DETERMINANTS OF VITAMIN A SUPPLEMENTATION COVERAGE AMONG CHILDREN AGED 6-60 MONTHS IN GANZE SUB COUNTY, KILIFI COUNTY, KENYA

BY

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PUBLIC HEALTH (MANAGEMENT OF HEALTH SYSTEMS)

SCHOOL OF PUBLIC HEALTH AND COMMUNITY DEVELOPMENT

MASENO UNIVERSITY

DECLARATION

I, Jardine Wughanga, declare that this thesis is my original work and has not been presented in any other university.

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EL/ESM/00680/2014

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We confirm that the work reported in this thesis was carried out by the candidate under our supervision.

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ACKNOWLEDGEMENT

I acknowledge the support offered by Maseno University School of Public Health and Community Development. I especially thank my supervisors Dr Doreen Othero of Maseno University School of Public Health and Community Development and Dr Martha Mwangome of KEMRI-Welcome Trust, Kilifi, for their guidance, mentorship and support that was crucial while working on this thesis.

I am grateful to my family for the support and encouragement they have given me. I specifically thank my spouse George Gacharamu for his support in planning and execution of data collection.

I would also like to acknowledge the Kilifi County Department of Health and more specifically the Ganze Sub County Health Management Team under the leadership of Md Esther Nzilani and Mr. Erasto Mwanganyi for their support and collaboration during the study. I am grateful to Mr. Alexon Mwasi formerly of Word Vision Kilifi for his support .I recognize both the national, local administration and the community for their reception. I am thankful to my research team for their commitment to have this success.

Ultimately, I thank the Almighty God for seeing me through this entire process.

DEDICATION

To my supportive husband, George,

My lovely children Marcus and Wesley,

And ultimately to the Almighty God.

ABSTRACT

Vitamin A deficiency is among the leading and preventable causes of childhood morbidity and mortality that may be attributable to low coverage of Vitamin A Supplementation among children 6-60 months. In Kenya, Vitamin A Deficiency is among the three most common forms of micronutrient deficiency. Vitamin A Supplementation coverage of >80% is recommended by WHO to address this problem. However, the coverage remains low in Kenya (71%). Kilifi County has one of the lowest coverage at 47.4%, with Ganze Sub-County having coverage of 31.3%. Despite the low coverage in Kilifi County and Ganze Sub-County, there exists limited information on its determinants .Most studies on VAS coverage in Kenya have been health facility-based which may not necessarily be representative of the general community. Community based studies are therefore needed to triangulate findings and fully understand VAS determinants within the population. This was therefore a community-based study whose overall objective was to investigate the determinants of Vitamin A Supplementation coverage among children aged 6- 60 months in Ganze Sub- County, Kilifi County, Kenya. The specific objectives were to determine the caregivers' demographic and socio-economic factors; to assess the caregivers' knowledge, attitude, and practices factors; to explore the caregivers' cultural factors and to examine health system-related factors associated with Vitamin A Supplementation coverage among children aged 6-60 months in Ganze sub-county. A cross-sectional study design was used adopting both quantitative and qualitative techniques. For the quantitative survey, a semi-structured questionnaire was administered to 435 randomly sampled caregivers of children aged 6-60 months. The qualitative survey was implemented through key informant interviews (KII) with health workers and policy makers. Quantitative data was analyzed using SPSS version 24 to descriptively generate frequencies and percentages mainly for categorical variables. Chi-square and univariate analyses were done to determine the association between the independent and dependent variables. Variables that were found significant (p-value= <0.05) at this level of analysis were subjected to multivariable logistic regression analysis to identify the main determinants of VAS coverage. The mean age of caregivers was 29.4 (SD=6.8) years while that of the children was 29.7 (SD=15.1) months. Of the children, 228 (52.4%) were female and 207 (47.6%) male. The age-appropriate full VAS coverage was 49.0% and coverage was higher in children 6-11months (50; 89.3%) than in those aged 12-60months 163 (43.0%). Socioeconomic and demographic factors strongly associated with VAS coverage included the age of caregiver (AOR=0.29, 95% CI (0.09, 0.96), P-value=0.042); area of residence (AOR=2.08, 95% CI (1.04, 4.18), P-value=0.039) ; age of the child (AOR=0.08, 95% CI (0.03, 0.20), P-value<0.001) and the number of 6-60 months children in the household (AOR=2.11, 95% CI (1.24, 3.59), P value=0.006). From the KIIs, caregivers' lack of in-depth knowledge on importance of VAS and illiteracy were factors contributing to low coverage. On cultural factors, disapproval of father as the household head was a key determinant of VAS coverage. On health system factors, door to door supplementation by Community Health Volunteers (CHVs) was the most effective approach for VAS delivery. In addition health workers' friendly approach to the caregiver during VAS delivery (AOR=0.25, 95% CI (0.08, 0.74), P value=0.012 was also significantly associated with VAS. The study therefore recommends the need to increase VAS coverage through implementation of strategies targeting both rural and urban areas, caregivers of all age groups and children above 12 months, involvement of male household heads and knowledge enhancement on VAS for caregivers. There is also need to scale-up and sustain effective approaches and strategies for VAS delivery such as the door-to-door supplementation by CHVs.

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LIST OF ABBREVIATIONS

AOR	Adjusted Odds Ratio
CI	Confidence interval
CHV	Community Health Volunteers
CHEWS	Community Health Extension Workers
CHMT	County Health Management Team
DALYs	Disability Adjusted Years
DOH	Department of Health
DHIS	District Health Information System
ECDE	Early Childhood Development Education
IEC	Information Education and Communication
IU	International Unit
IPC	Infection Prevention and Control
KCDH	Kilifi County Department of Health
KDHS	Kenya Demographic Health Survey
KEMSA	Kenya Medical Supplies Agency
KHIS	Kenya Health Information System
KNBS	Kenya National Bureau of Statistics
LMICs	Low- and Middle-Income Countries
MAD	Marginal Vitamin A Deficiency
MCH	Mother Child Health
MOH	Ministry of Health
SBCC	Social Behavior Change and Communication
SCHMT	Sub County Health Management Team
SMART	Standardized Monitoring and Assessment of Relief and Transitions
SPSS	Statistical Package for Social Sciences
SSA	Sub-Saharan Africa
UNICEF	United Nation Children's Fund
VAC	Vitamin A Capsules
VAD	Vitamin A deficiency
VAS	Vitamin A Supplementation
WHO	World Health Organization
OR	Odds Ratio
SD	Standard Deviation

DEFINITION OF TERMS AND OPERATIONAL DEFINITIONS

Vitamin A supplementation: Vitamin A Supplementation is recommended in infants and children 6-59months of age to prevent Vitamin A Deficiency. Vitamin A supplementation is given every 6 months. It is recommended a child 6-11 months receives at least 1 dose of 100,000 International Units (IUs) while that of age 12-59months receives at least two doses of 200,000 IUs in the last 12 months. Repeat Vitamin A Supplementation dose is recommended if a child has not been supplemented within 4-6 months.

Vitamin A Supplementation (VAS) Coverage: Our outcome variable VAS coverage was defined as the receipt of full age-appropriate recommended VAS in the last 12 months prior to the study. A child aged 6-60 months having received the age appropriate two doses of Vitamin A in the last 12 months, children 6-11months full coverage was 1 dose of 100,000IUs while children 12-59 months full coverage is two doses of 200,000IUs.

Malezi bora campaign – This is an initiative by the Ministry of Health in partnership with UNICEF and other stakeholders to scale up mother and child health and nutrition intervention. The campaign is conducted every twice a year either May or June and October or November. The campaign focuses on maternal child health and nutrition interventions among them Vitamin A Supplementation among children aged 6 months to 5 years.

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CHAPTER ONE
INTRODUCTION

1.1 Background Information

Vitamin A is a fat-soluble vitamin found as preformed Vitamin A (retinol) in animal products and as a pro-vitamin A carotenoid in fruits and vegetables. It is required in small amounts in the body for cell growth and maintenance of cell functions. It is also necessary for the functioning of the visual system, red blood cells production, maintenance of the integrity of the epithelial cells, reproduction and the body immune system WHO (2009). It is also vital for a child's well-being and survival (UNICEF, 2016a).

In the event of low or inadequate intake and absorption of this vitamin in children aged 6-59 months, Vitamin A Deficiency (VAD) results. Severe VAD leads to visual impairment, and xerophthalmia resulting in night blindness, corneal ulcer (Black, 2014), and high incidence of infectious disease and diarrhea(WHO, 2009). VAD has also been shown to increase vulnerability to measles, diarrhea, and respiratory infections (RiCE et al., 2004), which are among the leading mortality causes among children in most Low-and Middle-Income Countries (LMICs) (Black et al., 2008). Reduced Vitamin A concentration in children with measles is linked to increased risk of blindness making its control a high priority within the World Health Organization (WHO) vision 2020, the right to sight program (UNICEF, 2016b; WHO, 2011)

It is a known global problem, with a third of the world's young children having it (UNICEF, 2016a). Most of the affected children are from LMICs, especially the resource-limited settings. VAD affects nearly a third of young children worldwide (around 190 million pre-school children), with the most affected being from Africa and Asia (UNICEF, 2016b; WHO, 2011). The prevalence of VAD was highest in Sub-Sahara Africa (SSA) (48%) in 2013,with the region having reported a high VAD burden for more than 20 years (Stevens et al., 2015).

According to the 2011 Kenya National Micronutrient Survey, VAD is among the three most common forms of micro-nutrient deficiency in the country, alongside Iron and Iodine deficiency. VAD in Kenya is highest among pre-school children (6-59 months) (9.2%) than in school-aged children. (*The Kenya National Micronutrient Survey* 2011).

Vitamin A Supplementation (VAS) has been promoted as one of the vital interventions for VAD achievable on a large scale, with a huge potential to prevent and reduce child mortality. It is also

cost-effective in improving the survival of children (WHO, 2011). World Health Organization recommends VAS for children aged 6-59 months to curb the VAD menace, with a dosage of after every 4-6 months being recommended in high VAD prevalence regions (WHO, 2011). These guidelines were based on evidence showing a reduction in mortality of greater than 20% and a decrease of related common infections in children in places where the VAS coverage was 80% and above (Imdad et al., 2010).

To increase VAS coverage, many countries in Africa have integrated its delivery with the routine immunization schedule and services (WHO, 2011). Other countries have developed other innovative strategies, including integrating VAS delivery to special programs and health days and campaigns, especially the polio immunization campaign (Chehab et al., 2016). Such strategies have been cost-effective (Fiedler & Semakula, 2014; Vijayaraghavan et al., 2012). With the polio endgame strategy coming to an end (WHO, 2010), the number of polio campaigns will reduce, posing a significant risk to VAS coverage and data reporting in many countries making use of it (Chehab et al., 2016). With the reduction and phase-out of polio campaigns, there is an urgent need for transition strategies to ensure the continued provision of VAS to children, especially in areas where health access is poor (UNICEF, February 2016).

The Kenyan protocol for preventive VAS stipulates the schedule and dosage for children 6-11 months orally as a single dose of 100,000 International Units (IU) Vitamin A Capsule (VAC) at first contact with a health care provider. Children 12-59 months are required to be given a single dose of 200,000 IU VACs every six months during maternal child health clinics at health facilities and any other community contacts with a health care provider (MOH, 2017). The worldwide coverage of twice-yearly recommended VAS was approximately 70% in 2014 (UNICEF, 2016b). In Africa, two-dose coverage of VAS was approximately 73% on average in 2014, with the coverage ranging from 83% in the Western and Central regions and 62% in the Eastern regions (UNICEF, 2016b). The Kenya Food and Nutrition Security Policy and National Nutrition Action plan identifies VAS as a critical strategy in reducing the prevalence of micronutrient deficiency in the Country (*Kenya Nutrition Action Plan 2012-2017*, 2012-2017). However, the VAS coverage in the Country is still below the 80% WHO recommendation for increased child survival. In Kenya, the 2014 Kenya Demographic Health Survey (KDHS)

indicated that the national VAS coverage among children 6-59 months was 71.1% (KNBS/ ICF Macro, 2014).

In 2014, VAS coverage among children 6- 59 months in Kilifi County was 49.9%, way below the national coverage and the WHO recommendation. This qualified Kilifi to be among the top three counties in Kenya with the lowest VAS coverage (49.9%), after Kajiado County (47.8%) and Mandera County (19.5%). Of the three counties with the lowest VAS coverage, Kilifi County had the highest proportion of children less than five years with chronic malnutrition /stunting of 39.1%. Additionally , Kilifi County had the lowest coverage among the surrounding counties in the coastal region with Kwale County at 86.6%, Tana River at 67.6%,Lamu at 77.2%, Mombasa at 81.7% and Taita Taveta at 78.9% (KNBS/ ICF Macro, 2014).

In 2016, VAS coverage among children 12-59 months in Kilifi County was 47.4%. It was recommended that to improve coverage, there is a need for the Government and stakeholders to enhance other strategies. It was also noted that the VAS coverage differs across the livelihood zones and administrative boundaries in Kilifi County. In Kilifi North, South, Malindi and Rabai Sub-counties, VAS coverage among children 12-59 months was 61.1%. In Magarini, Kaloleni and Ganze Sub-counties, twice VAS among children 12-59 months was 31.3%. (KCDH/MoH, 2016). Ganze is one of the Sub-Counties in Kilifi County with the lowest VAS coverage and coupled with the highest prevalence of chronic malnutrition among children under five year (46%) (KCDH/MoH, 2016). Despite VAS coverage being below the WHO recommendation of 80%, there exists limited information about the determinants of VAS coverage and uptake in Kenya.

According to other studies various caregivers' factors are associated with VAS coverage, among them socio-economic and demographic, knowledge attitude and practice ,cultural and health system factors . For example studies in Pakistan and Brazil found increase in VAS coverage among rural children compared to their counterparts. The same study in Pakistan also found that found that maternal age greater than 24 years was positively associated with VAS. (F. Changezi & L. Lindberg, 2017; Lima et al., 2018). A study in Ethiopia also looked out geographical variations and associated factors in VAS coverage (Gilano et al., 2021) .

In addition, high maternal education was previously associated with increased likelihood of the child having received VAS (Berde et al., 2019; Choi et al., 2005; Grover et al., 2008; Marjan et

al., 2021; Semba et al., 2010). Another study in Ethiopia found family monthly income to be significantly associated with VAS coverage (Berihun et al., 2023). A multilevel analysis study in Ethiopia found higher age of the child and mother , full antenatal care, and improved wealth status to positively influence VAS (Amare et al., 2023).

Another study in 13 SSA countries which found out that strategies e.g. door to door supplementation and outreaches resulted in higher coverage than fixed site approaches(Janmohamed et al., 2017). Previous studies e.g in Pakistan and Kenya found high coverage of VAS in children 6-11 months compared to those aged 12-59 months. (Clohossey et al., 2014; Lima et al., 2018; Mostafa et al., 2019)..

Studies in low and middle income countries point on cultural factors as determinants of VAS and health service uptake. A study in Sokoto Nigeria also found disapproval of VAS by fathers to be a common barrier to VAS uptake (Adamu & Muhammad, 2016). Another study in Mali recommended VAS campaigns to also target fathers as key decision in VAS uptake (Ayoya et al., 2007)

According to a study at Mbagathi District Hospital, VAS coverage was 52%, and lack of awareness of VAS schedule and the end of the clinic visits were cited to be the main reasons affecting VAS utilization(Kamau et al., 2012).

With cultural practices in the country and socio-economic status being diverse, it is essential to follow up on this issue to provide evidence to inform practices. In addition, while VAS coverage among children 6-60 months in Kilifi County and Ganze Sub County continues to be low, to the best of our knowledge, the determinants of VAS coverage in the Sub County and Kilifi County, in general, have not been researched on.

Improving Vitamin, A Supplementation coverage calls for understanding of its determinants. Most of the studies done in Kenya on VAS coverage have been health facility-based, with a large and critical segment of the population (community) left out. This is therefore a community-based study.The study offers new insights into the reasons behind the low VAS coverage, which are likely to be context specific. The study findings also go a long way in providing policy recommendations to improve VAS coverage and uptake.

1.2 Statement of the Problem

Globally, coverage of VAS coverage remains below the recommended 80%, with Asia and Sub-Saharan Africa disproportionately affected. In the 82 prioritized countries, two-dose VAS coverage is 64%. West and Central Africa have the lowest coverage of 54%, followed by 64% in South Asia, 68% in Eastern and Southern Africa(UNICEF, 2018). In Kenya, VAS coverage remains below the 80% target while there are no documented reports of its stock out. According to the Kenya Demographic Health Survey (KDHS) of 2014, VAS coverage among children 6-60 months in Kilifi County was low at 49.9% against the national coverage of 71.7% (KNBS/ ICF Macro, 2014). In 2016, twice VAS coverage among children 12-59 months in Kilifi County was still consistently low at 47.4%, while the once VAS coverage for children aged 6- 59 months was 71.5% (KCDH/MoH, 2016).

Low or inadequate intake of Vitamin A in children aged 6-60 months results in VAD. VAD is among the three most common forms of micronutrient deficiency in Kenya, affecting 9.2% of preschool children and 52.6% of them having marginal VAD (2011). Severe VAD cases lead to visual impairment, xeropthalmia leading to night blindness and corneal ulcers (Black, 2014) and a high incidence of infectious diseases and diarrhea. VAD contributes to morbidity and mortality in children under five years' children. In order to prevent VAD and its related mortality and morbidity, over 80% VAS coverage and uptake is recommended every 4-6 months (Imdad et al., 2010).

Despite VAS coverage and uptake being low in Kilifi County and Ganze Sub-County, there exists limited information on the determinants of VAS coverage and uptake among children 6-23 months. A study done at Mbagathi District Hospital attempted to look at these issues even though the study did not exhaustively address the issue(Kamau et al., 2012)-. The study assessed the factors affecting practices and utilization of services among mothers with children under five years. It concluded that lack of awareness among both mothers and health workers was the main factor affecting utilization of VAS (Kamau et al., 2012). This was a hospital-based study, leaving out a segment of the population at community and household levels. The study focused more on utilization, practices, and awareness of VAS. However, it did not go deeper on how other factors, for example, cultural, socio-economic, health system-related factors, affect not just VAS awareness but also its uptake.

Besides, limited literature exists regarding the effect of caregivers' knowledge, attitude and practices, health system, cultural and socio-economic issues on VAS coverage. Previous studies were facility based hence there is need for a community-based study to understand determinants of VAS coverage in the context of household and community

1.3 Objectives

1.3.1 General objective

To investigate the determinants of Vitamin A Supplementation coverage among children aged 6-60 months in Ganze Sub- County, Kilifi County, Kenya.

1.3.2 Specific objectives

i) To determine the caregivers' demographic and socio-economic factors associated with VAS coverage in children aged 6-60 months in Ganze Sub- County.

ii) To assess the caregivers' knowledge, attitudes and practices factors associated with VAS coverage among children aged 6-60 months in Ganze sub-county.

iii) To explore the caregivers' cultural factors associated with Vitamin A supplementation coverage in children aged 6-60 months in Ganze sub-county.

iv) To examine health system-related factors associated with Vitamin A Supplementation coverage among children aged 6-60 months in Ganze sub-county.

1.4 Research questions

i) What are the main demographic and socio-economic factors of caregivers that determine VAS coverage among children aged 6-60 months in Ganze Sub-County?

ii) How do the caregivers' knowledge and attitudes influence VAS among children aged 6-60 months in Ganze Sub-County?

iii) What are the cultural factors of caregivers that determine VAS coverage among children aged 6-60 months in Ganze Sub-County?

iv) What Health System factors influence VAS coverage among children 6-60 months in Ganze Sub- County?

1.5 Significance of the study

Vitamin A supplementation is a key and cost-effective intervention which can be achieved on a large scale and with the great potential of reducing child mortality associated with VAD (Jones et al., 2003). However, VAS coverage in Kenya has been shown to remain low. Kilifi County has one of the lowest VAS coverage in the Country, with Ganze Sub-county having the lowest coverage in the County (KCDH/MoH, 2016; KNBS/ ICF Macro, 2014).

Improving Vitamin, A Supplementation coverage calls for understanding of its determinants. Most of the studies done in Kenya on VAS coverage have been health facility-based, with a large and critical segment of the population (community) left out (Kamau et al., 2012) This is therefore a community-based study.

While most local studies had tried to assess factors associated with low VAS coverage, the explanation of how and why those factors contribute to low coverage have rarely been explored, while the reasons for low coverage for VAS have been given less attention hence the uniqueness of this study. To ensure the in-depth gathering of information on the issues under study, a mixed-method approach involving qualitative and quantitative study designs was used to allow for in-depth data gathering and explain some of the findings.

The study offers new insights into the reasons behind the low VAS coverage, which are likely to be context specific. The study findings also go a long way in providing policy recommendations to improve VAS coverage and uptake. The findings will inform planning and increased uptake and coverage intervention by the County Government Department of Health Services in Kilifi, Ministry of Health at large.

CHAPTER TWO

LITERATURE REVIEW

2.1 Caregivers' demographic and socio-economic factors associated with Vitamin A Supplementation coverage among children 6-60months

The age and gender of the child have been significantly associated with VAS coverage, as was the case in Brazil, where children aged between 6-11.9 months had a greater VAS coverage compared to those aged 12 months and above (Lima et al., 2018). In Ghana, female children had high VAS coverage than male (Hadzi et al., 2016).

The area of residence is also a significant determinant of VAS coverage, as was the case in Brazil, where high VAS coverage was found among those living in the household with four or fewer rooms and living in rural areas (Lima et al., 2018). Residing in a rural area was also associated with high VAS coverage in Pakistan. VAS coverage was also significantly associated with the region (F Changezi & L Lindberg, 2017). A study in Ethiopia also looked out geographical variations and associated factors in VAS coverage (Gilano et al., 2021) .

In addition , evidence from demographic health surveys in Ethiopia extensive socio-economic and geographic-based disparities in VAS coverage where children from educated mothers , those living richer/richest households, residing in urban areas were more likely to receive VAS (Zegeye et al., 2022).

