notes that children with educated caregivers (secondary education and above) were 2.5 times more likely to receive VAS compared to those whose mothers had no education.

Consumption of vitamin A rich diet was significantly associated with age, education, and marital status of the caregiver. Although young caregivers in the less than 35 years age category had significant higher odds of having knowledge on vitamin A supplementation the reverse was significantly true on actual consumption of vitamin A rich diet. Young caregivers were significantly 10% less likely to provide children under their care with vitamin A diet (POR = 0.9, 95% CI=(0.1-1.0)).

For a sustainable Vitamin A Deficiency (VAD) control program, Aguayo et al. (2005) recommends that VAS should be complemented with strong dietary intake of vitamin A rich foods, including biofortification. This study found that a very small proportion of children take much of vitamin A rich food classes. The largest proportion of children consumed eggs as the main source of vitamin A under animal products 41/193(21.3). The main source of vitamin A under orange coloured vegetables was vegetables which include rape, covo, tsunga, mufushwa and pumpkin leaves 72/193(37.3%) which are mostly produced at household level. There was a low uptake of orange-yellow coloured fruit 15/193(7.8%). Married care givers were significantly 70% more likely to provide their children with vitamin A rich diet compared to single care givers (POR = 1.7, 95% CI =(1.5-2.0)). In addition, care givers with secondary level of education and above had 2.15 times odds of providing their children with vitamin A diet compared to those with primary level of education or less (POR=2.2, 95% CI =2.0-3.1).

5.1.3 Health system related factors associated with VAS uptake

Care givers living within 10km radius distance from the nearest health facility had 2.1 times odds of having knowledge on vitamin A supplementation compared to those who reside more than 10km from the nearest health facility(POR=2.1, 95% CI=(1.9-4.0)). Delivery platforms for VAS remain a major challenge to the achievement of full dosage. In the early years of introduction, VAS was mainly integrated with national Immunization Days (NIDs) but these are slowly being phased out in many countries (Dalmya & Palmer, 2007). It has become clearer to most programmers that integrating VAS with immunization is not the most suitable

strategy due to the differences in schedules (Dalmya & Palmer, 2007). Zimbabwe delivers VAS through different strategies including routine system through fixed site, integrated campaigns and VHWs task-sharing (MoHCC, 2018). Despite diversification of service delivery platforms, majority of children (50%) had received VAS through the health facility. The greatest proportion of children received their vitamin A capsules from their local health facilities 69(50.4%) followed by EPI outreach 33(24.1%). The least number of children received their vitamin capsules from their VHW through door to door (13.3%) and village assemblies 3 (2.2%). It therefore follows that those who lived closer to the health facilities (within 10Km) were likely to be supplemented compared to those who lived far out, showing clear geographical inequities in terms of access.

Care givers possessing health cards for their children were 90% more likely to provide Vitamin A supplementation compared to those with no cards (POR= 1.9, 95% CI =(1.3-2.0)). Attending community-based sessions on child health and nutrition increased the odds of vitamin A supplementation by 60% (POR= 1.6, 95% CI = (1.3-2.1)). Tarwa and De Villiers (2007) suggest that the child health card could be a powerful tool in fostering vaccine compliance if mothers are empowered to use it correctly.

5.1.4 Household factors associated with VAS uptake

Care givers living within 10km radius distance from the nearest health facility had 2.06

Bigger household sizes are associated with missed opportunity for health care and other essential social services. An increase in total household size of one member

was significantly associated with 40% lower odds of having vitamin A supplementation (AOR=0.6, 95% CI = (1.3-1.9)). Similarly, Semba et al. (2008) reports a decrease in chances of supplementation for every additional child in the household.

