PERFORMANCE OF COMMUNITY HEALTH VOLUNTEERS ON NUTRITION OUTCOMES OF HOUSEHOLDS WITH CHILDREN 6-59 MONTHS IN ALEGO USONGA, SIAYA COUNTY, KENYA

Amos Odiwuor

A Thesis Submitted to the School of Public Health, Biomedical Sciences, and Technology, in Partial Fulfilment of the Requirements for the Award of the Degree of Master of Science in Public Health Nutrition of Masinde Muliro University of Science and Technology

Department of Nutritional Sciences

October, 2025

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Supervisors:

Prof. Asenath Sigot
Professor of Nutritional Sciences
Department of Nutritional Sciences
Masinde Muliro University of Science and Technology
Signature_____ **Date**_____

Dr. Lucy Amanya Mutuli

Senior Lecturer

Department of Nutritional Sciences

Masinde Muliro University of Science and Technology

Signature_____**Date**_____

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DEDICATION

I dedicate this thesis to my loving and caring Parents and Siblings.

Their love, encouragement, support, and prayers inspired my success in life.

ACKNOWLEDGEMENTS

I sincerely thank the Almighty God for His protection, grace, and strength that enabled me to accomplish this thesis work. I also thank my Family for the support they granted me, not forgetting the consistent prayers they committed to me during my study period. I also appreciate the School of Public Health, Biomedical Sciences and Technology, and the Department of Nutritional Sciences of Masinde Muliro University of Science and Technology for the chance to undertake my Master's program. Finally, I appreciate my supervisors, Prof. Asenath Sigot and Dr. Lucy Mutuli, for their technical support and supervision during the entire thesis work.

May God bless you abundantly.

ABSTRACT

The World Health Organization (WHO) recommends using Community Health Volunteers (CHVs) to deliver nutrition services, contributing to Universal Health Coverage (UHC), a broader goal that encompasses nutrition. Thus, various programs have been implemented worldwide utilizing CHVs. Nevertheless, poor nutrition outcomes persist in households under the care of CHVs, leading to high rates of malnutrition and mortality. Poor hygiene and sanitation practices also contribute to malnutrition and infections, worsening nutrition challenges. Using the Donabenian Model of Quality in Health Care, this study evaluated the performance of CHVs on the nutrition outcomes of households with children aged 6-59 months in Alego Usonga, Siaya County, Kenya, where nutrition and health outcomes are poor. A cross-sectional study design was employed, using purposive, multi-stage, and systematic sampling methods to gather data from 356 households and conduct 3 focus group discussions (FGDs). A structured questionnaire and FGD guide were utilized to collect quantitative and qualitative data. The study was carried out from February to May 2024. Statistical Package of Social Sciences (SPSS) Version 28 was used to analyze quantitative data, while NVivo 14 was used for qualitative data analysis. Fisher's Exact Tests and Multinomial Logistic Regression Analysis, at a 95% confidence level, were employed to establish the relationship between CHVs' service delivery and nutrition outcomes in households with children aged 6-59 months. The main economic activity was farming at 36.7%, with 78% of households earning less than USD 77 monthly. Key nutrition and health outcomes included: low Minimum Dietary Diversity (MDD) – 6.1%, low Minimum Acceptable Diet (MAD) – 2.7%, high bottle-feeding – 44.6%, high food insecurity – 60.4%, and low handwashing uptake – 15.7%. Despite these findings, a significant relationship was established between CHVs' service delivery (household visitations, referrals, follow-ups, counseling services) and various nutrition outcomes. In conclusion, CHVs remain essential in nutrition service delivery, even though they visit only 71.9% of the targeted households every month. Therefore, to improve CHVs' service delivery, the Government of Kenya should review CHVs' policies and strengthen their capacity.

TABLE OF CONTENTS

PLAGIARISM STATEMENT ii
STUDENT DECLARATION ii
DECLARATION iii
COPYRIGHT STATEMENT iv
DEDICATION v
ACKNOWLEDGEMENTS vi
ABSTRACT vii
TABLE OF CONTENTS viii
LIST OF TABLES xii
LIST OF FIGURES xiii
ABBREVIATIONS AND ACRONYMS xiv
OPERATIONAL DEFINITION OF TERMS xvii
CHAPTER ONE 1
INTRODUCTION 1
1.1 Overview 1
1.2. Background Information 1
1.3 Problem Statement 5
1.4 Objectives of the Study 6
1.4.1 Broad Objective 6
1.4.2 Specific Objectives 6
1.5 Research Questions 6
1.6 Justifications of the Study 7
1.7 Significance of the Study 8
1.8 Limitations and Delimitations 8
1.8.1 Limitation 8
1.8.2 Delimitation 9
1.9 Theoretical Framework 9
1.10 Conceptual Framework 10
1.10.1 Nutrition Outcomes. 11
1.10.2 Performance of CHVs 12

CHAPTER TWO **13**
LITERATURE REVIEW **13**
2.1 Introduction 13
2.2 Definition and Origin of Community Health Volunteers 13
2.3 Selection and Remuneration of Community Health Volunteers 15
2.4 Measurement of CHV's Performance and Outputs 16
2.5 Enhancement of CHVs' Performance 17
2.6 The Roles of CHVs in Nutrition Service Delivery 18
2.7 The Impact of CHVs' Service Delivery on Nutrition and Health Outcomes 21
2.8 Improving Nutrition Outcomes 23
CHAPTER THREE **26**
RESEARCH METHODOLOGY **26**
3.1 Introduction 26
3.2 Study Area 26
3.3 Study Design 28
3.4 Study Population 29
3.4.1 Inclusion Criteria 30
3.4.2 Exclusion Criteria 30
3.5 Study Variables 31
3.5.1 Dependent Variables 31
3.5.2 Independent Variables 31
3.5.3 Intervening variables 31
3.6 Sampling Design and Selection of Participants 31
3.6.1 Sampling Strategy 31
3.6.2 Selection of the County, Sub-County, County Assembly Wards, Community Units, and Villages 32
3.6.3 Selection of Households 37
3.6.4 Selection of Participants for the FGDs. 38
3.7 Sample Size Determination 38
3.8 Data and Information Collection 39
3.8.1 Procedure of Data Collection 39
3.8.2 Measurement of Infant and Young Child Feeding Practices 40
3.8.3 Measurement of Household Food Security 43
3.8.4 Data Collection Instruments 45
3.8.5 Reliability 45
3.8.6 Validity 46
3.8.7 Recruitment and Training of Research Assistants 47
3.8.8 Quality Assurance 47

3.9 Pretesting of Research Tools 48
3.10 Data Analysis and Presentation 49
3.11 Logistical and Ethical Considerations 51
CHAPTER FOUR 53
RESULTS 53
4.1. Introduction 53
4.2. Demographic and Socio-Economic Characteristics 53
4.2.1 Demographic and Socio-Economic Characteristics of the Households 53
4.2.2 Demographic Characteristics of the FGDs Participants 56
4.3. Service Delivery of Community Health Volunteers 59
4.3.1 Household Visitation 59
4.3.2 Referral and Follow-up Services 59
4.3.3 Counseling and Education Services 60
4.3.4 Community Stakeholders' Perspective on CHVs' Service Delivery 62
4.4 Household Nutrition Outcomes 70
4.4.1 Infant and Young Child Feeding Practices 70
4.4.2: Household Food Security 74
4.4.3 Health-Seeking Behavior and Uptake of Nutrition Services 79
4.4.4 Health Promotion Behavior 81
4.4.5 Impact of CHVs on Nutrition Outcomes 83
4.5 Relationship between Demographic and Socio-economic Characteristics, the Service Delivery of CHVs, and Nutrition Outcomes of the Households with Children 6-59 Months 84
4.5.1 Relationship between Demographic and Socio-economic Characteristics of Households and Service Delivery of CHVs 85
4.5.2 Relationship between Demographic and Socio-economic Characteristics of the Households and the Nutrition Outcomes 85
4.5.3 Relationship between Service Delivery of CHVs and Nutrition Outcomes 90
CHAPTER FIVE 97
DISCUSSION 97
5.1 Introduction 97
5.2 Demographic and Socio-Economic Characteristics of the Households 97
5.3 Service Delivery of Community Health Volunteers 99
5.3.1 Household Visitation 99
5.3.2 Referral and Follow-up Services 100
5.3.3 Counseling and Education Services 102
5.4. Nutrition Outcomes 103
5.4.1 Infant and Young Child Feeding Practices 103
5.4.2 Household Food Security 107
5.4.3 Health-Seeking Behavior and Uptake of Nutrition Services 108

5.4.4 Water, Sanitation, and Hygiene 110
5.5 Relationship between Independent and Dependent Variables of the Study 111
5.5.1 Relationship between the demographic and socio-economic characteristics of households and service delivery of CHVs 111
5.5.2 Relationship between the demographic and socio-economic characteristics of households and the nutrition outcomes 112
5.5.3 Relationship between service delivery of CHVs and the nutrition outcomes 114
CHAPTER SIX 118
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS 118
6.1 Introduction 118
6.2 Summary 118
6.3 Conclusions 119
6.4 Recommendations 120
6.4.1 Recommendation for Policy Direction 120
6.4.2 Recommendations for Programming 121
6.4.3 Recommendations for further Research 122
REFERENCES 123
APPENDICES 148
Appendix I: Informed Consent 148
Appendix II: Structured Questionnaire 150
Appendix III: FGD guide 160
Appendix IV: DPS Approval Letter. 164
Appendix V: ISERC Approval Letter 165
Appendix VI: NACOSTI Research License 166
Appendix VII: CHMT Clearance Letter 168
Appendix VIII: Map of Study Area 169
Appendix IX: Framework Matrix of Themes, Sub-themes, and Codes Generated from the FGDs 170
Appendix X: Health Facilities in Siaya County 176

LIST OF TABLES

Table 3. 1 Sampling Frame 1 30
Table 3. 2 Sampling Frame 2 32
Table 3. 3 Table of Precision....37
Table 3. 4 Measurement of IYCF practices....38
Table 3. 5 Inter-rater Reliability Test Results 42
Table 3. 6 Data Analysis 45

Table 4. 1 Respondents for the Household Interviews....48
Table 4. 2 Demographic and Socio-economic Characteristics....50
Table 4. 3 Service Delivery of Community Health Volunteers 52
Table 4. 4 Infant and Young Child Feeding Practices....57
Table 4. 5 Household Food Insecurity Access Scale 61
Table 4. 6 Household Food Insecurity Access Scale Score 63
Table 4. 7 Scale for interpreting HFIAS scores 63
Table 4. 8 Uptake of Nutrition Services....65
Table 4. 9 Water, Sanitation and Hygiene....66
Table 4. 10 Relationship between Demographic and Socio-economic Characteristics of Households, Service Delivery of CHVs, and Nutrition Outcomes using Fisher's Exact Test 82
Table 4. 11 Relationship between Demographic and Socio-economic Characteristics of Households, Service Delivery of CHVs, and Nutrition Outcomes using Multinomial Logistic Regression Analysis 84
Table 4. 12 Relationship between Service Delivery and Nutrition Outcomes using Fisher's Exact Test 88
Table 4. 13 Relationship between Service Delivery and Nutrition Outcomes using Multinomial Logistic Regression Analysis 90

LIST OF FIGURES

Figure 1. 1 Donabedian Model of Quality Health Care 9
Figure 1. 2 Conceptual Framework 10

Figure 3. 1 Sampling Criteria 30
Figure 3. 2 Selection of respondents 34

Figure 4. 1 Karapul FGD Project Map 54
Figure 4. 2 Mur Malanga FGD Project Map 55
Figure 4. 3 Sumba FGD Project Map 55
Figure 4. 4 Referrals done by CHVs 57
Figure 4. 5 Counseling Services by CHVs 58
Figure 4. 6 Themes generated from the FGDs 65
Figure 4. 7 Sub-themes Generated from the FGDs 66
Figure 4. 8 Dietary Diversity of Children 6-23 months 70
Figure 4. 9 Minimum Meal Frequency per Age Group of children 6-23 months 71
Figure 4. 10 Domestic Animals reared by households 72
Figure 4. 11 Household Food Security Status 76
Figure 4. 12 Treatment given to Children with Diarrhea 78
Figure 4. 13 Main Source of Drinking Water 79
Figure 4. 14 Methods of Water Treatment 80

ABBREVIATIONS AND ACRONYMS

ASAL	-	Arid and Semi-Arid Land
CHA	-	Community Health Assistant
CHAMPS	-	Child Health and Mortality Prevention Surveillance
CHC	-	Community Health Committee
CBHIS	-	Community Based Health Information System
CHMT	-	County Health Management Team
CHO	-	Community Health Officer
CHS	-	Community Health Strategy
CHU	-	Community Health Unit
CHV	-	Community Health Volunteer
CHW	-	Community Health Worker
CIDP	-	County Integrated Development Plan
CMNH	-	Community-Based Maternal & Newborn Health
CORPS	-	Community-Owned Resource Persons
CSO	-	Civil Society Organization
CU/CHU	-	Community Unit/Community Health Unit
EBF	-	Exclusive Breast Feeding

FBO	-	Faith-Based Organization
FET		Fisher's Exact Test
FGD	-	Focus Group Discussions
HCW	-	Health Care Worker
HFIAS	-	Household Food Insecurity Access Scale
HIV	-	Human Immuno-deficiency Virus
ICCM	-	Integrated Community Case Management of Common Childhood Diseases
IMR	-	Infant Mortality Rate
KDHS	-	Kenya Demographic and Health Survey
KEPH	-	Kenya Essential Package for Health
KSH.	-	Kenya Shillings
KHIS	-	Kenya Health Information System
KII	-	Key Informant Interview
KNBS	-	Kenya National Bureau of Statistics
MAD	-	Minimum Acceptable Diet
MAM	-	Moderate Acute Malnutrition
MCA	-	Member of County Assembly
MDD	-	Minimum Dietary Diversity

MICS	-	Multi-Indicator Cluster Survey
MMF	-	Minimum Meal Frequency
MUAC	-	Mid Upper Arm Circumference
NACOSTI	-	National Commission of Science, Technology, and Innovation
NCD	-	Non-Communicable Diseases
NHSSP	-	National Health Sector Strategic Plan
NMR	-	Neonatal Mortality Rate
PHC	-	Primary Health Care
SAM	-	Severe Acute Malnutrition
SCHMT	-	Sub-County Health Management Team
SDG	-	Sustainable Development Goal
SQ	-	Structured Questionnaire
SSA	-	Sub-Saharan Africa
UHC	-	Universal Health Coverage
UMR	-	Under-five Mortality Rate
VAS+D	-	Vitamin A Supplementation and Deworming
WASH	-	Water and Sanitation Hygiene
WHO	-	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Community Action Day – a day set aside to implement health and development-related issues as discussed during the community dialogue.

Community Health - the first level of healthcare aimed at providing promotive and preventive services to the people.

Community Health Assistant (CHA) – an employee tasked with supervising the work of CHVs at the CU level.

Community Health Committee - a committee elected by the community members to govern health services at the CU level.

Community Health Volunteer - a person selected by the community, based on some set criteria, and has undertaken relevant basic training as per the curriculum to offer health services at the community level.

Community Health Volunteer Kit –A package with all essential supplies that a CHV uses to offer services in the community.

Community Dialogue - a forum where community members discuss and make resolutions about their health.

Community Unit / Community Health Unit - a health service delivery unit within a defined geographical area covering a population of approximately 5,000 people, served by one CHA and ten CHVs.

Household – a group of people living together and sharing the same cooking arrangement.

Household Food Security - access by household to adequate resources to acquire appropriate foods for a nutritious diet.

Functionality of a Community Health Unit - the extent to which a community health unit attains the eleven criteria outlined in the Kenya Community Health Policy (2020 – 2030).

Infant and Young Child Feeding Practices – the first seven out of the 17 infant and young child feeding practices in order of precision as defined by WHO (2021b).

Link facility - the nearest health facility located within the area where the community health workforce offers services and acts as the referral unit.

Overweight – Being too heavy for height.

Malnutrition - deficiencies or excesses in nutrient intake, imbalance of essential nutrients, or impaired nutrient utilization.

Micronutrient Deficiency – inadequate intake of essential vitamins and minerals that are required in small amounts by the body for proper growth and development.

Minimum Acceptable Diet - a measure of both the minimum feeding frequency and minimum variety in the number of food groups consumed among children aged 6-23 months, as appropriate for various age groups.

Minimum Dietary Diversity – the percentage of children 6-23 months of age who consumed foods and beverages from at least five of eight defined food groups during the previous day.

Minimum Meal Frequency – the percentage of children 6-23 months of age who consumed solid, semi-solid, or soft food (including milk feeds for non-breastfed children) the minimum number of times or more during the previous day.

Nutrition Outcomes - changes in behaviors/practices resulting from nutrition program activities in the household.

Performance of Community Health Volunteers – delivery of health services by Community Health Volunteers at the household level.

Pretesting of research tools – a small-scale preliminary study conducted to evaluate or test the study design, data collection tools, and their feasibility.

Primary Health Care - essential health care that is affordable and universally accessible to the community.

Reliability – the reproducibility or consistency of a measurement tool.

Service delivery- Quantity and quality of promotional, preventive, and curative services CHVs provide to community members.

Special Interest Groups – people in a community who are disadvantaged in one way or another owing to their status, roles, circumstances, and vulnerability.

Undernutrition – Insufficient intake of nutrients to meet an individual's needs to maintain good health.

Universal Health Coverage – a national program advocating for people to access the full range of quality health services they need, when and where they need them, without financial hardship. **Validity** – the accuracy and precision of a measurement tool.

Village – a health delivery unit within a specified location, consisting of an average of one hundred households under the care of one CHV.

CHAPTER ONE

INTRODUCTION

1.1 Overview

Chapter One presents the study's background, the problem statement, objectives, research questions, justification, significance, limitations, delimitations, and conceptual framework.

1.2. Background Information

Nutrition is critical to the well-being and development of children under five years, as good nutrition outcomes improve child health (WHO, 2025). Conversely, malnutrition is a global problem contributing to half of the deaths in children aged below five years (WHO, 2024). Across the globe, 149 million children below the age of five years are stunted, 45 million are wasted, 37 million are overweight or obese, and 400 million are micronutrient deficient (WHO, 2024).

Malnutrition encompasses undernutrition, over-nutrition, and micronutrient deficiency, collectively called the “triple burden of malnutrition” (Prentice, 2023). Nevertheless, undernutrition is the most prevalent form of malnutrition in low- and middle-income countries (WHO, 2024). Micronutrient deficiency remains a global public health issue and poses a significant risk to children's health worldwide, particularly in low-income countries (Goodluck *et al*., 2022). According to the UN 2016-2025 Nutrition Strategy—dubbed the United Nations Decade of Action on Nutrition—WHO advocates for universal access to nutritious and healthy diets from sustainable and resilient food systems (Freire, 2017).

The high rates of malnutrition are similarly reported in Africa, as 64 million (1 in every 3) children under the age of 5 years suffer from severe child food poverty, rendering them up to 50 percent more likely to experience wasting (United Nations Children's Fund [UNICEF], 2024). According to Christian & Dake (2021), Sub-Saharan Africa (SSA) is even worse as it presents the highest number of undernutrition cases in Africa, resulting from the ever-rising hunger since 2014. The Eastern and Middle sub-regions account for 27% and 29% of undernutrition, respectively, as of 2019 (Onyango *et al.*, 2019). These poor statistics signify the unlikelihood of ending hunger and all forms of malnutrition as envisaged in Sustainable Development Goal (SDG) number two by 2030 (Sathyamala, 2017).

Kenya, as part of SSA, registers stunting, wasting, and underweight rates of 17.6%, 4.9%, and 10.1%, respectively (Kenya National Bureau of Statistics [KNBS], 2023). These high malnutrition rates are attributed to the declining status of food security in the country, where 10 million people experience chronic food insecurity and severe hunger (Government of Kenya, 2011). Furthermore, two to four out of ten people require food assistance at any given time (Rono *et al*., 2023).

The national indicators on infant and young child feeding (IYCF) practices fall short of the targets: 59.7% of children under six months are exclusively breastfed; 60.1% of newborns are initiated on breast milk within one hour of birth; 83% of children are exclusively breastfed for the first two days after birth; 98% of children under two years are reported as having ever been breastfed; 87% of children aged 6-8 months are introduced to solid, semi-solid, and soft foods; 36.9% of children aged 6-23 months receive foods from at least five out of eight defined food groups (MDD); 71% of children

aged 6-23 months receive the recommended minimum meal frequency (MMF); 30.8% of children aged 6-23 months receive a minimum acceptable diet (MAD); 33.6% of children aged 0-23 months are fed from a bottle with a nipple; 65% of children aged 12-23 months continue breastfeeding; while the proportion of children aged 6-59 months with diarrhea treated with ORS and zinc stands at 31.6% (KNBS, 2023). Vitamin A supplementation among children aged 6-59 months is at 64%, while two-thirds of children aged 12-59 months have been dewormed in the last six months (KNBS, 2023). Regarding water, sanitation, and hygiene (WASH) indicators, 62.9% of Kenyan households do not treat their drinking water, 51.3% have functional handwashing facilities, and 7.2% defecate in open places (KNBS, 2023). These indicators reflect poor nutrition outcomes that require improvement.