The higher age of the mother was associated with high VAS coverage; as was the case in Pakistan, the child's mother being above 24 years was positively associated with high VAS coverage (F Changezi & L Lindberg, 2017). In the study by Hadzi et al., in Ghana, caregivers level of knowledge on VAS, age of the caregiver, parents' occupation, mothers level of education and knowledge on Vitamin A were associated with uptake of VAS (Hadzi et al., 2016). A study in Ethiopia showed that low literacy among mothers was associated with low coverage of VAS as most of the illiterate mothers did not remember to take their older children for the regular VAS dose (Gatobu et al., 2017). Another study in Ethiopia found family monthly income to be significantly associated with VAS coverage (Berihun et al., 2023) .Similarly, a study in Tanzania found maternal education and socio-economic status to be positively associated with VAS coverage while mothers knowledge on child ill-health signs were negatively associated with the child's VAS coverage (Masanja et al., 2006).

Agarwal and Agarwal showed that children of educated mothers in India and those from rural areas were more likely to receive vitamin A supplementation. Children of higher birth order (6+) and those residing in states with low social and economic development levels were only about half as likely to receive VAS as their counterparts of lower birth order and from high socio-economic class (Agrawal & Agrawal, 2013).

Semba et al. (2010) found that maternal education was vital in determining the receipt of VAS in Bangladesh. Young maternal age was found to be associated with low VAS coverage. Also, children of households of higher socioeconomic status were more likely to have received a Vitamin A capsule. In Nigeria, a study using Demographic Health Survey (DHS) data found maternal occupation to be associated with VAS coverage among the children. The geographic locations of the family and neighborhood socio-economic status were also associated with VAS coverage (Aremu et al., 2010). In another study in Nigeria, parents with low education, both mother and fathers, mother being a housewife or manual workers and the child being of the female gender were associated with low VAS uptake (Adamu & Muhammad, 2016). Another study carried out in Nigeria showed that mothers working status, educational level, ANC visits, place of delivery and the family's wealth index were associated with VAS coverage. Those whose mothers had high education attended ANC visits and delivered in the hospital were more likely to have received VAS (Dahiru et al., 2018). A multilevel analysis study in Ethiopia found higher age of the child and mother , full antenatal care, and improved wealth status to positively influence VAS (Amare et al., 2023).

In a post-*Malez*i *bora* survey carried out in Kenya covering all counties except arid and semi-arid regions, the child's age was found to predict VAS coverage. Children aged 6-11 months were more likely to had received VAS than those aged 12-59 months(Clohossey et al., 2014). In another study in Kenya at Mbagathi Hospital, VAS utilization was reported to increase with the high education level of the mother and high employment level. Mothers with post-primary education level were more likely to be aware of the VAS schedule when compared to those with a primary level of education and below (Kamau et al., 2012). According to Gitau (2018), the first dose of VAS coverage in Kwale County, Kenya, was significantly associated with by gender of the child, religion of the respondents, place of last delivery and delivery assistant. The second

dose of VAS had a significant association with the caregiver's age, place of last delivery and type of facilitator during delivery (Gitau, 2018).

From the literature review, socio-demographic factors influencing VAS coverage vary from one country to another, with the same trend seen with the direction of effect. There was also limited studies that have assessed these factors in Kenya. Of the three studies found in Kenya, one was facility-based(Kamau et al., 2012), another one was as Malezi bora post-VAS delivery program evaluation(Clohossey et al., 2014). Only the Kwale study was a community-based study(Gitau, 2018). Data on the factors associated with VAS coverage in Kenya is also scarce. It is also evident from the review that most of the studies were facility-based, while a small number evaluated intervention programs. Hence there is a scarcity of community-based studies which can provide a good picture of VAS coverage in the total population and factors associated with its coverage at household level.

2.2 Caregivers' Knowledge , Attitude and Practice factors associated with VAS coverage among children 6-60 months

In Kenya, a study evaluating knowledge, attitude and practices on VAS found that mothers and caregivers had a negative attitude towards VAS, with some of the reasons for the negative attitude being the perception that VAS was a contraceptive given to their child to make them sterile in future. Low knowledge level was also noted on VAS dosage, with only 33.3% of the mothers having taken their child for the recommended two-yearly dose(Murage et al., 2015).

A Knowledge , Attitude , Beliefs and Practise (KABP) survey on Maternal Infant and Young Child Nutrition (MIYCN) conducted in Kilifi , in 2017 reported that caregivers knowledge and attitude factors play a major role in influencing the caregivers MIYCN practices and hence also influencing VAS coverage (Kilifi County Government 2017) . Similar findings have previously been reported from a facility-based study in Nairobi where lack of information was found as a factor hampering VAS utilization (Kamau et al., 2012).

A study in Ghana highlighted most caregivers did not take their children to the health facility after their last vaccination hence, after the nine-month immunisation period, most mothers stopped taking their children to the facility for VAS or growth monitoring. They did not consider VAS to be a vaccine and did not understand its importance to their children, whom they considered growing well with no ill health. (Hadzi et al., 2016).

Several studies have linked higher maternal education with increased knowledge on VAS and consequently higher VAS coverage (Berde et al., 2019; Choi et al., 2005; Grover et al., 2008; Marjan et al., 2021; Semba et al., 2010). Information is key in enhancing high VAS coverage, it is an important predictor in the increased coverage .This was demonstrated in a population representative study covering most Sub-Saharan Africa Countries where those who had received information regarding door to door VAS campaign were 6.8 timely more likely to receive it while information increased uptake in those receiving it at fixed site outreach by 72.5 times more than those who did not have information regarding these services (Janmohamed et al., 2017). Another study in Humbo District, Southern Ethiopia also found out that better knowledge about the importance of VAS was positively associated with increased uptake (Kassa et al., 2020).Another study in southern Ethiopia found increasing maternal knowledge on VAS is key in improving coverage (Nigusse & Gebretsadik, 2021) .

From the review of literature, it is evident that there is limited information on caregivers' knowledge, attitude, and practices regarding VAS in Kenya. Data on the factors associated with VAS coverage in Kenya is also scarce. It is also evident from the review that most of the studies were facility-based, while a small number evaluated intervention programs. Hence there is a scarcity of community-based studies which can provide a good picture at community level on the knowledge attitude and practice factors associated with VAS.

2.3 Caregivers' cultural factors associated with VAS coverage among children 6-60 months

In a study carried out by Adamu & Muhammad in Nigeria, fathers' disapproval of VAS was cited as one of the main barriers to VAD uptake, as was reported by the mothers and health care providers. The society in which the study was carried out was patriarchal, with males making most of the decisions by virtue of them being the household heads according to the local cultural practices. Their disapproval for VAS was linked to the cultural belief that vaccines have harmful effects on children hence treated with a lot of suspicions(Adamu & Muhammad, 2016).Other studies have indicated male involvement as a key driver in uptake of health services at the household level(Kilifi County Government 2017).A study in Sokoto Nigeria also found disapproval of VAS by fathers to be a common barrier to VAS uptake (Adamu & Muhammad, 2016). Another study in Mali recommended VAS campaigns to also target fathers as key decision in VAS uptake (Ayoya et al., 2007).

Several studies have indicated the father /male involvement as a key determinant to the uptake of health services and more so specifically in developing countries. A study in Puntland, Somalia attributed low immunization coverage to lack of father involvement as the key family decision makers (Abdullahi et al., 2020). Another study in Ogun district Nigeria also supported these findings on how men in patriarchal societies of developing countries are often the key decision makers in the households including decisions on health related issues like immunization. (Sodeinde et al., 2020). Another study in Ethiopia found father's disapproval of VAS to be significantly associated with VAS coverage (Berihun et al., 2023).

From the review of literature, it is evident that there is limited information on caregivers' cultural factors associated with Vitamin A Supplementation in Kenya . It is also evident from the review that most of the studies were facility-based, while a small number evaluated intervention programs , leaving out the household-based population which could tease out the cultural factors associated with VAS. Hence there is a scarcity of community-based studies which can provide a good picture of VAS coverage .

2.4 Health system-related factors associated Vitamin A Supplementation coverage among children 6-60months

In Pakistan, high VAS coverage was associated with intense monitoring of the program and interpersonal counselling from female health workers. Coverage was high, with an increase of 35.7% in districts where intensive monitoring was carried out than in districts where intensive monitoring was not done (29.6%) (Janjua et al., 2018).

In a study in Sierra Leone, high VAS coverage was associated with adequate funding for the VAS distribution, sufficient distribution of VAS to reach far-flung areas, monthly macro-planning meetings for the program at the national level, high social community mobilization process and daily briefings in order to work on the challenges faced (Hodges et al., 2013).

In South Africa, it was found that there was no association between the child being fully immunized and VAS coverage. Among children who were fully immunized during the first 12 months of life, only 41.8% had received the required two doses of VAS, while those who were fully immunized at 18 months, only 30% had received the recommended three doses of VAS (Comley et al., 2015). A study covering data from 13 African countries found that door to door distribution of VAS was associated with higher coverage (91%) than when VAS was provided at

a fixed central location (63%). Providing information about the VAS campaign was found to be associated with high coverage in the door- to – door system and fixed site approach (Janmohamed et al., 2017).

According to Gatobu et al. (2017), record keeping challenges are one of the factors affecting VAS coverage when the door-to-door campaign method of delivery is used. Most of the time, no records are kept regarding the name of children who received the supplements, with only a tally of numbers and age groups taken, as was in Ethiopia. Record keeping challenges were also noted to affect facility routine provision of VAS as the records are mostly poorly kept. Heavy workload during such campaigns with little pay to the staff involved also affects coverage. The health workers walk for long distances and are expected to cover many households; hence most end up not meeting the targets (Gatobu et al., 2017).The facility-based study in Kenya showed that a long waiting period at the clinic, unfriendly staff and lack of transport to the health facilities negatively affect VAS Coverage. Failure to screen children for VAS status whenever they visited health facilities and improper recording were the other factors that affected VAS coverage (Kamau et al., 2012).

In the post-*Malezi* bora survey in Kenya, access to health information and the type of facility where the mother sought services significantly affected VAS coverage. For caregivers who regularly sought health services in a district hospital, the odds of their children receiving VAS were higher than the odds of those who sought health services in other institutions. After controlling for child's age and place where caregivers sought health services, those caregivers getting health information from their community leaders had an estimated 1.5 times the odds of their children receiving VAS compared with those who got health information from other sources (Clohossey et al., 2014). In Kwale County, a higher proportion of children receiving VAS at second dose was observed among children whose mothers had their last delivery in the health facility (41.6%) than those whose mothers had their last delivery at home (23.4%). A child born in a health facility was 2.34 times more likely to receive Vitamin A supplementation coverage at the second dose than those born at home. There was a significant association between VAS at the second dose and the facilitator at the delivery time. Children whose mothers were facilitated by health workers at the time of delivery were 3.44 times more likely to receive VAS at the second dose than children born by mothers who facilitated themselves (Gitau, 2018).

A study in rural parts of Kenya that found out that expanding child health campaigns e.g., *malezi bora* and integrated outreaches is key towards improving VAS coverage(Oiye et al., 2019). The restrictions for VAS to be delivered by trained health workers alone was highlighted previously to be a barrier to VAS uptake in Kenya (Murage et al., 2015).

Data on the factors associated with VAS coverage in Kenya is also scarce with most studies being facility based . This community-based study will integrate both caregivers' household factors in relation to the health system hence bringing out a clearer and more context specific association .Both the quantitative household interviews to the caregivers and key informant interviews to the health facility staff with provide a rich complementarity to explain findings .

2.5 Overview of Vitamin A Supplementation Coverage

The VAS coverage has been reported to vary from one region and country to another. In Brazil, the calculated coverage of VAS using the previous six months children records was 42.4%. The coverage was 91.9% for children 6 to 11.9 months and 38.6% for children 12- 59 months, hence reducing coverage as children grew older (Lima et al., 2018). In Pakistan, a study involving 10,906 children found the VAS coverage to be 68.5%. However, the figure was higher in one region than others, with a range of 8% to 79% (F Changezi & L Lindberg, 2017).

In the South Dayi District, Volta Region of Ghana, the coverage of VAS for children aged 6- 59 months who received at least one dose 12 months preceding the study was higher (64.3%). However, twice dose coverage was low (46.4%), with 17.9% having received one dose only. The coverage of at least one dose was high among female children (70.7%) compared to male (58.3%) counterparts. When stratified according to age, children aged 6-11 months had a high at least one dose coverage (90.7%) while those aged 24-59 months had low coverage (44.0%) (Hadzi et al., 2016).

In semi-urban areas of KwaZulu-Natal, South Africa, 923 children's cards were analyzed, out of which 653 contained information on Vitamin A. The coverage for the first dose at six months was highest (62.5%), while at five years, the coverage was lowest at 10.6%. Full dose coverage age one year was 40.9%, 29.1% at 18 months and 0.9% at five ye5ars. 3.7% of the children did not have any record of Vitamin A supplementation. The average number of doses received by each child was three, and a total of 2,289 vitamin A doses were given to the babies in the study, translating to coverage of 34.9% (Comley et al., 2015). In another study in South Africa,

conducted in Cape Town, a low VAS coverage of 34% was reported, with children from West Coast Winelands having coverage of 52% while Cape Metropole had coverage of 29%. However, high coverage of 79% for West Coast Winelands and 76% for Cape was found when the records were analyzed. The disparities might have been due to faulty and systematic errors in the facility data management (Hendricks et al., 2007). Similarly, low VAS coverage was reported in Nigeria, where at least one dose VAS coverage for one year was found 61.6%. In contrast, only 41.6% had received two doses for the one year as recommended (Adamu & Muhammad 2016). The same scenario of low VAS coverage was reported when Nigeria Demographic health survey data, consisting of 19,555 children, was used with VAS coverage being 19.8%, 38% in children aged 12- 23 months, 20.1% in male children and 19.1% in female children (Aremu et al., 2010).

The use of intervention programs was found to be effective in increasing VAS coverage. This was demonstrated in a study covering five African countries, including Chad, Cote d'Ivoire, Angola, Tanzania, and Togo, where there was an increase in VAS coverage to 80% and above in each of these countries after the VAS program was integrated into the 2013/2014 polio campaign (Chehab et al., 2016). Similarly, in the post-event coverage (PEC) survey in Sierra Leone, a high VAS coverage of 91.3% was reported in children aged 6-59 months, lower than that of 105.1% reported from the event tally sheets. According to age groups, coverage was high among children aged 6-11 months (98.5%) while 90.5% for those aged 12- 59 months. Of the caregivers interviewed, 91.6% reported that their children received the vas during the health week while 2.5% could not remember (Hodges et al., 2013).

An increase in coverage was also noted in Tanzania from 13% in the year 1999 to 76% in 2002 when VAS delivery in children aged 1- 2 years was shifted from the Expanded Program on Immunization (EPI+) approach to twice-yearly mass distribution campaigns (Masanja et al., 2006). In a related strategy in Zimbabwe, VAS coverage increased from less than 51% to 71% when outreach strategy was used where VAS was done at pre-scheduled outreach points once every month throughout the year in a rural district of Zimbabwe of a catchment of 35,905 children aged 6-59 months (Dube et al., 2014). Among intervention-based coverage studies, low coverage was reported in Kenya in a VAS Post-event Coverage study after the *Malezi* Bora campaign in Arid and Semi-Arid Lands in 2012. The coverage was 31.0% for children aged 6-59

months, being higher in those aged 6-11 months at 45.7% than those aged 12- 59 months, which was 28.8% (Clohossey et al., 2014). In a facility-based study in Kenya, VAS coverage of 52% was reported at Mbagathi hospital (Kamau et al., 2012), while in a study by Murage and Colleagues, the twice-yearly dose coverage was reported to be 33.3% in Kenya from a cross-sectional KAP study (Wefwafwa, 2015). First dose coverage of 45% and second dose coverage of 29.5% was reported from a cross-sectional study in Kwale County (Gitau, 2018).

2.6 Conceptual Framework

The conceptual framework for the study is a representation of the relationship expected to be seen between the study variables.The dependent variable for the study at was the VAS coverage. This was defined as the child having received the age-appropriate VAS 12 months before the study (2 doses for those above the age of 11 months and one dose for those aged 6-11 months) as per the WHO recommendations (WHO, 2011). Independent variables (exposure variables)in the study included were classified as socio-economic and demographic variables, Caregivers' knowledge, attitude and practice , cultural variables, and health system variables. Individual variables are indicated in the framework below in figure 2.1.

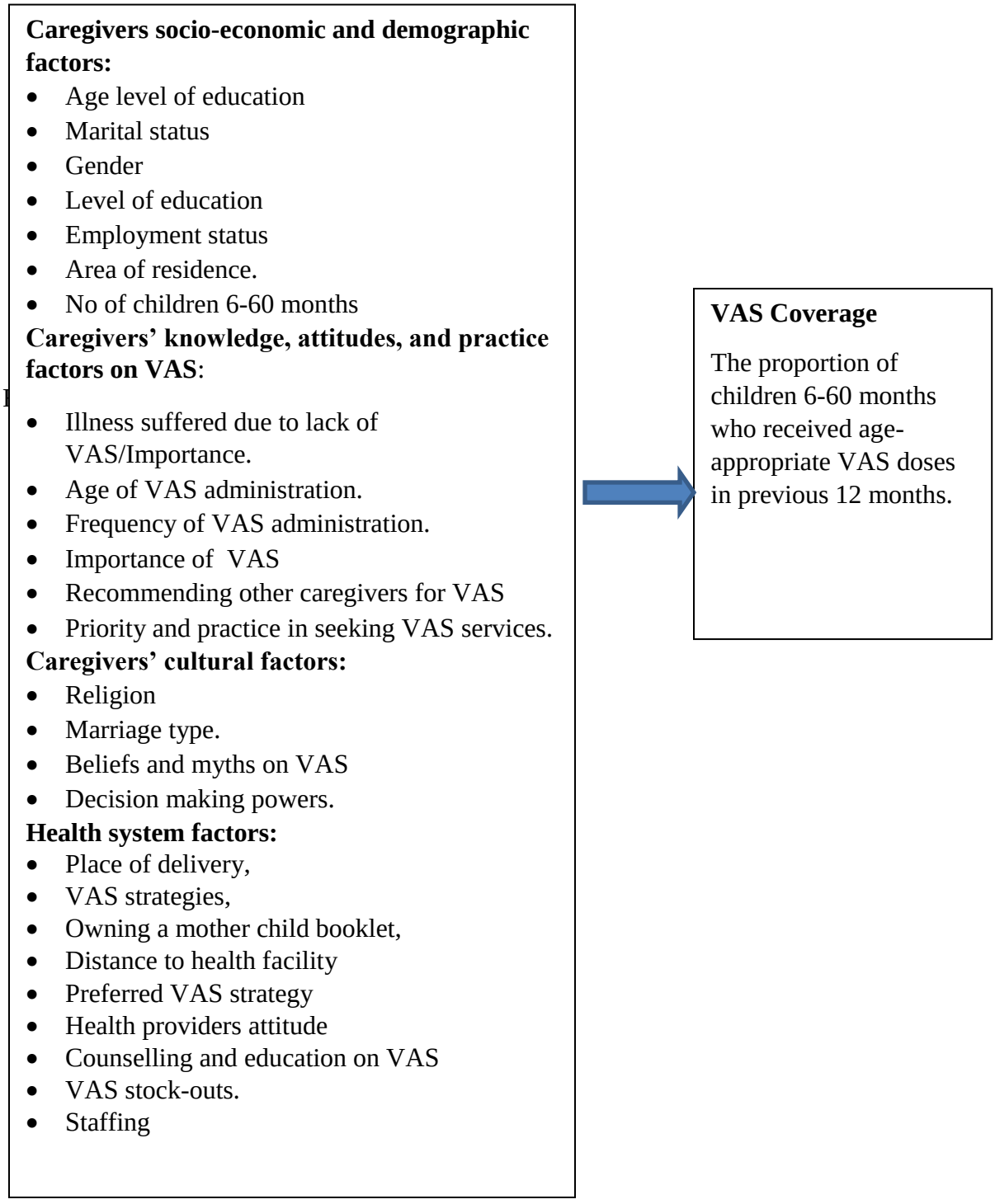


Figure 2.1: Conceptual Framework for Vitamin A Supplementation Coverage

CHAPTER THREE
METHODOLOGY

3.1 Study area

The study was carried out in Ganze Sub-County of Kilifi County, one of the 47 Counties in Kenya. Kilifi County is part of the former Coast Province of Kenya and is predominantly inhabited by the Mijikenda community. The county covers approximately 12,539.7 km squared and has an estimated population of 1,453,787, with 116 people per sq.km as per the 2019 Census report. Out of the total population, approximately 200,831 are children under years. The County is divided into four livelihood zones: food cropping, cash crop and dairy farming, marginal mixed farming, and livestock keeping/ranching. The County is further subdivided into 7 Sub-counties: Rabai, Kilifi North, Kilifi South, Malindi, Magarini, Ganze, and Kaloleni Sub-counties (KCDH/MoH, 2016).

Vitamin A Supplementation coverage differs across the livelihood zones and administrative boundaries in Kilifi County. In Kilifi North, South, Malindi and Rabai Sub-counties, VAS coverage among children 12-59 months was 61.1%. In Magarini, Kaloleni and Ganze Sub-counties, twice VAS among children 12-59 months was 31.3%. (KCDH/MoH, 2016). Ganze is one of the Sub-Counties in Kilifi County with the lowest VAS coverage and coupled with the highest prevalence of chronic malnutrition among children under five year (46%) (KCDH/MoH, 2016).Due to resource limitation, the study was conducted in one Sub-county, Ganze sub-county, which has the lowest twice VAS coverage of 31.1% among children 12-59 months (KCDH/MoH, 2016).

Ganze Sub County has 178,822 people, 86,986 male and 91,836 female, with 39,512 households and an average household size of 4.5 people. The under-five population in the sub-county is 24,248, and 23.2% of the population is composed of women of reproductive age (KNBS, 2019a, 2019b). The Sub- County has four administrative wards: Jaribuni, Sokoke, Ganze and Bamba wards. (Appendix I)

3.2 Study Design

A cross-sectional study design was employed. A cross-sectional study provides a snapshot of events at a particular point in time. The study used quantitative and qualitative study approaches, also referred to as the mixed-method study approach. (Johnson et al., 2007).