Participation in care/support group activities involves visits paid by VHW and attending community-based sessions on child health and nutrition All care givers were visited by village health workers hence no odds ratio could be computed. Attending community-based sessions on child health and nutrition increased the odds of vitamin A supplementation by 60% (POR= 1.6, 95% CI = (1.3-2.1)). While the results show positive community support structures, uptake of VAS remains sub-optimal, presenting some glaring missed opportunities. Again, the study found that the bulk of growth monitoring is delivered through VHWs in the community, but only 16% of the children were supplemented by the VHW through the task-sharing model. Early lessons from the Manicaland task-sharing pilot in Zimbabwe do show that VHWs with the right support are capable of safely delivering VAS to children in need and therefore could assist with decongesting facilities and improving coverage (MoHCC & CHAI, 2017).

The results presented above show that for the four levels of the theoretical model, significant associations exist of socioeconomic nature, environmental and child care practices. These areas highlighted will help model VAS delivery strategies that are more targeted and informed thus executing programmes with better impact. At hierarchical model, socioeconomic factors of education, ownership of agricultural land, total household size and material used for dwelling, were all identified as important factors associated with VAS uptake. These are factors which speak to

socioeconomic standing in society. Therefore, in summary, although a wealth index could not be produced due to the small sample size, in this model, children from better off households were more likely to receive VAS. In principle, VAS supplementation is meant to target the poorest of the poor as evidence has shown that these are more likely to experience child mortality compared to better off households. Children from the most vulnerable households, who are in most need for supplementation services were not receiving this life-saving intervention.

5.2 Limitations

5.2.1 COVID-19 movement restriction protocols limit face-face interaction with the respondents

This study was conducted during the COVID-19 pandemic. Because of prolonged lockdown measures between June and September 2021, data collection was delayed. The timing also coincided with heightened COVID-19 catch-up for vaccination and this affected available of key informants, especially Health Care Workers (HCWs), including VHWs. Infection Prevention and Control (IPC) measures were adhered to, an IPC sensitization was offered to all Enumerators as part of the training, and Personal Protective Equipment (PPE) supplied for the data collection teams. The methodology was restricted to limit gatherings such that no Focus Group Discussions (FDGs) were conducted.

5.2.2 Limitations in terms of time available

The study was conducted under competing priorities. In addition, the country experienced prolonged lockdown as part of Government pronounced lockdown

measures against the third and fourth waves of COVID-19 infections. The researcher engaged efficient data collection methods, including computer assisted data collection and parallel virtual engagements to ensure the process was efficient.

5.3 Conclusion

Coverage of VAS was 28.5-percent in this study, similar to the 29-percent reported through routine data, but still falling short of the NHS target of 80-percent. The major factors associated with poor VAS uptake and negative attitudes were maternal education, marital status of the mother, distance to health facilities and age of the child. Presence of a functional difficulty or disability in the child was also associated with low uptake although there was no causal analysis. Religion of the mother and sex of the child had no association with uptake. A blend of recommendations that will address service delivery, the operating environment and demand generation for VAS is being proposed to ensure VAS is recognized as a life-saving intervention and prioritized both by the health delivery system and the clients.

5.4 Recommendations

This study acknowledges the efforts that the district and the health sector have put in place to improve vitamin A coverage in young children. The researcher presents in this section a few areas guided by the results for improvement going forward which may assist programmers and policy makers in the field of vitamin A.

Table 17: Recommendations

Specific finding	**Recommendation**	**Responsible Office**	**Time Frame**
Health facilities are the	A review of the current VAS	National	September