Similarly, in Siaya County, the rates of stunting, wasting, and underweight remain high at 19.2%, 1.7%, and 7%, respectively (KNBS, 2023). However, this is an improvement from 24.7%, 4%, and 11% in 2014 (KNBS, 2023). The county poverty index stands at 47.5%, the literacy level at 80%, and only 42% of the population can access clean and safe water (Siaya, CIDP 2023-2028). Exclusive breastfeeding among children under six months is 65.5%, while Vitamin A supplementation and Deworming (VAS+D) is 81.6% (Kenya Health Information System [KHIS], 2022). KNBS (2023) also reports poor WASH indicators, with 36.3% of households not treating drinking water, 6.2% of the population defecating in open places, and only 20.7% owning functional handwashing facilities. Moreover, there is limited information on complementary feeding and household food security status due to the few studies conducted and published in Siaya County.

Following shortages in human resources for health, many low-income countries have adopted task-shifting and introduced Community Health Volunteers (Ndu et al., 2022). Community Health Volunteers can be used to improve nutrition outcomes as they are well-positioned to promote health and prevent diseases at the household level (Wakiaga *et al*., 2024). As discussed by Mijwanga and Cheptum (2022), Community Health Volunteers have also proven effective in promoting maternal health services through home visitations, referrals, and linkages between health systems and the refugee community in Dadaab. Their model effectively manages child undernutrition, especially in conflict-affected areas (Bridge & Lin, 2024). Therefore, they are recognized in health service delivery as they are cost-effective and impactful (Cometto *et al*., 2018).

However, little is known about CHVs' work challenges ((Ndu et al., 2022)). Moreover, there is little information on the relationship between CHVs' service delivery and the nutrition outcomes of households with children aged 6-59 months; thus, the need for this study.

According to Kenya Essential Package of Health (KEPH), Community Health Volunteers (CHVs) are the first point of contact in health service delivery, which includes nutrition (MOH, 2005). Therefore, CHVs are authorized to perform health functions within the community (Government of Kenya, 2023). In nutrition, CHVs receive training in nutrition assessment, growth monitoring and promotion, counseling on good food, and referral of malnutrition cases (MOH, 2013). To support these initiatives, the government builds the capacity of CHVs and procures health products for their use, although this assistance is insufficient to meet the current demands (MOH, 2020a).

Several legal, political, and policy frameworks underpin the role of CHVs in nutrition and health service delivery in Kenya. Consequently, the Constitution of Kenya 2010 guarantees every Kenyan the right to the highest attainable standard of health and access to quality health services (Government of Kenya, 2010). The Kenya Vision 2030 advocates for a shift in national health from curative to preventive, thus putting the role of CHVs at the center of its priority areas (Government of Kenya, 2007). The community unit (CU), the first among the four tiers in the health system, is mandated to carry out appropriate healthy behaviors, recognize signs and symptoms of conditions requiring health care, and facilitate diagnosis, management, and referral of cases (MOH, 2020a). Moreover, there is a need for integrated, participatory, and sustainable community health services aimed at attaining universal health coverage, identifying challenges facing CHVs in their routine service delivery, and proposing long-term and sustainable solutions to alleviate them (MOH, 2020b).

1.3 Problem Statement

Malnutrition is a significant cause of ill health, contributing to almost half of deaths in children under five years old globally (WHO, 2024). In SSA, children are 14 times more likely to die before reaching their fifth birthday than in developed regions (WHO, 2024). A majority of under-five deaths in SSA and other developing regions are due to undernutrition and poor household environmental conditions (Amegah, 2020). In Kenya, one in every thirty-one children dies before the first birthday, while one in every twenty-four dies before celebrating the fifth birthday (KNBS, 2023). The child mortality rates in Siaya County are equally wanting, as one in every nine children is lost before the first birthday, while one in every six children also dies before the fifth birthday (KNBS, 2013).

Despite CHVs' role, nutrition outcomes remain poor in Siaya County. Furthermore, there has never been a comprehensive evaluation of CHVs' service delivery and their subsequent effect on the nutrition outcomes of households with children aged 6-59 months in the County. Malnutrition accounts for 23% of the deaths as an underlying cause in Western Kenya, second highest after HIV related diseases (Onyango *et al.*, 2021). Further, routine data showed that Alego Usonga Sub-County had the poorest nutrition and WASH indicators among the six sub-counties of Siaya County (KHIS, 2022). Moreover, the following are documented as challenges befalling community health services: weak supervision of CHVs, weak referral systems between communities and facilities, inadequate knowledge of the role of the community health workforce in the referral system, incomplete implementation of community health services, and limited monitoring of the quality of community health services (MOH, 2020b).

1.4 Objectives of the Study

1.4.1 Broad Objective

To evaluate performance of Community Health Volunteers on nutrition outcomes of households with children 6-59 months in Alego Usonga, Siaya County, Kenya.

1.4.2 Specific Objectives

The specific objectives of the study were to;

i. Assess service delivery of Community Health Volunteers in households with children aged 6-59 months in Alego Usonga, Siaya County.
ii. Assess nutrition outcomes in households with children aged 6-59 months in Alego Usonga, Siaya County.

iii. Establish a relationship between service delivery of Community Health Volunteers and nutrition outcomes of households with children aged 6-59 months in Alego Usonga, Siaya County.

1.5 Research Questions

i. What is service delivery of Community Health Volunteers in households with children aged 6-59 months in Alego Usonga, Siaya County?

ii. What are nutrition outcomes in households with children aged 6-59 months in Alego Usonga, Siaya County?

iii. What is the relationship between the service delivery of Community Health Volunteers and the nutrition outcomes of households with children aged 6-59 months in Alego Usonga, Siaya County?

1.6 Justifications of the Study

Community Health Volunteers have been engaged worldwide to implement various components of health models, and high success rates have been registered (Cometto *et al.*, 2018). Their efforts complement the government strategies in ensuring community access to and utilization of health services (Woldie *et al.*, 2018). In Kenya, the government has invested heavily in building CHVs' capacity and their surrounding support systems (MOH, 2020a).

Routine child mortality audits in Siaya County have revealed that more than 50% of mortalities in children aged 6-59 months are associated with malnutrition as an underlying cause (KHIS Aggregate, 2022). Most of these deaths occur in the community unnoticed, with some reported in the health facilities immediately upon referral (Onyango *et al.*, 2021). These occurrences have poked holes in the weak systems, which, in turn,

hinder early case detection, prompt referrals, and follow-ups, which are roles performed by CHVs (MOH, 2020b; Onyango *et al.*, 2021).

With a paradigm shift towards Universal Health Coverage (UHC) and primary health care (PHC), CHVs remain indispensable in nutrition service delivery (Woldie *et al.*, 2018). They help in household visitation to identify malnutrition cases, refer needy cases to health facilities, follow up on the cases, and give health education and counseling services on healthy nutrition practices (Mijwanga and Cheptum, 2022; Bridge & Lin, 2024). Therefore, this study evaluated ways of effectively engaging CHVs to improve nutrition outcomes at the household level.

1.7 Significance of the Study

New knowledge is important in improving the health and nutrition outcomes of households with children below five years old. Therefore, the findings of this study supplement the existing literature on public health nutrition. Consequently, the study addresses the Sustainable Development Goals 1, 2, 3, and 6 –which aim to reduce poverty and hunger, promote good health and well-being, and improve access to clean water and sanitation. Moreover, the study findings inform public health policies, particularly the review of the Kenya Community Health Policy, 2020-2030, to align the capacity of CHVs with their expected outputs. It also necessitates the need for the government to recognize, and embrace the roles played by various community health stakeholders and support systems, in strengthening nutrition service delivery. For the CHVs and the community of Alego Usonga, the findings serve as a yardstick for improved performance in nutrition service delivery.

1.8 Limitations and Delimitations

1.8.1 Limitation

The study relied on the responses given during the household interviews and FGDs - thus, there could be chances of response bias. The findings are limited to Siaya County and may not represent the exact image of the other 46 counties in Kenya, though they can be transferable in areas where community health services are implemented. This follows the variation in functionality, coverage, and implementation stages of community health strategy in different parts of the country. The difference in demographic and socio-economic factors in different parts of Kenya may also limit the generalizability of the findings, more so the nutrition outcomes of the households.

1.8.2 Delimitation

To mitigate the chances of response bias, the data collection tools were standardized, and the research assistants were competitively recruited, rigorously trained and retrained on administering questions to the respondents. The respondents were also anonymously and confidentially engaged during the household interviews. To ensure the generalizability of the study findings, the sample size was scientifically determined, and probability sampling was deployed to identify participants for the interviews.

1.9 Theoretical Framework

The study was backed by the Donabedian Model of Quality in Health Care, a framework founded in 1966 by Avedis Donabedian, and applied in assessing the quality of health services (Ayanian & Markel, 2016). It measures the difference between expected and actual performance to identify gaps in health care system (Sharew *et al*., 2020). The

model is simple, flexible, and appropriate in promoting primary health care (Moayed *et al.,* 2022), and posits that health outcomes are dependent on structures and processes (Opele & Adepoju, 2024). Following this model, a CHV is considered as a resource (structure) in nutrition service delivery (process) to improve nutrition outcomes in the household (results). In this case, if CHVs are effectively engaged in nutrition service delivery by visiting households, making referrals and follow ups, and providing nutrition education and counselling services; nutrition outcomes like IYCF practices, food security, uptake of nutrition services, health-seeking and health promotion behaviors are likely to improve. The model is illustrated in Figure 1.1.

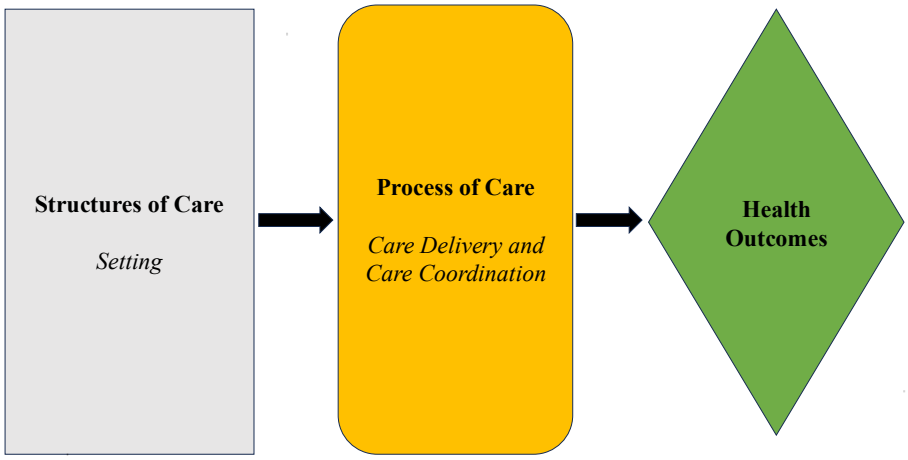

Figure 1. 1 Donabedian Model of Quality in Health Care (McCullough *et al.*, 2022)

1.10 Conceptual Framework

The conceptual framework (Figure 1.2) underscores the pivotal role of CHVs in influencing the dependent variables (nutrition outcomes). It establishes a clear link between CHVs' service delivery and the nutrition outcomes in households with children 6-59 months. The framework also delves into how demographic and socio-economic

characteristics of these Households impact both the performance of CHVs and the nutrition outcomes. It is anchored on the Donabedian Model of Quality Health Care.

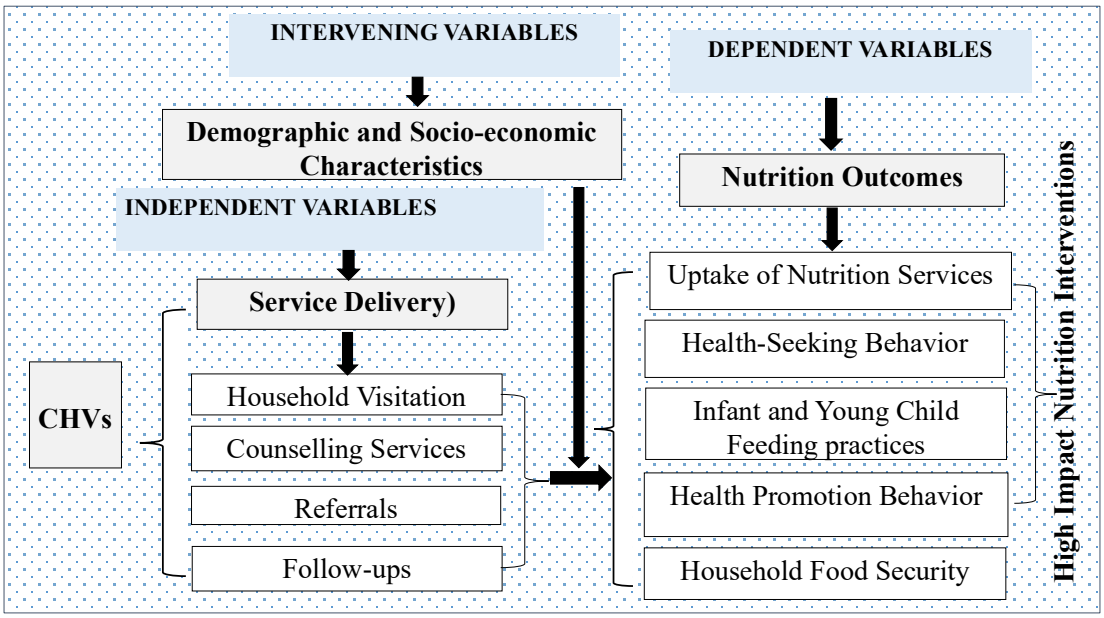

Figure 1. 2 Conceptual Framework (Odiwuor *et al*., 2024)

1.10.1 Nutrition Outcomes.

The study assessed and measured changes in nutrition outcomes attributed to CHVs' service delivery at the household level. The outcomes included uptake of nutrition services, health-seeking and promotion behaviors, IYCF practices, and household food security. These outcomes are documented by the Ministry of Health as high-impact nutrition interventions (HINI) (MOH, 2013). Some of them were derived from the Community-Based Health Information System (CBHIS) as reported by CHVs in their Service Delivery Logbook (MOH 514) monthly. They included children 12-59 months dewormed, children 6-59 months participating in growth monitoring and promotion, children aged 6-59 months with diarrhea treated with ORS + zinc sulfate, children 6-59 months supplemented with vitamin A in the last six months, children born in the last 24

months who were ever breastfed, children born in the last 24 months initiated on breast milk within one hour, children born in the last 24 month exclusively breastfed for the first two days after birth, bottle feeding 0–23 months, Minimum Dietary Diversity 6–23 Months(MDD), Minimum Meal Frequency 6–23 Months (MMF), Minimum Acceptable Diet 6–23 Months (MAD), and household food security. The other outcomes included households with functional pit latrines, hand washing facilities, treating water at point of use, availability of a kitchen garden, immunization uptake, and skilled deliveries in the households.

1.10.2 Performance of CHVs

This research involved a comprehensive assessment of the performance of CHVs in terms of their service delivery at the household level. This assessment was based on indicators from the CBHIS, which were captured in various data sets and reported monthly by the CHVs. The variables assessed included household visitation, counseling, referrals, and follow-ups conducted by the CHVs. The study evaluated the frequency of household visitation, the number of households visited by the CHVs every month, newborns visited within 48 hours of birth, children 6-59 months referred for immunization services, children 6-59 months referred for vitamin A supplementation, children 12-59 months referred for deworming, children 6-59 months referred to the health facility within 24 hours of the onset of illness (fever and diarrhea), children 6-59 months with moderate and severe malnutrition referred to the health facility for management, and children counseled on IYCF and other nutrition-related indicators. This detailed assessment provided a comprehensive understanding of the CHVs' performance, which is crucial for current research findings.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter helps in understanding how the performance of CHVs affects nutrition outcomes of households with children aged 6-59 months. It comprises an extensive literature review on the following topics: origin of CHVs, selection and remuneration of CHVs, measurement of CHVs' performance and outputs, enhancement of CHVs' performance, the role of CHVs in nutrition service delivery, the impact of CHVs' service delivery on nutrition outcomes, improving nutrition outcomes, and a summary of identified gaps in knowledge. The sources of literature for this study included peer reviewed online journals, published government surveys and reports, Kenya Health Information System, and intergovernmental organizations reports.

2.2 Definition and Origin of Community Health Volunteers

Community Health Volunteer (CHV) and Community Health Worker (CHW) have been used interchangeably to mean the same thing, but contextually have different meanings (Kok *et al.*, 2016). Community Health Workers are usually employed and paid a salary to perform specific tasks, while Community Health Volunteers work voluntarily and are offered stipends or incentives (Perry, 2013). According to Woldie *et al.* (2018), "CHVs are lay individuals of varied background, coming from, or based in the communities they serve, who have received brief training on health problems they have volunteered to engage with."

In Kenya, the name has evolved from Community Health Worker to Community Health Volunteer, and now Community Health Promoter (CHP), depending on the context in which they are used (Government of Kenya, 2023). However, this study was conceptualized and approved before the enactment of the Primary Health Care Act No. 13 of 2023, which changed the name from CHV to CHP. Therefore, the name CHV and its definition by Woldie *et al.* (2018) was adopted in this study.

Community Health Workers originated from China in the 1950s, then, referred to as "Farmer Scholars," trained as forerunners of the Barefoot Doctors (Perry, 2013). Further emergence of small CHWs' programs in the 1960s and 1970s, particularly in Latin America, inspired much larger CHW programs in many low-income countries in the 1980s (Perry, 2013). The Alma-Ata Declaration of 1978 in Kazakhstan further spurred the growth of CHWs' programs (Kok *et al.*, 2016). The Declaration called for the achievement of Health for All by the year 2000 through PHC, focusing on the principles of social justice, equity, community participation, disease prevention, multi-sectoral collaboration, decentralization of services, use of appropriate technology, and service provision (Kok *et al.*, 2016).

Following this Declaration, CHVs programs have proliferated in Africa, especially in Ghana, South Africa, and Ethiopia. In South Africa, CHV programs started between 1990s and early 2000s, and were necessitated by the increasing burden of HIV/AIDS and Tuberculosis (Murphy *et al.,* 2020). In Ghana, community-based health planning and services (CHPS) was introduced in 1999 with the aim of increasing access to health care, and empowering local communities to have control over their health (Ankomah *et al.,*

2024). Later in 2003, Ethiopia started implementing a community health extension program (HEP) with the aim of achieving UHC in 2003 (Assefa *et al.,* 2019).

In Kenya, the first Community Health Workers were founded in 1979 in Saradidi, Rarieda District, where a rural health project was implemented (Owino *et al.*, 1989). Subsequently, many other Organizations engaged CHWs in PHC projects (MOH, 2005). However, these projects were unsustainable following the top-bottom implementation model that did not incorporate the community's inputs; resulting in their collapse (MOH, 2020a).

The introduction of the Community Health Strategy (CHS) in 2006 rejuvenated CHVs' role in implementing community health services in Kenya (MOH, 2020a). The approach borrowed a lot from the initial PHC model but with adjustments – giving the community the priority in selecting CHVs to serve their health needs (MOH, 2020a). Today, Kenya has over 100,000 CHVs supervised by 3,250 Community Health Assistants (CHAs), serving 6,087 Community Units (CUs), with a coverage of 59% (MOH, 2020b).

2.3 Selection and Remuneration of Community Health Volunteers

According WHO, CHVs should be selected for pre-service training based on the following criteria: minimum education, membership of and acceptance by the target community, gender equity, capabilities, values, life, and professional experience of candidates (Cometto *et al.*, 2018). However, age is not recommended as a criterion, as there is no evidence to support it (Cometto *et al.*, 2018).

In Kenya, CHVs are selected by the community in a meeting convened by the area assistant chief and overseen by the former, or the Community Health Committee (CHC) chairperson (MOH, 2020a). Upon selection, the CHV is expected serve an average of 100

households domiciled in a village that is part of a Community Unit (CU) (MOH, 2020a). To support CHVs' work, county governments are advised to provide stipends and other forms of motivation for their invaluable services in the community (MOH, 2020a).

WHO also emphasizes on fair compensation for the CHVs and recommends a financial package commensurate with job demands, complexity of tasks, number of hours worked, training level, and roles they undertake (Cometto *et al.*, 2018). In Ghana, it was established that non-monetary incentives would enhance the performance of CHVs, and motivate them to continuously provide health services to their people (Chatio *et al.*, 2019). Similarly, in Kenya, Ogutu *et al.* (2023) and Lopar & Lotulya (2023) recommended that CHVs be adequately and timely remunerated and provided with appropriate logistics, supportive supervision, and enough supply of resources and commodities to enhance their performance. The reiteration of fair compensation underscores the value and respect for the work of CHVs, though it should not exclusively be performance-based incentives (Cometto *et al.*, 2018).

Despite the government of Kenya having adopted a standard monthly stipend of Ksh. 2,500, there are still variations on how different counties remunerate their CHVs (Government of Kenya, 2023). The counties that do not pay any stipend to their CHVs solely rely on the one from the national government, which is inadequate. Whereas in those that provide monthly stipends, CHVs receive double payment, as they also get the share from the national government. In Siaya county, CHVs are paid Ksh. 3,000 on top of the Ksh. 2,500 offered by the national government (Siaya County Health Department, 2025). The amount may not be adequate for their needs, as it does not even match the

minimum wages for Kenyan employees. These disparities are likely to affect the performance of CHVs.