3.2.1 Study Participants and Study Population

The study participants were caregivers/ mothers and their child aged 6-60 months in Ganze Sub-County who consented for the study .

The study population were mothers/caregivers of children aged 6-60months in Ganze Sub County . The mother/caregiver and their child must have resided in the area for at least 12 months prior to the study .

3.3 Eligibility Criteria

To be eligible to participate in the study, the participant had to meet the following inclusion criteria.

3.3.1 Inclusion criteria

i. Caregivers with children aged 6-60 months or legal guardians of the child who were residents of the area 12 months before the study .
ii. Those who consented to participate in the study.

3.3.2 Exclusion criteria

i. Mothers/ caregivers with children aged 6-60months who were not residents of the study area.
ii. Mothers/caregivers with children aged 6-60 months who were not available at the time of the study.
iii. Those who were incapacitated with mental illness, chronically ill and not able to participate, or those who did not consent to participate were excluded.

3.4 Sampling

3.4.1 Sample Frame

The Sample frame was based on the households with children aged 6-60 months located in Ganze Sub County. The participants were defined as mothers/caregivers with children aged 6-60 months in Ganze Sub County. The mother /caregiver-index child of interest pair was the study focus at household level.

3.4.2 Sample size determination

For the quantitative phase, the sample size was calculated using the Yamane formula for calculating sample sizes (Yamane, 1973). This was because the approximate population of

women of reproductive age in Ganze Sub- County was known. A 95% confidence level and a standard error of 0.5 (variability) were assumed in the calculation.

Where n is the sample size, N is the population size, this was the total population of Women of Reproductive Age (WRA) in Ganze Sub- County, and e is the level of precision =±5%.

$$n = \frac{N}{1 + N(e)^2}$$

N= Total population of Women of child bearing age in Ganze sub-county = 43057(KHIS, 2022).
e =level of precision -±5%
When this formula was applied to the above sample:
n = $43057 \div 1 + 43057(0.05 * 0.05)$
n = 396.3
Add 10% for non-response.
n=396.3 + 396.3 X 10/100 =435.93
Hence sample size= 436 respondents.
For the qualitative component , the sample size was determined by thematic saturation, when no new information was forthcoming from the data collection process (Charmaz, 2006; Fusch & Ness, 2015). Hence, for this study, a sample size of 12 was used when the thematic saturation was reached, with the themes in the information being given being nearly like that of previous participants. Among the 12, 4 were members of the sub county health management team, 1 was a member of the county health management team, 1 was a CHV, 1 CHEW, 2 nutritionists, 1 nurse and 2 implementing partners.

3.4.3 Sampling Unit

The sampling unit was the 436 sampled mothers/caregivers of children 6-60 months.

3.4.4 Sampling Technique

Step 1: Identification of number of participants per ward -Probability proportional to size (PPS)

Ganze sub-County in Kilifi County was purposively selected as the study area due to the low VAS coverage. It has four administrative wards (Jaribuni, Sokoke, Ganze and Bamba wards).

Probability Proportional to size was used to determine the number of caregivers/children pairs sampled from each ward. This sampling approach ensured that the sample size was distributed according to cluster sizes (wards), with larger ones allocated more participants proportionate to their size (Skinner, 2014). The population of women of reproductive age was used as the auxiliary variable for the sample size calculation. The ward's population of WRA was used as sampling units.

The proportional sample per ward was determined by dividing the total number of WRA in the ward by WRA in the sub-county and then multiplying it with the total calculated sample size **(**Table 3.1).

Table 3.1: Sample size per ward

Ward	Population of WRA	Number of proportionately stratified samples per ward
Bamba Ward	11832	120
Ganze Ward	9801	99
Jaribuni Ward	7806	79
Sokoke Ward	13620	138
Total Ganze Sub County	**43057**	**436**

Source of population data: (KHIS, 2022)

Step 2: Identification of villages for household data collection.

In collaboration with the Ganze sub county community strategy, public health focal person and other sub county health management team members , we conducted simple random sampling was used to select three villages from each ward from which data was collected. The names of each village in the ward were written on pieces of paper, one village per piece of paper. The papers were then folded and put in a bowl. They were then thoroughly mixed, and three picked randomly. The villages on the picked pieces of paper were selected for the study. This process was repeated for all four wards.

Step 3: Identification of the number of study participants per sampled villages.

Since there was no available data on population of WRA per village, the total village population was used to calculate the village-specific sample size using probability proportional to size (PPS.) For each of the three villages selected per ward, the number of participants per village was determined by dividing the total village population by the total population of the three

villages in each ward and then multiplied by the proportionately allocated ward sample size in step 1. Table 2.

Table 3. 2:Sample size per village

Ward	3 Randomly sampled villages	Total population per village	No of caregivers to be interviewed in each village (PPS)
Bamba ward	Kari	590	61
	Godoma	360	38
	Ndugu Ni Jembe A	202	21
Sub-total Bamba ward		1152	**120**
Ganze Ward	Jila	819	43
	Fundumulo	627	33
	Petanguo Central	421	22
Sub-total Ganze ward		1867	**98**
Jaribuni ward	Mwapula	660	27
	Mbaoni	870	36
	Mtsangamali	384	16
Sub-total Jaribuni ward		1914	**79**
Sokoke	Kafuloni	274	22
	Vitengeni	796	65
	Madamani	628	51
Sub-total Sokoke ward		1698	**138**
Grand total			**435**

Step 4: Listing and Identification of households with eligible study participants

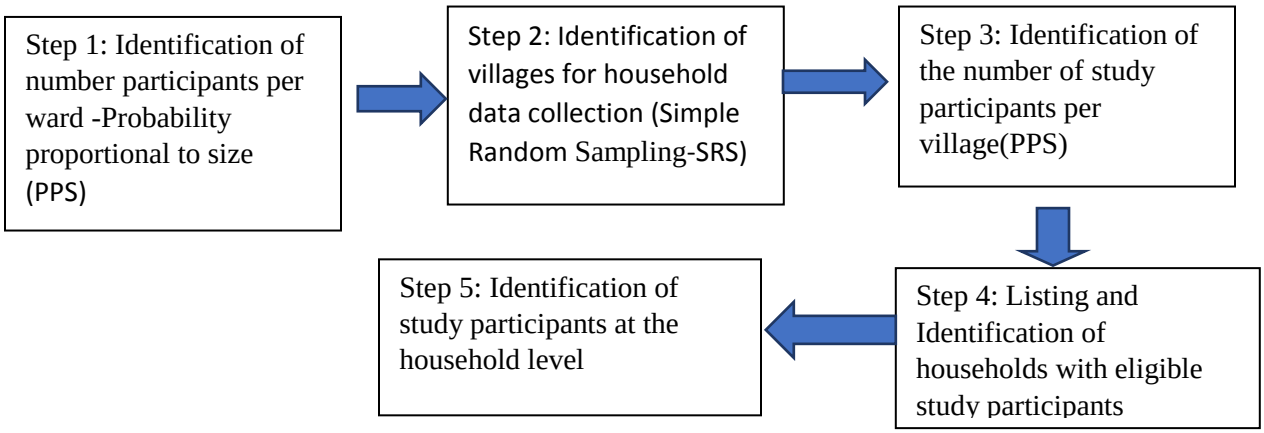
In each of the three randomly selected villages in every ward, CHVs and village elders for those villages were used to list all households with eligible mothers/caregivers of children 6-60 months. A household refers to a person or group of persons who reside in the same homestead or compound but not necessarily in the same dwelling unit, having a shared cooking arrangement and answerable to the same household head.

Each household with eligible participants was given a number. From the household list, simple random sampling was applied to identify the households for data collection in line with the number of the required sample size in that village. The random number generator function in MS Excel software was used to generate and select random numbers using the RAND function. The selected household numbers were included in the study.

Step 5: Identification of study participants at the household level

From the selected households for data collection, if a household has more than one eligible study participant (mother with a child 6-60 months), simple random sampling was used to select the primary participant by tossing a coin. In households where the selected mother has more than one aged child 6-60 months, a similar approach was also used to identify the index child of interest (Kumar, 2011).

Figure 3. 1 Sampling technique flow chart



3.5 Data Collection

3.5.1 Data collection tools

A hard copy semi-structured questionnaire was used for quantitative data collection from the sampled mothers or caregivers (Appendix V). Uptake of VAS was confirmed from the mother-child booklet or immunization card or based on mothers recall where documentation evidence was not available. Samples of the Vitamin A capsules of 100,000IUs and 200,000IUs were used to support the caregiver/ mother to identify via recall.

For the qualitative method, an open-ended key informant interview guide was used and administered to the sampled VAS stakeholders (Appendices VI,VIII and VIII).

3.5.2 Data Collection Procedures

A total of 10 enumerators and two KII interviewers were recruited and trained on the study objectives ,interviewing methods and research ethics for two days.

A data collection and movement plan was developed to cover all the sampled villages and the 436 caregivers. Quantitative data was collected from the sampled caregivers and mothers in the

households using the semi-structured questionnaire (Appendix V).All participants consented before being interviewed by the research assistants. Data collection took a total of eight days .
Qualitative data was collected from the sampled key informants and stakeholders implementing VAS using the KII interview guides ranging from health facility staff and CHEWs, County and Sub County Health Management Teams and partners . (Appendices VI,VIII and VIII).

3.5.3 Reliability and Validity

Treiandis (1971) observed that reliability is the extent to which the obtain information is free of measurement error, while validity refers to the degree of relevance of the instrument. Before actual data collection commenced, data collection instruments were pre-tested in 44 households in the one village (Bandari village) in Ganze not included in the final study to gain first-hand experience on administering the tools, assess the clarity and logic of the tools, and understand how data would be analysed as recommended by Sampson, (2004). This ensured reliability of the instruments. The validity of the tools ensures that the questions answer what they were intended to answer. Validity was ensured by sharing the tools with experts and academic supervisors to review and give insight and expert opinion on the tools. Content validity was assessed by checking the tool carefully, including what it tested against the assessed conceptual issues. Besides, most of the questions on the tool were derived from related studies in literature.

3.5.4 Pre-test

A pre-test study was carried out among 44caregiver/children's pairs (10% of sample size) in Bandari village, Bamba ward to test its validity and reliability before the final study was conducted. The data entered in EPI info to check for completeness and areas of improvement in data collection and management.

3.5.5 Quantitative Data Collection

Trained data collectors visited the sampled households and administered the semi structured questionnaire to the child's primary caregiver after explaining the study's details and getting their informed consent. The research team first explained the objectives and scope of the study and details as indicated in the information consent sheet , after which consent of caregiver was sought and confirmed by signature or thumbprint before administration of the questionnaire. VAS coverage was confirmed from the mother-child booklet or the mother's recall.

3.5.6 Qualitative Data Collection

For the qualitative method, key informant interviews using the KII guides were conducted in English by the researcher with the help of a trained research assistant. The interviews took place at the health facilities of the respondents, especially the nutritionists, health workers and CHEWs . For the other respondents, the interviews were conducted at their respective offices.

3.6 Data Analysis

The collected data was entered into EPI Info software for cleaning and management. The entries were double-checked for completeness and any missing data sought. The data was then coded, and a copy saved on a password protected online drive. The data was then imported into IBM Statistical Package for Social Sciences (SPSS) version 24 for data analysis.

3.6.1 Quantitative

In descriptive analysis, the mean (SD) or median (IQR) was used for continuous variables .Frequencies and percentages were used for categorical variables. 12-month age-appropriate VAS coverage was the binary outcome variable (yes/no). The chi-square test was used to determine a significant association between VAS coverage and each of these variables, with the test's degrees of freedom, chi-square values, and P values reported. In places where chi-square test assumptions were violated, the fisher's exact test P-values were used for binary exposure variables.

Univariate binary logistics regression was conducted for the variables significantly associated with VAS coverage on the chi-square test/fisher's exact test. The unadjusted odds ratio was used as a measure of effect, P-values of <0.05 were used to determine the association's significance. Those variables that were significantly associated with VAS coverage were then added to the multivariable logistic regression model where the adjusted odds ratios were determined and used as measures of effect, while Wald's p values were used to determine the significance of the effect. A p-value of < 0.05 was used as the cut off value for significance. Some variables in objectives one (caregivers' demographic and socio-economic factors associated with VAS coverage) and four (health system-related factors associated with VAS coverage) were statistically significant in chi-square and univariate analysis and hence added in multivariable logistics regression analysis. Since none of the variables in objectives two (caregivers'

knowledge, attitudes, and practices associated with VAS coverage) and three (caregivers' cultural factors associated with VAS coverage) were statistically significant in both chi-square and univariate analysis , qualitative thematic analysis findings from the KII were used to determine the factors associated with VAS coverage .

Table 3. 3:Summary of Quantitative Data Analysis per Objective

Objective	**Variables**	**Method of Analysis**
Caregivers' demographic and socio-economic factors associated with VAS coverage.	Caregiver's age, Marital status, Gender, Level of education, Employment status, Area of residence, Number of children.	• Descriptive -Mean (SD) or median (IQR) -continuous variables ,Frequencies and percentages -categorical variables. • 12-month age-appropriate VAS coverage -**binary outcome variable (yes/no).** • Cross tabulation/Chi-square to determine association, Fishers exact test. • Univariate logistics regression -variables significantly associated with VAS coverage on the chi-square test/fisher's exact test. • Multivariable logistic regression model where the adjusted odds ratios were determined and used as measures of effect. P-value of <0.05 was considered statistically significant.
Caregivers' knowledge, attitudes, and practices associated with VAS coverage .	Knowledge on Illness suffered due to lack of VAS, Importance of VAS, age of VAS administration, frequency of VAS administration. Attitude Importance of VAS, recommending other caregivers for VAS ,Priority and practice in seeking VAS services	
Caregivers' cultural factors associated with VAS coverage	Religion, Marriage type, Beliefs and myths on VAS, Decision making powers.	
Health system-related factors associated with VAS coverage	Place of delivery, VAS strategies, Owning a mother child booklet, Distance to health facility, Preferred VAS strategy, Health providers attitude, counselling and education on VAS, VAS stock-outs, staffing	

3.6.2 Qualitative

The qualitative recordings were transcribed verbatim. The researcher listened to each interview and read through the transcripts for familiarization purposes and quality checks. The transcripts were then imported into Nvivo software, where they were coded, and themes identified. Thematic analysis was used for the qualitative data analysis (Smith & Firth, 2011).

The quantitative and qualitative results were integrated during the presentation of the results with qualitative results used to explain, interpret or back up quantitative findings. The qualitative findings were used to complement the quantitative results.

3.7 Variable Measurements

The study outcome variable was age-appropriate (past 12 months) VAS coverage constructed into a binary variable (yes/no) from the number of VAS received by the child as confirmed from the mother-child booklet or caregiver's recall.

The independent variables were socio-economic and demographic factor variables , cultural variables, knowledge ,attitude and practise variables and health system variables. Caregivers 'socio-economic and demographic variables included : age of child, gender, age of caregiver, gender , level of education, occupation, area of residence and number of children 6-60 months. Caregivers' knowledge ,attitude and practice variables included knowledge score on VAS , attitude score on VAS.

Cultural variables included : religion, marriage type, beliefs and myths on VAS and decision making powers. Health system variables included :distance from nearest health facility ,place of VAS ,place of delivery ,informed of date for next VAS ,time period for taking child for VAS ,preferred VAS delivery strategy, counselling on VAS and VAS Stock out

The individual exposure variables and their definition are indicated in appendix VIII on variable measurements.

3.8 Ethical considerations

The study's proposal underwent ethical review and was approved by the Maseno University ethical Review and approval. Permission was also sought from the Kilifi County research office and the Department of Health. The nature and purpose of the study were explained to the participants, including its purpose, procedure, likely benefits/risks, and written consent sought from them for themselves and their children's participation in the study.

Consent: Both oral and written consent were sought from the participants. For the in-depth interviews, consent was sought for the recording of the interviews using a tape recorder.

Confidentiality: Confidentiality of the information provided by the respondents was maintained by storing the recordings on a password-protected computer and using codes on the transcripts in place of individual names. The questionnaires for quantitative interviews were stored in a locked cabinet while the soft copies of entered data were stored on a password-protected online drive.

Benefits: There were no direct monetary benefits for their participation in the study. However, the study's findings are helpful in the general health system as they could inform policies on VAS programmes.

Risks: No significant risks resulted from participating in the study except the time spent participating in the study.

CHAPTER FOUR

RESULTS

4.1 Participants Characteristics

4.1.1 Caregivers' characteristics

A total of 435 caregivers and their children aged 6-60 months participated in this study translating to a response rate of 99.8%. All the 435 caregivers in the study were female. Their mean age was 29.4 (SD=6.8) years, with the youngest being 16 years and the oldest being 52 years. On occupation, majority 202 (46.4%) were housewives **(Table 4.1)**

Table 4.1: Caregivers socio-economic and demographic characteristics

Demographic information	Frequency (n)	Percent (%)
Gender		
Female	435	100
Marital status		
Single	26	6.0
Married	379	87.1
Divorced	20	4.6
Widowed	7	1.6
Cohabiting	3	0.7
Occupation		
Formal employment	28	6.4
Others	1	0.2
Informal employment	17	3.9
Casual labourer	34	7.8
Own business	59	13.6
Petty trading/Hawking	7	1.6
Farming	57	13.1
Dependant	30	6.9
Housewife	202	**46.4**
Area of residence		
Semi-urban	51	11.7
Rural	384	88.3
Level of education		
None	124	**28.5**
Primary school not completed	127	**29.2**
Primary school completed	109	25.1
Secondary school not completed	15	3.4
Secondary school completed	33	7.6
University/college	27	6.2

4.1.2 Characteristics of Children

The mean age of the children was 29.7 (SD=15.1) months. The date of birth of the children was verified from the mother-child booklet in 361 (83.0%) of the cases, by recall in 68 (15.6%) and birth notification in 6 (1.4%). Among them, 228 (52.4%) were female, while 207 (47.6%) were male. Most of the caregivers (350; 80.5%) had one child aged 6-60 months in their household, 67 (15.4%) had two children, while 18 (4.1%) had three children aged 6-60 months in the household. In the case of more than one eligible child, simple random sampling was used to pick the index child.(Appendix I).

4.2 Vitamin A Supplementation and Coverage

4.2.1 Vitamin A Supplementation

Of the 435 respondents, children of 426 (98.0%) were reported to have had ever received VAS, 8 (0.18%) had never received VAS while 1 (0.2%) was not aware of the VAS status of the child. Most children, 214 (50.2%) received their last dose of VAS via household visits by Community Health Volunteers (CHVs) during the child health, "*malezi bora"* campaign.

Of the 426 children who had ever received VAS , 135 (31.7%) reported being informed on when to bring back the child for subsequent VAS, 276 (64.8%) reported not being informed.

Table 4.2 :Vitamin A Supplementation

VAS	Frequency (n)	Percent (%)
Ever received VAS (n=435)		
Yes	426	98.0
No	8	0.18
Don't know	1	0.2
Means of verification (n=426)		
Verified by card	304	69.9
Verified by recall-	130	29.9
Don't know	1	0.2
Correctly identified color of VAS (n=426)	426	100
Why child did not receive VAS (n=8)		
I am not aware of it	2	
It is not available in our health facilities	3	
The health facility is too far	3	
Do not know	2	
No of VAS in last 12 months (n=426)		
.00	51	11.7
1.00	214	49.2
2.00	152	34.9
3.00	18	4.1
Means of verification of VAS in last 12 months (n=384)		
By card	138	35.9
By recall	246	64.1
Where the child received the last dose of Vitamin A Supplementation (n=426)		
At the Health facility	207	48.6
At the ECDE	2	.5
At the outreach	1	.2
In my household during household visits by community health volunteers	214	50.2
Do not know	1	.2
Other	1	.2
Where the child usually (most of the times receive VAS (n=426)		
At the Health facility	361	84.7
At the ECDE	4	.9
In my household during household visits by community health volunteers	61	14.3
Health workers inform the caregiver the next time or date to bring their child back for another VAS dose		
Yes	135	31.7
No	276	64.8
I don't know	15	3.5
Total	426	100.0

4.2.2 Coverage of Vitamin A Supplementation

Among the 435 children 6-60 months included in the study, 213 (49.0%) had received the full age-appropriate VAS coverage in the last 12 months prior to the study, while 222 (51.0%) had not. This was way lower than the WHO recommendation of >80% coverage.

Age-appropriate Vitamin A Supplementation coverage was higher among children 6-11months than those aged 12-60 months. Most of those aged 6-11 months (50;89.3%) had received the age-appropriate VAS coverage (1 dose), while among those aged 12-60 months, 163 (43.0%) had received the age-appropriate VAS coverage of 2 doses in the last 12 months, as recommended by WHO.

4.3 Association between VAS coverage and participants' demographic and socio-economic factors

Using Chi-square test ,the study found that there was statistically significant association (p value <0.05) between the following factors and VAS coverage; caregiver's age, area of residence, level of education, number of children 6-60 months in the household, age group of the child. (**Table 4.3).**

There were no significant differences in the proportion of children of the employed caregiver compared to those whose caregivers were not employed. However, in qualitative data, the health providers associated the high level of poverty in the area to low VAS uptake as the caregivers prioritised seeking food and carrying out daily living activities instead of taking their children to the health facility VAS. The high poverty and illiteracy levels contributed to poor birth spacing; hence some mothers would have three children under five years. This made it difficult and expensive for the mother to carry all the children for routine VAS at the facility.

But the issue of illiteracy and sometimes poverty is a huge contributor to that. KII 003

Here they give birth in short intervals, you get. So, you can find a mother with 3 children under 5 and then they come from a distant place, maybe costing around 400/- to come here, to and from. And then that is a monthly like they are supposed to come every month for weight monitoring and then at the 6months interval for the Vitamin A. And then at 6 months maybe they are now supposed to carry all the 3 children. Now you see it is an expensive affair and maybe the parent is of poor economic status. Poverty is a problem. KII 007.