most common modes of delivery of VAS Children living more than 10Km away from health facilities are less likely to be supplemented	delivery strategies is urgently required to define a standardized delivery package for HcWs. The package should include explicit solutions for children living with disabilities and those who live far away from health facilities	Nutrition Unit UNICEF	2022
	Transition to full integration of VAS commodities and supplies into the national distribution system	National Nutrition Unit UNICEF	September 2022
	Provide consistent integrated quarterly mentorship support for the district, mentorship should be beyond health facilities and should have provision for community reach	DHE	Immediate
	Accelerate construction of health posts to ensure equitable distribution of health services	MoHCC Policy and Planning	NHS priority 2025
Low knowledge on VAS Negative attitudes towards VAS	Design and implement human centered demand driven social behavior change solutions for mothers and caregivers which promote VAS even for those with little maternal education	Nutritionists Health Promotion Community Nurse UNICEF	June 2022
	Position the caregroup model, as a one stop shop for nutrition related essential service delivery. Revise the model's TORs to include VAS so as to avoid missed opportunities	Nutritionists Health Promotion Community Nurse UNICEF	September 2022
	Invest in innovative technology solutions which act as reminders to prompt the mothers to seek VAS services and others which require repeated contact with the health system such as mHealth	National nutrition Unit Health Information Unit UNICEF	June 2022

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APPENDICES

Appendix 1: English Household Questionnaire

QUESTIONNAIRE FOR PRIMARY CAREGIVERS OF CHILDREN 6-59 MONTHS

IDENTIFICATION	CODES (OFFICE USE ONLY)
ENUMERATION AREA NO_____	☐☐
District_____	☐☐
Ward_____	☐☐
Village_____	
Name of Respondent_____	☐☐
Interviewer : _____	
Date of Interview _____ /_____ /_____ Day /Month / Year	
Checked by (Supervisor) _____	

INFORMED CONSENT

Greetings. My name is _____ and I am a Public Health Student at the Africa University and currently attached at UNICEF. I am conducting an assessment about vitamin a supplementation in children aged 6 – 59 moths in Murehwa district. I would very much appreciate your participation in this survey. The information you provide will help the district to plan and improve vitamin A supplementation services. The interview will take about 20 minutes to complete.

I would very much appreciate your participation in this exercise. As I proceed with the interview, I will rely very much from information from the child health card. Whatever information you provide will be kept confidential and will not be shown to other persons.

Participation is voluntary and you can choose not to answer any individual question or all of the questions. However, I hope that you will participate in this survey since your views are important.

At this time, do you want to ask me anything about the survey?

Do you agree to participate in this survey? YES ☐ NO ☐

Respondents' Signature:_____

Date

IF NO, MARK THIS HOUSE AS A REFUSAL IN THE TABLE FOR SEQUENCE OF HOUSEHOLDS VISITED AND GO TO THE NEXT HOUSE.

THANK YOU

RECOMMENDATIONS FOR THE INTERVIEWER

VERIFY THAT THE RESPONDENT IS A PRIMARY CAREGIVER OF A CHILD AGED 6-59 MONTHS OF AGE; USE THE CHILD HEALTH CARD OR MATERNAL CARD IF POSSIBLE TO VERIFY.

IF MORE THAN ONE CHILD AGED 6-59 MONTHS LIVES IN THIS HOUSEHOLD INCLUDE ALL OF THEM IN THE SAMPLE.

FOR ALL QUESTIONS IN THIS SURVEY, NEVER READ THE POSSIBLE OPTIONS UNLESS THERE IS A SPECIAL INSTRUCTION (CAPITAL AND IN BOLD). WAIT FOR THE RESPONDENT TO ANSWER THE QUESTION AND THEN CIRCLE THE RESPONSE GIVEN.

Record the time the interview BEGINS	__ __ : __ __ HOUR: MINUTE

Section 1: Caregiver/Mother's Background

No.	Questions and Filters	Coding Categories	Skips
MB1	In what month and year were you born?	Date of birth Month.....__ __ Dk month.....98 Year .....__ __ __ __ Dk year……..98	
MB2	How old are you? **PROBE: HOW OLD WERE YOU AT YOUR LAST BIRTHDAY?**	AGE (IN COMPLETED YEARS) __ __	