2.4 Measurement of CHV's Performance and Outputs

CHVs' performance can be measured at the individual CHV level by assessing their cognitive, affective, and behavioral changes, adherence to guidelines, job satisfaction, and capacity to facilitate community agency (Kok *et al.,* 2016). CHV-attributable behavioral outcomes regarding increased consumption of health services and adoption of healthy practices can also be measured at the community level (Kok *et al.,* 2016). In this study, the performance of CHVs based on their service delivery outputs was assessed in the following areas: household visitation, counseling services, referrals, and follow-ups conducted by them.

In measuring community workforce performance within primary healthcare systems, Agarwal *et al.* (2019) identified the following sub-domains: service delivery, quality of services, community use of services, the experience of services, and referrals, among others. However, there were more practical challenges with data capture systems and resources at the community, than at the facility level – a factor that may compromise CHVs' service delivery (Agarwal *et al.,* 2019).

2.5 Enhancement of CHVs' Performance

Basic training, continuous education, mentorship, supportive supervision, incentives, and support from community members are crucial for CHVs' success (Palazuelos *et al.*, 2013; Namoli *et al.*, 2014; Glenton *et al.*, 2013). Further, CHVs, communities, and other health actors are important when assessing CHVs' performance (Kok *et al.*, 2016). However,

factors that could influence CHVs' performance have never been researched in their totality, and detailed information on how they play out in CHVs' performance is lacking (Tulenko *et al.*, 2013).

According to Hernandez *et al.* (2014), knowledge and quality of training could be influenced by interventions introducing training, guidelines, protocols, and technologies, which have been shown to improve health outcomes in other settings. Hernandez *et al.* (2014) further stated that technical solutions, self-esteem, and self-efficacy can also enable CHV performance.

2.6 The Roles of CHVs in Nutrition Service Delivery

The World Health Organization recommends that CHVs perform promotive and preventive services (Cometto *et al.*, 2018). Further, there is sufficient evidence to support the use of CHVs in delivering certain preventive, promotive, and curative services in the community where they belong (Woldie *et al.*, 2018). Across the globe, several studies have evaluated the contributions of CHVs in various health and nutrition activities, and a majority have proven significant (Cometto *et al.*, 2018). "The contribution of CHWs or their effectiveness on nutrition programs depends not only on the CHW program but also on the efficacy of the nutritional interventions they adopt" (Perry & Zulliger, 2012). Therefore, CHVs can supplement the formal health system in advancing the UHC agenda; thus, there is a need for more studies to examine their capabilities to support policymakers' decision-making (Woldie *et al.,* 2018). However, there is a gap in using CHVs to manage more complex activities, as well as several barriers related to the community, the health system, and the volunteers themselves (Woldie *et al.,* 2018).

CHVs are geographically and socially well-positioned to provide their communities with maternal and neonatal health (MNH) services (Olaniran, 2019). They are effective in active case finding and early identification of malnutrition cases (Mohammed & Mosmar, 2018). However, CHVs' policies are not aligned to their practice and local realities, necessitating the revision of the existing scope of practice to respond to local health needs and priorities (Olaniran, 2019).

According to Lopez-Ejeda *et al.* (2018), CHWs play a crucial role in identifying, referring, and improving cure rates for SAM cases, thus reducing defaulting rates. However, they should be adequately trained, supervised, and appropriately motivated (Lopez-Ejeda *et al.*, 2018). Lopez-Ejeda *et al.* (2018) also noted that stock-out of commodities significantly hinders performance, and recommended modification of nutrition and health policy and practice to deliver a successful SAM program.

According to Hall (2011), CHVs can identify moderately or severely malnourished children in communities and help mothers improve their nutrition status. Hall (2011) further established that mothers counseled by CHWs had EBF odds of 5.6 times greater than those not counseled. Community Management of Acute Malnutrition (CMAM) also created more access to malnourished children, five times greater than inpatient programs for similar cost (Ahmed *et al.*, 2008).

In other studies, CHVs have distributed micronutrient supplements to eliminate micronutrient deficiencies (Bhutts *et al.*, 2008). Regular home-based distribution of iron and folate to pregnant women by CHWs has also been associated with favorable results for birth weights, and mortality in neonates and preterm infants; reducing intrauterine growth retardation by 14% (Bhutts *et al.*, 2008).

In Kenya, the roles of CHVs align with the WHO recommendations and they include: health education; household registration; disease prevention; treatment of minor ailments and injuries; identification and referral of common child diseases; management of CHVs kit; promotion of care-seeking behavior; targeted household visitation; participation in community dialogue, action days, and monthly feedback meetings; responding to the health concerns of the community; promotion of healthy practices; coordination of village health activities; keeping records of community health-related events; and monthly reporting of health activities and events (MOH, 2020a).

A Community Health Volunteer is also expected to promote HINI in the community (MOH, 2020a; Government of Kenya, 2023). These HINI include promoting infant and young child nutrition through exclusive breastfeeding, optimal complementary feeding, handwashing, intake of micronutrients such as Vitamin A supplements for children aged 6-59 months, zinc supplements for diarrhea management, diversifying local foodstuffs, deworming, and identifying, screening and referring malnourished children (MOH, 2013).

According to Wakiaga *et al.* (2024), CHVs can conduct health education, promote healthy behaviors, and provide messages on disease prevention measures, reducing the burden of preventable diseases. These are in line with global practices which outline the following as the roles of CHVs: home visitation, health education, health promotion, disease prevention, identification and referral of cases for advanced care, management of pneumonia and diarrhea, behavior change promotion, education on nutrition, safe delivery, family planning, immunization, hygiene, sanitation, treatment for moderate acute malnutrition, monitoring nutrition state of children, promoting the uptake of

nutrition and health services, improving care-seeking behavior, and counseling on child nutrition services (De Deus E Méllo *et al.*, 2023; Shreshtha *et al.*, 2024).

Following the literature reviewed in this work, it is evident that CHVs are indispensable in nutrition service delivery. Therefore, evaluating and quantifying CHV's performance and the resultant output is important. This would inform appropriate policies and guidelines to improve the performance of CHVs in the community.

2.7 The Impact of CHVs' Service Delivery on Nutrition and Health Outcomes

Previous studies have demonstrated the crucial role played by CHVs in household visits, referrals, follow-ups, and counseling, and their subsequent impact on the nutrition and health outcomes (Mohammed and Mosmar, 2018; Woldie *et al.,* 2018; Lopar and Lotulya, 2023). CHVs have significantly influenced IYCF practices, food security, uptake of nutrition services, health promotion, and health-seeking behavior (Rahman *et al.,* 2023; Githinji and Ngala, 2023; Bridge and Lin, 2024). This section, therefore, highlights the impact of CHVs' service delivery on some selected nutrition outcomes.

In Bangladesh, Rahman *et al.* (2023) established that home visits by CHVs demonstrated a remarkable improvement in complementary feeding practices, dietary diversity, Minimum Meal Frequency, and Minimum Acceptable Diet. Based on the same study by Rahman *et al.* (2023), children whose caregivers benefited from CHV visits in the 12 months were 1.51 times more likely to maintain dietary diversity in their children's feeding practices than those who were never visited in that period. However, according to Rahman *et al.* (2023), this study was cross-sectional and did not show a causal relationship between CHVs' home visits and complementary feeding practices.

Moreover, the baseline and follow-up surveys had different participants, hence, the actual effects of household visits could not be established. The area of study had also benefited from MIYCN programs.

In Ghana, Ma *et al.* (2019) found that CHVs' home visits did not significantly affect diarrhea or fever prevalence, but improved hand hygiene practices and registered greater participation in the community's outreach programs. Ma *et al.* (2019) further revealed that the duration of household visits is more important in producing benefits than the coverage, thus implying that when CHVs take longer in the households, their impact may be greater. Therefore, there is a need to have a smaller CHV-to-population ratio, allowing for longer visit durations.

In a systematic review of several studies in LMICs by Janmohamed *et al.* (2020b), one-on-one home visits by CHVs proved effective in improving breastfeeding practices. Githinji and Ngala (2023) also concluded that CHVs are crucial in improving the health and nutrition status of children aged 0-59 months in Kisii County, Kenya.

Dewidar *et al.* (2023) found a positive association between counseling and timely initiation of breastfeeding, though there was no clarity on the definition of counseling. Dewidar *et al.* (2023) further noted uncertainty about the effects of nutrition counseling due to low certainty of evidence and low studies for some key outcomes. This calls for a clear definition of counseling to be offered by CHVs in the households. There is also a need for more studies to establish the effect of nutrition counseling by CHVs on other outcomes.

According to Kimani-Murage *et al.* (2017), home-based counseling to mothers by CHVs significantly increased exclusive breastfeeding for six months in Nairobi slums, Kenya.

Further, training CHVs and providing them with information materials improved exclusive breastfeeding (Kimai-Murage *et al.,* 2017). In a study conducted in Lurambi Sub-County, Kenya, a high prevalence of skilled delivery was attributed to the messages and influence of CHVs (Muhanda *et al*., 2020). In 2024, Bridge and Lin established that nutrition counseling can be effective in addition to supplementary feeding. However, the effectiveness of supplementary foods without counseling was not investigated (Bridge and Lin, 2024). Thus, there is a need for properly coordinated nutrition counseling sessions with approved content to be delivered to the household.

During the COVID–19 Pandemic, CHVs facilitated increased uptake of primary vaccines and boosters in Kenya as they acted as role models by receiving the vaccines first, thus motivating the community (Shumba *et al.,* 2024). They also contributed to improved maternal and neonatal health services during the COVID–19 Pandemic in Nakuru, Kenya (Gachathi *et al.,* 2024).

According to Anyanwu *et al.* (2022), improved WASH activities significantly enhanced dietary diversity in women and improved MUAC. The finding is further qualified by the WHO (2015), which recommended the integration of WASH into nutrition policies and programs to achieve more significant health gains and benefits of primary prevention. In a study conducted in urban Kenya by Aseyo *et al.* (2017), CHVs were found to be instrumental in health service delivery and were increasingly involved in WASH behavior change promotion. However, they were over-burdened, forcing them to compromise the services as they looked for their livelihood (Aseyo *et al.,* 2012).

2.8 Improving Nutrition Outcomes

Programs to improve nutrition outcomes should focus on food security, caregiving practices, access to nutrition and health services, and maintaining a safe and hygienic environment (Technical Assistance for Strengthening Capabilities [TASC], 2022). Consequently, "desired nutritional outcomes require a cohesive and comprehensive approach that entails nutrition-specific, nutrition-sensitive, and robust governance action" (Nikhil and Roopashree, 2020). Moreover, nutrition can effectively be promoted through institution building at the community level, by prioritizing interventions related to social behavior change communication (Nikhil and Roopashree, 2020). Therefore, if appropriately engaged, CHVs can improve nutrition outcomes by implementing both nutrition-specific and nutrition-sensitive programs through communication focused on behavior change at the household level.

2.9 Summary of Identified Gaps in Literature

Following the extensive literature review conducted for this research, CHVs can implement various nutrition and health programs. Nevertheless, there are program-related and contextual factors that affect CHV programs. Therefore, it is imperative to involve not just the CHVs themselves but also the communities and various health actors in assessing the performance of CHVs (Palazuelos *et al.*, 2013; Naimoli *et al.*, 2014; Glenton *et al.*, 2013; Tulenko *et al.*, 2013; Hernandez *et al.*, 2014).

Moreover, the literature identifies some gaps that this study sought to address. For instance, "there is limited evidence on the quality of care provided by CHVs or the overall performance of CHV programs" – necessitating further research to establish and validate the effectiveness of CHVs programs (WHO, 2021a). Agarwal *et al.* (2019) identified

practical challenges in data collection in the community by CHVs and recommended discussion to develop more robust systems for monitoring CHV programs. Olaniran *et al.* (2019) noted a tension between CHV policy and local realities and recommended the revision of existing CHV scope of practice to align with local health needs and priorities. Woldie *et al.* (2018) supported the use of CHVs in delivering certain preventive, promotive, and curative services but reported a gap in the use of CHVs to manage more complex activities. Therefore, Woldie *et al.* (2018) recommended more studies examining CHVs' capabilities to support policymakers' decisions. Subsequently, according to Lopez-Ejeda *et al.* (2018), stock-out of essential commodities compromises the performance of CHVs, necessitating a need for modifying nutrition and health policies for a successful nutrition program. If implemented, these recommendations can significantly improve nutrition outcomes.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter addresses various aspects of study execution. It presents details of the study area, research design, target population, inclusion and exclusion criteria, and sampling strategy. It also presents research protocol and instruments, their reliability and validity, quality assurance, pretest, data presentation and analysis, ethical approvals, logistical considerations, recruitment, and training of research assistants.

3.2 Study Area

The study area was Alego Usonga Sub-County in Siaya County, Kenya, located in the Lake Victoria Basin. Siaya borders Busia, Kakamega, Vihiga, Kisumu, and Homa Bay Counties, with a substantive portion covering Lake Victoria. The county has a population of 993,183 people (471,669 males, 521,496 females, and 18 intersexes), confined in an area of 2529.8 km2, with a population density of 393 people per square kilometer (KNBS, 2019). The main economic activities in the County include subsistence farming, livestock keeping, fishing, and small-scale trading. (KNBS, 2019).

Administratively, the County is subdivided into 6 Sub-Counties, i.e., Alego Usonga, Bondo, Gem, Rarieda, Ugenya, and Ugunja; and 30 County Assembly Wards (KNBS, 2019). There are 221 community units (CUs) served by 2128 CHVs covering 250,698 households and 157 Community Health Assistants (CHAs) (Siaya County Health Department Data, 2025). Each household has an average of 4 members (KNBS, 2019).

As reflected in Appendix X, Siaya County currently has 302 health facilities, both public and private, consisting of 1 county referral hospital, 32 level four hospitals, 80 health

centers, and 189 dispensaries (Siaya County Health Department Data, 2025). These health facilities are important in community health services as they receive referrals from the CHVs in the community. They also do counter-referrals to the community for follow-up by CHVs. Each of them is linked to a community unit. Despite these facilities being within the recommended radius of 5km from the communities they serve, they cannot attend to all health issues (Siaya County Health Department Data, 2025). Thus, the need to upscale promotive and preventive health services to the household level, to further improve care-seeking, health promotion behavior, and access to PHC services.

Siaya County was selected because it presented with high child mortality and stunting rates. In Western Kenya, it tied with Bungoma County with the highest stunting rate of 19%, pointing to the long-term impact of poor nutrition outcomes (KNBS, 2023). It is also unique in terms of community health services implementation, being among the first counties to achieve 100% CU coverage. Siaya's CHVs have also been on a monthly stipend for the most extended duration since the advent of the community health strategy in Kenya (Siaya County Health Department Data, 2025).

Alego Usonga sub-county was picked as a study area because it presented with the poorest community health and nutrition outcomes compared to the other five sub-counties. For instance, the Sub-County was cited as having the lowest percentage of households with handwashing facilities at 30.2% and using treated water at 40.5%, against the County averages of 52.9% and 66.4%, respectively (KHIS, 2022). The Sub-County also presented the highest rates of underweight children and treated diarrhea cases among under-five-year-old children at 10.8% and 18.2%, respectively, compared to the County rates of 6.8% and 4.9% (KHIS, 2022).

The Sub-County has a population of 224,343 people (105,906 males and 118,433 females), occupying a land area of 598.9 square kilometers, with a population density of 375 people per square kilometer (KNBS, 2019). It is subdivided into 6 County Assembly Wards: Siaya Township, South East Alego, North Alego, West Alego, Usonga, and 50 CUs.

3.3 Study Design

The study was conducted from February to May 2024 using a cross-sectional design. Qualitative and quantitative data were triangulated to explain various concepts, characteristics, and measures. The use of mixed methods cements the credibility of the findings (Maier *et al*., 2023).

The cross-sectional study design was suitable as it simultaneously assessed several outcomes and their risk factors, making it appropriate for public health planning and generating hypotheses (Xiaofeng and Zhenshun, 2020). However, it cannot infer causality or temporal relationships, save for demonstrating association between concepts as applied in this study (Rahman *et al.,* 2023; Maier *et al*., 2023). To make the findings more reliable, a larger and diversified sample has been used in the study. A larger and diversified samples enhances statistical power and improves the generalizability of the study findings (Maier *et al*., 2023). The sample size was scientifically calculated, ensuring it was representative. To minimize researcher bias, data collection tools and methods were adopted from standardized and validated sources - ensuring the interview questions were logically arranged, administered in a similar sequence, and responses uniformly captured. Service delivery was assessed by establishing visitations, referrals, follow-ups, and counseling services offered by CHVs. Whereas, nutrition outcomes were appraised by

looking at the first seven IYCF practices in order of their priority and precision as listed by WHO; calculating household food security using the Household Food Insecurity Access Scale (HFIAS); and evaluating uptake of nutrition services, health-seeking behavior, and health promotion at the households using the standard indicators in the CBHIS.

3.4 Study Population

The study targeted households with children 6-59 months old served by CHVs in Alego Usonga. The Sub-County had 60591 households under the care of 519 CHVs, subsequently supervised by 48 Community Health Assistants (CHAs) (Siaya County Health Department Data, 2023). This translates to one CHV covering an average of 111 households, against a recommendation of 100 households per CHV (MOH, 2020a). A CHV is in charge of a unit called a village, while a CHA is in charge of a Community Unit (CU) (Kenya Health Information System [KHIS], 2022; MOH, 2020a).

As reflected in the KHIS (2022), routine monthly data indicated that a CHV could cover an average of 70% of the households under his / her jurisdiction – justifying a gap in service delivery that would in turn compromise nutrition outcomes. Thus, verifying this information and establishing why CHVs cannot cover all the households assigned to them is imperative. However, CHVs are encouraged to prioritize visiting households with pregnant mothers and children under the age of five years every month, as these populations remain the most vulnerable in terms of health outcomes (MOH, 2020a).

In the Community Health Services governance system, there is a Village Health Committee (VHC) at the village level, a Community Health Committee (CHC) at the CU level, a Sub-County Health Management Team (SCHMT) at the Sub-County level, and a

County Health Management Team (CHMT) in that hierarchy (MOH, 2020a). These structures are charged with overseeing community health services at various respective levels.

3.4.1 Inclusion Criteria

The following criteria were followed in selecting the study subjects:

1. A household with children aged 6-59 months—the study population was children between 6-59 months.
2. A household that had existed for more than six months—this is because a CHV is expected to register new households and update the existing ones every six months during the household registration exercise.
3. For a household with more than one caregiver/mother of a child between 6-59 months, we picked the caregiver/mother with the most extended duration of stay in that household – the probability of the caregiver with the most extended duration of stay interacting with or benefitting from the services of a CHV is higher compared to the one with the shortest duration of stay.
4. For a caregiver with more than one child in the age bracket of 6-59 months, we picked the youngest child – this aligns with the WHO (2021b) recommendation.
5. Community Health Stakeholders from the wards selected for the study, following their involvement in nutrition and health services at the community level.

3.4.2 Exclusion Criteria

1. A household with no child aged 6-59 months - data from these households did not align with the study's objectives.

2. A household with a caregiver and a respondent who refused to consent to the study - the researcher ensured voluntary participation by participants and respect for their autonomy and self-determination.
3. Households with children who were unwell at the time of data collection – sickness would have direct influence on some of the variables of study especially the infant and young child feeding practices.

3.5 Study Variables

3.5.1 Dependent Variables

Nutrition outcomes: uptake of nutrition services, health-seeking behavior, health promotion behavior, IYCF practices, and household food security.

3.5.2 Independent Variables

Performance of CHVs: service delivery (household visitations, counseling services, referrals, follow-ups).

3.5.3 Intervening variables

Demographic and socio-economic characteristics of the households: age of caregiver, sex of caregiver, marital status of caregiver, occupation of caregiver, income of household, education level of caregiver, type of housing, household size.

3.6 Sampling Design and Selection of Participants

3.6.1 Sampling Strategy

A multistage sampling strategy was applied as explained in sections *3.6.2* and *3.6.3.* This strategy was necessary because several structures had to be followed before narrowing down to the household, where the data was collected.

3.6.2 Selection of the County, Sub-County, County Assembly Wards, Community Units, and Villages

In the first stage, Siaya and Alego Usonga were purposively sampled considering their uniqueness, as discussed in section 3.1. In the second stage, 3 County Assembly Wards (CAWs) were randomly sampled from the selected sub–county. In the third stage, 11 CUs were randomly sampled from the selected 3 CAWs. In the fourth stage, 38 villages were randomly sampled from the selected 11 CUs. In the last stage, 356 households were selected from the 38 villages using systematic random sampling. The selected CUs and villages are shaded color red in Tables 3.1 & 3.2. A proportionate sampling technique was also employed based on each unit's population. Figure 3.1 shows the sampling methods used for each unit.