Table 4. 3 Association between caregivers' and children's demographic characteristics and VAS

Variable	Full VAS coverage in last 12 months		df	X^2	p-value
	No	Yes			
Age group of caregivers					
19 years and below	4 (23.5%)	13 (76.5%)	1	5.356	**0.021**
20 years and above	218 (52.2%)	200 (47.8%)			
Area of residence					
Rural	188 (49.0%)	196 (51.0%)	1	5.7	**0.017**
Semi-urban	34 (66.7%)	17 (33.3%)			
Marital status					
Single	29 (51.8%)	27 (48.2%	1	0.015	0.904
Married	193 (50.9%)	186 (49.1%)			
Highest level of education					
None	66 (53.2%)	58 (46.8%)	2	9.836	**0.020**
Primary school	110 (46.6%)	126 (53.4%)			
Secondary school	25 (52.1%)	23 (47.9%)			
University/college	21 (77.8%)	6 (22.2%)			
Employment status					
Employed	27 (60.0%)	18 (40.0%)	1	1.614	0.204
Not employed	195 (50.0%)	195 (50.0%)			
Age group of the child					
6-11 months	6 (10.7%)	50 (89.3%)	**1**	41.8	**<0.001**
12-60 months	216 (57.0%)	163 (43.0%)			
No of children 6 -60 months in the household					
1 child	193 (55.1%)	157 (44.9%)	1	12.098	**0.001**
2-3 children	29 (34.1%)	56 (65.9%)			
Gender of child					
Male	109 (52.7%)	98 (47.3%)	1	0.416	0.519
Female	113 (49.6%)	115 (50.4%)			

In order to explore the relationship between the socio-economic and demographic factors of the participants and VAS coverage /update , univariate regression analysis was further applied.On univariate analysis, only caregiver's age (OR=0.28, 95% CI (0.09, 0.88), P-value=0.029), area of residence (OR=2.09, 95% CI (1.13, 3.86), P-value=0.019), level of education (OR=0.33, 95% CI (0.12, 0.86), P value=0.024) and area of residence (.OR=2.09, 95% CI (1.13, 3.86), P-value=0.019), number of children 6-60 months in the household (OR=2.37, 95% CI (1.45, 3.90), P value=0.001) and age group of the child ;(OR=0.09, 95% CI (0.04, 0.22), P value<0.001) were found to be associated with VAS coverage. Children whose caregivers were 20 years and above were 72% less likely to receive VAS compared to children of young mothers (19 years and below); OR=0.28, 95% CI (0.09, 0.88), P-value=0.029.

Children who lived in rural areas were two times more likely to have received full VAS compared to those living in semi-urban areas. OR=2.09, 95% CI (1.13, 3.86), P-value=0.019. Those whose caregivers had a university/college level of education were 67% less likely to have received full VAS compared to those with no formal education OR=0.33, 95% CI (0.12, 0.86), P value=0.024. Children aged 12-60 months were 91% less likely to have received full age-appropriate VAS for the last 12 months compared to those aged 6- 11 months; OR=0.09, 95% CI (0.04, 0.22), P value<0.001. For those who had 3-2 children aged 6-60 months in the household, their child was two times more likely to have received age-appropriate VAS compared to those who had one child: OR=2.37, 95% CI (1.45, 3.90), P value=0.001 **(Table 4.4).**

Table 4.4:Univariate analysis of socio-economic and demographic factors associated with VAS.

Characteristic	Odds	OR	95%CI of OR	P-value
Religion				
Christians	158/167	1		
Muslims	16/30	0.564	0.296, 1.074	0.081
None	39/25	1.649	0.954, 2.850	0.073
Age of caregiver				
19 years and below	13/3	1		
20 years and above	200/218	0.282	0.091, 0.880	**0.029**
Area of residence				
Semi-urban	17/34	1		
Rural	196/188	2.085	1.127, 3.859	**0.019**
Highest level of education				
None	58/66	1		
Primary school	126/110	1.303	0.843, 2.015	0.233
Secondary school	23/25	1.047	0.537, 2.040	0.893
University/college	6/21	0.325	0.123, 0.861	**0.024**
Age of the child				
6- 11 months	50/6	1		
12- 60 months	163/216	0.091	0.038, 0.216	<**0.001**
No of children 6-60 months				
1	157/193	1		
2-3	56/29	2.374	1.446, 3.896	**0.001**

To explore the relationship further between caregivers' age, area of residence, religion, level of education, age group of the child, number of children 6-60 months in the household and VAS Coverage; a multivariable logistics regression model was applied. On multivariable logistic regression analysis, the study found that only the age of caregiver, area of residence, age of the child, and the number of 6-60 months children in the household were strongly associated with

age-appropriate full VAS coverage. Children whose caregivers were 20 years and above were 71% less likely to have received full age-appropriate VAS; AOR=0.29, 95% CI (0.09, 0.96), P-value=0.042 compared to children of caregivers aged 19 years and below. Further to this, children residing in rural areas were two times more likely to have received full age-appropriate VAS coverage; AOR=2.08, 95% CI (1.04, 4.18), P-value=0.039 compared to those living in semi-urban areas. In addition, children aged 12-60 months were 92% less likely to have received age-appropriate full VAS compared to young children aged 6-11 months. AOR=0.08, 95% CI (0.03, 0.20), P-value<0.001. Lastly the study also found that children from households with 2-3 children aged 6-60 months were two times more likely to have received age-appropriate 12 months VAS compared to those with one child, OR=2.11, 95% CI (1.24, 3.59), P value=0.006**.** This is summarized in **table 4.5 below**.

Table 4. 5 :Multivariable logistic regression analysis

Variables	**AOR**	**95% CI**		**P value**
		Lower	**Upper**	
Age of caregiver				
19 years and below	1			
20 years and above	0.291	0.089	0.957	**0.042**
Having a mother-child booklet				
No	1			
Yes	1.564	0.871	2.809	0.134
Area of residence				
Semi- urban				
Rural	2.081	1.036	4.182	**0.039**
Age of child				
6-11 months	1			
12-60 months	0.078	0.030	.199	**<0.001**
No of children 6-60 months in household				
1	1			
2-3	2.112	1.244	3.586	**0.006**
Health worker friendly				
Agree	1			
Disagree	0.245	0.082	0.736	**0.012**

These findings were further confirmed from the qualitative key informant interviews from health care workers and stakeholder's analysis where it was reported that most mothers believed that once the nine-month measles immunisation schedule was completed, they did not need to take their children to the health facility again unless the child was ill. Health workers reported that mothers also did not understand the importance of VAS hence they could not appreciate the need

to take their children to the health facility just to receive VAS droplets after every 6 months, and this was considered simply a waste of precious time.

". *If you talk to any parent, she/he will talk about the immunisations. And once a person is through with the measles at 9 months, in fact most of them go away, they will never come back. Even measles 2 is becoming an issue because most of the parents believe that at 9 once you get measles then the issues of going back to the MCH that is done, growth monitoring, Vitamin A supplementation that one is not important." KI 008*

"Once they finish that one, they say what will I be going to do there. So, they have not seen the importance of bringing the children after 9months…. " KII 004

It was also reported that most mothers did not consider VAS to be a vaccine because it did not involve injections and did not understand its importance to their children whom they considered to be growing well with no ill health and hence confirming the study findings that children aged 12-60 months were 93% less likely to have received age-appropriate full VAS coverage; AOR=0.07, 95% CI (0.03, 0.19), P value<0.001.

"They don't come specifically for Vitamin A. It is like, I think they assume let's say with weight, the way they don't take weight monitoring after 2years so serious, like I need to go to the clinic every month because of weight monitoring and I have other duties to take care of in the home, it is the same as Vitamin A. Why would I come after every 6 months because of Vitamin A, and I have other duties and I have other smaller children? "KII 007.

The health providers also reported this during the interviews that older children were considered stubborn and heavy to carry; hence most mothers did not want to go with them to the hospital for VAS to avoid transportation challenges and the struggle with the child during VAS administration. A health worker responded,

'Those *who are four years, you know those stubborn ones, they disturb to be brought to the clinic". KII 001.* "*In the absence of physical sickness, they find it hard to bring the children to these facilities, especially the old ones. They consider them to be heavy to carry". KII 006.*

Besides, the long waiting time before the next dose resulted in mothers forgetting regarding the next appointment, especially for children 12-60 months who had finished with their routine immunization schedule. A health worker pointed out,

There are those who come, and there are those who forget. So, we probably get them on outreach sites for those who forget, and we involve the CHVs." KII 006.

There were no significant differences on VAS coverage in the proportion of children of the employed caregiver compared to those whose caregivers were not employed. However, in

qualitative data, the health providers associated the high level of poverty and illiteracy in the area to low VAS uptake as the caregivers prioritised seeking food and carrying out daily living activities instead of taking their children to the health facility VAS. The high illiteracy was cited for contributing to some of the mother shying away from taking their children to the health facilities for both immunisation and VAS. *One respondent said,*

The other one is about illiteracy, literacy levels, you know really educating somebody who is very illiterate to understand the benefits of Vitamin A and stuff, it requires sometimes. It is something that requires an SBC to take place, a social behaviour change." KII 003… But the issue of illiteracy and sometimes poverty is a huge contributor to that. KII 003.

The high poverty and illiteracy levels also contributed to poor birth spacing; hence some mothers would have three children under five years. This made it difficult and expensive for the mother to carry all the children for routine VAS at the facility.

But the issue of illiteracy and sometimes poverty is a huge contributor to that. KII 003. Here they give birth in short intervals, you get. So, you can find a mother with 3 children under 5 and then they come from a distant place, maybe costing around 400/- to come here, to and from. And then that is a monthly like they are supposed to come every month for weight monitoring and then at the 6months interval for the Vitamin A. And then at 6 months maybe they are now supposed to carry all the 3 children. Now you see it is an expensive affair and maybe the parent is of poor economic status. Poverty is a problem. KII 007

The health workers also associated the high level of poverty in the area to low VAS uptake as the caregivers prioritised seeking food and carrying out daily living activities instead of spending time taking their children to the health facility for VAS.

4.4 Association between VAS coverage and participants' knowledge, attitude, and practice factors

4.4.1 Caregivers knowledge attitudes and practice characteristics

Four multiple-choice questions were used to assess participants' knowledge on VAS , the following questions were used; "What Age should the first administration of VAS to the child be done" and frequency of VAS, while the third question was on the number of VAS doses a child should receive. A score below the mean score was considered inadequate knowledge, while a score above the mean was considered adequate knowledge. Three items were used to gauge participants' attitudes on VAS ; Think VAS is useful to the children, would advise other mothers to take their children for VAS, and think it is necessary to take the child to the health facility to

receive VAS. Any score of 2 or 3 was taken as a positive attitude, while a score of 1 and below was taken to represent a negative attitude. (Appendix V, section C)

On VAS, 197 (45.3%) had adequate knowledge (below mean score), while 238 (54.7%) had inadequate knowledge(above mean score).

Similarly, awareness of VAS was reported to be low among most caregivers, and they could not explicitly explain to fellow mothers the importance of having their children receive VAS**. (Table 4.6).**

"There is also not that awareness like me to another mother; I tell a fellow mother the importance of why she should take her child because mine had this benefit, so take yours because Vitamin A has this benefit, you see." KII 007.

Most (418;96.1%) had a positive attitude towards VAS. However, some of the mothers had a negative attitude to VAS, affecting their uptake. Of the 435 caregivers, 164 (37.7%) received information about VAS, while the rest did not. For those who received information, health worker/ health facility was the main source 144 (87.8%) followed by community health volunteers 93 (56.7%).

Table 4. 6:Knowledge, attitude and information and VAS

Knowledge and attitude	Frequency (n)	Percent (%)
Knowledge of Vitamin A		
Inadequate knowledge	183	42.1
Adequate knowledge	252	57.9
Level of knowledge on VAS		
Inadequate knowledge (below mean score)	238	**54.7**
Adequate knowledge (above mean score)	197	45.3
Attitude towards VAS		
Negative (score of 1 and below)	17	3.9
Positive (score of 2-3)	418	96.1
Information	**Frequency (n)**	**Percent (%)**
Received information on VAS		
Yes	164	37.7
No	271	62.3
Source of information (n=164)		
Health worker/ health facility	144	87.8
Community health volunteers	93	56.7
Integrated health Outreaches	5	3.0
Child health campaigns	4	2.4
Print media	2	1.2
Electronic media	2	1.2
ECDE	7	4.3
Relatives	3	1.8
Others	1	0.6
Type of information received (n=164)		
Importance of vitamin A	141	86.0
Food sources of Vitamin A	70	42.7
Vitamin A Supplementation schedule and age cohorts	57	34.8
Don’t know	5	3.0

4.4.2 Caregivers’ knowledge, attitudes and practices factors associated with VAS coverage.

Quantitative data analysis from the study found no significant association between Knowledge on importance of Vitamin A, level of knowledge on Vitamin A Supplementation, attitude towards VAS and full VAS coverage(**Table 4.7).**However, the qualitative informant interviews by health workers and stakeholders provided more in-depth on how knowledge and attitude factors have hugely impacted VAS coverage and uptake.

Table 4.7:Association between knowledge and attitude and age-appropriate VAS coverage-

Knowledge and attitude	Full VAS coverage		df	X^2	p-value
	No	Yes			
Knowledge on importance of VA					
Inadequate knowledge	90 (49.2%)	93 (50.8%)	1	0.435	0.510
Adequate knowledge	132 (52.4%)	120 (47.6%)			
Level of knowledge on VAS					
Inadequate knowledge	116 (48.7%)	122 (51.3%)	1	1.108	0.293
Adequate knowledge	106 (53.8%)	91 (46.2%)			
Attitude towards VAS					
Negative	10 (58.8%)	7 (41.2%)	1	0.430	0.512
Positive	212 (50.7%)	206 (49.3%)			

While there was no significant association between knowledge and VAS coverage, health providers reported that knowledge was vital in utilising VAS by the caregiver's children from quantitative analysis, Health workers reported that caregivers with adequate knowledge regarding when their children should receive VAS took their children to the facility to receive it. Some who could not manage to go to the health facility sent the Community Health Volunteer (CHV) in their cluster to pick them, on their behalf. Some took the initiative to remind community health workers to pick VAS for their children from the facility.

"There are those mothers who know there is Vitamin A, my child should get. So, she stays, when the time reaches you see she has come. She says she has come for Vitamin A or others send you. She can see you and tell you, either send the CHV. There are others who send the CHVs" KII 001.

There was a lack of in-depth understanding of what VAS was among some mothers who viewed it as an injection. Knowledge gap, especially on when to take their children for VAS, was highlighted as a reason for low uptake. Most mothers believed that once the nine-month measles immunisation schedule was completed, they did not need to take their children to the health facility again unless the child was ill. Hence, after the nine-month immunisation period, most mothers stopped taking their children to the facility for VAS or growth monitoring. They did not consider VAS to be a vaccine and did not understand its importance to their children, whom they considered growing well with no ill health. Knowledge regarding the importance of VAS was considered inadequate among them.

"For most caregivers, what is important to them is the vaccines. If you talk to any parent, she/he will talk about the immunisations. And once a person is through with the measles at nine months,

they will never come back. Even measles two is becoming an issue because most parents believe that at nine months, once you get measles, then the issues of going back to the MCH are done, growth monitoring, Vitamin A supplementation that one is not important." KI 008.

"When she comes here, and you give her Vitamin A she will insist and tell you, 'I was told he/she is coming for injection'. So now we have to tell her that this is also a vaccine that he/she needs to get after every 6months. So, when she leaves home, she knows that her child is coming for an injection vaccine, so she feels that she has wasted herself coming here only to be given something small in the mouth, and then she goes, and maybe she has spent like Ksh 250 on transport, or she walked a long way". KII 005.

From the quantitative data analysis,while most(418;96.1%) had a positive attitude towards VAS, qualitative interviews with health workers indicated some of the mothers had anegative attitude to VAS, that may have affected their uptake.

"Attitudes, there are people who have attitudes, not just with Vitamin A but the issue of health services, is an issue here." KII 009.

With no apparent effect of lack of VAS that could be visibly seen to the caregivers, they did not take it seriously. They did not appreciate the importance of VAS to their children as they did not see any severe side effects for their children not receiving it. Besides, caregivers were not convinced that lack of VAS causes problems to the child as the effects of lack of VAS was not apparent as other conditions. This attitude affected their uptake of VAS, as most religiously observed the immunisation schedule but did not bring their children to the facility for VAS after immunization.

"People believe in seeing somebody is sick before they go to seek medication, and you know we are giving Vitamin A to address the issue of hidden hunger. You can't see exactly the sickness of somebody suffering from Vitamin A deficiency. The only thing you know scientifically is that their immune system becomes weak. They are always vulnerable to diseases, and infections easily put them down but generally, you will somebody appearing okay if you are not very keen. However, these people suffer from Vitamin A deficiency, which is why it is referred to as hidden hunger. In the absence of physical sickness, they find it hard to bring the children to these facilities". KII 003.

"Yes, because, like the Polio example, it is even usually announced on radio, the TV that if your child lacks the Polio vaccine, he/she will be paralysed in the legs and will not walk…. You see now, but this one for Vitamin A has not seen what will happen if he/she does not get." KII 005.

While most caregivers receive VAS information from health workers, the health workers found it difficult to explain the importance of VAS to the mothers. Not being able to understand the importance of VAS meant that mother could not appreciate the need to take their children to the

health facility just to receive VAS droplets after every 6 months, and this was considered simply a waste of precious time.

"They don't come specifically for Vitamin A. It is like, I think they assume let's say with weight, the way they don't take weight monitoring after 2years so serious, like I need to go to the clinic every month because of weight monitoring and I have other duties to take care of in the home, it is the same as Vitamin A. Why would I come after every 6 months because of Vitamin A, and I have other duties and I have other smaller children? "KII 007.

There was also misinformation and lack of clear information of what VAS was and how it related to vaccines, resulting in caregivers viewing VAS as not beneficial to their kids. Besides, the mode of its administration was different from most vaccines.

". When she comes here, and you give her the Vitamin A she will insist and tell you 'I was told he/she is coming for injection'. So now we have to tell her that this is also a vaccine that he/she needs to get after every 6months." KII 005.

Some also had misinformation regarding when the hospitals are open hence ending up not bringing their children for VAS, this was mostly experienced during the period of the Covid-19 pandemic.

"You find someone stays long then comes after some time and if you ask her why she didn't come she says I was told that hospitals are not operating and that is why I didn't come." KII 004.

Hence, in the sub-county, mothers voluntarily bringing their children to the facility specifically for VAS was a rare thing, and only a few did so. The health providers highlighted the few mothers who voluntarily brought their children to the health facility specifically for VAS to be a few who were mostly educated, informal employment and not from the area.

"...she was not just a nobody because she told me she works in Ukambani and she had come to visit and her child had come, in fact, she didn't even say weighing, she has come for Vitamin A. And the other one is a teacher. It was at 18 months, but she also insisted, she didn't come at exactly 18 months, she came at 19months and some weeks and asked, 'I hear there is Corona and children are not being weighed but I am requesting you give my child Vitamin A'." KII 005.

Most mothers in the sub-county were also reported to be illiterate, which hampered health education to understand the benefits of their children receiving VAS. The high illiteracy was cited for contributing to some of the mother shying away from taking their children to the health facilities for both immunisation and VAS. They instead went for the traditional and complementary and alternative medicine (CAM).

"Sometimes some level of illiteracy contributes. There are mothers who, a child has reached almost 2years, she/he has never ever gone to clinic, she/he has not received any vaccine even a single day and the day she/he comes, she/he has so many those local vaccines, those antibiotics, the traditional paraphernalia." KII 009.

The other one is about illiteracy, literacy levels, you know really educating somebody who is very illiterate to understand the benefits of Vitamin A and stuff, it requires sometimes. It is something that requires an SBCC to take place, a social behaviour change" KII 003.

4.5 Caregivers' cultural factors associated with Vitamin A supplementation uptake in children aged 6-60 months.

4.5.1 Caregivers cultural characteristics

Only 4 caregivers (0.9%) reported to have beliefs or cultural myths that may have affected their attitude, opinion, or practice towards Vitamin A supplementation to their child. Only 1 out of the total 435 caregivers (0.5%) reported that there existed beliefs against VAS in your community. Similarly, from the qualitative results, participants reported never having heard or aware of any cultural beliefs regarding VAS. (**Table 4.8).**

Table 4.8:Cultural factors

Cultural factor	Frequency (n)	Percent (%)
Religion		
Christian	325	74.7
Muslim	46	10.6
None	64	14.7
Have beliefs or myths on VAS		
Yes	4	0.9
No	431	99.1
Presence of beliefs and myths against VAS in the community		
Yes	1	0.5
No	418	95.9
Don't know	16	3.7
Family type		
Monogamous	381	87.6
Polygamous	24	5.5
Others	30	6.9

4.5.2 Caregivers' cultural factors associated with Vitamin A supplementation coverage in children aged 6-60 months

Quantitative data analysis indicated none of the cultural factors including religion, having cultural beliefs and myths on VAS, marriage type explored to be significantly associated with

VAS coverage. Out of the total 435 caregivers, 14.7% had no religious affiliation, 74% were Christians while 10.6% were Muslims. .A high proportion of children whose caregivers had no religious affiliation (60.9%) received full VAS, followed by those of a Christian caregiver (48.6%), while a lower proportion of children whose caregivers were Muslims (34.8%) received full VAS. The association was statistically significant; X^2 (2,N=435) = 7.390, P = 0.025

The association between having cultural beliefs and myths on VAS, the community having cultural beliefs and myths on VAS, marriage type and VAS coverage was also not statistically significant**,**X^2 (1 , N=435)= 0.205, P= 0.651, **(Table 4.9).**However, the qualitative informant interviews by health workers and stakeholders provided more insight on the cultural factors that influence VAS uptake in the area.