MB3	Have you ever attended school?	Yes.....1 No.....2	➔MB5
MB4	What is the highest level of education you completed?	Primary.....1 Secondary.....2 Higher ……3 None…….4	
MB5	What is your <u>current</u> marital status?	Single.....1 Married.....2 Widowed.....3 Divorced/separated.....4 Prefer not to say…….5	
MB6	What is your religion? (Do not read, mark only)	Roman Catholic……..1 Protestant……2 Pentecostal……..3 Apostolic sect……4 Zion……5 Other Christian……..6 Traditional……7 No Religion……8 Other religion (specify)_____	
MB7	What is your relationship to (Name)	Mother……1 Father……2 Grandmother……3 Grandfather…….4 Aunt……5 Uncle……..6 Sister……..7 Brother……8 Other (Specify)_____	

Section 2: Child's Background

No.	Questions and Filters	Coding Categories	Skips
Under 5 Listing	Line Listing No. 1 2 etc	Sex	
CB1	**RECORD THE NAME OF SELECTED CHILD:**	_____ NAME OF SELECTED CHILD	
CB2	What is the sex of [NAME]?	Male……..1 Female…….2	
CB3	Now I would like to ask you some questions about the health of (NAME). In what month and year was (NAME) born? **PROBE: WHAT IS HIS / HER BIRTHDAY?** **IF THE MOTHER/CARETAKER KNOWS THE EXACT BIRTH DATE, ALSO ENTER THE DAY** **MONTH AND YEAR MUST BE RECORDED.**	Date of birth Day .....__ __ Month.....__ __ Year __ __ __ __	
CB4	How old is (NAME)? **PROBE:** **HOW OLD WAS (NAME) AT HIS / HER LAST BIRTHDAY?**	AGE (IN COMPLETED MONTHS)	
CB5	Is name currently going to school/ECD/Creche?	Yes……1 No……2 Don't Know……9	
CB 6	Is (name's) biological father alive?	Yes……1	

		No……2 Don't Know……98	
CB7	Is (name's) biological mother alive?	Yes……1 No……2 Don't Know……98	
CB8	Does (Name) experience any of the following functional difficulties/disabilities **Read out loud. Probe if necessary and select all that apply**	Mentally challenged (Y/N) Difficulty seeing(Y/N) Difficulty hearing (Y/N) Difficulty walking (Y/N) Difficulty remembering/concentrating(Y/N) Difficulty communication (Y/N) Difficulty in self care (Y/N) Other (specify)	

Section 3a: Household Background

No.	Questions and Filters	Coding Categories	Skips
BF1	What is the total household size **Explain, here we are only interested in the members that you live with and eat from the same pot for the past 3 months. Please do not include visitors**	Number of people_____	
BF2	How many rooms do members of this household usually use for sleeping?	Number of Rooms_____	

BF3	Main material of the dwelling floor. Record observation. **If observation is not possible, ask the respondent to determine the material of the dwelling floor.**	1. Earth / Sand 2. Dung 3. Wood Planks 4. 7. Parquet or Polished Wood /ceramic tiles 5. 10. Cement 6. 11. Carpet 7. 12. Other (specify)	
BF8	Main material of the roof. Record observation.	1. Thatch 2. Tin 3. Asbestos 4. Concrete tiles 5. Cardboard 6. IBR/Chromadeck 7. No roof 8. Wooden planks/other wooden 9. Other (specify)	
BF 9	Main material on the exterior walls	1. Bricks 2. Stone 3. Cement 4. Mud 5. Sticks 6. Tins 7. Cardboard boxes 8. grass 9. Other (specify)	
BF11	Does your household have electricity?	1. Yes, Interconnected Grid 2. Yes, Off-Grid (Generator/Isolated System) 3. No	

bF13	Does any member of your household own: (Read all and mark all that applies)	2. Bicycle (Y/N) 3. Motorcycle or Scooter (Y/N) 4. Animal-drawn Cart (Y/N) 5. Car, Truck or Van (Y/N) 6. Boat with a Motor (Y/N) 7. Wheel Barrow (Y/N) 8. Animal drawn plough (Y/N)	
BF14	Does any member of your household own: (Read all and mark all that applies)	1. Land for agriculture purposes (Y/N) 2. Cattle(Y/N) 3. Goats/sheep(Y/N) 4. Chickens/ducks/geese other poultry(Y/N) 5. Donkeys/horse(Y/N) 6. Pigs(Y/N) 7. rabbits(Y/N) 8. Other livestock (specify)(Y/N)	9.