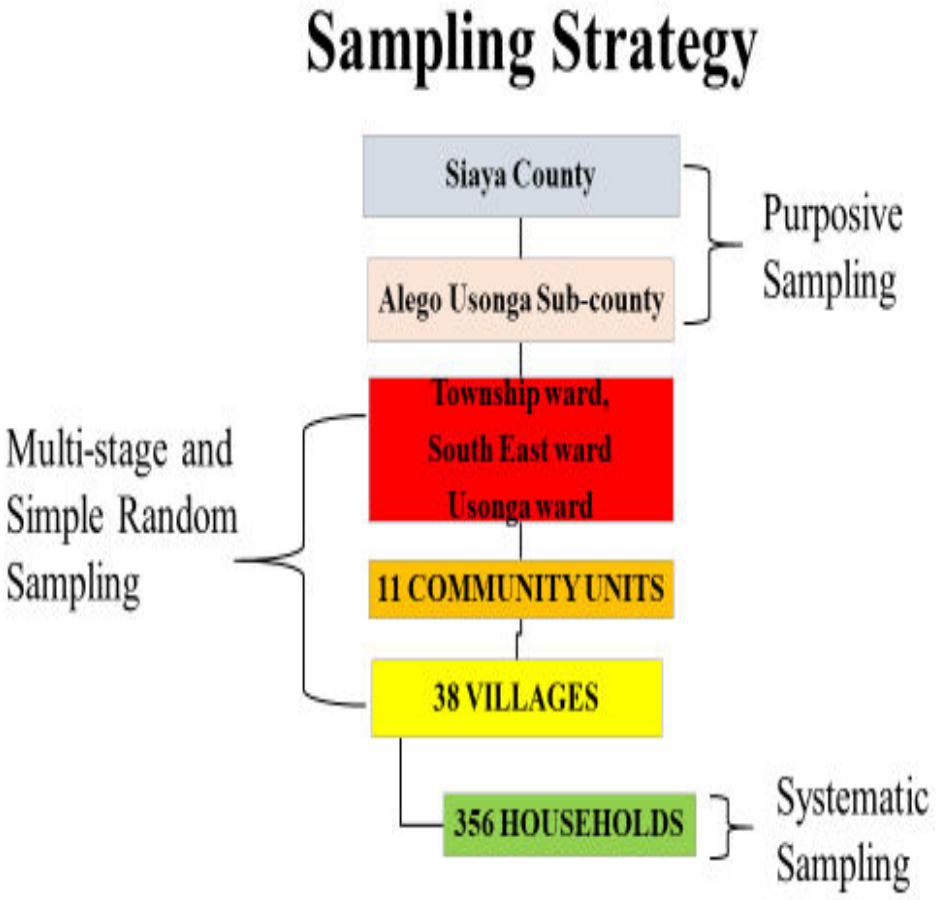

Figure 3. 1 Sampling Criteria

Table 3. 1 Sampling Frame 1

WARD		COMMUNITY UNIT	HOUSEHOLDS	NO. OF CHVS
CENTRAL ALEGO	1	KOCHIENG' A	865	9
	2	OJUANDO A	1677	14
	3	KADENGE RATUORO	1523	15
	4	OBAMBO	1081	11
	5	KOYEYO A	948	8
	6	KOYEYO B	845	7
	7	KOCHIENG' B	907	9
	8	NYADHI	1308	11
	9	OJUANDO B	1139	11
TOTAL		**9**	**10293**	**95**
NORTH ALEGO	1	HONO A	1349	10
	2	HONO B	955	9
	3	KOMOLO A	1213	10
	4	KOMOLO B	814	6
	5	NYAMILA	1294	11
	6	OLWA	1065	9
	7	NYALGUNGA	1455	12
	8	ULAFU	995	8
	9	UMALA	1069	10
TOTAL		**9**	**10209**	**85**
SIAYA TOWNSHIP	1	MULAHA A	1252	11
	2	MULAHA B	1039	11
	3	NYANDIWA A	1412	11
	4	NYANDIWA B	1244	11
	5	KARAPUL A	1058	10
	6	KARAPUL B	1230	10
	7	KARAPUL C	1275	10
	8	KARAPUL D	1031	10
TOTAL		**8**	**9541**	**84**

Table 3.1 – Continued

WARD		COMMUNITY UNIT	HOUSEHOLDS	NO. OF CHVS
SOUTH EAST ALEGO	1	BAR AGULU	1994	15
	2	BAR OLENGO	995	10
	3	BARDING'	1104	12
	4	MUR NG'IYA	1669	12
	5	KOGELO	1480	14
	6	MUR MALANGA	1038	10
	7	MASUMBI	1679	12
	8	PAP ORIANG'	1568	13
	9	BAR OSIMBO	794	8
	10	RANDAGO	1148	10
	11	NYAJUOK	1751	15
TOTAL		**11**	**15220**	**131**
USONGA	1	NYADORERA A	1811	13
	2	NYADORERA B	1589	13
	3	SUMBA	1367	8
TOTAL		**3**	**4767**	**34**
WEST ALEGO	1	GANGU	1292	11
	2	KAUGAGI HAWINGA	1100	10
	3	KAUGAGI UDENDA	1390	10
	4	KABURA UHUYI	687	5
	5	KODIERE	826	5
	6	MAHOLA ULAWE	763	5
	7	KALKADA URADI	1100	8
	8	KOMENYA KALAKA	983	10
	9	KOMENYA KOWALA	1086	10
	10	SIGOMA URANGA	1334	13
TOTAL		**10**	**10561**	**87**
GRAND TOTAL		**50**	**60591**	**516**

Table 3. 2 Sampling Frame 2

		TOWNSHIP WARD				SOUTH EAST WARD					USONGA WARD		TOTAL
		MULAHA A CU	KARAPUL A CU	KARAPUL D CU	NYANDIWA A CU	KOGELO CU	BAR AGULU CU	MUR MALANGA CU	MASUMBI CU	RANDAGO CU	SUMBA CU	NYADORERA B CU	
VILLAGES	1	AWELO A	GOT OJUR A	**UROGI A**	**NYAWANGA**	AYOO "A"	**KIRINDO**	**MALANGA B**	RALAK	KOGA	UDAMAYI A	**MAHURU A**	
	2	AWELO B	**GOT OJUR B**	**NDERE**	ACHAGE	KATUDA "B"	UDIDA A	MURGWENG	URADI	OSUMBA	**UDAMAYI B**	MAHURU B	
	3	**ARINGO A**	**GOT OJUR C**	NGOYA	ANDURO	AYOO "C"	AGORO LIEYE B	MATERA B	KOFWAYA	SIREMBE "B"	MILAMBO A	MUDAO	
	4	ARINGO B	GOT OJUR D	MFUAYO A	JONYO B	PALA	LOWER ULORE	NDISI WEST	OJALO	KAMWAI	MILAMBO B	SEGA	
	5	RAE A	GOT OJUR E	MFUAYO B	JONYO A	**BAR OKANG**	SAMANYINYA	MALUNGA	UUNA	**USINGO**	UWASI A	**UHEMBO A**	
	6	RAE B	GOT OJUR F	MFUAYO C	LWALA B	OLUTHI	KANYIORO	UDINDI	**BUGO**	SIREMBE "A"	UWASI B	UHEMBO B	
	7	BANANA A	GOT OJUR G	MFUAYO D	LWALA A	MASANGA	UHURU A	**NDISI EAST**	NDURU LOWER A	**NYANGINJA "A"**	UWASI C	SIDUNDO	
	8	**BANANA B**	RAMBA PUNDO B	**MFUAYO E**	**SULWE B**	**ACHIEWO 'A'**	UHURU B	**MALANGA A**	NDURU LOWER B	NYANGINJA "B"	UWASI D	LOLWE A	
	9	**FUTRO A**	RAMBA PUNDO D	MFUAYO F	SULWE A	**AYOO "B"**	LIEYE A	MATERA A	**NDURU LOWER C**	**UGADHI**	NDAGAYWA A	LOLWE B	
	10	FUTRO B	**AGAGE**	MFUAYO G	UHONGO A	ACHIEWO "B"	**UDONGA**	OTIT	PAP NYADIEL UPPER	MAGWAR	**NDAGAYWA B**	LUNYU A	
	11	TOWN CENTER			**UHONGO C**	RAMBO SCHOOL	UDIDA B		**PAP NYADIEL LOWER**		NDAGAYWA C	LUNYU B	
	12					**KATUDA "A"**	**HAGA**		**BAR KOYOO**		NDAGAYWA D	**MALANGA**	
	13					OCHERE	KANYIBONG A				ULUPI A	MAOHO	
	14					RAMBO OJALO	**KANYIBONG B**				ULUPI B	DIBUORO	
	15						**UPPER ULORE**				BUKHOBA A	**NYALHUMA**	
	16										BUKHOBA B	LUNYU D	
	17										BUKHOBA C	HAWAGAYA	
	18										**BUKHOBA D**	LIGEGA	
	19										BUKHOBA E	LUNYU C	
	20										BUKHOBA F	USUWO A	
	21											USUWO B	
HOUSEHOLDS		**1252**	**1058**	**1031**	**1412**	**1480**	**1994**	**1038**	**1678**	**1148**	**1367**	**1589**	**15047**
SAMPLED H/H		**30**	**25**	**24**	**33**	**35**	**47**	**24**	**39**	**27**	**32**	**37**	**353**
VILLAGES		**3**	**3**	**3**	**3**	**4**	**5**	**3**	**4**	**3**	**3**	**4**	**38**

N/B: The sampled villages are shaded color red

3.6.3 Selection of Households

Lists of all households with children aged 6-59 months were acquired from the CHVs of the selected villages. The research assistants then randomly sampled the required households from the lists provided and requested the CHVs to escort them to those households. The households had existed in the selected villages for at least six months before the study. The algorithm in Figure 3.2 was used as a guide once a household was identified:

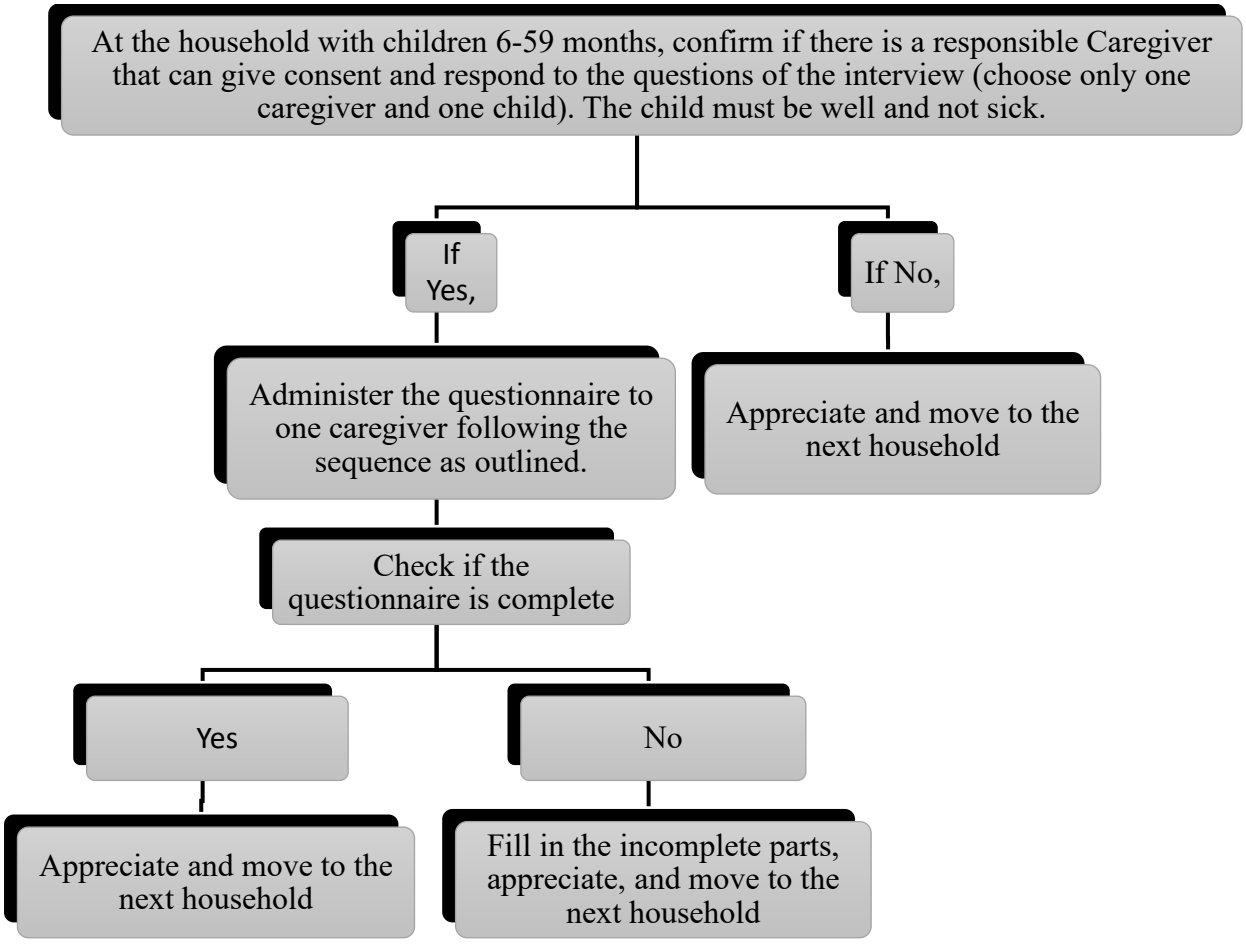

Figure 3. 2 Selection of respondents

3.6.4 Selection of Participants for the FGDs.

The FGDs targeted stakeholders of community health services having direct contact with the CHVs. Each FGD comprised between 9-11 participants purposively sampled from one CU in each of the three wards selected for the study. The Sub-County Community Services Focal Person, a key figure in this process, assisted in selecting Community Units with robust governance structures. Subsequently, the CHAs of the selected CUs assisted in identifying and inviting the participants. The FGDs were conducted in Mur Malanga CU in South East ward, Karapul CU in Township ward, and Sumba CU in Usonga ward. The participants, who played a vital role in shaping our understanding during the FGDs, consisted of members of the Community Health Committee (CHC), Provincial Administration, Faith Based Organizations (FBOs), local Civil Society Organizations (CSOs), representatives of link health facilities, representatives of special interest groups, i.e., the youth, women, People Living with Disabilities (PLWD). One FGD was conducted in every County Assembly Ward.

3.7 Sample Size Determination

Krejcie and Morgan's (1970) formula determined the sample size since the study was conducted in a finite population. This formula is considered ideal for determining a sample size in a study where the data to be collected is categorical like in this case.

$$n = \frac{NZ^2P(1-P)}{d^2(N-1) + Z^2P(1-P)}$$

The sample size for the Households:

Where;

n'= sample size with finite population correction,

N= the size of the target population (No. of Households in Alego Usonga) =60,591 (KHIS, 2022)

Z= Z statistic for 95% confidence level=1.96

P= estimated proportion of households visited by CHV every month = 70% (KHIS, 2022)

d= margin of error = 5%

$$n = \frac{60591 * 1.96^2 * 0.7 * 0.3}{0.05^2(60591 - 1) + 1.96^2 * 0.7 * 0.3}$$

$$= 321$$

Add 10% for design defect, n = 321 +(0.1*321)

= 353 households with children 6-59 months.

3.8 Data and Information Collection

3.8.1 Procedure of Data Collection

Quantitative data were collected through household interviews conducted by trained research assistants, with the assistance of CHVs in selected villages. The data were then used to examine the demographic and socio-economic characteristics of households, the service delivery of CHVs, and the nutrition outcomes of the households. Qualitative data were gathered through FGDs, with participants drawn from stakeholders of community health services in Mur Malanga, Karapul, and Sumba community units in South East Alego, Siaya Township, and Usonga wards, respectively. FGDs were utilized to collect in-depth information from community health stakeholders. The qualitative data supplemented the quantitative data. Four research assistants conducted the interviews and FGDs from February to May 2024.

3.8.2 Measurement of Infant and Young Child Feeding Practices

"Infant and young child nutrition is a critical factor in human health, nutrition, survival, growth, and development" (Abate *et al.*, 2023). The WHO and the United Nations Children's Fund established a global strategy for infant and young child feeding; targeting initiation of breastfeeding within one hour of birth, exclusive breastfeeding for six months of life, and introduction of nutritionally adequate and safe complementary foods at six months, along with continued breastfeeding for children up to 2 years of age or beyond (WHO, 2021b).

Further, WHO (2021b) recommends seventeen (17) indicators for measuring IYCF practices. These include six breastfeeding indicators, nine complementary feeding indicators, and two others. Breastfeeding indicators include: having ever breastfed, early initiation of breastfeeding, exclusive breastfeeding for the first two days after birth, exclusive breastfeeding for infants under six months, mixed milk feeding for infants under six months, and continued breastfeeding from 12 to 23 months.

Complementary feeding indicators include the introduction of solid, semi-solid, or soft foods 6-8 months, minimum dietary diversity 6- 23 months (MDD), minimum meal frequency 6-23 months (MMF), minimum milk feeding frequency for breastfed children 6-23 months, minimum acceptable diet 6-23 months (MAD), eggs and or flesh food consumption 6-23 months, sweet beverage consumption 6-23 months, unhealthy food consumption 6-23 months, and zero vegetable or fruit consumption 6-23 months. The other indicators are bottle feeding 0-23 months and infant feeding area graphs.

WHO (2021b) has also arranged the seventeen indicators in order of precision, starting with the most precise and moving down to the least. The most precise indicators are

considered to have smaller confidence intervals because they are based on a more significant number of IYCFs (WHO, 2021b). Based on precision and information gap, the first seven indicators were picked for this study to assess IYCF practices in the households. Tables 3.3 and 3.4 illustrate the indicators based on their level of precision and the measurement of the first seven IYCF practices used in this study.

Table 3. 3 Table of Precision

Most precise	1.	Ever breastfed	Children born in the last 24 months, whether living or dead
	2.	Early initiation of breastfeeding	
	3.	Exclusively breastfed for the first two days after birth	
	4.	Bottle feeding 0–23 months	Living children 0–23 months of age
	5.	Minimum dietary diversity 6–23 months	Living children 6–23 months of age
	6.	Minimum meal frequency 6–23 months	
	7.	Minimum acceptable diet 6–23 months	
	8.	Egg and flesh food consumption 6–23 months	
	9.	Sweet beverage consumption 6–23 months	
	10.	Unhealthy food consumption 6–23 months	
	11.	Zero vegetable or fruit consumption 6–23 months	
	12.	Continued breastfeeding for 12–23 months	Living children 12–23 months of age
	13.	Exclusive breastfeeding under six months Living infants 0–5 months	Living infants 0–5 months of age
	14.	Mixed milk feeding under six months of age	
Least precise	15.	Introduction of solid, semi-solid, or soft foods 6–8 months	Living infants 6–8 months of age

Source: WHO (2021b)

N/B: The list does not include the indicator "Minimum milk feeding frequency for non-breastfed children 6–23 months of age" because its precision varies with the number of non-breastfed children in the sample. In samples where very few IYC are not breastfed its precision will be low (WHO, 2021b).

Table 3. 4 Measurement of IYCF practices

Indicator	Definition	Numerator	Denominator
Ever breastfed	Percentage of children born in the last 24 months who were ever breastfed.	Children born in the last 24 months who were ever breastfed.	Children born in the last 24 months.
Early initiation of breastfeeding	Percentage of children born in the last 24 months who were put to the breast within one hour of birth.	Children born in the last 24 months who were put to the breast within one hour of birth.	Children born in the last 24 months.
Exclusively breastfed for the first two days after birth	Percentage of children born in the last 24 months who were fed exclusively with breast milk for the first two days after birth.	Children born in the last 24 months who were fed exclusively with breast milk for the first two days after birth.	Children born in the last 24 months.
Bottle feeding 0–23 months.	Percentage of children 0–23 months of age who were fed from a bottle with a nipple during the previous day.	Children 0–23 months of age who were fed from a bottle with a nipple during the previous day.	Children 0–23 months of age.
Minimum Dietary Diversity 6–23 Months(MDD)	Percentage of children 6–23 months of age who consumed foods and beverages from at least five of the eight defined food groups during the previous day.	Children 6–23 months of age who consumed foods and beverages from ≥ five food groups during the previous day.	Children 6–23 months of age.
Minimum Meal Frequency 6–23 Months (MMF)	Percentage of children 6–23 months of age who consumed solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children), the minimum number of times or more during the previous day.	Breastfed children 6–23 months of age who consumed solid, semi-solid, or soft foods a minimum number of times or more during the previous day; or Non-breastfed children 6–23 months of age who consumed at least four solid, semi-solid or soft food feeds or milk feeds during the previous day, with at least one of the four is a solid, semi-solid, or soft food feed.	Children 6–23 months of age.
Minimum Acceptable Diet 6–23 Months (MAD)	Percentage of children 6–23 months of age who consumed a minimum acceptable diet during the previous day.	Children 6–23 months of age who consumed at least the minimum dietary diversity and minimum meal frequency during the previous day, **AND** are either breastfed or consumed the minimum milk feeding frequency during the previous day.	Children 6–23 months of age.

Source: WHO (2021b)

3.8.3 Measurement of Household Food Security

Food security is commonly defined as a situation where all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 2012). Household food security can be measured using different methods: household survey food consumption data, caloric intake, dietary diversity, household food insecurity access scale (HFIAS), and food adequacy questions (Mota *et al.*, 2019).

In this study, the access component of food security was measured and, therefore, definitions of food security by Shaw (2007) and Bickel *et al.* (2000) were adopted.

Shaw (2007) defined food security as "access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet." Whereas Bickel *et al.* (2000) defined food security as "access by all people at all times to enough food for an active, healthy life." Conversely, Bickel *et al.* (2000) defined food insecurity as "limited or uncertain availability of nutritionally adequate and safe foods, or limited, or uncertain ability to acquire acceptable foods in socially acceptable ways."

Further, according to Bickel *et al.* (2000) "any single indicator cannot capture the full range of food insecurity and hunger, instead, a household's level of food insecurity or hunger must be determined by obtaining information on a variety of specific conditions, experiences, and behavior that serve as indicators of the severity of the condition."