Table 4.9:Association between cultural factors and age-appropriate full VAS coverage

Cultural variables	**Full VAS coverage**		**df**	X^2	**p-value**
	No	**Yes**			
Religion					
Christian	167 (51.4%)	158 (48.6%)	2	7.390	**0.025**
Muslim	30 (65.2%)	16 (34.8%)			
None	25 (39.1%)	39 (60.9%)			
Have beliefs or cultural myths on VAS					
Yes	2 (50.0%)	2 (50.0%)			1.00
No	220 (51.0%)	211 (49.0%)			
Community has cultural beliefs and opinions towards VAS					
Yes	0	1 (100.0%)			0.490
No	222 (52.2%)	212 (48.8%)			
Family polygamous or monogamous					
Monogamous	198 (52.0%)	183 (48.0%)	2	1.105	0.576
Polygamous	11 (45.8%)	13 (54.2%)			
Others	13 (43.3%)	17 (56.7%)			

Upon univariate analysis , there was no statistically significant association between religion and VAS coverage , Appendix IX on univariate analysis of cultural factors.

Like the quantitative findings, from the qualitative results, participants reported never having heard or aware of any cultural beliefs regarding VAS.

"For Vitamin A I have not heard[beliefs against VAS]. *I have not heard of those because they say it is very important for a child to get those immunisations, all those vaccinations, everything. They are saying it is important for a child to get that is why she struggles and after completing she stays at home." KII 001.*

Health workers reported to have had few instances cultural beliefs and practices discouraging their members against VAS and formal health system that resulted in parents refusing their kids from getting VAS and other immunisation services. However, the intervention of public health officers, and the local administration had to be sought with the parents being threatened with legal action for them to allow their kids to receive VAS.

Religion does that to a very small extent, there are pockets, you may find some people who don't want to bring their children because of their religious inclinations, whatever beliefs they have, but we have always tried, wherever we have such we bring in the people of public health to intervene and even actually threaten them to tell them that we are going to take legal action if you don't do bla or we seek the support of chief, the sub chief and the village elders' support though it is not very strong. KII 003

However, the power dynamics regarding health-seeking behaviour decision-making were also an issue due to the community's socio-cultural setup. The household head, mostly the man, acted as a barrier to VAS uptake and uptake of other health services as they had to consent for the child to be taken to the clinic for VAS and other immunizations. Besides, they facilitated their women by providing the financial resources needed to go to the hospital. In case consent was not provided, the mother could not take their child to the clinic. With no VAS engagement targeting men who were mostly the household decision-makers, this was thought to affected VAS uptake.

*Two, we have the household heads, here in our community the men have a lot of influence, the household heads, they are known as 'Mwenye', there is something called '**Mwenye syndrome**' where if the household head has not said/ given you permission to go to clinic you can't go because they are the ones who facilitate you first on transport, can facilitate you in terms of a number of things to go to the clinic. So, if they don't give it a positive nod you will not achieve that.* KII 003.

There are also instances where the grandmother of the child was the decision maker or had the influence of deciding on the family's health-seeking practices. Some did not allow their grandchildren to be taken to the hospital but instead offered tradition medication and practices to protect the child. Such grandmothers encouraged home delivery as it was considered a heroic act.

"So, the grandmother is the one controlling that child cannot go to the clinic, that is what she is saying. And the day she came is like the grandmother was not there, that is when she was brought. So, she/he has never been done for any vaccination and it is home delivery. So, we still have those pockets, within the community cycle who still follow those old ways that they can still do. without hospitals and all that because they believe that delivering at home is in fact heroic for them. "KII 009.

4.6 Health system-related factors associated with Vitamin A Supplementation coverage among children aged 6-60 months in Ganze sub-county.

4.6.1 Caregiver health system related characteristics

Majority of caregivers reported to usually take their children to the health facility when sick 361 (83.0%) when sick,. Door to door supplementation by community health volunteers was the topmost 332 (76.3%) preferred strategy by caregivers for effective VAS supplementation.

181 (41.6%) agreed that health workers counselled them on the importance of VAS, 143 (32.9%) disagreed, however only 139 (32.0%) reported being informed by the health worker on their next VAS appointment. 64 (14.7%) reported taking their child for VAS and being sent back because VAS was not available**.** Only 106 (24.4%) reported receiving counselling on VAS from health workers all the time they took their child for supplementation **(Table 4.10).**

Table 4.10:Health system-related factors

Variable (N=435)	Frequency (n)	Percent (%)
Have a mother-child health card/ booklet		
Yes	369	84.8
No	66	15.2
Place of delivery		
Public Health facility	360	82.8
Private health facility	17	3.9
Home delivery	58	13.3
Distance to the nearest health facility		
Less than 3kilometers (<30 minutes' walk)	233	53.6
3-5 km (30 minutes -1-hour walk)	131	30.1
5-10km (1-2hour walk)	43	9.9
More than 10 km (above 2-hour walk).	28	6.4
When they take the child to the health facility		
When a child is sick	361	**83.0**
Rarely visit	23	5.3
For immunization	245	56.3
For growth monitoring	316	72.6
For VAS	81	**18.6**
Never taken child to health facility	2	.5
Others	2	.5
Preferred strategies for delivery of VAS		
National immunization days (NIDs)	16	3.7
Child health, e.g., Malezi bora	157	36.1
A fixed site like a hospital	188	43.2
Outreach sites	16	3.7
ECDEs/ Day care centres	79	18.2

Door to door supplementation using community health volunteers	332	**76.3**
Others	5	1.1
Don't know	59	13.6
Health workers or are friendly during VAS		
Strongly agree	101	23.2
Agree	308	70.8
Neither agreed nor disagree	16	3.7
Disagree	7	1.6
Strongly disagree	3	.7
Health workers counsel mothers on the importance of VAS		
I strongly agree	56	12.9
I agree	181	41.6
I am not sure/ undecided	38	8.7
Disagree	143	32.9
Strongly disagree	17	3.9
Informed when the child should receive subsequent VAS dose		
Yes	139	32.0
No	296	68.0
Sent back due to lack of VAS		
Yes	64	14.7
No	371	85.3
Receive counselling on VAS from health workers		
Yes	106	24.4
No	329	75.6
Health information on VAS	**Frequency (n)**	**Percent (%)**
Where child usually receives VAS		
Health facility	361	84.7
Household visits	61	14.3
ECDE	4	0.9
Informed when the child should go for subsequent VAS dose		
Yes	135	31.7
No	276	**64.8**

4.6.2 Health system-related factors associated with Vitamin A Supplementation coverage

Chi-square test was used to determine the association between VAS coverage and the health system related factors. Using this approach, the study found that there was statistically significant association (p value <0.05) between the caregiver having a mother child booklet X^2 (1, N=435)= 4.945, P = 0.017), health workers being friendly during the VAS facility visits by caregivers X^2 (1,N=435) = 7.417, P-value <0.006) and VAS coverage. (**Table 4.11).**

Table 4.11:Age-appropriate VAS coverage and health system factors

Health system factors	Full VAS coverage (12 months)		df	X^2	p-value
	No	**Yes**			
Have a mother-child health card/ booklet					
Yes	**180 (48.8%)**	**189 (51.2%)**	**1**	**4.945**	**0.026**
No	**42 (63.6%)**	**24 (36.4%)**			
Distance to the nearest health facility					
Less than 3km	126 (54.1%)	107 (45.9%)	1	1.859	0.173
More than 3 Km	96 (47.5%)	106 (52.5%)			
Place of delivery					
Health facility	197 (52.3%)	180 (47.7%)	1	1.685	0.194
Home delivery	25 (43.1%)	33 (56.9%)			
Informed by health worker when the child should receive subsequent VAS					
Yes	78 (56.1%)	61 (43.9%)	1	2.110	0.146
No	144 (48.6%)	152 (51.4%)			
Health workers were friendly during VAS.					
Agree	**202 (49.4%)**	**207 (50.6%)**	**1**	**7.417**	**0.006**
Did not agree/undecided	**20 (76.9%)**	**6 (23.1%)**			
Health workers counsel mothers on the importance of VAS					
Agree	120 (50.6%)	117 (49.8%)	1	0.034	0.855
Disagree/undecided	102 (51.5%)	96 (48.5%)			
Taken child to the health facility for VAS and sent back because there was no Vitamin A					
Yes	33 (51.6%)	31 (48.4%)	.008	1	0.927
No	189 (50.9%)	182 (49.1%)			

On univariate analysis, those who had the mother-child booklet were 84% more likely to have received full VAS compared to those who did not have it; OR=1.84, 95% CI (1.07, 3.16), P-value=0.028. Those who disagreed with the statement that the health worker was friendly during the last visit were 71% less likely for their child to have received age-appropriate full VAS coverage; OR=0.29, 95% CI (0.12, 0.74), P value=0.010. **(Table 4.12).**

Table 4.12:Univariate analysis of health system factors associated with VAS.

Characteristic	Odds	OR	95%CI of OR	P-value
Having a mother child booklet				
No	24/42	1		
Yes	189/180	1.837	1.069, 3.158	**0.028**
Health worker friendly				
Agree	117/120	1		
Disagree	96/102	0.293	0.115, 0.744	**0.010**

To explore the relationship further between a caregiver having a mother child booklet, health workers being friendly during VAS and its coverage, a multivariable logistic regression model was applied. On multivariable regression analysis, health workers being friendly during VAS was found to be strongly associated with VAS coverage. Children of caregivers who reported that health workers were not friendly were 75% less likely to have received the age-appropriate VAS coverage; AOR=0.25, 95% CI (0.08, 0.74), P-value=0.012.

Related findings were highlighted from the interviews. With some health providers scolding the caregivers, they felt insulted and disrespected hence avoiding coming to the facility again, even for VAS and potentially other services.**(Table 4.13).**

"Sometimes you find a client complaining that they came to the facility once then they were somehow scolded by the healthcare worker, the reason being they missed a TCA. So, with that, that client might not come back again. So, we have those clients who are complaining, "if you go there, you are insulted by the doctor." If she tells you like that, do you expect she will come for Vitamin A or any other service? She will not come." KII 009

Table 4. 13: Multivariable logistic regression analysis

Variables	AOR	95% CI		P value
		Lower	Upper	
Age of caregiver				
19 years and below	**1**			
20 years and above	**0.291**	**0.089**	**0.957**	**0.042**
Having a mother-child booklet				
No	1			
Yes	1.564	0.871	2.809	0.134
Area of residence				
Semi- urban				
Rural	**2.081**	**1.036**	**4.182**	**0.039**
Age of child				
6-11 months	1			
12-60 months	**0.078**	**0.030**	**.199**	**<0.001**
No of children 6-60 months in household				
1	**1**			
2-3	**2.112**	**1.244**	**3.586**	**0.006**
Health worker friendly				
Agree	**1**			
Disagree	**0.245**	**0.082**	**0.736**	**0.012**

The key informant interviews by health workers and stakeholders provided more insight on the health system factors to VAS and different approaches employed in the study area enhance VAS coverage. Various approaches were used for VAS delivery and these included VAS at health

facilities, during bi-annual *malezi bora* campaigns, during outreach activities and ECD visits, and during door-to-door visits to households by CHVs. Door to door visits by CHVs, supplementation and ECDEs was mostly done during the bi-annual malezi bora campaign which was routinely conducted in May and October every year by the Department of Health with support from stakeholders. VAS services were also integrated in other services delivery such as growth monitoring sites ensuring that all eligible children receive it.

Basically, routine at the service delivery point, two, at the community during outreaches and then three, during national days nutritional activities like Malezi Bora and four, during National immunisation campaigns. KII 010

Various other factors were also reported by health workers as components associated with VAS coverage and uptake in the area, among these include preferred mode of VAS delivery, distance and accessibility of health facilities, health workers and CHVs technical capacity on VAS , understaffing at the health facilities, health education ,counselling and SBCC on VAS, VAS supply chain management , and lastly the effect of covid-19 pandemic which was experience during the study period. Integrated outreaches by health workers and door to door visits by CHVs made up the community-based VAS system were reported to be the effective means of VAS delivery instead of health facility-based delivery. This is because many of the children were found during outreaches compared to facility visits. Household visits were particularly highlighted to have been useful in increasing VAS uptake and coverage in the sub-county and more so especially during malezi bora campaign.

"The one for the household to household, that is the best because you go to a household and you will be able to get all of them, you can hit 100% but it has its own weaknesses also or challenges, let me not call them weaknesses, it is challenges. The one for facility is good but not all can come for that Vitamin A. Our mothers and caregivers don't see the need of bringing a child for Vitamin A dose when they cannot see clinical sickness in a child.". KII 003.

Long distance from homes to the health facility was also highlighted to hinder some caregivers from visiting a health facility for VAS, especially those living far from the facilities. They preferred to wait for outreach for their children to get VAS or wait for the household visits by CHVs during *Malezi bora* VAS campaigns.

Some facilities are far placed. So, you can imagine a mother walking for over 2km to take a child for Vitamin A supplementation; they don't find it a good thing to do. KII 003.

Some households are very far from the facility. So, it becomes difficult. They consider the immunisation a child gets as very important, he/she must get. So, when it reaches a time that a child must get Vitamin A you find that she tells you "I am very far from the health facility for me to becoming all the time, every month just to get the child weighed", you know they just take it as just having their baby weighed. KII 002.

Also, some of the facilities were not accessible due to the impassable roads, especially during the rainy season, forcing caregivers to stay at home. In some instances, the health facilities were locked due to flooding making health services such as VAS inaccessible to the area residents.

When it rains, some facilities you cannot even reach them like Mrima wa ndege can be landlocked for even two months. KII 008.

Most staff reported having received some form of training on VAS either in school or through continuous health education and others on the job training. NGOs and development partners in the county also helped train staff and increase their capacity on VAS.

Yes, we have trained, we've trained with support from partner like UNICEF, we trained almost all staff during that time on Vitamin A supplementation and even sensitised. And we've gotten some support through health systems strengthening, where we also do OJTs, on job training, mentorship on Vitamin A supplementation and reporting, all reporting and time reporting on Vitamin A. So, that has happened. KII 003.

Yes, I am trained. Even in college, I studied and then you know there are these small training that we have been attending. KII 001. Another one is the CME (Continuing medical education), if we are doing CME, there is a topic for that like immunisation they have been heaped together. KII 001

While the community health volunteers did not have formal training on VAS, they usually received informal training from health workers or community health assistants (CHA). They were also given more information on VAS to disseminate to households during their monthly meetings and briefing sessions.

We usually do for them short training, not always, but we usually have feedback meetings. So, any time we have monthly feedback meetings, we usually give them some information. We discuss anything that would assist a community person health-wise, so Vitamin A is one of them. KII 002.

The mothers were educated regarding VAS and its importance during health education sessions at health facilities as they wait for services, during facility visits for immunisation and integrated outreach events. Information regarding VAS was also given to mothers during health talks following health facility visits and CHV visits to the households. During the education sessions,

mothers were taught regarding the importance of VAS, when the child is supposed to receive it and where it is offered. They have also shown the colours codes for the different VAS dosages. Besides, mothers were also taught regarding the food sources of VA. The subsequent VAS's date was also written in the mother and child booklet and the information explained to the mother to avoid confusion between VAS dates and those for the other child clinics or immunisation.

Yeah, especially in the morning we have health talks. So, when we go through the vaccines, we also tell the importance of Vitamin A to children and even when we go to the outreaches, we also try to educate them. KII 006.

However, the study found issues identified to affect VAS education and awareness creation. It was highlighted that VAS was not promoted in the media, as is usually the case with other vaccines for example the polio vaccine. Hence, some mothers had not heard of it being announced in the media, which affected the value they placed on it. Health education on VAS was also reported not to be very strategic and was considered not to have adequately captured the local caregivers' needs. It was suggested, just as is with the case with polio vaccine messaging, the posters used should capture the pictorial representation of the defects due to lack of VAS so that the caregivers can appreciate its importance.

Yes, because like the Polio example is even usually announced on radio, TV that if your child lacks the Polio vaccine, he/she will be paralysed in the legs and will not walk." KII 005

I think we should have the IEC materials and maybe pictures of babies affected with lack of Vitamin A. They should be placed there so that at least we can show them if your child lacks this Vitamin A or foods that have Vitamin A, he/she will be like this, like the Marasmus quash pictures because when you show her 'when a child lacks proper nutrition, he/she will look like this, can't you see how he/she looks'. Even when she is at home and sees the ribs have started protruding, even if she is told by the CHV your child has malnutrition, she looks at him/her and reflects with the picture she saw in the hospital, she brings the child herself. KII 005.

Additionally, with no evidence like permanent ink marking on the finger as it is with the polio vaccination, parents did not view VAS as a serious program. They also expressed fear of their children being given more doses as there was no evidence to show that their children received VAS.

The Polio mark, yes. With Vitamin A, it is up to you, if maybe you don't want those questions you walk with that pen to apply on that child……So that she sees for sure my child has been immunised. So that she sees the importance that for sure this is immunisation…. Oh, so you just apply the ink, the child gets Vitamin A and that's it…. But if you don't apply, she can tell you

'Why haven't you applied this on him/her, what if he/she is found out there playing and then is given again? 'KII 005

Besides, most messaging for VAS was in English, which most mothers did not understand. The English language was used on IECS materials used for VAS awareness creation, and this was considered a barrier as most caregivers could not understand it. Use of local or Kiswahili languages on such materials was proposed to be key in VAS health messaging in the region which was not being done. The health workers also struggled to translate the same information to the local understandable language hence a barrier in awareness creation.

That is, the way we have been taught it is in English. So, you see like most of the charts, they are in English. Now here we are in a village, so if I want to tell you something, I tell you in Giriama or I translate that thing into Giriama, maybe I don't the translation into Giriama or Swahili, so how will I say that person? I will say Vitamin A gives this, maybe it helps, the only thing I have ever heard people say is it helps with the eyes, of which you see after telling her about the eyes only and leave all the other benefits, why should she continue coming here and she says, "my child's eyes are seeing properly. "KII 007

We talk the local language but there is no local language of Vitamin A. KII 007

Most of the health workers also reported a challenge of health personnel understaffing, which interfered with the standard VAS services delivery. With some facilities not having a nutritionist, most nutrition services were being offered by the MCH department nurses who were also overwhelmed with other duties.

Is just that there is no nutritionist but if there were a nutritionist, she/he could be the one dispensing, dispensing there at the weighing point, he/she would dispense the de-wormers and the Vitamin A, when she goes the other side it is only immunisation and vaccination. She goes but here since there is no nutritionist all the services are provided there at MCH. KII 001

With understaffing of the technical staff such as nurses and nutritionists, task shifting was done with VAS services delegated to the CHV who did not have adequate technical skills and needed close supervision. However, due to the limited staff, even getting health workers to supervise the VAS activities of CHV in the field was a challenge. While CHVs were being used to provide the VAS door to door, there was no policy to guide this. Hence supervision was needed. The available human resources were not adequate to provide the staff needed for supervision. Even the CHVs themselves were few and could not cover all households.

"But we may not achieve much from the look of things because as we were going around for supervision, I discovered several gaps. Several gaps in terms of maybe the healthcare workers, the provision of healthcare workers was so small. And again, we were in a state where we could not say which authority that the CHVs, because there is no policy support for that, to go and do Vitamin A dosing in the households. If they must do that, because there is no policy supporting that, they must do that under the supervision, close supervision of a technical staff. The provision for technical staff this time around was so small, very little, it could not support that. KII 003

I discovered several gaps in terms of maybe the healthcare workers, the provision of healthcare workers was so small. And again, we were in a state where we could not say which authority that the CHVs, because there is no policy support for that, to go and do Vitamin A dosing in the households. If they have to do that, because there is no policy supporting that, they have to do that under the supervision, close supervision of technical staff." KII 001

The VAS supply process started with planning with each facility making projections on the VAS requirements for its catchment per year using the population data and previous utilisation data. The projections were then merged at the sub-county level and the county level before being forwarded to the ministry of health where the total national VAS supply order was made. Once the national supply is made to the national central stores, each region's order was dispatched twice a year to regional stores from where each county got its share as per their projected requests. The county then distributed the VAS to each sub-county as per their order from where each health facility made orders for VAS whenever needed. VAS supply chain was generally reported to be fair by the health workers and indicated to have never experience a permanent stock out of VAS or that which lasts over two months. However, a few health workers reported instances of VAS stock-outs lasting up to 2 months which interfered with routine VAS administration. The type that was out of stock varied from facility to another. In case a given dosage of VAS ran out of stock, the facilities came up with innovative approaches to ensure continued supplementation. For example, the facilities improvised in case the 100,0000IUs were out of stock by giving the children of 6-11 months 2 drops of the available 200,000IUs capsules.

When it is available, when it is not out of stock, because at times you may find like now, we don't have the one for 100,000IUs, the small blue one, we don't have it for now. So, you know it will be difficult for a child who is within that 6-11months to get it. So, we must improvise like this one we give him/her the drops. So, when it is available, of course the children are given but we have never had a complete stock out of Vitamin A in the facility, it has never happened but the one for children of 6-11 at times is a challenge, at times it is not available. So, we still must give them. So, we give them 2 drops of this one so that they don't lack completely. KII 002

It has been good though in the past we had a few challenges and lacked the 100,000IUs for a period of about 3weeks and then we got but we were supplementing with the 200,000IUs. KII 005

In some cases, the facilities borrowed from neighbouring facilities or sub counties in instance of facility stock outs to ensure continued VAS provision. However, in some instances, they could not get any hence had to wait until the next stock is supplied by the sub-county pharmacist. However, in periods where all the county facilities were faced with stock-outs, they had to wait until the next order from the central stores arrived, which sometimes took about 2 months. However, the participants reported adequate stocks of VAC 200,000IUs during this period.

If they don't have you contact the Sub County Nutritionist, and he can borrow from other Sub Counties. KII 004.

Some of the issues contributing to stock-outs was the emphasis placed on malezi bora campaign which occurred twice a year in May and October with many VAS capsules offered during these events. The VAS capsules are highly utilized during malezi bora and sometimes facilities remain with very low stocks after the campaign. This resulted in stock-outs, leading to inadequate supply of VAS for routine supplementation breaking the supply chain and forcing facilities to wait longer before the stock is replenished. The emphasis and resources put in the malezi bora event during two months of the year affected the routine VAS supplementation. There was a shortage of resources needed to support routine VAS services. This resulted from wastage of VAS during malezi bora or insurance to overage children as age was not verified. Over supplementation also occurred due to lack of documentation of VAS given outreach events like malezi bora.