Section 4: Water Sanitation and Hygiene

No.	Questions and Filters	Coding Categories	Skips
HS1	Does your household have a special place for hand washing	Yes.....1 No.....2 Don't know.....98	➔ **HS3**

HS2	Ask to see the place used most often for hand washing and observe if the following items are present	Soap and water.....1 Ash and water.....2 Soap with no water……..…….3 Water with no soap.....4 Other……..98	
HS3	What is the main type of toilet facility used by members of your household**?** **(ask to see it)** *'Flush' or 'Pour flush', probe:* Where does it flush to? *If not possible to determine, ask permission to* *observe the facility.* **CIRCLE ONLY ONE RESPONSE**	Flush to piped sewer sytem ……. .1 Flush to septic tank……..2 Flush to pit latrine ……3 Flush to somewhere else …… ……..4 Flush, don't know where …… ……..5 Ventilated improved pit litrine …… ……6 Pit latrine with slab ……7 Pit latrine without slab/open pit ……8 Bucket toilet …… ……..9 No facility/bush/field ……..….10 Hanging latrine (pile) ……..11 Other…… 98	
HS4	Does your household share the toilet facility with other households	Yes.....1 No.....2 Don't know.....……98	

HS5	What is currently the main source of drinking water for members of your household?	Piped into home ……1 Piped to yard/plot …….2 Public tap/standpipe ……3 Tubewell or borehole…….4 Protected well……5 Unprotected well ……..6 Water from spring…….7 Unprotected spring . . . . . 8 Rainwater . . . . . 9 Tanker truck . . . . . 10 Cart with small tank . . . . . 11 Surface water (river/dam/ Lake/pond/stream/canal/irrigation channel) . …….12 Digging into a dry river bed ……13 Sand abstraction system……..14 Sub-surface tank……15 Bottled water . . . . . 16 Other …….98	
HS6	How long does it take to go there, get water, and come back?	Minutes . . . . . . Don't know 98	
HS7	Is water available from this source all year round?	Yes.....1 No.....2 Don't know.....……98	

HS8	In the last two weeks, was water unavailable from this source for a day or longer?	Yes.....1 No.....2 Don't know.....……98	
HS9	In the last two week, has (Name) had diarrhoea ?	Yes.....1 No.....2 Don't know.....98	➔ **GM1** ➔ **GM1**
HS10	Did you seek any advice or treatment for the diarrhoea from any source?	Yes ..... 1 No ..... 2 Dk 8	
HS11	Where did you seek advice or treatment? *Probe:* Anywhere else? *Record all providers mentioned, but do not prompt* *with any suggestions.*	1. government/council hospital/clinic 2. village health worker 3. mobile / outreach clinic 4. private medical sector 5. relative / friend 6. shop / market / street 7. traditional practitioner 8. religious leader/prophet/priest/ faith 9. pharmacy 10. other (specify) _____	
HS14	During the time (name) had diarrhoea, was (he/she) given: [A] A fluid made from a special packet called ORS? [C] Zinc tablets or syrup? [D] Sugar Salt Solution (SSS)?	Y N DK FLUID FROM ORS PACKET ..... 1 2 98 ZINC TABLETS OR SYRUP ..... 1 2 98 SUGAR SALT SOLUTION 1 2 98	

Section 5: GROWTH MONITORING AND PROMOTION

No.	Questions and Filters	Coding Categories	Skips
GM1	**Does (Name) have a child health card Card? If yes may I see it please?**	1. Yes, seen by interviewer…….1 2. Yes, but not available/ lost/misplaced……..2 3. Never had a card…….3 4. Don't know……98	➔ CH1 ➔ CH1
GM2	Look at the GMP card and see if (NAME) Has been weighed in the last **I MONTH**	Yes……1 No…….2 Cannot determine for sure…..98	