In this regard, the study used the Household Food Insecurity Access Scale (HFIAS), a tool recommended for measuring food security across cultures (Bickel *et al.,* 2000). HFIAS is based on the idea that there is a set of predictable reactions to the experiences of food insecurity that can be summarized and quantified, allowing measurement through

household surveys (Bickel *et al.,* 2000). This method assessed feelings of uncertainty or anxiety, perception of insufficient quantity and quality of food, reported a reduction in food intake, and feelings of shame for resorting to socially unacceptable means to obtain food resources in the household (Bickel *et al.,* 2000).

HFIAS, adapted from the United States, uses nine questions that effectively distinguish the food secure from the food insecure at the household level (Coates *et al.*, 2007). Consequently, the questions represent universal aspects of the experience of food insecurity, capturing information on food shortage, quantity, and diet quality to determine the status of a given household's access to food (Coates *et al.*, 2007).

Therefore, households can be classified based on the severity of their food security status along the spectrum by using data on the severity and frequency of their experiences over the previous thirty days (Coates *et al.*, 2007). HFIAS captures responses on a scale of between 0 (most food insecure) and 27 (most food insecure) and codes the responses to calculate the index, which is then used to classify households into levels of food insecurity (Coates *et al.*, 2007).

Households were asked if they experienced any problem with food access 30 days preceding the interview. Nine questions about modifications made to their diets or food consumption patterns due to limited resources to acquire food were posed to the households. Some questions asked about the household's perception of food vulnerability or stress, while the rest addressed the household's behavioral responses to food insecurity.

Each of the questions had two parts. The first part asked about whether there was an occurrence. If households had a yes response, the second part of the question about frequency of occurrence was administered, too. The frequency of occurrence had three

responses: the first response was “rarely” (once or twice in the past four weeks) with a score of 1; the second response was “sometimes” (three to ten times in the past four weeks) with a score of 2; and the last response being “often” (more than ten times in the past four weeks) with a score of 3. The total scores ranged from 0 to 27, with 0 indicating no occurrence prompting the interviewer to skip to the next question, and 27 indicating all the households responding “often” to part two of all questions.

3.8.4 Data Collection Instruments

Data were collected using a structured questionnaire (Appendix II) and an FGD guide (Appendix III). The structured questionnaire was divided into three sections, each containing the following information: Section one – demographic and socio-economic characteristics of households with children aged 6-59 months; Section two – household service delivery by CHVs; Section three – nutrition outcomes of households with children aged 6-59 months (health-seeking behavior, IYCF practices, uptake of nutrition services, health promotion behavior, and household food security). The questionnaire was adopted from WHO/UNICEF indicators for assessing IYCF practices (2021), Household Food Insecurity Access Scale (HFIAS) for measuring food access: indicator guide, version 3 by FANTA/USAID, and the Community-Based Health Information System. The FGD guide was adopted from https://www.mcsprogram.org/wp-content/uploads/2017/12/FGD-tool-3-for-Community-Health-Workers.docx.

3.8.5 Reliability

The study design was meticulously crafted, instilling confidence in the reliability and applicability of the findings in any setup. The sample size was scientifically calculated, ensuring it was representative. To ensure internal reliability, data collection tools and

methods were standardized by arranging the questions in the interviews and FGDs logically, administering them in a similar sequence, and capturing responses uniformly. An inter-rater reliability test was conducted to evaluate the reliability of the questionnaire. An intra-class correlation coefficient (ICC) score of 0.916 was achieved, indicating a consistent and reproducible assessment across different raters (Tulliez *et al*., 2025). This method is used when testing the degree of agreement among multiple raters or evaluators assessing the same thing (Zhao *et al.,* 2022). Table 3.4 shows the results of the Inter-Rater Reliability Test calculated from the pre-test data.

Table 3. 5 Inter-rater Reliability Test Results

	Intra-class Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	0.547[a]	0.175	0.981	16.000	2	16	0.000
Average Measures	0.916[c]	0.657	0.998	16.000	2	16	0.000

*Two-way mixed effects model where people effects are random and measures effects are fixed

a. The estimator is the same, whether the interaction effect is present or not.
b. Type A intra-class correlation coefficients using an absolute agreement definition.
c. This estimate is computed assuming the interaction effect is absent because it is not estimable otherwise.

3.8.6 Validity

To achieve internal validity (credibility and legitimacy of the study), inclusion and exclusion criteria outlined in the study protocol when selecting the respondents was followed. Adherence to the measurement techniques was also ensured when collecting the data. The research tools were pre-tested for precision in different Community Units. Probability sampling methods using proportionate sampling techniques were deployed to identify the respondents and ensure external validity. Content validity was ensured by adopting the questionnaire's content from standard and validated tools

previously used by other lead researchers: WHO/UNICEF, FANTA/USAID, and CBHIS. The data collection tools (Appendices II and III) contained all possible questions that could be asked about the content.

3.8.7 Recruitment and Training of Research Assistants.

With the assistance of the Sub-County Community Health Services Focal Person, 4 Research Assistants were recruited on 19th February 2024. These Research Assistants were identified among the volunteer Community Health Assistants attached to the Department of Health in Alego Usonga Sub-County. These CHAs were familiar with the study area and could speak fluent Dholuo, English, and Swahili. They were trained for one day on 20th February 2024 to familiarize themselves with the data collection tools and procedures. Thereafter, they got engaged in the pretest exercise for one day on 27th February 2024, and retrained for another day to correct the mistakes identified during the pretest on 7th March 2024. The training focused much on using the ODK platform, administering the questions, recording the responses, potential ethical issues, and the selection of study participants. Research assistants were further followed up and refreshened in the field during data collection.

3.8.8 Quality Assurance

The research assistants underwent rigorous training on the data collection tools and procedures. This training, which included sampling study respondents, inclusion and exclusion criteria, interview administration, and adherence to ethical principles, ensured the quality of data collection, management, and storage. Close supervision was offered to the research assistants daily, enhancing the quality assurance process. This was done by accompanying the research assistants to the sampled households, listening to how they

were administering the questionnaire, and making necessary adjustments accordingly. The supervision also offered an opportunity to replenish field supplies and logistics.

3.9 Pretesting of Research Tools

The research tools were pretested in Central Alego ward in February 2024. With the help of the Sub-County Community Health Services Focal Person, two villages outside the study area were identified: one in a rural setup and the other in a semi-urban setup. The rural village was from Kochieng' A CU, and the semi-urban village was from Ojwando CU. The CHVs of the two villages then helped compile a list of households with children aged 6-59 months. Thereafter, 35 households were randomly sampled from the list for interviews: 20 from a rural village (Kaya) and 15 from a semi-urban village (Adodi A). The sample size for the pretest was informed by the recommendation of Perneger *et al.* (2014), which stated that small sample sizes may fail to uncover everyday problems when pretesting a questionnaire and recommended a default sample size of 30 participants.

Four Research Assistants, each with the company of a CHV, collected the pretest data from the households. Ten participants for FGDs were also purposively selected from the two community units, with representations cutting across various community health stakeholders. They included 4 CHC members, one CHA, one Health Facility in charge, one youth representative, and three representatives of the provincial administration. These participants were chosen following their direct involvement in or influence over the health service delivery in the community.

The pretest helped to identify various gaps in the research tools regarding the sequence and flow of questions and the timing of the interview and FGD sessions. As a result, the questionnaire and FGD guide were revised, making them more transparent and precise.

The pretest exercise also helped in planning the logistics for the primary data collection exercise. As such, we estimated that one FGD session would last for approximately one hour, and one household interview session would last for 30-45 minutes. Therefore, each Research Assistant would cover 8-10 households daily, considering other factors and challenges in the field.

3.10 Data Analysis and Presentation

After completing fieldwork, quantitative data generated by the household interview were imported into an Excel sheet for cleaning and verification. Subsequently, the Excel sheet was exported to the Statistical Package for Social Sciences (SPSS) Version 28 software for analysis. Analysis was done using descriptive statistics (frequencies, measures of central tendency, and measures of dispersion) for objectives 1 and 2, Fisher's Exact Test, and Multinomial Logistic Regression for statistical analysis of objective 3. P-values of less than or equal to 0.05 were considered statistically significant at a 95% confidence level.

According to Kim (2017), "Chi-Square Test and Fisher's Exact Test can be used to test the independence between two variables when comparing independent and unrelated groups." Chi-Square Test is also best suited for large samples, while Fisher's Exact Test works best with small samples but is also valid for all samples. Kim (2017) further confirms that Fisher's Exact Test is recommended, especially when more than 20% of the cells have expected frequencies less than 5, and the application of approximation is inadequate. Having run the Chi-Square Test of independence on the variables for comparison, it was found that more than 20% of the cells had expected frequencies less

than 5. Therefore, Fisher's Exact Test was used to test the independence of the variables of the study.

For the qualitative data, FGD responses were transcribed and imported into NVivo 12 Pro; then analyzed by generating themes, sub-themes, and codes. The results were then presented in frequency and percentage tables, charts, graphs, project maps, matrix coding queries, bar graphs, and framework matrix as appropriate. This is summarized in Table 3.6.

Table 3.6 Data Analysis

Type of Data	Objectives	Statistical Tool	Statistical Test	Data Presentation
Quantitative data	**Objective 1:** To assess the service delivery of Community Health Volunteers in households with children aged 6-59 months in Alego Usonga, Siaya County.	SPSS V28	Descriptive Statistics • Frequencies • Measures of central tendency • Measures of dispersion	• Tables • Bar Graphs
	Objective 2: To assess the nutrition outcomes in households with children aged 6-59 months in Alego Usonga, Siaya County.	SPSS V28	Descriptive Statistics • Frequencies • Measures of central tendency • Measures of dispersion	• Tables • Bar Graphs
	Objective 3: To establish the relationship between the service delivery of Community Health Volunteers and the nutrition outcomes of households with children aged 6-59 months in Alego Usonga, Siaya County.	SPSS V28	Fisher's Exact Test Multinomial Logistic Regression	• Tables
Qualitative Data	**FGD data**	NVivo 12 Pro	Thematic Analysis	• Project Maps • Matrix Coding Queries-Bar Graphs • Frame-work Matrix

3.11 Logistical and Ethical Considerations

The study was guided by three fundamental ethical principles: beneficence, autonomy, and justice. Under beneficence, the benefits of the study were explicitly explained to the respondents before their participation. The participants were made to understand how the study would impact existing community health and nutrition policies and their implementation. This commitment was upheld by strictly adhering to the study protocol. The study also took cognizance that every study subject had a right to self-determination by respecting all their rights and granting them full autonomy in their participation. By this, informed consent was sought from all the subjects. The purpose of the study was explained to the subjects, ensuring that they understood and comprehended the content of the informed consent. Subjects with deprived autonomy from vulnerability were treated with dignity, and proxy consents were sought. The study subjects had the liberty to participate and withdraw their consent at any stage of the study.

All the engagements between the researcher and the study subjects were private, and all the information collected was treated with confidentiality, professionalism, and integrity. By this, the CHVs accompanying research assistants were excused during the household interviews. The questionnaires were coded and treated anonymously, and no personal details were captured. For data safety and confidentiality, the research assistants were assigned passwords for ODK platform access and usage. The ODK data were also end-to-end encrypted, and the SPSS raw data and output were protected with passwords only known to the researcher. The study's findings were used only for the intended purpose, and no personal information was shared with third parties without the express permission of the affected persons.

Justice was upheld by ensuring that the benefits and burdens of the study were distributed fairly among the participants and the community. This was achieved by deploying probability sampling in identifying the respondents – thus ensuring equal and equitable treatment for all the subjects, and consequently instilling confidence in the study's integrity.

The research was approved by Masinde Muliro University of Science and Technology - Directorate of Post Graduate Studies (DPS) and, subsequently, cleared by Masinde Muliro University of Science and Technology, Institutional Scientific and Ethics Review Committee (ISERC), approval no. **MMUST/IERC/002/2024**. The National Commission of Science, Technology, and Innovation (NACOSTI) issued a research permit No. **NACOSTI/P/24/32711**. Lastly, permission was sought from the County Health Management Team (CHMT) of Siaya County before going to the field to collect data as shown in Appendix VII. The CHMT further cascaded the information to the Sub-County Health Management Teams, Provincial Administration, and Community Units. Out of this goodwill, no serious form of resistance was encountered from the community during data collection.

CHAPTER FOUR

RESULTS

4.1. Introduction

This Chapter focuses on data analysis and interpretation of the study findings. The results are presented on the demographic and socio-economic characteristics, service delivery of CHVs, household nutrition outcomes, and the relationships between the study variables.

4.2. Demographic and Socio-Economic Characteristics

4.2.1 Demographic and Socio-Economic Characteristics of the Households

The section provides a detailed descriptive analysis of the demographic and socio-economic characteristics of the households covered in the study. Results in Table 4.1 show the coverage of households in each geographical area sampled for the study.

Table 4. 1 Respondents for the Household Interviews

Ward	**CU**	**Target Households**		**Households Interviewed**	
Township	Mulaha A	30	112	29	115
	Karapul A	25		33	
	Karapul D	24		19	
	Nyandiwa A	33		34	
South East	Kogelo	35	172	38	173
	Bar Agulu	47		50	
	Mur Malanga	24		20	
	Masumbi	39		37	
	Randago	27		28	
Usonga	Sumba	32	69	33	68
	Nyadorera B	37		35	
Total		**353**		**356**	

The demographic and socio-economic characteristics of the households of the study are shown in Table 4.2. With 69.1% of the respondents living in rural villages, while 30.9% are in semi-urban settlements (trading centers). About 51.7% of the children aged 6-59 months were males, and most of the caregivers to these children were their mothers at 78%. The research also revealed that 78.7% of the primary caregivers were married. The main economic activity was agriculture, whereas 21.6% of the primary caregivers were domestic workers.

Most households had a monthly income of less than Ksh. 10,000.00, whereas none exceeded Ksh. 50,000.00. More than three-quarters of the respondents lived in temporary and semi-permanent houses. Only 43% of the primary caregivers had attained education beyond the primary level, while 2.8% had no formal education.

Further, every household had an average of one child aged between 6 and 59 months. The households with the lowest number had one child, while those with the highest had five children. The mean age of children 6-59 months was 27.7 months. The youngest was six months, while the oldest was 59 months. The mean age of the primary caregivers was 32.1 years, the youngest being 17 years old, while the oldest was 79 years old. The average number of persons in the households was 6, with the smallest household having two people and the largest having 14.

Table 4. 2 Demographic and Socio-economic Characteristics of the Households

Characteristics	Categories	n	Percentage
Settlement location	Rural	246	69.1
	Semi-urban	110	30.9
Gender of the children	Male	184	51.7
	Female	172	48.3
Primary Caregivers	Father	44	12.4
	Mother	278	78
	Grandparent	27	7.6
	Older sibling	6	1.7
	Other Guardian	1	0.3
Marital Status of Primary Caregiver	Married	280	78.7
	Single	53	14.9
	Divorced	4	5.3
	Widowed	19	1.1
Occupation of Primary Caregiver	Business persons	97	27.3
	Casual Laborers	20	5.6
	Farmers	130	36.5
	Fishermen	1	0.3
	Minors	4	1.1
	Transport Operators	9	2.5
	Formal Employment	18	5.1
	Domestic Workers	77	21.6
The monthly Income of the households	Below Ksh.10,000	279	78.37
	Ksh. 10,000 - 30,000	69	19.38
	Ksh. 30,000-50,000	8	2.25
	Ksh. 50,000 and above	0	0
The Highest Education Level of the primary caregiver	No Formal Education	10	2.8
	Primary	193	54.2
	Secondary	135	37.9
	Tertiary	18	5.1
Type of Housing	Permanent	84	23.6
	Semi-permanent	138	38.8
	Temporary/makeshift	134	37.6

	N	Minimum	Maximum	Sum	Mean
Number of children in the age bracket of 6-59 months	356	1	5	525	1.47
Age of the selected child in months	356	6	59		27.7
Primary Caregivers' age in years	356	17	79		32.1
Household Size	356	2	14		5.86

4.2.2 Demographic Characteristics of the FGDs Participants

Three FGDs were conducted in Karapul, Mur Malanga, and Sumba Community units, each lasting for an average of one hour. Project maps were used to analyze the demographic characteristics of each FGD, as shown in Figures 4.1, 4.2, and 4.3.

4.2.2.1 Demographic Characteristics of Karapul FGD Participants

Ten participants were invited, and all of them attended. Among them were various representations, including five CHC members, one CBO member, one youth representative, and three County Government and provincial administration representatives. The mean age of the participants was 42.4 years, with the youngest being 21 and the eldest 72. Most participants (5) had attained tertiary education, 2 with secondary education, and 3 with primary education. Eight participants were married, one single, and one widow.

4.2.2.2 Demographic Characteristics of Mur Malanga FGD Participants

The FGD was attended by eleven participants, comprising four CHC members, one FBO representative, one PLWD representative, one women leader, and four County Government and provincial administration representatives. The mean age of the participants was 60.3 years, with the youngest being 42 and the oldest being 69. All the participants had primary education, which was the highest level attained. Nine of them were married, while two were widowed.

4.2.2.3 Demographic Characteristics of Sumba FGD Participants

Nine participants attended the session, comprising five CHC members, one CBO member, one youth leader, one women leader, and one person representing the provincial administration. The mean age of the participants was 45.8 years, with the youngest being

28 and the oldest being 60. Five participants had primary education, two had secondary education, and two had tertiary education. Six participants were married, one was single, and two were widows.