"*We would assume because we surpass our target of 100% during Malezi bora campaigns. So, we would assume because now, the ones that are missed in the schools are captured in facilities because during Malezi bora we don't check if you had already had Vitamin A, we give all the children under-5 Vitamin A". KII 007*

"The challenge I have seen is that we've really concentrated so much on the two major events, Malezi Bora of May, and October hence the chain is broken. Once we are approaching to do the Malezi Bora we have so many of the Vitamins, the capsules. We do give, sometimes we give, and we give everything, we remain without any in the store that are supposed to be given routinely….So, you find you must wait until they have the same in stores is when they can give you. …. " KII 003

Among other factors pointed out by health workers to affect VAS coverage during the study period was the covid-19 pandemic which led to reduced hospital visits by the community due to fear of the virus and the suspension of *the malezi bora campaign* in the year by the MoH. The bi-annual malezi bora campaign is usually conducted twice a year in May and October nationally however the Covid-19 pandemic led to suspension of this campaign which was later conducted in July and not May as in practice. The campaign's approach was also changed from a community gathering, outreach, Early Childhood Development Education (ECDE) supplementation to door to door delivered by CHV instead of other health cadres who typically dispense them during malezi bora.

"*It has affected us almost to about 80%, we are not achieving our results because for one as I already indicated when you go to ECDs, these are kids you go find them there already mobilised, yours is to dose, But now this year COVID-19 complicated matters for us. For one, you must ensure that whoever is going to give this Vitamin A in that household is somebody who is not having Corona. That is challenge number one. So, you must observe all the government laid down regulations as far as our new norm is concerned, keeping social distance, putting on a mask, sanitising, bla, bla, all that stuff. So, that is the good thing, and you see employing all those measures is not cheap, it is expensive". KII 003*

While partners organisation offered financial support for VAS services in addition to budgetary allocation from the county government, it was not adequate to support all activities and community units in the provision of VAS. Besides, the county government diverted most of the VAS allocated money to purchase PPEs during the COVID 19 pandemic.

Then this time around of course we didn't really get money from the County Government because much of the money went to procurement of personal protective equipment for COVID-19 and establishment of the isolation centres and quarantine centres. KII 003

CHAPTER FIVE
DISCUSSION

5.1 Caregivers' demographic and socio-economic factors associated with VAS coverage among children 6-60 months

The study found that the age of caregiver, area of residence, age of the child, and the number of 6-60 months children in the household were the demographic and socio-economic factors strongly associated with VAS coverage. The study found that children residing in rural areas or living within households with 2-3 ,children aged 6-60 months were more likely to have received age-appropriate full VAS. Further to this, children aged 12-60 months and those with caregivers older than 20 years were less likely to have received the age-appropriate full VAS.

The study findings on children residing in rural areas more likely to receive age-appropriate VAS are not surprising as others have also found increase in VAS coverage among rural children compared to their counterparts as was the case in Pakistan and Brazil (F. Changezi & L. Lindberg, 2017; Lima et al., 2018). However, we have found studies that have different outcomes, where children living in urban areas were more likely to have received VAS compared to their rural counterparts (Berde et al., 2019). Unlike this study, evidence from demographic health surveys in Ethiopia extensive socio-economic and geographic-based disparities in VAS coverage where children residing in urban areas were more likely to receive VAS (Zegeye et al., 2022). Hence, this seems to be context dependent. In this study, the likely reason for high coverage in rural areas as reported during the qualitative key informant interviews may be attributed to increased programme targeting rural areas such as door to door VAS delivery by CHVs, integrated outreaches and child health campaigns days e.g., *malezi bora* campaigns which are rarely likely to be hosted in urban areas but instead the hard-to-reach areas in the rural locations. A study in 13 SSA countries which found out that strategies e.g. door to door supplementation and outreaches resulted in higher coverage than fixed site approaches(Janmohamed et al., 2017). There is therefore need for VAS scale up programs to target both rural, urban and semi urban areas to ensure optimal coverage and avoid missed opportunities in areas assumed not be hard to reach. A study in Ethiopia also looked out geographical variations and associated factors in VAS coverage (Gilano et al., 2021) .

The key informant interviews with health workers and stakeholders further explain why the study found out that children aged 6-11months were more likely to have received age-appropriate full VAS compared to those aged 12-60months. Mothers did not see the need to take their children for VAS after completing their 9 months measles immunization schedule, VAS is also incorporated in the immunization services. This is also in agreement with a study in Ghana the difference was attributed to caregivers not taking their children to the health facility after their last vaccination (Hadzi et al., 2016) . In addition, qualitative interviews in the study found that older children were being viewed as a burden to carry coupled with long distances to health facilities affected access.

In agreement to the findings of these study, several previous studies also found high coverage of VAS in children 6-11 months compared to those aged 12-59 months. In a study in Bangladesh, children below 24 months were 38% more likely to have receive VAS compared to those above 24 months (Mostafa et al., 2019). Similarly, a previous study in Kenya, children aged 6-11 months were twice likely to have received VAS during *malezi bora* campaigns than those aged 12-59 months (Clohossey et al., 2014). This was also the case in a study in Brazil where younger age of child (6-11.9 months) was associated with VAS uptake (Lima et al., 2018).There is therefore need for VAS programs to deliberately target children above 12 months to ensure they receive the recommended dosages whether they visit the health facility or not. Scale up programs e.g., child health campaigns, malezi *bora* campaigns have proven to be good strategies to increase coverage among children 12-59 months as these children are reached through door to doors supplementation by CHV, ECDE supplementation and integrated outreaches. Contrary to these findings, few other studies have found older children to be more likely to receive VAS. Data from 23 SSA countries showed older age of the child (12-59 months) to be associated with high VAS coverage (Berde et al., 2019). The reasons for the differences in findings are not known and further research is warranted to understand this. VAS supplementation delivery strategies in health facilities , campaigns and door to door supplementation by CHVs should aim at ensuring that children aged 12-60months are also reached with VAS.

In relation to age of caregiver, the study found that children whose caregiver was 20 years and above were 71% less likely to have received full age-appropriate VAS. The study findings differ from the study in Pakistan that found that maternal age greater than 24 years was positively

associated with VAS(F. Changezi & L. Lindberg, 2017). A multilevel analysis study in Ethiopia found higher age of the child and mother to positively influence VAS (Amare et al., 2023).The reasons for the differences in findings are not known and further research is warranted to understand this. VAS scale up programs therefore need to target caregivers of all age cohorts including more older mothers to ensure improved coverage and avoid missed opportunities. While there was no significant association between level of education and VAS coverage, the in-depth qualitive interviews reported level of education as a key influencer of VAS uptake in the area as most caregivers were illiterate and this hampered health education on the benefits of their children receiving VAS. This also affected their attitude towards VAS and hence did not view it as an important. Unlike in this study several previous studies have found caregivers level of education to influence VAS coverage. High maternal education was previously associated with increased likelihood of the child having received VAS (Berde et al., 2019; Choi et al., 2005; Grover et al., 2008; Marjan et al., 2021; Semba et al., 2010).The findings could be explained by the fact that formal education increases health awareness and ability to comprehend health information. However, contrary results have also been reported in a study in Bangladesh where illiterate parents were associated with high coverage. Children whose mother was illiterate were 43% more likely to have received VAS while those whose father was illiterate were 3% more likely to have received VAS (Mostafa et al., 2019).

As highlighted in the qualitative key informant interviews, illiteracy has played a major role in influencing VAS coverage in the study, there is therefore need for the Government and stakeholders to put in strategies to address these basic and foundational causes among them access to education. There is also need for a Social Behaviour and Communication Strategy (SBCC) strategy that includes translation of VAS messages into the local language to ensure that even the illiterate caregivers comprehended the messages and hence improve knowledge and practice on optimal VAS uptake.

5.2 Caregivers Knowledge, Attitude, and Practice factors associated with VAS Coverage among children 6-60 months

The study found that most caregivers had low to average level of knowledge on VAS. Interviewed mothers reported to lack in depth knowledge on VAS and were unaware of VAS importance which hampered its uptake. The findings are similar to those reported in a

Knowledge , Attitude , Beliefs and Practise (KABP) survey on Maternal Infant and Young Child Nutrition (MIYCN) conducted in Kilifi , in 2017 where they reported that caregivers knowledge and attitude factors play a major role in influencing the caregivers MIYCN practices and hence also influencing VAS coverage (Kilifi County Government 2017) . Similar findings have previously been reported from a facility-based study in Nairobi where lack of information was found as a factor hampering VAS utilization (Kamau et al., 2012). While the quantitative data analysis in this study showed no significant association between knowledge, attitude and VAS coverage, health providers reported that caregivers' knowledge was vital in VAS uptake and utilization. They explained that caregivers with adequate knowledge regarding when their children should receive VAS took their children to the facility to receive it or sent CHV in their cluster to pick them from the health facility.

Key informant interviews with health workers provided further insight into the importance of knowledge and identified several factors that led to the knowledge gap on VAS among caregivers. It was reported that lack of in-depth understanding of what VAS was among some mothers who viewed it as an injection. Knowledge gap, especially on when to take their children for VAS, was highlighted as a reason for low uptake. Most mothers believed that once the nine-month measles immunisation schedule was completed, they did not need to take their children to the health facility again unless the child was ill. This is also in agreement with a study in Ghana where most caregivers did not take their children to the health facility after their last vaccination (Hadzi et al., 2016). Hence, after the nine-month immunisation period, most mothers stopped taking their children to the facility for VAS or growth monitoring. They did not consider VAS to be a vaccine and did not understand its importance to their children, whom they considered growing well with no ill health.

Unlike other diseases e.g., paralysis from Polio, the caregivers could also not visibly see any severe effects due to lack of VAS in their children, and hence they did not take it like a serious immunization, this attitude affected their uptake of VAS as most observed the immunisation schedule but did not bring their children to the facility for VAS after the measles immunization. In addition, while most caregivers receive VAS information from health workers, the health workers found it difficult to explain the importance of VAS to the mothers. There was also lack of clear information of what VAS was and how it related to vaccines, resulting in caregivers

viewing VAS as not beneficial to their children. Besides, the mode of its administration was different from most vaccines.

Most mothers in the sub-county were also reported to be illiterate, which hampered health education to understand the benefits of their children receiving VAS. The high illiteracy was cited as a contributing factor to some of the mothers shying away from taking their children to the health facilities for both immunisation and VAS. Several studies have linked higher maternal education with increased VAS coverage (Berde et al., 2019; Choi et al., 2005; Grover et al., 2008; Marjan et al., 2021; Semba et al., 2010). Information is key in enhancing high VAS coverage, it is an important predictor in the increased coverage .This was demonstrated in a population representative study covering most Sub-Saharan Africa Countries where those who had received information regarding door to door VAS campaign were 6.8 timely more likely to receive it while information increased uptake in those receiving it at fixed site outreach by 72.5 times more than those who did not have information regarding these services (Janmohamed et al., 2017). Another study in Humbo District, Southern Ethiopia also found out that better knowledge about the importance of VAS was positively associated with increased uptake (Kassa et al., 2020). Another study in southern Ethiopia found increasing maternal knowledge on VAS is key in improving coverage (Nigusse & Gebretsadik, 2021) .

All caregivers knew at least one colour of VAS (blue or red) in line with the findings of a previous facility-based study in Nairobi which found that most mothers (90%) knew the colour of the VAS capsule(Kamau et al., 2012). Contrary results were found in Sokoto Nigeria where only 54% of the mothers in the study could correctly identify VAS (Adamu & Muhammad, 2016).

We therefore recommend that stakeholders develop and implement a context specific and robust social behaviour change and communication (SBCC) strategy for VAS to influence the caregiver's knowledge, attitude, and practise on VAS. The SBCC strategy should also target the influencers of the caregivers' decisions. In addition, the strategy should include development and dissemination of Information Education and Communication (IEC) materials for VAS targeting both caregivers and the influencers of decision making e.g., the fathers. The IEC materials for VAS should be translated into local language that both caregivers and community health volunteers even those illiterates can easily comprehend. As a long-term intervention, there is

need to increase access to education as the health workers attributed inadequate caregivers' knowledge and poor attitude on VAS to high illiteracy levels in the area.

5.3 Caregivers Cultural factors associated with VAS coverage among children 6-60months

Quantitative findings of the study did not find any cultural factors associated with VAS which is in agreement with previous study findings in a Kenyan hospital which did not find any cultural beliefs associated with VAS that was likely to be a barrier to its uptake (Kamau et al., 2012). However, we found social issues like father involvement to be associated with VAS uptake. Several interviews highlighted the father, who was the household head being the sole decision maker in several households and in cases where he did not approve their children being taken to the facility for VAS or other routine health matters this sighted as a key barrier to not only the uptake of VAS but other child health services. The importance of involving men in health promotion and health interventions is not a new phenomenon. Others have indicated that male involvement as a key driver in uptake of health services at the household level (Kilifi County Government 2017). More specifically, a study in Sokoto Nigeria also found disapproval of VAS by fathers to be a common barrier to VAS uptake (Adamu & Muhammad, 2016). Another study in Mali recommended VAS campaigns to also target fathers as key decision in VAS uptake (Ayoya et al., 2007).

Several studies have indicated the father /male involvement as a key determinant to the uptake of health services and more so specifically in developing countries. A study in Puntland, Somalia attributed low immunization coverage to lack of father involvement as the key family decision makers (Abdullahi et al., 2020). Another study in Ogun district Nigeria also supported these findings on how men in patriarchal societies of developing countries are often the key decision makers in the households including decisions on health related issues like immunization. (Sodeinde et al., 2020). Another study in Ethiopia found father's disapproval of VAS to be significantly associated with VAS coverage (Berihun et al., 2023).

It is likely that fathers are not adequately engaged on education and awareness regarding VAS and other child health services hence the suggestion made by health workers in the qualitative interviews for the need to engage them to increase VAS coverage. Such issues can well be addressed by engaging fathers also in VAS health education. We therefore recommend VAS strategies that deliberately engage fathers in health education and importance of VAS to raise

awareness and consequently influence their decision making. Father involvement and awareness creation on VAS will help them support their spouses and the household members at large to enhance demand creation and increased uptake of VAS hence improving the coverage .I further recommend that male involvement should come out strongly in the SBCC strategy for VAS.

5.4 Health system factors associated with VAS coverage among children 6-60 months

Even though the existing VAS policy did not to allow or clearly spell out CHVs to deliver VAS through door to door, this was used and found to be the most effective and preferred approach by both the interviewed health workers and caregivers.In this study ,door to door supplementation by community health volunteers was the topmost 332 (76.3%) preferred strategy by caregivers for effective VAS , followed by fixed site like the hospital, child health days like *Malezi bora*, ,ECDEs and day care centers, national immunization days and outreach sites. The study found that door to door VAS by CHVs was conducted during the biannual child health campaigns commonly known as *malezi bora* hence underscoring this campaign as an effective strategy in increasing the coverage. The malezi bora campaign is a national campaign in Kenya aimed at scaling up the maternal child health and nutrition services and is normally conducted every twice a year in May and October, the study area is one of the areas usually targeted for this biannual campaign . Among other VAS scale up interventions during the bi-annual child health campaigns include intensified service delivery at health facilities, integrated outreaches, and supplementation at ECDEs.

The study findings agree with a study in rural parts of Kenya that found out that expanding child health campaigns e.g., *malezi bora* and integrated outreaches is key towards improving VAS coverage (Oiye et al., 2019). Further, the findings are in agreement with a study in 13 SSA countries which found out that strategies e.g. door to door supplementation and outreaches resulted in higher coverage than fixed site approaches (Janmohamed et al., 2017). The restrictions for VAS to be delivered by trained health workers alone was highlighted previously to be a barrier to VAS uptake in Kenya (Murage et al., 2015). This calls for the review of the available policies and development of approaches to train and institutionalize use of CHVs in VAS delivery. There is need for the VAS policy to state out the role of CHVs in VAS and door to door supplementation as one of the delivery points. I also recommend the Government and stakeholders prioritise strategies found to be effective in improving VAS coverage for instance

the bi-annual child health campaigns *(malezi bora)*, door to door supplementation by CHVs, integrated outreaches and intensified supplementation at health facilities to avoid missed opportunities.

The study also found that with the end of the immunization schedule, most mothers did not bring back their children for VAS. In concurrent to this, a previous survey reported low uptake post immunization (Murage et al., 2015). This explains the low coverage among children 12 months and above compared to those 6-11 months. This was also reported in the Kilifi SMART survey in 2016 (KCDH/MoH, 2016). We therefore recommend strategies targeting children above 12 months not coming to the health facilities with supplementation among them the child health campaigns which target all children under five years e.g., *malezi bora*, door to door supplementation, integrated outreaches and ECDE supplementation for the school going children.

The study found that inconsistent supply and VAS stock outs was an issue commonly reported by some health providers, varying form that of the 100,000 IU dose to the 200,000-capsule dose. Related findings were also found in the study by Murage et al., (2015) where the stock out of the 100,000 IU capsules was found to be common. Such stock-outs are likely to limit uptake and discourage caregivers from taking their children to the facility for VAS. We recommend strategies to strengthen the VAS supply chain system to ensure consistent and adequate supply of Vitamin A Capsules. This may include training of health care workers on forecasting and quantification of VAS to ensure consistent and adequate supplies throughout the year. There is also need for timely delivery of VAC upon ordering by the health workers from the central source. Reporting of VAS was also an issue with deliveries not being adequately documented in some instances in the mother child booklet and the health facility registers. Such instances of poor and inadequate documentation were also found in the survey conducted in the 15 Kenyan counties. Such challenges hamper planning as it makes it difficult to determine coverage accurately. We therefore recommend that the documentation and reporting of VAS strengthened both in the mother child booklet and the health facility records which are subsequently reported in the Kenya Health Information System (KHIS).

The distance to the health facility was also reported to affect uptake as some of the mothers could not access the facility for their children to get VAS. As was the case in this study, in a

previous facility-based study in Nairobi, some of the mothers reported the long distance to the facility as the reason why they did not take their children for VAS (Kamau et al., 2012). This calls for need to employ strategies to increase access to VAS services for instance the door-to-door supplementation and integrated outreaches in the hard-to-reach areas.

Mothers who disagreed with the statement that health workers were friendly during their last VAS visit, their children were less likely to have received VAS. This was also reiterated in in-depth interviews where it was reported that some health workers scolded mothers which made them shy away from visiting the health facility again for fear of the same. Like this study, negative attitude of health personnel was also reported previously as a reason why some mothers did not take their children to the health facility for VAS (Kamau et al., 2012). We therefore recommend the need for health workers to always create a friendly environment for the caregivers whenever they come to seek services. From qualitative in-depth interviews, the covid-19 pandemic played a major role affecting the coverage of health and nutrition services. Most health facilities were closed at the beginning of the pandemic and the number of hospital visits by the community reduced due to fear of contacting the virus. Door to door VAS supplementation by CHVs was also restricted and delayed as an infection prevention control measure, this therefore delayed the implementation of the bi-annual malezi bora campaign. This agrees with the study in Kenya that provided insights how the covid-19 pandemic affected the routine health system and continuity of service delivery (Barasa et al., 2021) . We therefore recommend the need for the Government and stakeholders to put in strategies to enhance health system resilience to shocks and pandemics and ensure business continuity process mechanisms are in place to avoid disruption and services delivery, demand, access and subsequently the coverage.

CHAPTER SIX
CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

This study sought to investigate the determinants of Vitamin A Supplementation coverage among children aged 6- 60 months in Ganze Sub-County, Kilifi County, Kenya. The specific objectives were to determine the caregivers' demographic and socio-economic factors; assess the caregivers' knowledge, attitude, and practices factors; explore the caregivers' cultural factors and examine health system-related factors associated with Vitamin A Supplementation coverage among children aged 6-60 months in Ganze sub-county.

Some of the caregivers' demographic and socio-economic variables had a positive and significant association with VAS coverage in Ganze Sub- County . Age of the child (AOR=0.08, 95% CI (0.03, 0.20) emerged to be the most significant influencer of VAS coverage (P-value<0.001); followed by the number of children aged 6-60 months in a household (AOR=2.11, 95% CI (1.24, 3.59), P value=0.006) ; area of residence (AOR=2.08, 95% CI (1.04, 4.18), P-value=0.039) and age of caregiver (AOR=0.29, 95% CI (0.09, 0.96), P-value=0.042). Children residing in rural areas or living within households with 2-3 children aged 6-60 months were more likely to receive full VAS .Those with caregivers older than 20 years were less likely to have received the age-appropriate full VAS .Further to this, children aged 12-60 months were less likely to receive full VAS.

Regarding caregivers' knowledge attitude and practices factors, the qualitative analysis revealed inadequate knowledge on VAS among caregivers to be associated with low VAS coverage. Quantitative analysis of caregivers' knowledge and attitude on VAS variables did not demonstrate a statistically significant association with VAS hence knowledge attitude and practice factors were analysed thematically from qualitative findings.

Concerning caregivers' cultural factors, qualitative analysis revealed issues majorly disapproval of father as the household head as a key determinant of VAS coverage. The father was the household head and the sole decision maker in several households and hence his consent towards VAS uptake was pointed out as a likely factor influencing VAS coverage. Although chi-square analysis indicated religion was significantly associated with VAS (P-value=0.025); upon

univariate analysis , there was no statistically significant association .Other cultural variables among them house ownership, marriage type and cultural beliefs and myths were not significantly associated with VAS. On health system factors, the qualitative analysis revealed door to door supplementation through Community Health Volunteers was the most effective approach and strategy for VAS delivery . Univariate analysis showed those who had the mother-child booklet were more likely to have received full VAS ,OR=1.84, 95% CI (1.07, 3.16), P-value=0.028. In addition health workers being friendly was also strongly associated with higher VAS coverage (AOR=0.25, 95% CI (0.08, 0.74), P-value=0.012). Other variables for instance distance to health facility or being informed on subsequent dose of VAS did not demonstrate a statistically significant association with VAS .