Section 5: Participation in care/support group activities

No.	Questions and Filters	Coding Categories	Skips
CH1	Have you ever been visited by a Village Health Worker for health related purposes? **(exclude social visits)**	Yes…….1 No……..2	➔ CH4
CH2	During the past three months have you received a home visit from a VHW **(exclude social visits)**	Yes……1 No…….2	

CH4	During the past three months have you attended a community-based training on child health and nutrition?	Yes……1 No…….2	

Section 6: VITAMIN A SUPPLEMENTATION

Section 6a: Knowledge on Vitamin A supplementation

I am going to ask you some questions about vitamin A. Please let me know if you need me to clarify any of my questions. Feel free to ask any question you may have.

No.	Questions and Filters	Coding Categories	Skips
KM1	Have you ever heard about Vitamin A	YES…….1 NO…….2 Don't Know……98	➔ VD1
KM2	Can you tell me how you can recognize someone who lacks vitamin A in his or her body	1. Weakness/less energetic 2. Likely to be sick (more prone to infections) 3. Eye problems (night blindness, dry eyes, blindness, corneal damage) 4. Other (specify) 5. Don't know	
KM3	How can one prevent lack of vitamin A in the body	1. Eat vitamin A rich foods 2. Eat vitamin A fortified foods 3. Eat a wide variety of foods 4. Take vitamin A supplements 5. Sprinkle micronutrient powders 6. Other (specify) 7. Don't know	
Section 6b : Vitamin A dietary practices			

Now I would like to ask you about foods that (Name) may have eaten on their own or as part of a meal. Yesterday during the day and night did (Name) eat any of the following foods ? **Read out the list of Vitamin A rich foods and tick yes or no against each food**			
VD1	Animal source foods	1. Liver (Y/N) 2. Kidney (Y/N) 3. Heart (Y/N) 4. Eggs (from chicken, fowl, duck, other bird) (Y/N) 5. Milk, cheese, yoghurt or other dairy (Y/N)	
VD 2	Orange coloured vegetables	6. Orange sweet potato (Y/N) 7. Carrots(Y/N) 8. Pumpkins(Y/N) 9. Butternut(Y/N) 10. Squash(Y/N) 11. Other (specify)	
VD 3	Green leafy vegetables	1. Spinach 2. Amaranths 3. Other green leafy vegetable	
VD 4	Orange-yellow colored frout apart from citrus	1. Ripe mango (Y/N) 2. Ripe pawpaw (Y/N) 3. Apricot (Y/N) 4. Peaches (Y/N) 5. Other (specify)	
Section 6C : Attitudes towards Vitamin A related problems			
VP 1	How serious do you think lack of vitamin A is	1. Not serious 2. Not sure 3. Serious	
VP2	Now I am going to ask you about the sources of vitamin A related information	Yes……...…1	➔ VA6

	in your community. Have you ever heard about Vitamin A supplementation?	No…….2 Can't say for sure…….…… 98	
VP3	If yes, where have you heard about Vitamin A (select all that apply)	VHW Health Worker (Nurse, doctor, nutrition assistant, EHT) Radio Television Internet Newspapers Pamplets/posters Social media Friends/neighbour/relatives Other (specify)	
VP3	Do you think it is important for your child to get Vitamin A regularly	Yes……1 No……..2 Cant say for sure……98	
VP4	If Vitamin A supplementation was recommended for your child, do you think you will get your child supplemented?	Yes……1 NO……..2 Child already received Vitamin A…….3 Can't say for sur……98	
VP5	What is the approximate distance of the nearest clinic/health facility from your house?	1=Less than 5km 2=From 5km to 9km 3=More than 10km	

		98 =Don't know	
VP6	Sometimes children who are eligible for vitamin A do not get the services for various reasons. In your opinion, what are some of the key reasons why this is happening?		