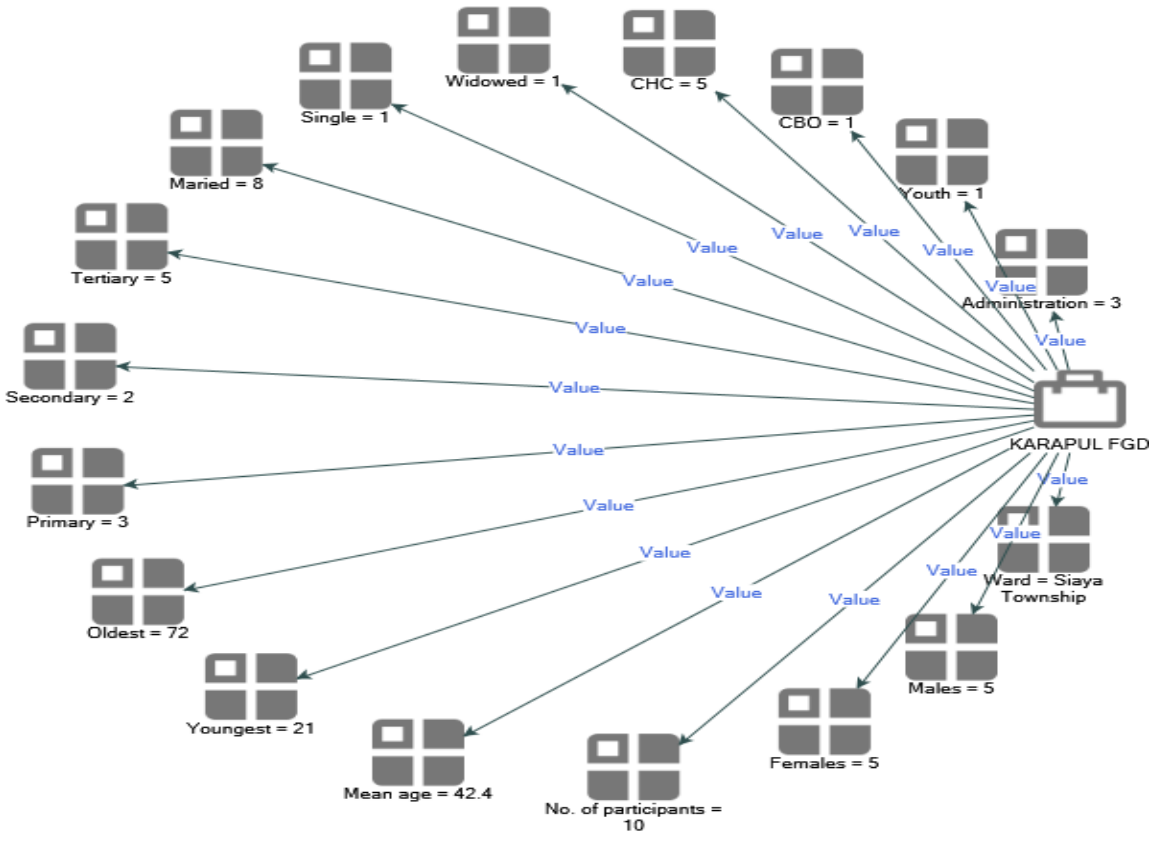

Figure 4. 1 Karapul FGD Project Map

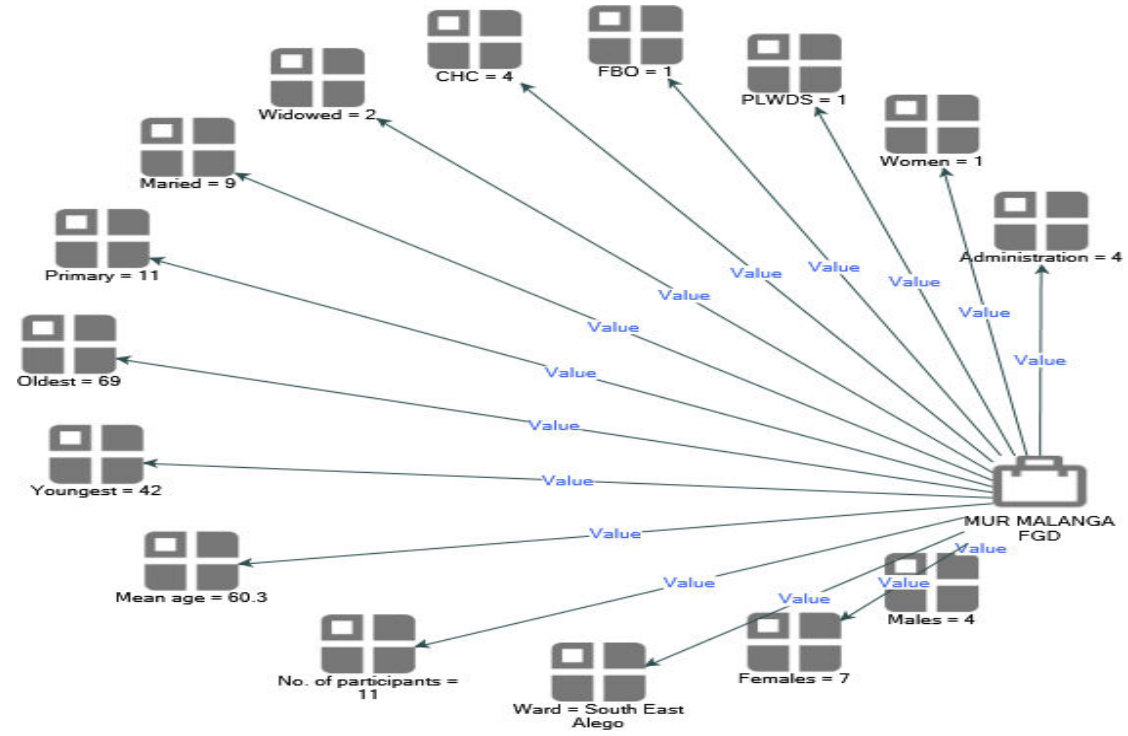

Figure 4. 2 Mur Malanga FGD Project Map

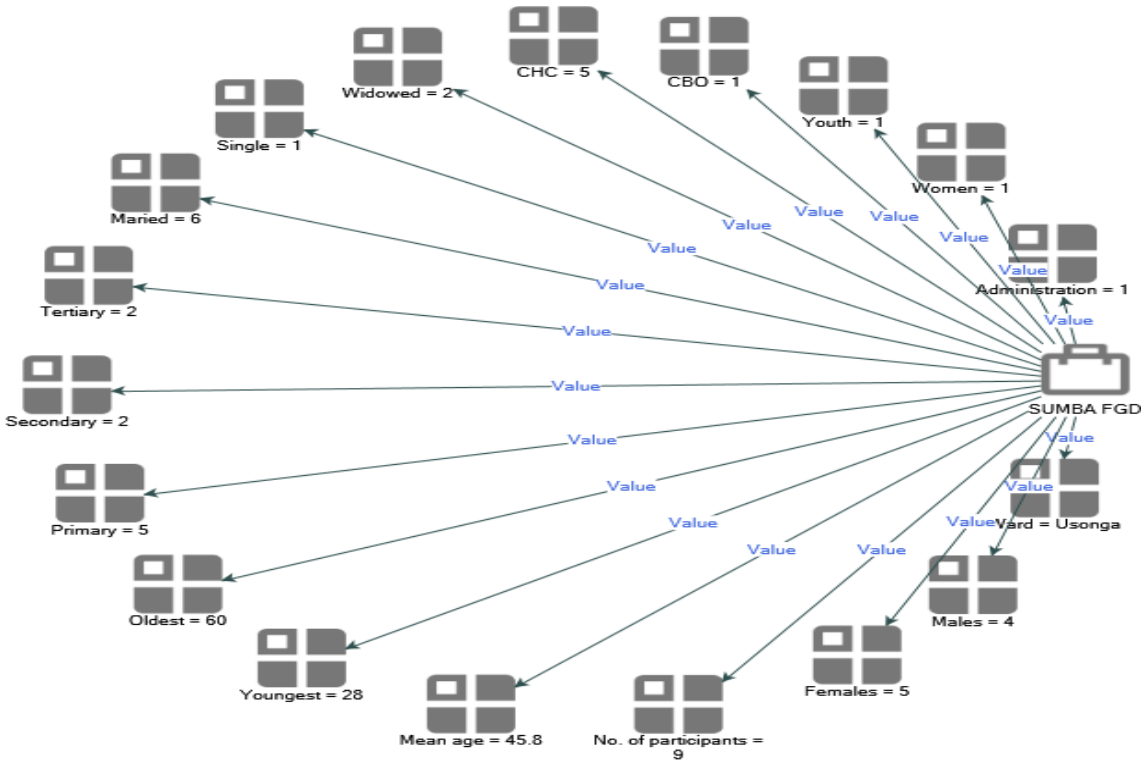

Figure 4. 3 Sumba FGD Project Map

4.3. Service Delivery of Community Health Volunteers

This section presents a detailed descriptive analysis of the service delivery of Community Health Volunteers. The findings regarding visitations, referrals, follow-ups, and counseling services rendered by Community Health Volunteers in the households are presented in Table 4.3.

4.3.1 Household Visitation

When asked about their CHVs, nearly all the respondents confirmed they knew them. Concerning the frequency of household visitation, 71.9% confirmed that their CHVs visited them monthly, while 0.3% reported that they were never visited.

4.3.2 Referral and Follow-up Services

As indicated in Table 4.3, 32% of the households had benefited from referral services conducted by the CHVs. Among the referrals done by the CHVs, 86% were issued with referral notes. Up-on referral, 96.5% visited health facilities for services, 58.2% were escorted to the health facilities by CHVs, and 92.1% followed up by CHVs. Among the follow-ups, 76.2% were done the same day, 21.9% after one week, and 1.9% took place after two weeks. Further, Figure 4.4 shows that most referral services were for growth monitoring and promotion, diarrhea and fever, vitamin A supplementation, immunization, malnutrition management, chronic cough, deworming, and HIV services in that order. Referral for other health services comprised only 9.9%.

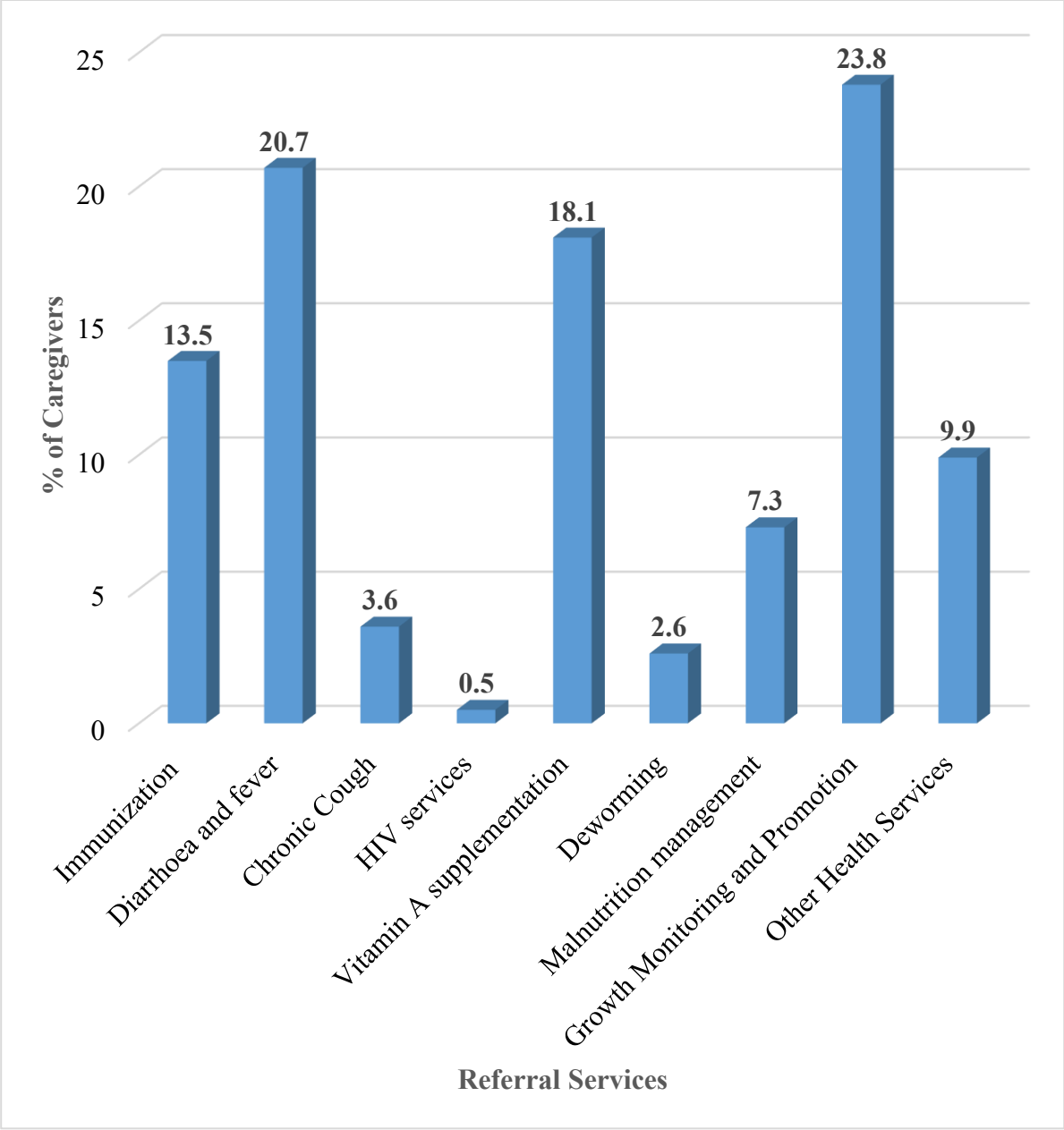

Figure 4. 4 Referrals done by CHVs

4.3.3 Counseling and Education Services

Among the households visited by the CHVs, 34.8% confirmed having benefited from counseling services. As shown in Figure 4.5, most of the counseling services were on IYCF practices.

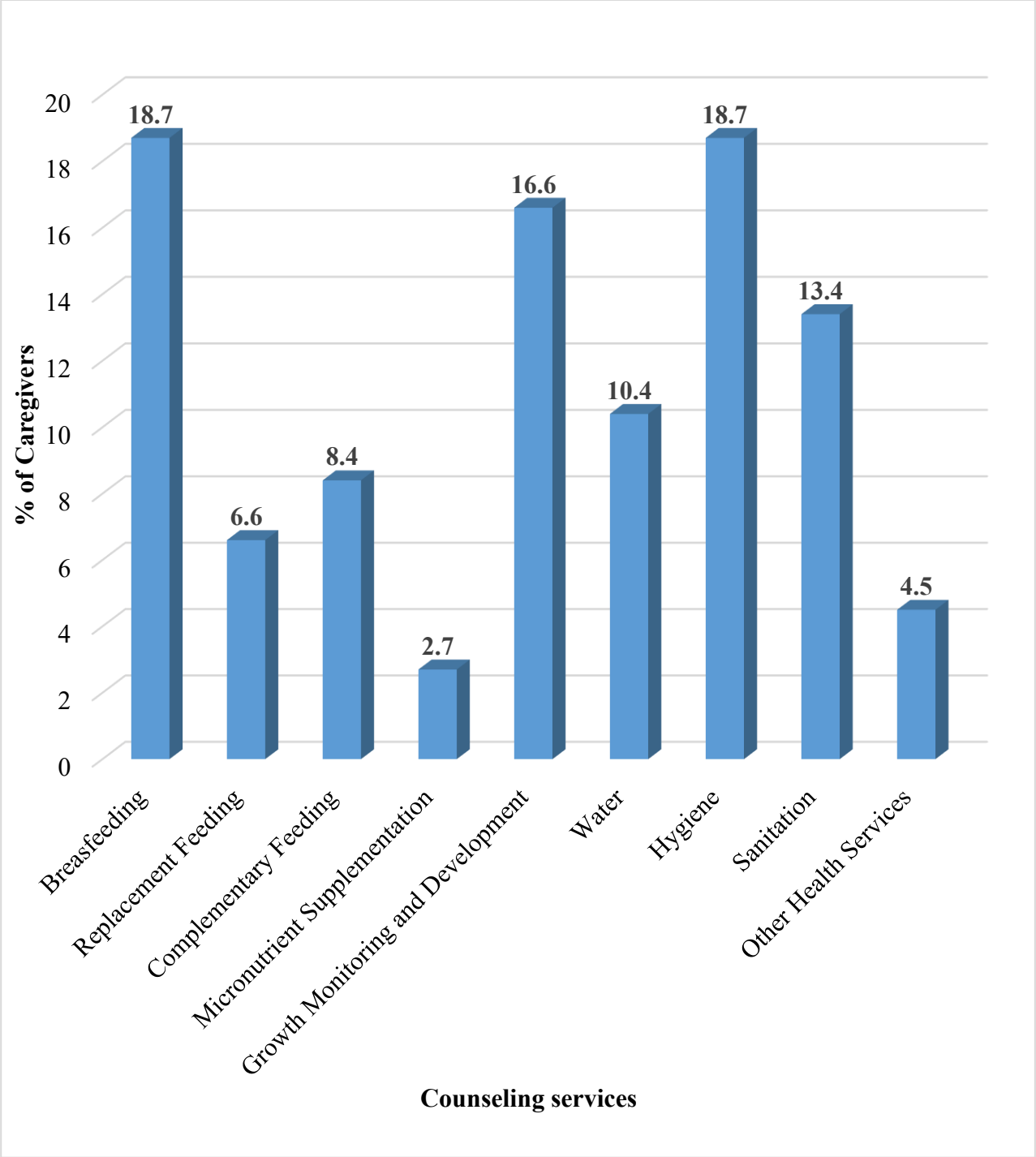

Figure 4. 5 Counseling Services by CHVs

Table 4. 3 Service Delivery of Community Health Volunteers

CHVs' Service Delivery	Categories	n	Percentage
Household's knowledge of CHVs	Yes	355	99.7
	No	1	0.3
Frequency of Household Visitation by CHV	Never Visited	1	0.3
	Rarely	98	27.5
	Monthly	256	71.9
	N/A	1	0.3
Last Month's Visitation by CHV	Yes	331	93.0
	No	24	6.7
	N/A	1	0.3
Referral by CHV	Yes	114	32.0
	No	241	67.7
	N/A	1	0.3
Use of Referral Note for referral by CHV	Yes	98	86
	No	16	14
Visitation of the Health Facility after referral by CHV	Yes	110	96.5
	No	4	3.5
Escorted to the Health Facility by CHV after referral	Yes	64	58.2
	No	46	41.8
Follow-up by CHV post-referral	Yes	105	92.1
	No	9	7.9
Duration of follow-up by CHV	Same day	80	76.2
	After one week	23	21.9
	After two weeks	2	1.9
Counseling services by CHV	Yes	124	34.8
	No	231	64.9
	N/A	1	0.3
Education on the importance of having a kitchen garden by CHV	Yes	182	51.1
	No	173	48.6
	N/A	1	0.3

*N/A – Not Applicable

4.3.4 Community Stakeholders' Perspective on CHVs' Service Delivery

The findings in this section were anchored on ten questions administered to the participants during the three FGD sessions. The questions touched on the interactions with CHVs, roles of community health stakeholders in facilitating the work of CHVs in nutrition service delivery, preparedness and unpreparedness of CHVs in nutrition service

delivery, the impact created by CHVs in nutrition service delivery, challenges facing CHVs when offering nutrition services, the proposed solution to the challenges, and recommendations to the County Government on improving the performance of CHVs and nutrition outcomes in the community.

The responses were captured through note-taking and audio recording. The responses were transcribed into three written scripts representing the three FGDs, which were subsequently imported into the NVivo software for analysis. Thematic analysis was then used to analyze the data generated from the three FGDs. This involved developing codes from the ten questions and grouping the codes based on similarities and content to develop themes and sub-themes for each question. Bar charts derived from matrix coding queries were then used to present the findings as shown in Figures 4.6 and 4.7, and a framework matrix in Appendix IX. The bar graphs highlight the number of responses by the participants of each FDG on each theme and sub-theme. Verbatim quotes have also been used to highlight the opinions of some selected participants in the FGDs.

4.3.4.1 Interactions of CHVs and Community Stakeholders

Most of the three FGD participants agreed that they had interacted with the CHVs in one way or another, and their interactions were meant to help improve their performance in health service delivery. The participant with the shortest duration of interaction cited one year, while the longest mentioned 13 years. The one with the shortest duration was a CHC member and was barely one year old since the community elected her to represent them in the CHC. Several participants with the most extended duration said they had been part of the community health services since its inception in 2011.

4.3.4.2 Community Stakeholders' Role in facilitating CHVs' Nutrition Service Delivery

Four sub-themes were developed from the responses to answer the research questions. The sub-themes included coordination of referrals, mobilization and sensitization, support supervision, and water sanitation and hygiene. In coordinating referrals, the participants emphasized the crucial role of CHVs in our community. They work together with CHVs to identify cases of malnutrition and ensure they are promptly sent to the nearest health facilities for treatment. They also play a pivotal role in disseminating health information and messages, supervising and supporting CHVs in complex cases, and promoting community sanitation, hygiene, and safe water consumption. The following are some verbatim quotes recorded from the participants:

> *"…When CHVs refer patients to the hospital and they refuse to go, it is our role to accompany them to those particular households to convince the members to go to the hospital…at times we even escort them…"* (Sumba FGD).

> *"…At times, CHVs are faced with difficult cases in the households…household heads may refuse to grant access and chase them away…in such scenario, we come in as arbitrators to bring understanding and help the households to access the services offered by the CHVs…"* (Mur Malanga FGD).

> *"…We CHC members are the governors of community health services…we do supervise CHVs in their routine work at the household and lend support especially in complex cases…"* (Karapul FGD).

4.3.4.3 Preparedness of CHVs in Nutrition Service Delivery

The community had varied opinion about the preparedness of CHVs to offer nutrition services in the community. Majority believed CHVs are well-prepared and equipped to offer nutrition services. Their responses in support were grouped into two sub-themes: ability and visibility of CHVs. On the ability of the CHVs, the participants cited the following reasons: CHVs are knowledgeable and are capable of doing nutrition education

and passing knowledge in the households; they are capable of assessing nutrition status, identifying needy cases, and referring them to the health facilities for treatment. The following is a verbatim quote recorded from the participants:

> *"…Our CHVs have been trained by the government and we believe they have adequate knowledge to pass to the household members, especially on healthy eating…they can identify needy cases and make appropriate referrals to the nearest health facilities…"* (Karapul FGD).

On the visibility of CHVs, participants said CHVs are always in touch with the households, understand their issues better, and can easily access the households any time and when needed.

> *"…CHVs live with us in the village, they understand our problems well, and therefore, we can present our problems to them any time we feel like…they are always ready and willing to help when approached…"* (Mur Malanga FGD).

The participants who believed CHVs were unprepared and unequipped to offer nutrition services questioned their capacity. They thought that CHVs lacked the knowledge to offer nutrition services and address nutrition concerns, were few, and could not adequately cover households under their jurisdictions.

> *"…When CHVs visit households and find malnutrition cases, they cannot help them because they lack nutrition supplements to correct malnutrition…"* (Sumba FGD).
>
> *"…We have few CHVs who cover a big area… some of them don't have the required equipment and tools for assessing malnutrition…"* (Sumba FGD)

4.3.4.4 Challenges faced by CHVs in Nutrition Service Delivery

From this theme, six sub-themes were developed from the responses given by the respondents. The sub-themes included high expectations from the community, hostility, ignorance, inadequate motivation, religious beliefs, and inadequate resources. For instance, regarding high expectations by the community, the respondents reported that

when CHVs visit the households, the members expect to be enticed with goodies in exchange for their time. Some face hostility, such as verbal abuse or physical threats, leading to non-response to health services they promote and offer to the households.

> "*…Our people have high expectation… when CHVs visit them, they expect to be given something small to compensate for their time…this makes the work of CHVs to be difficult, because they are the ones who should be motivated in their work…"* (Mur Malanga FGD).
>
> *"…Sometimes our CHVs get it very tough when they visit some households…some household heads are always very hostile… they never allow CHVs time to do their work...some end up throwing insults at the CHVs…"* (Sumba FGD).

Some households also exhibit high levels of ignorance, such as not understanding the importance of nutrition or the services provided by CHVs and tampering with the uptake of CHVs. The respondents also felt CHVs are not adequately motivated to offer nutrition services in the community. This is attributed to limited resources, the inability to procure adequate nutrition assessment tools and commodities for the CHVs, inadequate financial support, and delayed stipends paid by the government.

4.3.4.5 Proposed Solutions to Challenges faced by CHVs

The responses provided by the participants were grouped to form three sub-themes for discussion. These included resource mobilization, stakeholders' involvement, and training and sensitization. Regarding resource mobilization, the respondents suggested that CHVs should be provided with nutrition assessment tools and commodities, paid stipends on time, and, if possible, the stipend should be adjusted upwards. They also suggested that relevant stakeholders should continuously be involved in tackling nutrition issues. Other suggestions were about periodic training of CHVs on nutrition, mobilization, sensitization, and community education about the work of CHVs and nutrition.

> *"…For our CHVs to be productive, they should be given adequate tools and commodities…they should be paid in time, and if possible, their stipend should be adjusted upwards…whatever they are paid now cannot sustain their work, because they also have families to take care of…"* (Mur Malanga FGD).