6.2 Policy Recommendations

i. To address caregivers' demographic and socio-economic factors, the Ministry of Health (MOH), County Department of Health (DOH) and stakeholders should implement VAS programs targeting both rural, urban, semi urban areas and caregivers of all age groups to avoid missed opportunities and enhance optimal coverage. Additionally, VAS programs should also deliberately target children above 12 months.

ii. The Ministry of Health, County Department of Health and stakeholders should establish and implement strategies to increase caregivers' knowledge on Vitamin A Supplementation.

iii. Regarding cultural factors, the County Department of Health and stakeholders should implement VAS programs and strategies that purposefully target men /fathers being the household decision makers regarding VAS service uptake.

iv. On health system factors, the County Department of Health should up-scale and sustain effective approaches and strategies for VAS service delivery. Specifically, the door to door Vitamin A supplementation by Community Health Volunteers as evidenced by the findings, should be strengthened to increase VAS coverage.

6.2.1 Recommendations for further research

There is need for further research on likely reasons for lower VAS coverage among children of older caregivers above 20 years, compared to children of younger caregivers below 19 years. Further reasons why in some studies and depending on the context, VAS coverage is likely to be higher in rural areas compared to semi-urban or urban areas.

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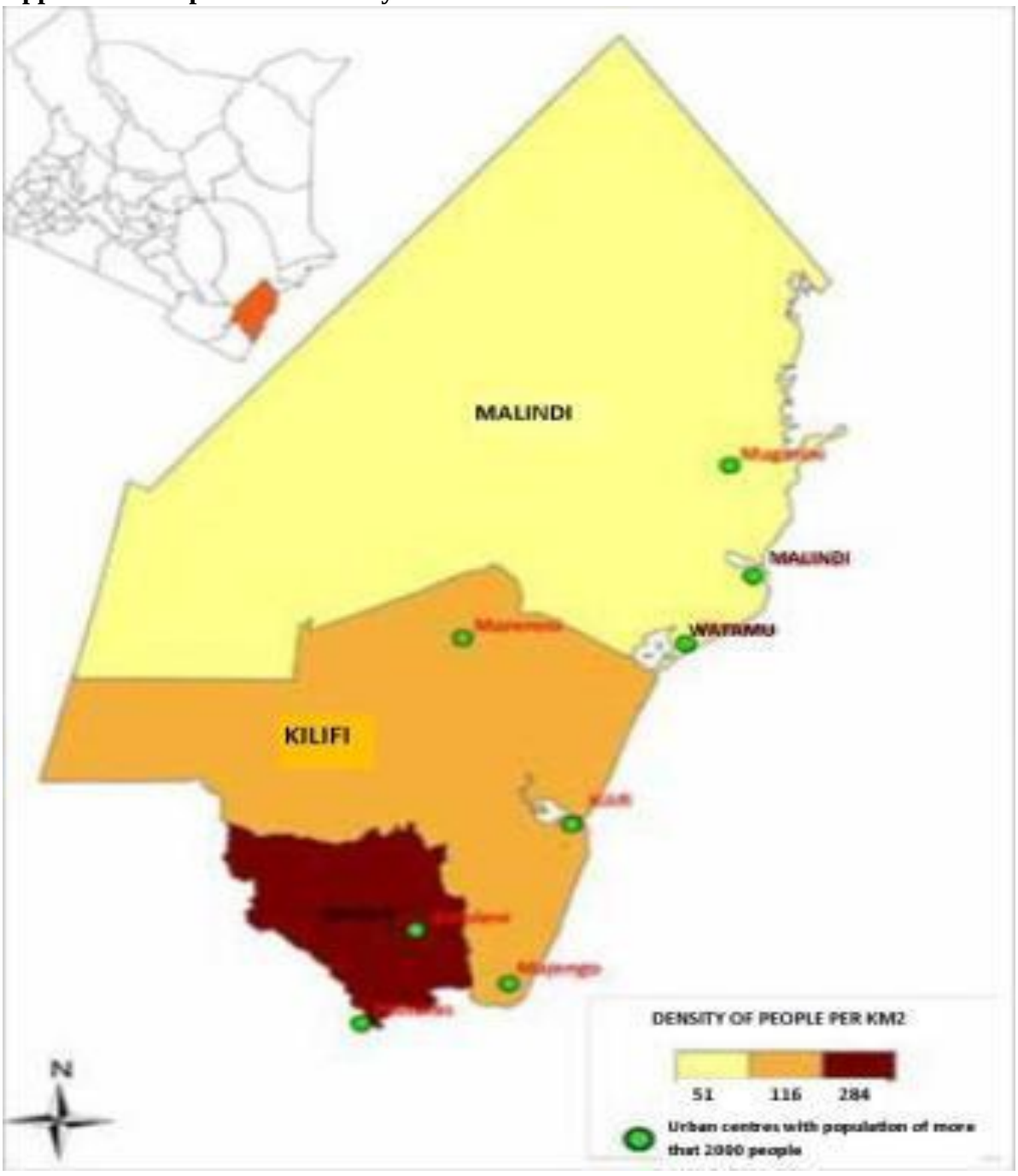
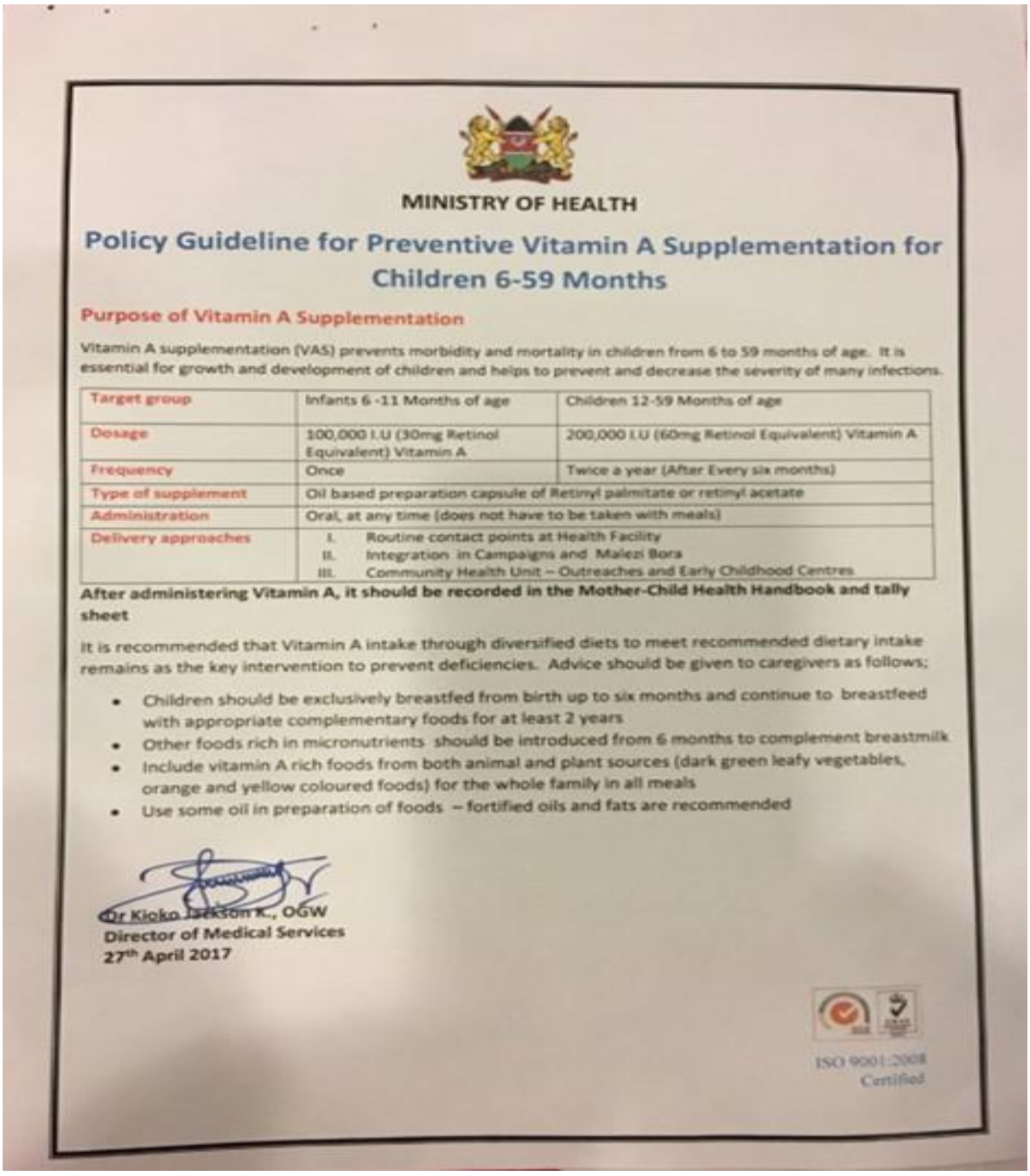
APPENDICES

Appendix I: Map of Kilifi County



Appendix II: Ministry of Health Policy guideline for preventive Vitamin A Supplementation for Children 6-59 months



MINISTRY OF HEALTH

Policy Guideline for Preventive Vitamin A Supplementation for Children 6-59 Months

Purpose of Vitamin A Supplementation

Vitamin A supplementation (VAS) prevents morbidity and mortality in children from 6 to 59 months of age. It is essential for growth and development of children and helps to prevent and decrease the severity of many infections.

Target group	Infants 6 -11 Months of age	Children 12-59 Months of age
Dosage	100,000 I.U (30mg Retinol Equivalent) Vitamin A	200,000 I.U (60mg Retinol Equivalent) Vitamin A
Frequency	Once	Twice a year (After Every six months)
Type of supplement	Oil based preparation capsule of Retinyl palmitate or retinyl acetate	
Administration	Oral, at any time (does not have to be taken with meals)	
Delivery approaches	I. Routine contact points at Health Facility II. Integration in Campaigns and Malezi Bora III. Community Health Unit – Outreaches and Early Childhood Centres	

After administering Vitamin A, it should be recorded in the Mother-Child Health Handbook and tally sheet

It is recommended that Vitamin A intake through diversified diets to meet recommended dietary intake remains as the key intervention to prevent deficiencies. Advice should be given to caregivers as follows;

- Children should be exclusively breastfed from birth up to six months and continue to breastfeed with appropriate complementary foods for at least 2 years
- Other foods rich in micronutrients should be introduced from 6 months to complement breastmilk
- Include vitamin A rich foods from both animal and plant sources (dark green leafy vegetables, orange and yellow coloured foods) for the whole family in all meals
- Use some oil in preparation of foods – fortified oils and fats are recommended

Dr Kioko Jackson K., OGW
Director of Medical Services
27th April 2017

ISO 9001:2008 Certified

Appendix III: Information sheet and Consent form for household interviews with mothers- extract

Below is an extract of what was read to the caregivers before the interview:

Purpose of research study/project**:** The purpose of this research study is to investigate the determinants Vitamin A Supplementation uptake and coverage among children aged 6- 60 months in Ganze Sub- County, Kilifi County, Kenya. The findings of this study will help inform the improvement of Vitamin A Supplementation programs and in increasing its coverage.

Part I: Information Sheet

Introduction:

You are being asked to take part in a research study. This information is provided to tell you about the study. Please read this form carefully. You will be given a chance to ask questions. If you decide to be in the study, you will be given a copy of this consent form for your records.

Taking part in this research study is voluntary. You may choose not to take part in the study. You could still receive other treatments. Saying no will not affect your rights to health care or services. You are also free to withdraw from this study at any time. If after data collection you choose to quit, you can request that the information provided by you be destroyed under supervision- and thus not used in the research study. You will be notified if new information becomes available about the risks or benefits of this research. Then you can decide if you want to stay in the study

Description of the research study/project:

This research project is part of my Master of Public Health Course requirements. This study will be looking at the determinants of Vitamin A Supplementation Uptake and Coverage among Children Aged 6-60 Months. The study aims at understanding those factors that affect the uptake of VAS in the community and the reasons for the low VAS uptake and coverage. To be able to understand this, the study aims at interviewing mothers and /or caretakers of children within the age bracket of 9 – 59 months, which is the group for whom VAS is recommended.

The questionnaire containing your information will be securely stored for a period of 10 years before being destroyed.

Type of Research Project/Intervention:

If you agree to be in this study, you will be asked to sign and date this consent form. You will be interviewed by the study research using a questionnaire regarding your child's Vitamin A Supplementation uptake. You will be asked about your cultural, social and demographic and knowledge attitude and practice information with regards to Vitamin A. supplementation.

Participation in this study is voluntary. Refusal to participate will not affect your position or job status in any way.

Why have I been identified to Participate in this study?

You have been chosen to participate in this study because you are a mother/ caretaker of a child aged 6- 59 months.

How long will the study last? Your participation in this study will only involve being asked questions by the researcher using a questionnaire, which is estimated to take 30- 45 minutes.

What will happen to me during the study?
During the study, we will ask you general questions about yourself and your child, questions on whether your child received Vitamin A Supplementation and factors associated with Vitamin A uptake. We will also use your mother child clinic to check on Vitamin A Supplementation status for your child.

Potential Benefits:
You will not receive any direct benefits by participating in this study. However, your participation will help us understand the factors that hinder or promote Vitamin A supplementation uptake hence the results of this study will be key in improving VAS uptake. This will in turn help save many lives of young children through increased VAS uptake and coverage.

Confidentiality:
Your name will not be mentioned anywhere on the study questionnaire, but codes will be used instead. The information you provide will be held in a confidential manner and will only be shared among the study team; that is the student and the supervisors. The collected data will be stored in a lockable cabinet. The data will be entered onto a password protected computer.

Reimbursement: You will not receive any compensation for your participation or for your time in this study.

Part II: Consent of Subject:
I have read or have had read to me the description of the research study. The investigator or his/her representative has explained the study to me and has answered all the questions I have at this time. I have been told of the potential risks, discomforts, and side effects as well as the possible benefits (if any) of the study. I freely volunteer to take part in this study.

_____	_____	
Name of Participant (Witness to print if the Subject is unable to write.	Signature of subject/thumbprint	Date & Time
_____	_____	
Name of Representative/Witness	Relationship to Subject	
_____	_____	_____
Name of person Obtaining Consent	Signature of person Obtaining Consent	Date
_____	_____	_____
Printed name of Investigator	Signature of Investigator	Date

Appendix IV: Information sheet and Consent form for Key Informant Interviews
Below is an extract of what was read to the caregivers before the interview:

Part I: Information Sheet

Introduction:
You are being asked to take part in a research study. This information is provided to tell you about the study. Please read this form carefully. You will be given a chance to ask questions. If you decide to be in the study, you will be given a copy of this consent form for your records.

Taking part in this research study is voluntary. You may choose not to take part in the study. Saying no will not affect your rights to health care or services. You are also free to withdraw from this study at any time. If after data collection you choose to quit, you can request that the information provided by you be destroyed under supervision- and thus not used in the research study. You will be notified if new information becomes available about the risks or benefits of this research. Then you can decide if you want to stay in the study

Description of the research study/project:
This research project is part of my master's degree requirements. This study will be looking at the determinants of Vitamin A Supplementation Uptake and Coverage among Children Aged 6-60 Months. The study aims at understanding those factors that affect the uptake of VAS in the community and the reasons for the low VAS uptake and coverage. As part of this study, we are interviewing stakeholders involved in Vitamin A Supplementation programs in the county to understand the factors hindering the program and the challenges encountered.

Why have I been identified to Participate in this study? You have been chosen to participate in this study because you are a stakeholder involved in Vitamin A supplementation program in this county.

What will happen to me during the study? During the study, we will ask you general questions about yourself, the VAS program you have been involved in, the challenges faced, hindrances and ways of improving VAS uptake and coverage.

Potential Benefits: You will not receive any direct benefits by participating in this study. However, your participation will help us understand the factors that hinder or promote Vitamin A supplementation uptake hence the results of this study will be key in improving VAS uptake and coverage. This will in turn help save many lives of young children through increased VAS uptake and coverage.

Confidentiality: Your name will not be mentioned anywhere during the interview, but codes will be used instead. The information you provide will be held in a confidential manner and will only be shared among the study team; that is the student and the supervisors. The consent forms will be stored in a lockable cabinet. The data will be entered onto a password protected computer.

Reimbursement:

You will not receive any compensation for your participation or for your time in this study.

Contact:

For any questions or concerns about a study/project or in the event of a study/project-related injury, kindly contact the researcher on the following contacts: Jardine Ngolo, Phone No: 0727375479. Physical address; P.O. BOX, Private Bag, Maseno.

Part II: Consent of Subject:

I have read or have had read to me the description of the research study. The investigator or his/her representative has explained the study to me and has answered all of the questions I have at this time. I have been told of the potential risks, discomforts and side effects as well as the possible benefits (if any) of the study. I freely volunteer to take part in this study.

_____	_____	_____
Name of Participant (Witness to print if the Subject is unable to write.	Signature of subject/thumbprint	Date & Time
_____	_____	
Name of Representative/Witness	Relationship to Subject	
_____	_____	_____
Name of person Obtaining Consent	Signature of person Obtaining Consent	Date
_____	_____	_____
Printed name of Investigator	Signature of Investigator	Date

Appendix V: Questionnaire for caregivers with children 6-60months
ALL QUESTIONS ARE TO BE ADDRESSED TO MOTHERS WITH A CHILD BETWEEN 6 MONTHS AND 60 MONTHS OF AGE

Interviewer's Name /Code	
Interview Date	
Village Name	
Cluster Number	
Household Number	

Do you have a child below between 6 to 59 months years of age?

1. Yes [ ] 2. No [ ]

If yes, proceed to the next section.

Section A: Demographic information

1.1 Age of the respondent in years …….
1.2 What is your religion?

1. Christian [ ] 2. Muslim [ ] 3. Hindu [ ] 4.None [ ] 5.Others, specify [ ]

1.3 Marital status

1. Single [ ] 2. Married [ ] 3. Divorced [ ] 4. Widowed [ ] 5.Cohabiting [ ]

1.4 What is your occupation?

1. Formal employment [ ]
2. Informal employment [ ]
3. Casual labour [ ]
4. Own business [ ]
5. Petty trading /hawking [ ]
6. Farming [ ]
7. Pastoralist [ ]
8. Dependant [ ]
9. Housewife [ ]
10. Others…specify…

1.5. What is your area of residence?

1. Urban [ ] 2. Semi- urban [ ] 3. Rural [ ]

1.5 What is the highest level of education you have :

1. None [ ]

2. Primary school not completed [ ]
3. Primary school completed [ ]
4. Secondary school not completed [ ]
5. Secondary school completed [ ]
6. University /college [ ]
7. Others. Specify……

Section B: Information about the child (including practise on Vitamin A Supplementation)

2.1 How many children of age 6 -59 months do you have in your household?
……

(If more than 1, select 1 for the purpose of this study using random sampling).

2.2 Do you have a child health card?

1. Yes [ ] 2. No [ ]

2.3 What is the age of the selected child? In months, verify by card……
2.4 What is child's birth date, Date/ Month /Year ……..
2.5 Verification of the age of the child, how was the child's age verified:

1. Health card [ ]
2. Birth certificate/ notification [ ]
3. Baptism calendar [ ]
4. Recall [ ]
5. Other, specify [ ]

2.6 What is the gender of the child?

1. Male [ ] 2. Female [ ]

2.7 Where did you deliver your child (name?)

1. Public Health facility [ ]
2. Private health facility [ ]
3. Home delivery [ ]
4. Others, specify ……..

2.8 Has your child (name) ever received a Vitamin A Supplement like this? Show the samples capsule of the respective strength *(verify by card)*

1Yes [ ] verified by card, 2. Yes verified by recall [ ] *2.* No [ ] 3. Do not know [ ]

2.9 If yes in 2.8, what was the colour of the capsule? 1. Blue [ ] 2. Red [ ] 3. Don't know [ ] 4. Others, [ ] specify

2.10 If NO above, why did the child not receive Vitamin A:

1. I am not aware of it [ ]

2. It is not available in our health facilities [ ]
3. The health facility is too far [ ]
4. Do not know [ ]
5. Others [ ], ……..

2.11 If yes in Qs 2.8, how many times has your child received the Vitamin A Supplement in the past 12 months? *Verify by card. ,*

1. Once -Verified by card [ ]
2. Twice-verified by card [ ]
3. More than twice –verified by card [ ]
4. Once- by recall [ ]
5. Twice –by recall [ ]
6. More than twice – by recall [ ]

2.12 Where did your child receive your last dose of Vitamin A Supplementation?

1. At the Health facility [ ]
2. At the ECDE [ ]
3. At the outreach [ ]
4. During child health campaign *(malezi bora) [ ]*
5. In my household during household visits by community health volunteers [ ]
6. Do not know [ ]
7. Other , [ ] specify

2.13 Where does your child usually receive Vitamin A Supplementation services?

1. At the Health facility [ ]
2. At the ECDE [ ]
3. At the outreach [ ]
4. During child health campaign*(malezi bora) [ ]*
5. In my household during household visits by community health volunteers [ ]
6. Do not know [ ]
7. Other , specify [ ]

2.14 When your child last received Vitamin A Supplement, did the health worker inform you the next time or date to bring your child back for another dose?

1. Yes [ ]
2. No [ ]
3. Do not know [ ]

2.15 If yes, in 2.8 how many doses of Vitamin A Supplementation/ times since the child turned six months?

1. 1 dose [ ]
2. 2 doses [ ]
3. 3 doses [ ]
4. 4 doses [ ]
5. 5 doses [ ]
6. 6 doses [ ]
7. 7 doses [ ]
8. 8 doses [ ]
9. 9 doses [ ]
10. 10 doses[ ]

Section C: Knowledge and attitude towards VAS

3.1 What are the main sources of Vitamin A?

1. Green leafy vegetables [ ]
2. Yellow fleshed fruits and vegetables e.g. mangoes, carrots, paw paws [ ]
3. Other fruits and vegetables: name them [ ]
4. Cereals and starches e.g. rice, ugali, wheat [ ]
5. Meat, eggs or poultry [ ]
6. Dairy and dairy products e.g milk, yoghurt, mala [ ]
7. Breastfeeding [ ]
8. Do not know. [ ]

3.2 Why do you think is the importance of Vitamin A and why does your child need it?

1. To protect the child against diseases [ ]
2. To protect the eyesight and prevent night blindness [ ]
3. To help the child grow strong [ ]
4. Prevents vitamins and mineral deficiency [ ]
5. It is not necessary [ ]
6. Others [ ], specify

3.3 Have you ever received information about Vitamin A Supplementation? (Show the samples of both strength)

1. Yes [ ]
2. No [ ]

3.4 If yes in Qs 3.3 , from whom/ where do you receive / have you received information about Vitamin A Supplementation?

1. Health worker/ health facility [ ]
2. Community health volunteers [ ]
3. Integrated health Outreaches [ ]
4. Child health campaigns [ ]
5. Print media [ ]
6. Electronic media [ ]
7. ECDE [ ]
8. Day care centre [ ]
9. Relative [ ]
10. Others, [ ], specify……..