Section 6d: Vitamin A supplementation

No.	Questions and Filters	Coding Categories	Skips

VA1	Has (NAME) received any Vitamin A capsule like this in the last 6 months? ***SHOW PICTURE OF CAPSULES***	Yes.....1 No.....2 Don't know.....9	END
VA2	Where did (NAME) receive his/her last Vitamin A capsule	Local health facility (static site……1 Local health facility (epi outreach) …….. 2 Local VHW (door-to-door) …… 3 Local VHW (village assembly)…….. ……4 Other (specify)_____	
VA3	May I see (NAME's) immunization card or child health record card? **RECORD FROM (NAME'S) CARD NUMBER OF VITAMIN A DOSES AND DATE OF LAST DOSE RECEIVED**	NUMBER OF DOSES **LAST DOSE WAS RECEIVED:** IN THE LAST 6 MONTHS.....1 BETWEEN 6 AND 12 MONTHS AGO.....2 CARD NOT AVAILABLE.....3 DATE NOT RECORDED.....4	

Appendix 2 : Informed Consent English

Informed Consent Form for the Vitamin A supplementation study among children aged 6-59 months in Murehwa district

Principle Investigator: Annastancia Chineka

Name of Organization: Africa University

Name of Project: Factors associated with low vitamin A coverage in children aged 6-59 months in Murehwa district, Mashonaland East, Zimbabwe

Introduction

I am Annastancia Chineka working for UNICEF Zimbabwe and pursuing my studies in the Master of Public Health degree with Africa University. I am doing a research on factors associated with low vitamin A coverage among children aged 6-59 months in Murehwa district. I am going to give you information regarding this study and invite you to be part of the study. Participation is voluntary and you have the right to decline participation at any time. If you understand the information I am going to share with you and feel that you want to be part of the study, I will ask you to sign at the end of the form to show that you understood the information and your participation is voluntary.

Purpose of the research

As a caregiver of a child below the age of five years, the health of your child is a priority. Children below the age of five years are still vulnerable to infections and as so they need many services from the health system to help them grow healthy and strong. Vitamin A supplementation is one of those services offered to young children to help them grow strong and healthy. Sometime times children do not get all these services from the health system and I want to understand from you as a caregiver why it happens like this without harming anyone in the process.

Type of Research Intervention

The research will involve me asking you a few questions for about 20 minutes. The questions will involve some general information on your household, you as the caregiver and some information about your child aged 6-59 months. . Some of the

questions involve personal and confidential information and for the child, I will need to get information from the child health card. Feel free to stop me at any moment if you feel uncomfortable with the questions.

Benefits

There is no financial benefit for you participating in the study but the information we get may be used by policy makers to ensure better health outcomes for the community.

Confidentiality

All the information you provide will be kept very confidential and nothing in the study report will be traceable to you. No one who is not part of the study will access this information. The report will not include your name.

Sharing the Results

The results of the study will be shared with the Ministry of Health and Child Care, UNICEF and the Africa University faculty, but nothing in the report will be attributable to you.

Right to Refuse or Withdraw

As mentioned earlier, you have the right to refuse or withdraw from the study at any time. You will not be penalized for that.

Who to Contact

If ever you think or find something you may want to discuss or share after the interview, feel free to contact me or your local health facility staff. You may ask me any questions if you want.

Part II: Certificate of Consent

Having been invited to take part in the study, I have read the above information and understood it. I was given a chance to ask questions where I did not understand and the questions were answered to my satisfaction. I therefore, voluntarily consent to take part in the study.

Name of Participant_____

Signature of Participant _____

Date _____

Day/month/year

Statement by the researcher/person taking consent

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this ICF has been provided to the participant.

Print Name of Researcher/person taking the consent_____

Signature of Researcher /person taking the consent_____

Date _____

Day/month/year