4.3.4.6 Ways of Improving CHVs' Service Delivery by the County Government

The Participants' responses were packed into the following three sub-themes: capacity building, partnership, and planning and budgeting. On capacity building, the participants recommended that CHCs, the immediate supervisors of CHVs, should be recognized and supported by the County Government. They also felt that more nutrition training should be advanced for CHVs.

> *"…We, the CHC members, who are also the governors charged with the responsibility of supervising and supporting CHVs in their work, feel neglected by the government… the government has been training CHVs and leaving us out … how can you supervise someone more knowledgeable than yourself?... the government should also consider training us…"* (Karapul FGD).

Regarding partnership, the participants recommended that the county government strengthen partnerships with other organizations to acquire nutrition tools and commodities. Finally, regarding planning and budgeting, the participants recommended that all CHVs be provided with means of transport to enhance their mobility in the community, adequate nutrition equipment and supplies, and agricultural subsidies to enhance food production. They also recommended incorporating nutrition services in the County's Annual Development Plans to facilitate budgeting and deployment of nutrition personnel in health facilities so that when CHVs refer patients for nutrition services, they get served promptly.

> *"…We request our governor to provide adequate medical and nutrition supplies to our CHVs… they should also be prioritized when distributing agricultural subsidies to make them food secure…"* (Mur Malanga FGD).
>
> *"…We would be happy to hear nutrition issues being discussed in public fora, especially in public participation during the budget-making process… through*

this, nutrition activities can be captured in the annual work plans and budgeted for…" (Sumba FGD).

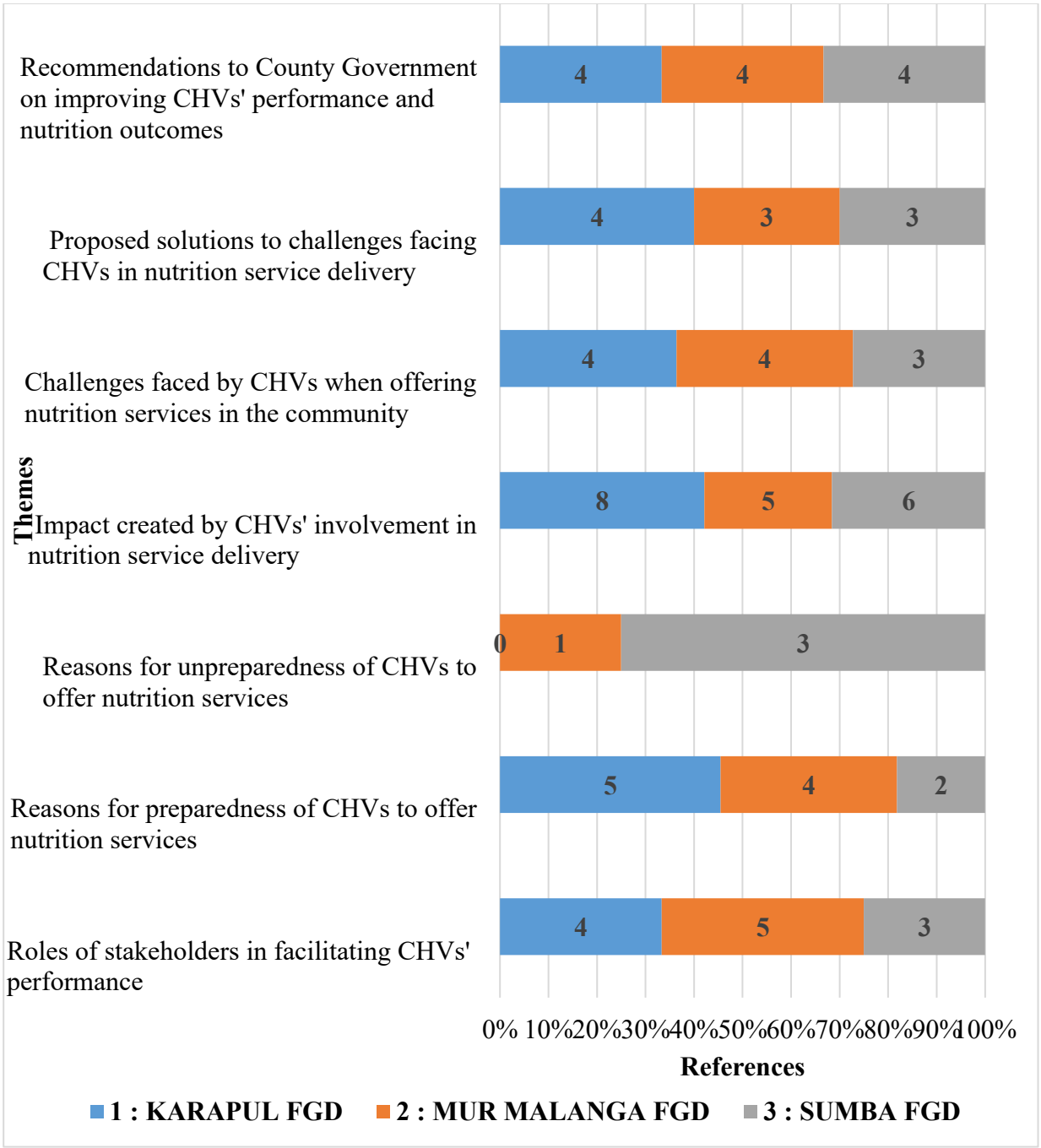

Figure 4. 6 Themes generated from the FGDs

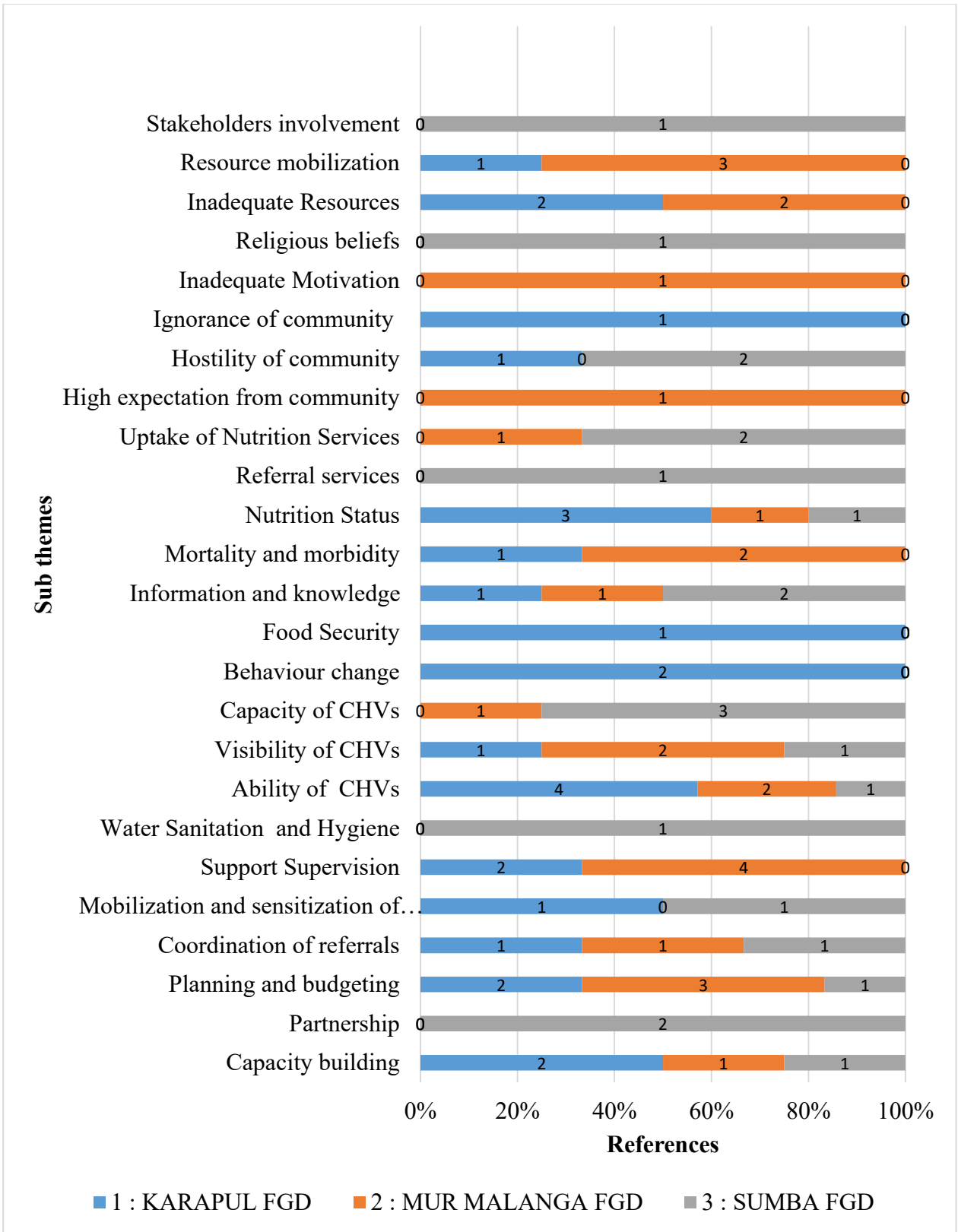

Figure 4. 7 Sub-themes Generated from the FGDs

4.4 Household Nutrition Outcomes

This section outlines the study findings on the nutrition outcomes.

4.4.1 Infant and Young Child Feeding Practices

The section presents a descriptive analysis of the Infant and Young Child Feeding practices among children in the age bracket of 6- 59 months. The results of these practices are detailed in Table 4.4.

4.4.1.1 Breastfeeding Practices.

On breastfeeding practices of children born in the last 24 months, 97.3% were reported to have been breastfed by their mothers at any given time. A majority were initiated on breast milk within the recommended 1 hour after delivery, at 71.6%. However, 4.7% of the primary caregivers could not recall when their children were initiated on breast milk. Nevertheless, despite most of the children having been put on breast milk within 1 hour, 7.4% of them were still given foods other than breast milk in the first two days of birth. Most caregivers (62.5%) gave their children water.

4.4.1.2 Bottle feeding

Bottle feeding seems to be a common practice as 44.6% of children in the age bracket of 6-23 months were fed from bottles with nipples during the previous day.

4.4.1.3 Dietary Diversity (DD)

The results in Table 4.4 show that 6.1% of the children consumed foods from at least five food groups out of the eight, thus meeting minimum dietary diversity. Further, Figure 4.8 shows that most children aged 6-23 months were fed on starches with very little

consumption of dairy products, legumes, nuts, fruits, and vegetables. The study also revealed low consumption of flesh foods.

4.4.1.4 Minimum Meal Frequency (MMF)

As captured in Table 4.4, 65.5% of the children in the age bracket of 6-23 months met the recommended requirement of Minimum Meal Frequency: a minimum of 4 meals per day for the non-breastfed children, 2-3 meals per day for the age bracket of 6-8 months, and 3-4 meals per day for the age bracket of 9-23 months, both breastfed. Figure 4.9 further shows that 64.3% of children aged 6-8 months, 95.5% in the age bracket of 9-11, and 59.2% in the age bracket of 12-23, were fed the minimum number of meals recommended in a day.

4.4.1.5 Minimum Acceptable Diet (MAD)

As reflected in Table 4.4, the study also revealed a large percentage of children aged 6-23 months failing to meet the MAD requirement. Only 2.7% of these children achieved the Minimum Acceptable Diet.

Table 4. 4 Infant and Young Child Feeding Practices

IYCF Practices	Categories	n	Percentage
Children ever breastfed	Yes	144	97.3
	No	4	2.7
Initiation of BF	Within 30 minutes	71	48
	Within 30 minutes - 1 hour	35	23.6
	After 1 hour	31	20.9
	Do not know	11	7.5
Other foods given in the first 2 days of birth, other than BM	Yes	11	7.4
	No	136	91.9
	Do not know	1	0.7
Foods given other than BM	Given water	10	62.5
	Given animal milk	2	12.5
	Given porridge	3	18.75
	Given infant formula	1	6.25
Bottle feeding	Yes	66	44.6
	No	82	55.4
MDD	Yes	9	6.1
	No	139	93.9
MMF	Yes	97	65.5
	NO	51	34.5
MAD	Yes	4	2.7
	No	144	97.3

*BF – Breastfeeding *BM – Breast Milk *IYCF – Infant and Young Child Feeding *MDD- Minimum Dietary Diversity *MMF – Minimum Meal Frequency *MAD – Minimum Acceptable Diet

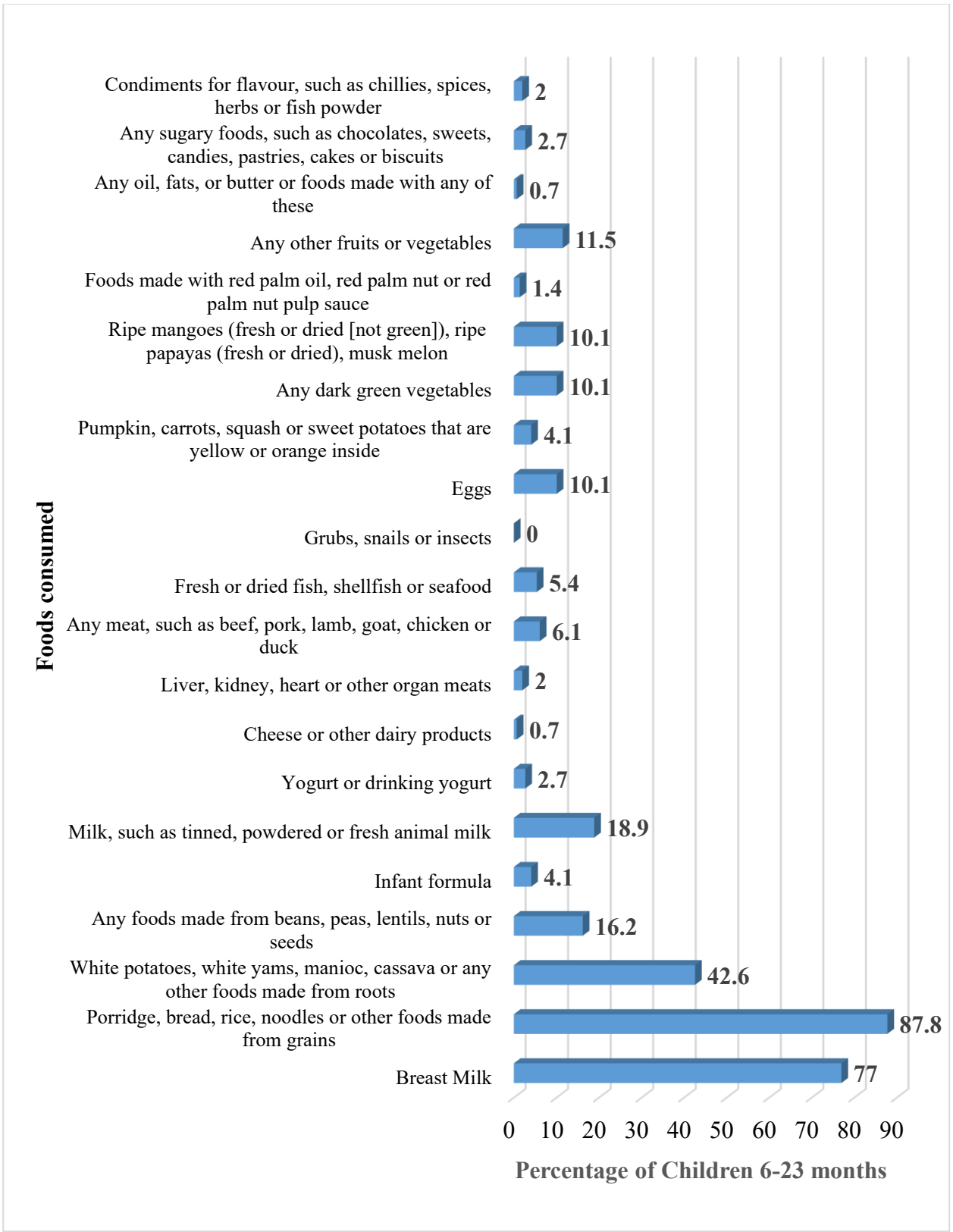

Figure 4. 8 Dietary Diversity of Children 6-23 months

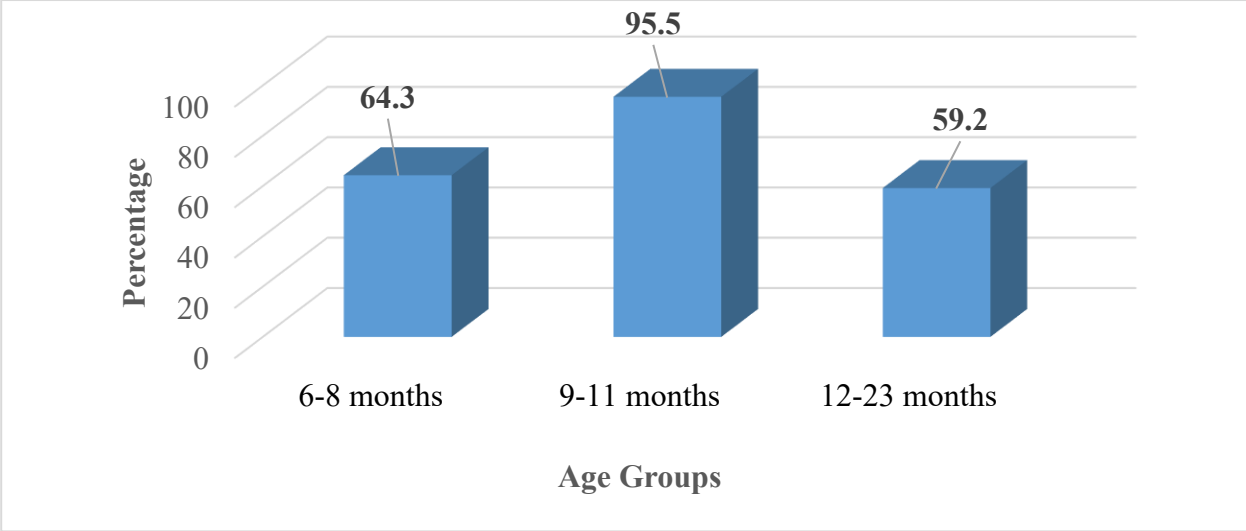

Figure 4. 9 Minimum Meal Frequency per Age Group of children 6-23 months

4.4.2: Household Food Security

In this section, findings were presented on domestic animals reared by households, the household food insecurity access scale, the household food insecurity access scale score, and household food security status.

4.4.2.1 Domestic Animal Reared by the Households

The study found that most households (69.4%) owned at least one chicken. The average number of chickens owned by households was 4, with the highest number being 50. However, very few households owned other domestic animals, with no household rearing donkeys. The details are outlined in Figure 4.10.

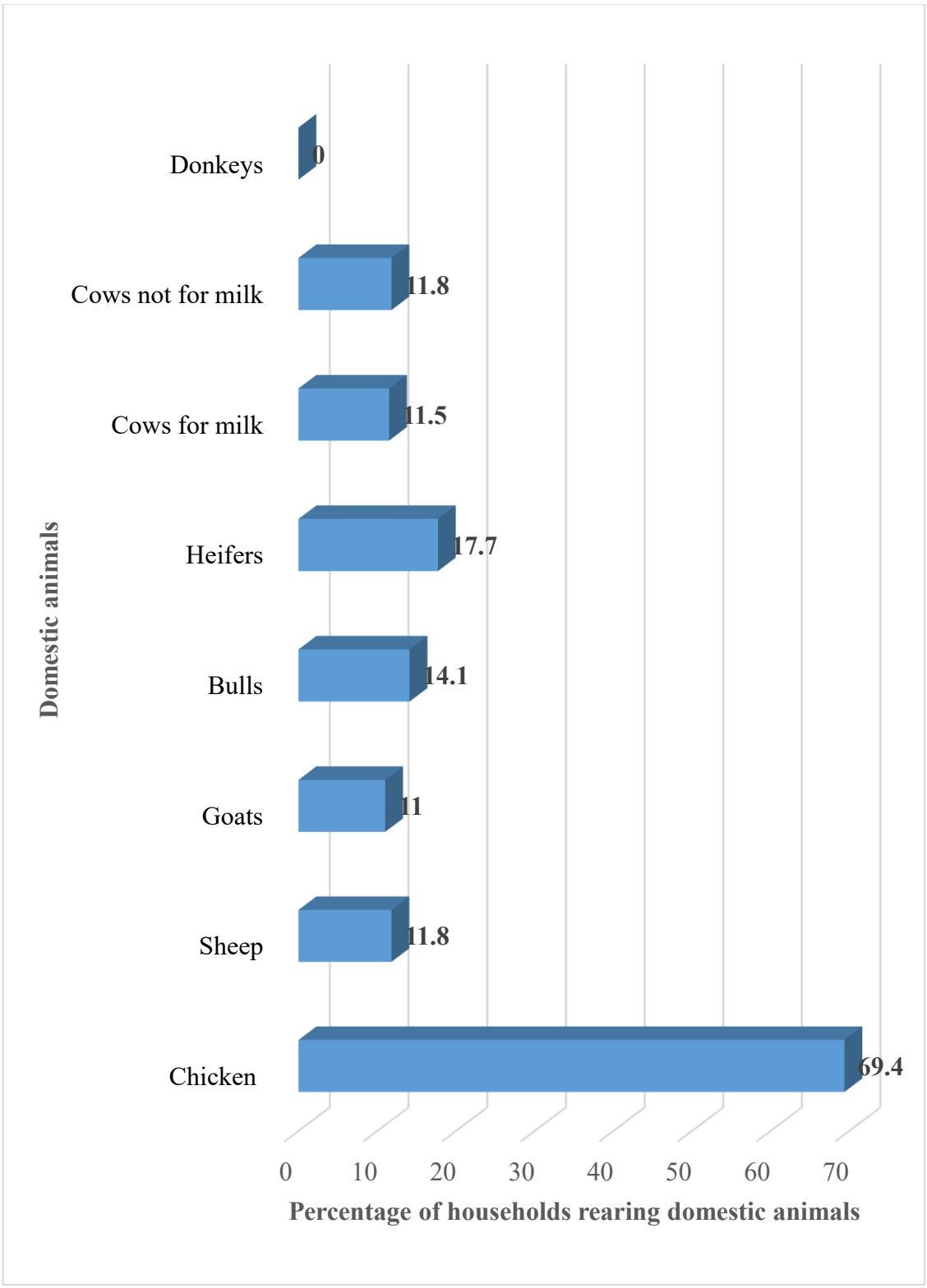

Figure 4. 10 Domestic Animals reared by households

4.4.2.2 Household Food Insecurity Access Scale

The findings on food security using HFIAS are shown in Tables 4.5 and 4.6.