3.5 If yes in Q 3.3 what kind of information regarding Vitamin A Supplementation do you normally receive from health workers?

1. Importance of Vitamin A [ ]
2. Food sources of Vitamin A [ ]
3. Vitamin A Supplementation schedule and age cohorts [ ]
4. None [ ]

5. Do not know [ ]
6. Other, specify [ ]

3.6 Do you normally receive counselling on Vitamin A Supplementation from health workers all the time your take child for supplementation?

1. Yes [ ]
2. No [ ]

Caregivers' Knowledge on Vitamin A Supplementation

3.7 Why do you think is the importance of the Vitamin A Supplementation and why does your child need it?

1. To protect the child against diseases [ ]
2. To protect the eyesight and prevent night blindness [ ]
3. To help the child grow strong [ ]
4. Prevents vitamins and mineral deficiency [ ]
5. Improves child's appetite [ ]
6. It is not necessary [ ]
7. Other…specify [ ]

3.8 When the child(name) does not receive enough Vitamin A Supplementation, what illness may she /he suffer from:

1. Night blindness [ ]
2. Malnutrition [ ]
3. Diarrhoea [ ]
4. Measles [ ]
5. Malaria [ ]
6. Worm infestation [ ]
7. None [ ]
8. Do not know [ ]
9. Other.. specify [ ]

3.9 At what Age should first administration of Vitamin A to the child be done?

1. At birth [ ]
2. 6 months 198 [ ]
3. 9 months [ ]
4. Do not know 189 [ ]
5. Other, [ ] specify……..

3.10 How often children should receive vitamin A

1. At each clinic visit [ ]
2. Every six months [ ]

3. Does not know [ ]

4. Other, [ ] specify ……..

Caregivers' Attitude on Vitamin A Supplementation

3.11 Do you think vitamin A is useful to the children?

1. Yes [ ]

2. No [ ]

3.12 Would you advise other mothers to take their children for vitamin A supplementation?

a) Yes [ ]

b) No [ ]

3.13 If not, why?

……
……
……

3.14 Have you ever discussed about Vitamin A supplementation with other mothers / people?

a) Yes [ ]

b) No [ ]

3.15 If yes, what did you discuss?

……
……
……

3.16 In your opinion at what age should a child (name) receive the first dose of Vitamin A supplement?

1. At one month [ ]
2. At two months [ ]
3. At three months [ ]
4. At four months [ ]
5. At five months [ ]
6. At six months [ ]
7. At nine months [ ]
8. Do not know [ ]
9. Others [ ], specify

3.17 How often should you take a child (name) to the health facility to receive Vitamin A?

1. Once a month [ ]
2. Every three months [ ]
3. Every four months [ ]
4. Every six months [ ]
5. Once a year [ ]
6. Other [ ], specify ……
7. Do not know [ ]

3.18 In your opinion, do you think it is necessary to take your child (name) to the health facility to receive Vitamin A supplement even when she/he is not ill?

1. Yes [ ]
2. No [ ]
3. Do not know [ ]

3.19. If yes in Qs 3.18 why is it necessary to take your child to the health facility or any other service delivery site to receive Vitamin A Supplement even when he/she is not ill?

1. To protect the child against diseases [ ]
2. To protect the eyesight and prevent night blindness [ ]
3. To help the child grow strong [ ]
4. Other [ ], specify

Section D: Social factors

4.1 Do you own the house you live in?

1. Yes [ ] 2. No [ ]

4.2 Do you have any beliefs or cultural myths that affect your attitude, opinion or practice towards Vitamin A supplementation to your child?

1. No [ ]
2. Yes [ ], specify……..

4.3 Does this community have any cultural beliefs and opinions towards Vitamin A Supplementation for children?

1. Yes [ ]
2. No [ ]

4.4If yes above , please name some of the cultural myths and beliefs:

1. Child will paralyse [ ]
2. It is family planning method [ ]
3. Child will vomit
4. Child will not grow well [ ]
5. It is has a bad taste [ ]
6. Other [ ] ,specify

Section E: Cultural factors

5.1 Is your family polygamous?

1. Yes [ ] 2. No [ ]

5.2 Are there beliefs against VAS in your community?

1. Yes [ ] 2. No [ ]

5.3 If yes, give examples

……
……
……

Section G: Health system related factors

7.1 What is the distance to the nearest health facility?

1. Less than 3kilometers (<30 minutes' walk) [ ]
2. 3-5 km (30 minutes -1 hour walk) [ ]
3. 5-10km (1-2hour walk) [ ]
4. More than 2km (above 2 hours walk). [ ]

7.2 When do you normally take (name of child) to the health facility .

1. When a child is sick [ ]
2. Rarely visit [ ]
3. For immunization [ ]
4. For growth monitoring [ ]
5. For Vitamin A Supplementation [ ]
6. Other, [ ] specify…….

7.3 Were you informed by the health worker about when the child should receive the subsequent VAS dose?

1. Yes [ ]
2. No [ ]

7.4 What challenges have you encountered when seeking for VAS services from the health facility?

……
……

7.5 What are your experiences at the hospital in relation to VAS (with staff / supply)?

……
……

7.6 Which strategy would you recommend for best delivery of Vitamin A supplementation?

1. National immunization days (NIDs) [ ]
2. Child health days *e.g Malezi bora* [ ]
3. Fixed site like hospital [ ]
4. Outreach sites
5. Others [ ] (specify) ……

7.7 Do you agree that health workers or are friendly during Vitamin A Supplementation.

1. I strongly agree [ ]
2. I agree [ ]
3. I am not sure/ undecided [ ]
4. Disagree [ ]
5. Strongly disagree [ ]

7.8 Do you agree that health workers counsel mothers on the importance of Vitamin A Supplementation?

1. I strongly agree [ ]
2. I agree [ ]
3. I am not sure/ undecided [ ]
4. Disagree [ ]
5. Strongly disagree. [ ]

7.9 Have you ever taken your child to the health facility for Vitamin A Supplementation and was sent back because there was no Vitamin A?

1. Yes [ ]
2. No [ ]
3. Don't know [ ]

END OF QUESTIONAIRRE

Thanks!

Appendix VI: Key Informant Interview guide for County, sub county health management team and implementing partners.

DETERMINANTS OF VITAMIN A SUPPLEMENTATION UPTAKE AND COVERAGE AMONG CHILDREN AGED 6-60 MONTHS IN GANZE SUB COUNTY, KILIFI COUNTY, KENYA.

KEY INFORMANT GUIDE FOR COUNTY, SUB COUNTY HEALTH MANAGERS AND IMPLEMENTING PARTNERS.

Dear County / Sub County health manager/ implementing partner

In collaboration with your department (Kilifi County Department of Health Services) and Ganze sub county health management team, we are collecting data on determinants of Vitamin A Supplementation uptake and coverage among children 6-59 months in Ganze sub county.

The information we collect will help to department of health plan for health and nutrition services in the sub county and the county at large. The information is also intended to help complete an MPH course. The information you provide will be treated with confidentiality. Kindly provide as much information as possible. With your consent, I will appreciate your participation in the interview. The interview will take about 30 minutes. Thank you.

1. What is your role in the county department of health services. How are you involved in Vitamin A Supplementation program for children 6-59 months in Ganze Sub County or Kilifi County at large?
2. Tell us how Vitamin A Supplementation services for children 6-59 months are offered in your sub county and at health facilities, how effective is the program and do the health workers have the adequate capacity to offer these services.
    i. What is the effectiveness and the coverage of the Vitamin A Supplementation program in health facilities in Ganze Sub County and what strategies has the department of health put in place to increase coverage?
    ii. What would are the factors that facilitate Vitamin A Supplementation program in Ganze Sub County?
    iii. What is the level of community awareness in your catchment area regarding Vitamin A Supplementation in Ganze Sub County? Probe on where do mothers in Ganze Sub County mostly receive their Vitamin A?
    iv. In your opinion what would you say are the barriers to the Vitamin A Supplementation program in Ganze Sub County?

3. What are some of the factors that influence Vitamin A Supplementation program uptake and coverage in your sub county?
4. Explain to me about the Vitamin A Supply chain system from the source to the health facilities in Ganze Sub County. What are the strengths of the VAS supply chain and are the areas of weakness /challenges. Probes:
    i. How do you get Vitamin A Supplements and how consistent is the supply of VAS to health facilities?
    ii. What is the current and previous stock status, have you had any stock outs and what is the longest time the sub county has been out of stock
    iii. Generally what strengths and challenges do you have regarding Vitamin A Supply chain in your sub county?
    iv. What recommendations will you give to improve or sustain a smooth VAS supply chain in your sub county?
5. Tell us more about the leadership and coordination of Vitamin A Supplementation program in Ganze Sub County
    i. What challenges does the overall Vitamin A Supplementation program implementation face at health facility, sub county or county?
    ii. What are some of the strategies the department of health has put in place to increase Vitamin A Supplementation coverage among children 6-59 months?
    iii. What opportunities does the sub county/ health facilities have and normally uses to address Vitamin A Supplementation program challenges?
6. How is Vitamin A Supplementation information and data managed at health facility, Sub County, and county level?
    i. How does the sub county document and report on Vitamin A Supplementation services provided in the health facilities.
    ii. How often do you or health management team conduct Vitamin A Supplementation support supervision to the health facilities?
7. Please make suggestions for the way forward in the efforts to improve Vitamin A Supplementation coverage in this sub county.

END OF QUESTIONNARE

Thank you for participating.

Appendix VII: Key Informant Interview guide for health facility staff including community health extension workers.

DETERMINANTS OF VITAMIN A SUPPLEMENTATION UPTAKE AND COVERAGE AMONG CHILDREN AGED 6-60 MONTHS IN GANZE SUB COUNTY, KILIFI COUNTY, KENYA

Key Informant Guide for health facility staff in charge or those in charge of the mother child health clinic or community health extension workers.

Dear Health Worker, e.g., Nurse

In collaboration with the Kilifi County Department of Health services and Ganze sub county health management team, we are collecting data on determinants of Vitamin A Supplementation uptake and coverage among children 6-59 months in Ganze sub county.

The information we collect will help to department of health plan for health and nutrition services in the sub county and the county at large. The information is also intended to help complete an MPH course. The information you provide will be treated with confidentiality. Kindly provide as much information as possible. The interview will take about 30 minutes. With your consent, I will appreciate your participation in the interview. Thank you.

1. What is your role / cadre in this health facility or community health unit?
2. Are you involved in Vitamin A Supplementation activities for children 6-59 months in the health facility? If yes above, what are your main roles regarding Vitamin A Supplementation for children 6-59 months in the health facility?
3. Tell us how you offer Vitamin A Supplementation services for children 6-59 months in your health facilities, how effective is the program and does your health facility have the adequate capacity to offer these services. Probes:
    i. At what age do we first administer Vitamin A Supplementation to children in your health facility? What is the frequency of administering Vitamin A Supplementation to children 6-59 months in your health facility?
    ii. Does the community have any beliefs or cultural practices that affect Vitamin A Supplementation program? If yes, please elaborate/ name them.
    iii. Where do mothers within your catchment area mostly receive their Vitamin A?
    iv. What do you think are some reasons why some mothers do not bring their children to the health facility for Vitamin A Supplementation?
    v. How do you normally give information to the mothers on VAS? Probe on counselling, health talk schedule to mothers on Vitamin A Supplementation.
    vi. What kind of information on Vitamin A do you pass to the mothers? Probe on at point and how do you communicate to mothers about Vitamin A Supplementation and whether mothers are informed on the next schedule for Vitamin A Supplementation?
4. What are the main factors that influence Vitamin A Supplementation uptake and coverage in your health facility and the catchment area?
5. Tell us about the capacity of your health facility to offer Vitamin A Supplementation services, is there adequate capacity to offer those services. Probes:
    1. Have you or any of your health facility staff in this facility trained or sensitized on Vitamin A Supplementation?
    2. Do you have any Vitamin A Supplementation policies or guidelines available in your health facility?

3. Do you have IEC materials on Vitamin A Supplementation, if yes are these materials disseminated to the mothers?

6. How do you normally manage Vitamin A Supplementation information and data in your health facility? Probes:
    1. Do you have all the Vitamin A Supplementation recording and documenting tools at the health facility? Yes or No, If Yes, name them.
    2. How do you normally document Vitamin A Supplementation services in the mother child booklet?
    3. How do you normally document and report on Vitamin A Supplementation services to the sub county level or to the health information system?
7. . Explain to me about the Vitamin A Supply chain system from the source all the way to your health facility. What are the strengths of the VAS supply chain and are the areas of weakness /challenges. Probes:
    1. Do you currently have Vitamin A in your health facility and is Vitamin A always available at the health facility?
    2. How do you normally receive Vitamin A at the health facility and what is the source of the Vitamin A and how often do you normally receive Vitamin A stock?
    3. What is longest time the health has ever been out of stock of Vitamin A and what do you normally do when you are out of stock Vitamin A?
    4. Upon having Vitamin, A stock out, how fast do you receive another stock?
    5. What challenges do you face with the Vitamin A Supply chain system?
8. Tell us more about the leadership and coordination of Vitamin A Supplementation program in Ganze Sub County. Probes:
    1. What is the state of Vitamin A Supplementation coverage or uptake among children 6-59 months in your sub county?
    2. How often does the sub county health management team conduct Vitamin A Supplementation support supervisions at your health facility?
    3. What challenges does the overall Vitamin A Supplementation program implementation face at the health facility level?
    4. What opportunities does the health facility have and normally uses to address Vitamin A Supplementation program challenges?
    5. What challenges and opportunities exist in the implementation of Vitamin A Supplementation program in your sub county?
9. . Please make suggestions for the way forward in the efforts to improve Vitamin A Supplementation coverage in this sub county and in your health facility.

END OF QUESTIONNARE

Thank you for participating.

Appendix VIII: Variable measurements and definitions.

NO	Characteristics	Definition of variable
1	**Dependent variable at sub-county level**	
	Vitamin A Supplementation Coverage	Having received age-appropriate full age-appropriate VAS doses in the previous 12 months [Binary Variable-Yes/No]
2	**Independent variables**	
i)	**Socio-demographic variables**	
	Age of the child	What is the age of the selected child? [Continuous]
	Gender of child	How many children of age 6 -59 months do you have in your household? [Continuous variable]
	Age of caregiver	Age of the respondent in years (Continuous variable)
	Gender	Gender of caregiver [Binary variable]
	Level of education	What is the highest level of education? [Categorical variable]
	Marital status	Marital status [Categorical variable]
	Occupation	What is your occupation? [Categorical variable]
	Areas of residence	What is your area of residence? [Binary variable]
	Number of children aged 6-60 months in household	How many children aged 6-60 months live in your household [Continuous variable]
ii	**cultural variables**	
	Religion	What is your religion? [Categorical variable]
	cultural myths	Do you have any beliefs or cultural myths that affect your attitude, opinion, or practice towards Vitamin A supplementation to your child?[Binary variable].
	House ownership	Do you own the house you live in? [binary]
	Family type	Is your family polygamous? [binary]
	Beliefs on VAS	Are there beliefs against VAS in your community? [binary]
iii	**Health system factors**	
	Distance from nearest health facility	What is the distance to the nearest health facility? [categorical Variable]
	Place of VAS	Where did your child receive your last dose of Vitamin A Supplementation?
	Place of delivery	Where did you deliver your child?
	Informed of date for next VAS	Did the health worker inform you the next time or date to bring your child back for another dose?
	Time period for taking child for VAS	When do you normally take (name of child) to the health facility [Categorical]
	Preferred VAS delivery strategy	Which strategy would you recommend for best delivery of Vitamin A supplementation? [Binary variable]
	Counselling on VAS	Health workers counsel mothers on the importance of Vitamin A Supplementation [Binary variable]
	VAS Stock out	1 Have you ever taken your child to the health facility for Vitamin A Supplementation and was sent back because there was no Vitamin A? Binary variable]
iv)	**Knowledge and attitude variables**	
	Knowledge on VAS	Knowledge scores on VAS [Binary variable]
	Attitude on VAS	Attitude score on VAS [Binary variable]

Appendix IX :Univariate analysis of cultural factors.

Characteristic	Odds	OR	95%CI of OR	P-value
Religion				
Christians	158/167	1		
Muslims	16/30	0.564	0.296, 1.074	0.081
None	39/25	1.649	0.954, 2.850	0.073

Appendix X: Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **838680**

Date of Issue: **15/May/2020**

RESEARCH LICENSE

This is to Certify that Ms.. Jardine Wughanga Ngolo of Maseno University, has been licensed to conduct research in Kilifi on the topic: DETERMINANTS OF VITAMIN A SUPPLEMENTATION UPTAKE AND COVERAGE AMONG CHILDREN AGED 6-60 MONTHS IN GANZE SUB COUNTY, KILIFI COUNTY, KENYA for the period ending : 15/May/2021.

License No: **NACOSTI/P/20/4958**

838680

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

Appendix XI: Research Authorization Letter

COUNTY GOVERNMENT OF KILIFI

DEPARTMENT OF HEALTH SERVICES

When Replying quote
Email; chmtkilifi@gmail.com
REF: KLF/DH/DOM/VOL.3/73

P. O. Box 9-80108
Kilifi

Date: 26th June 2020

OFFICE OF THE COUNTY DIRECTOR OF HEALTH

Jardine Wughanga Ngolo
Maseno University, Department of Public Health
School of Public Health and Community Development
Reg No. EL/ESM/00680/2014

Dear Madam,

RE: DEPARTMENTAL AUTHORIZATION TO CARRY OUT RESEARCH IN KILIFI COUNTY

The Kilifi County Department of Health Services is in receipt of your request to conduct a study titled, **"Determinants of vitamin a supplementation uptake and coverage among children aged 6-60 months in Ganze sub county, kilifi county, Kenya"** that has received ethical and scientific approval from Maseno University Ethics Review Committee ***Ref:*** **MSU/DRPI/MUERC/00813/19** and NACOSTI permit ***License No:*** **NACOSTI/P/20/4958.**

The Department is glad to grant you authorization to conduct your study within **Ganze Sub County** in line with the approved study protocol and within the expiry date of NACOSTI permit **May 15th, 2021**. It is required that you engage the sub County administration prior to commencing data collection.

Upon completion of the study, you are required to share your study findings, conclusion and recommendations with the County Director, Department of Health Services, Kilifi County.

COUNTY DIRECTOR OF HEALTH
KILIFI COUNTY
26 JUN 2020
P.O. Box 9 - 80108, KILIFI

Dr. Cecilia Wamalwa
For; County Director of Medical Services
KILIFI COUNTY

cc
- County Executive Committee Member
- Chief Officers –Medical Services & Public Health

Appendix XII: SGS Approval Letter

MASENO UNIVERSITY
SCHOOL OF GRADUATE STUDIES
Office of the Dean

Our Ref: EL/ESM/00680/014

Private Bag, MASENO, KENYA
Tel:(057)351 22/351008/351011
FAX: 254-057-351153/351221
Email: sgs@maseno.ac.ke

Date: 13th November, 2019

TO WHOM IT MAY CONCERN

RE: PROPOSAL APPROVAL FOR JARDINE WUGHANGA NGOLO — EL/ESM/00680/014

The above named is registered in the Master of Public Health degree programme in the School of Public Health and Community Development, Maseno University. This is to confirm that her research proposal titled "Determinants of Vitamin A Supplementation Uptake and Coverage among Children Aged 6-60 Months in Ganze Sub County,Kilifi County, Kenya" has been approved for conduct of research subject to obtaining all other permissions/clearances that may be required beforehand.

DEAN SCHOOL OF GRADUATE STUDIES MASENO UNIVERSITY 13 NOV 2019 P.O. PRIVATE BAG, MASENO

Prof. J.O. Agure
DEAN, SCHOOL OF GRADUATE STUDIES

Appendix XIII: Ethical Approval Letter

MASENO UNIVERSITY ETHICS REVIEW COMMITTEE

Tel: +254 057 351 622 Ext: 3050
Fax: +254 057 351 221

Private Bag – 40105, Maseno, Kenya
Email: muerc-secretariate@maseno.ac.ke

FROM: Secretary - MUERC

DATE: 30th April, 2020

TO: Jardine Wughanga Ngolo
EL/ESM/00680/2014
Department of Public Health
School of Public Health and Community Development
Maseno University
P. O. Box, Private Bag, Maseno, Kenya

REF: MSU/DRPI/MUERC/00813/19

RE: Determinants of Vitamin A Supplementation Uptake and Coverage among Children aged 6-60 months in Ganze Sub County, Kilifi County, Kenya. Proposal Reference Number MSU/DRPI/MUERC/813/19

This is to inform you that the Maseno University Ethics Review Committee (MUERC) determined that the ethics issues raised at the initial review were adequately addressed in the revised proposal. Consequently, the study is granted approval for implementation effective this 30th day of April, 2020 for a period of one (1) year. This is subject to getting approvals from NACOSTI and other relevant authorities.

Please note that authorization to conduct this study will automatically expire on 29th, April 2021. If you plan to continue with the study beyond this date, please submit an application for continuation approval to the MUERC Secretariat by 15th March, 2021.

Approval for continuation of the study will be subject to successful submission of an annual progress report that is to reach the MUERC Secretariat by 15th March, 2021.

Please note that any unanticipated problems resulting from the conduct of this study must be reported to MUERC. You are required to submit any proposed changes to this study to MUERC for review and approval prior to initiation. Please advice MUERC when the study is completed or discontinued.

Thank you.

MASENO UNIVERSITY SECRETARY 30 APR 2020 ETHICS REVIEW COMMITTEE

Dr. Bonuke Anyona,
Secretary,
Maseno University Ethics Review Committee

Cc: Chairman,
Maseno University Ethics Review Committee.