Table 4. 5 Household Food Insecurity Access Scale

HFIAS Responses in the last 4 weeks	Categories	n	Percentage (%)
Households worried about not having enough food due to a lack of resources.	Yes	237	66.6
	No	119	33.4
Frequency of worrying about not having enough food due to a lack of resources.	Rarely	87	24.4
	Sometimes	116	32.6
	Often	34	9.6
	N/A	119	33.4
Households that did not eat their preferred food because of a lack of resources.	Yes	239	67.1
	No	117	32.9
Frequency of inability to eat preferred food because of a lack of resources.	Rarely	73	20.5
	Sometimes	130	36.5
	Often	36	10.1
	N/A	117	32.9
Households that ate a limited variety of foods due to a lack of resources.	Yes	224	62.9
	No	132	37.1
The frequency of eating a limited variety of foods is due to a lack of resources.	Rarely	79	22.2
	Sometimes	112	31.4
	Often	33	9.3
	N/A	132	37.1
Households that ate disliked foods because of inadequate resources to obtain other types of food.	Yes	238	66.9
	No	118	33.1
The frequency of eating disliked foods because of inadequate resources to obtain other types of food.	Rarely	81	22.8
	Sometimes	133	37.4
	Often	24	6.7
	N/A	118	33.1

* HFIAS – Household Food Insecurity Access Scale

* N/A – Not Applicable

N/B: Only households that answered Yes to the first part of the question (about occurrence) were asked the second part of the question (about frequence).

Table 4.5 – Continued

HFIAS Responses in the last 4 weeks	Categories	n	Percentage (%)
Households that ate smaller meals than they felt they needed because there was not enough food.	Yes	207	58.1
	No	149	41.9
The frequency of eating smaller meals than needed because there not enough food.	Rarely	97	27.2
	Sometimes	104	29.2
	Often	6	1.7
	N/A	149	41.9
Households that ate fewer meals in a day because there was not enough food.	Yes	212	59.5
	No	144	40.5
The frequency of eating fewer meals in a day was reduced because there was not enough food.	Rarely	95	26.7
	Sometimes	98	27.5
	Often	19	5.3
	N/A	144	40.5
Households with no food of any kind to eat because of a lack of resources to get food.	Yes	168	47.2
	No	188	52.8
Frequency of no food to eat of any kind in the household because of a lack of resources to get food.	Rarely	83	23.3
	Sometimes	83	23.3
	Often	2	0.6
	N/A	188	52.8
Households that went to sleep at night hungry because there was not enough food.	Yes	113	31.7
	No	243	68.3
The frequency of going to sleep at night hungry because there was not enough food.	Rarely	54	15.2
	Sometimes	59	16.5
	Often	0	0
	N/A	243	68.3
Households that went a whole day and night without eating anything because there was not enough food.	Yes	89	25.0
	No	267	75.0
Frequency of going a whole day and night without anything because there was not enough food	Rarely	37	10.4
	Sometimes	52	14.6
	Often	0	0
	N/A	267	75.0

* HFIAS – Household Food Insecurity Access Scale

* N/A – Not Applicable

N/B: Only households that answered Yes to the first part of the question (about occurrence) were asked the second part of the question (about frequence).

4.3.2.3 Household Food Insecurity Access Scale Score

This was calculated by taking the total sum of all the scores by the households (2922) and dividing it by the total number of scores (households) in the sample (356).

Average HFIAS Score = Sum of HFIAS scores in the sample / Number of HFIAS Score (i.e., households) in the sample

= (421+441+402+419+323+348+255+172+141)/356

= 2922/356

= 8.2

Table 4. 6 Household Food Insecurity Access Scale Score

Households	**n**	**Sum**	**Mean**	**SD**
Worried about not having enough food	237	421	1.78	0.680
Unable to eat preferred foods	239	441	1.85	0.659
Eating a limited variety of food	224	402	1.79	0.678
Eating disliked foods	238	419	1.76	0.621
Eating smaller meals	207	323	1.56	0.553
Eating fewer meals	212	348	1.64	0.641
With no food	168	255	1.52	0.525
Sleeping at night hungry	113	172	1.52	0.502
Going without eating anything	89	141	1.58	0.496
Total		**2922**		

*SD – Standard Deviation

4.4.2.4 Household Food Security Status

Bickel *et al.* (2000), in their interpretation of the HFIAS score, categorized households as food secure, food insecure without hunger, moderately food insecure with hunger, and severely food insecure with hunger. Their interpretation provided a basis for converting the scores to a range of 0-10 by dividing the individual household score by the maximum household score (27) and multiplying by 10. The resultant scores were used to categorize households as illustrated in Table 4.7

Using the interpretation scale in Table 4.7, households were categorized as indicated in Figure 4.11. On average, most households were categorized as food insecure without hunger, with a score of 3.0 (8.2X10/27).

Table 4. 7 Scale for interpreting HFIAS scores

Up to 2.32	**Up to 4.56**	**Up to 6.53**	**Up to 10**
Food Secure	Food Insecure		
	Food Insecure without Hunger	Food Insecure with Hunger	
		(Less Severe) "Moderate"	(More Severe) "Severe"

Adopted from Bickel *et al.* (2000)

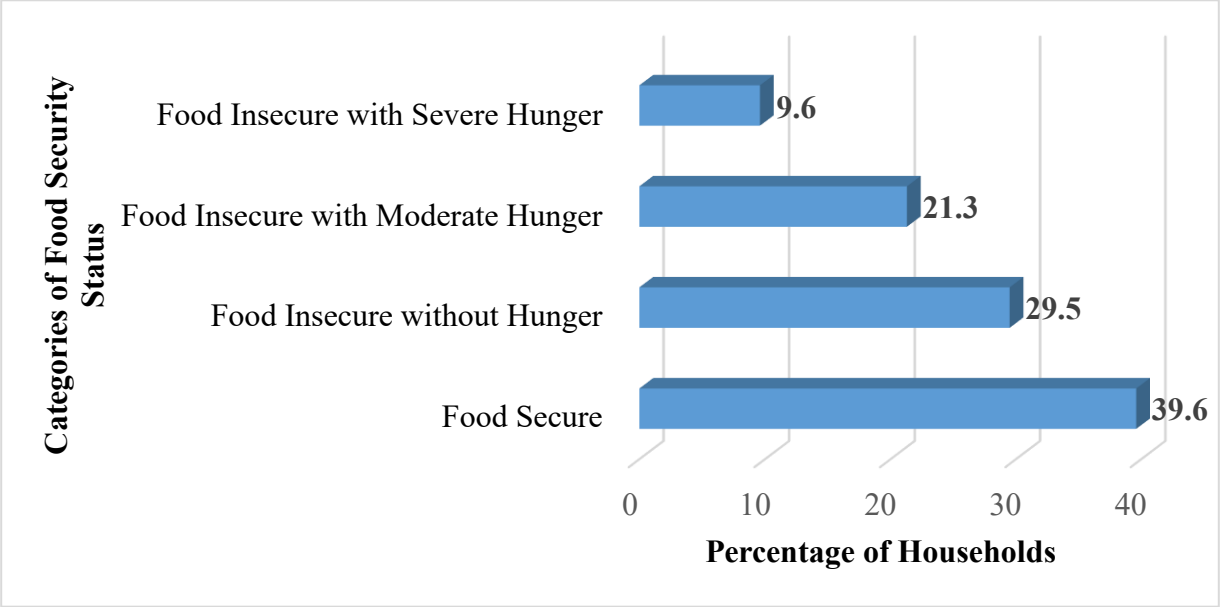

Figure 4. 11 Household Food Security Status

4.4.3 Health-Seeking Behavior and Uptake of Nutrition Services

The results on health-seeking behavior and uptake of nutrition services at the household level are captured in Table 4.8. The study showed that a majority (94.9%) of the children in the age bracket of 6-59 months had Mother Child Health booklets. Skilled birth attendant was found to be 93.3%, attendance of growth monitoring and promotion at 85.4%, fully immunized children at age 11 months at 81.5%, vitamin A supplementation

(6-59 months) in the previous six months was at 97.2%, and deworming (12-59 months) at 97.1%. The proportion of children aged 6-59 months who presented with diarrhea in the previous two weeks of the study was 19.9%. As indicated in Figure 4.12, among the diarrhea cases, 38% and 31% were treated with ORS+ZnSo4 at the hospital and home, respectively. This meant that 31% of the diarrhea cases did not get any recommended treatment.

Table 4. 8 Uptake of Nutrition Services

Nutrition Services	Categories	n	Percentage (%)
Presence of MCH booklets	Yes	338	94.9
	No	18	5.1
Delivery	Unskilled	24	6.7
	Skilled	332	93.3
Growth Monitoring and Promotion Clinic Attendance	Yes	304	85.4
	No	52	14.6
Fully immunized at 11 months.	Yes	290	81.5
	No	66	18.5
Vitamin A supplementation in the last six months (6-59 months)	Yes	346	97.2
	No	10	2.8
Deworming in the last six months (12-59 months)	Yes	297	97.1
	No	9	2.9
Diarrhea in the last two weeks	Yes	71	19.9
	No	285	80.1

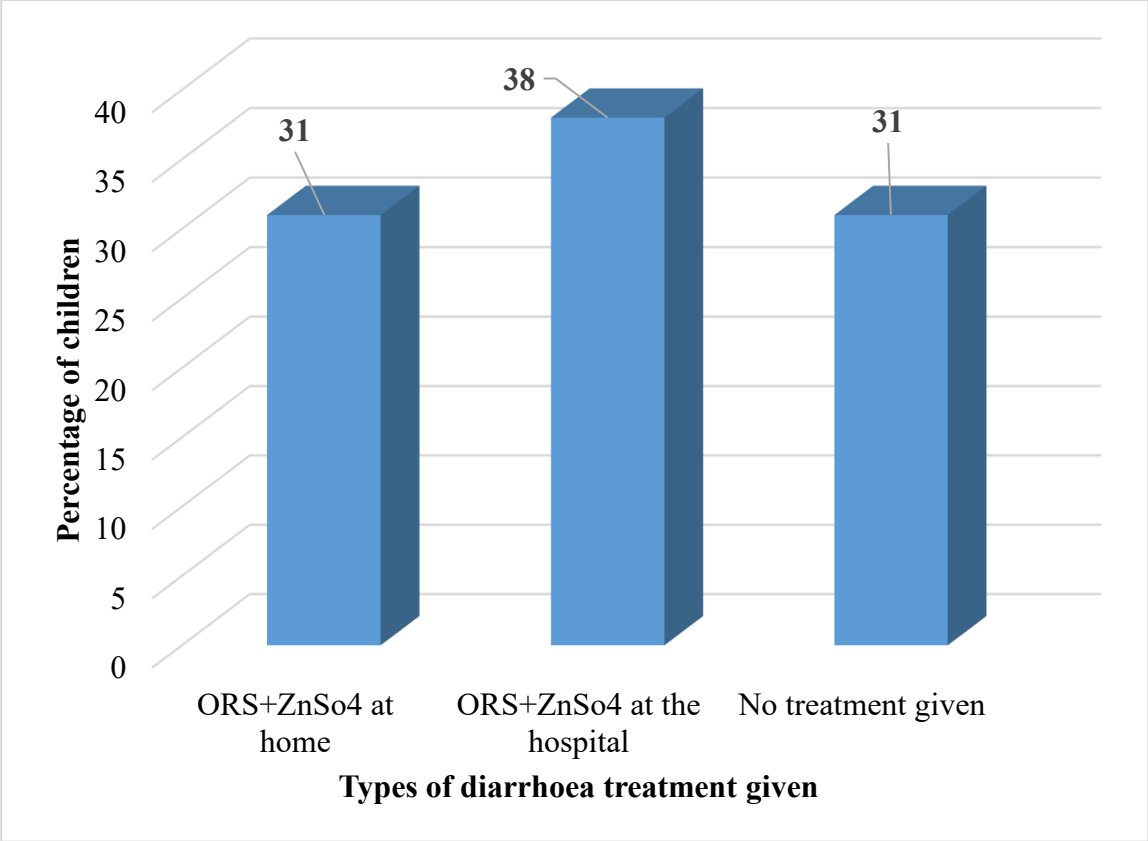

Figure 4. 12 Treatment given to Children with Diarrhea

4.4.4 Health Promotion Behavior

This section presents findings on household water, sanitation, and hygiene promotion.

4.4.4.1 Water, Sanitation, and Hygiene

As shown in Table 4.9, 89.6% of the households had functional pit latrines, 75.8% were treating their drinking water, and only 15.7% had functional handwashing facilities. Most households without functional pit latrines said they were sharing with their neighbors. Figure 4.13 shows that most households fetched water from open and unprotected sources. Further, Figure 4.14 shows that the most preferred method of treating water for domestic was chlorine-based treatment at 80.4%, followed by boiling at 17%, and a combination of the two at 2.6%.

Table 4. 9 Water, Sanitation, and Hygiene

WASH Indicators	Categories	n	Percentage (%)
Treatment of drinking water	Yes	270	75.8
	No	86	24.2
Availability of functional pit latrine	Yes	319	89.6
	No	37	10.4
Availability of a functional handwashing facility	Yes	56	15.7
	No	300	84.3

*WASH – Water, Sanitation, and Hygiene

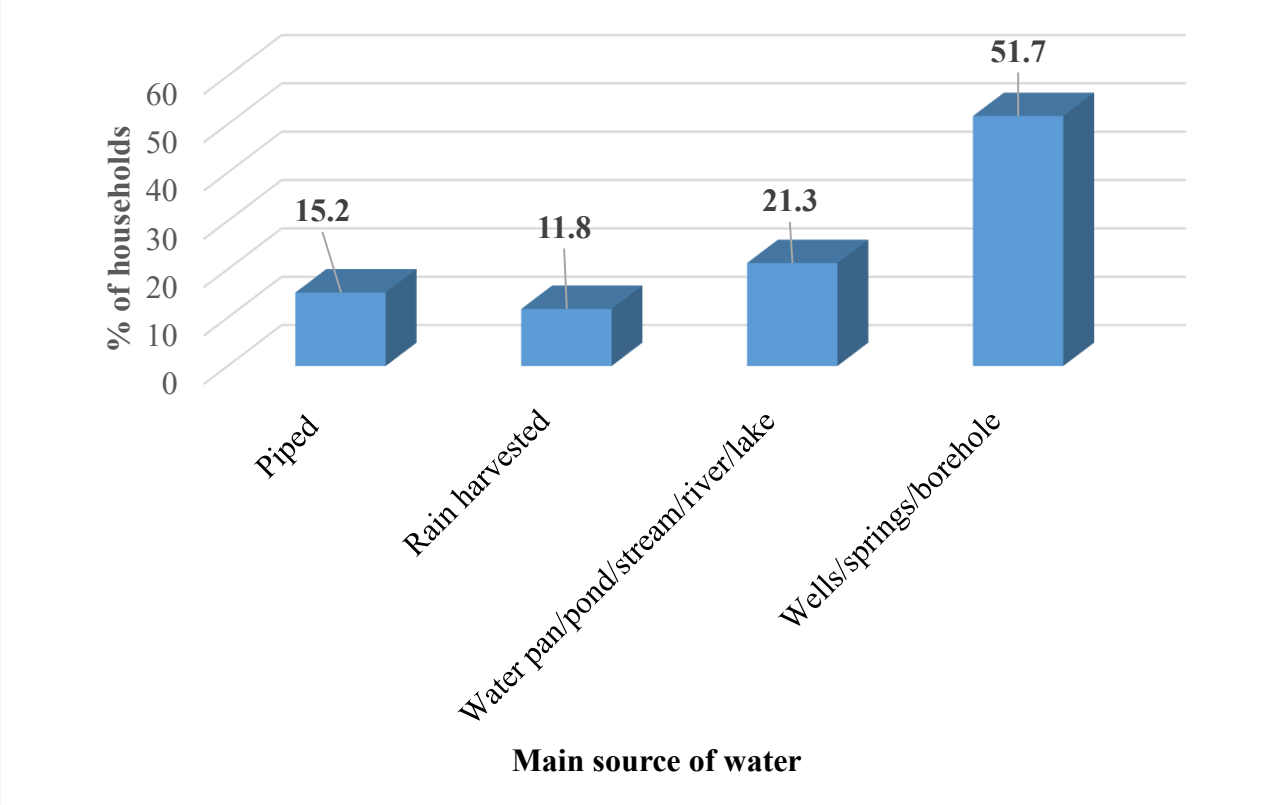

Figure 4. 13 Main Source of Drinking Water

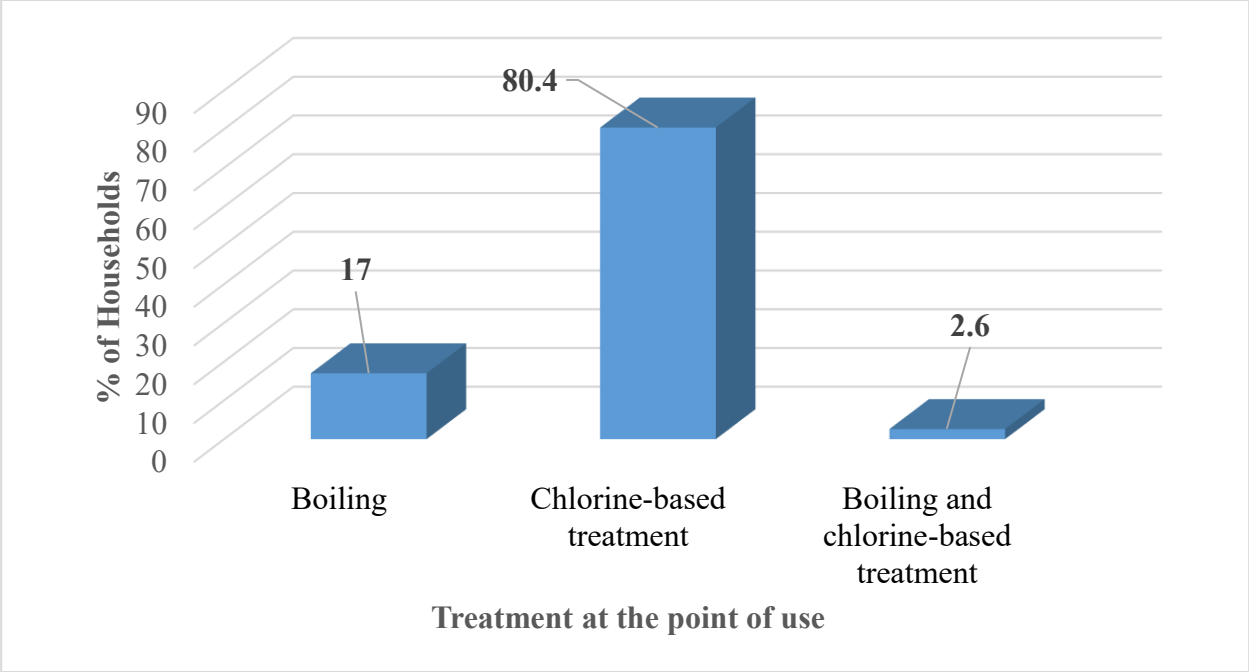

Figure 4. 14 Methods of Water Treatment

4.4.5 Impact of CHVs on Nutrition Outcomes

The FGD participants' responses were coded and grouped into the following sub-themes: behavior change, food security, knowledge and information, mortality and morbidity, nutrition status, referrals, and uptake of nutrition services. On behavior change, participants said that CHVs had not just promoted health-seeking behavior, but had sparked a transformation in the community's approach to health, with the community now preferring to seek services in health facilities instead of seeking help from traditional healers.

> *"…Since CHVs started visiting and teaching the households, we have seen our people preferring to seek services in our hospitals, unlike before, when they would go to traditional healers…"* (Karapul FGD).

Regarding food security, the participants opined that CHVs promoted household kitchen gardening and revolutionized food security status. On knowledge and information, the participants stated that due to CHVs' work, there is not just increased nutrition knowledge

in mothers, especially on infant and young child feeding practices, but a wealth of nutrition information is available to households. They also reported a reduction in morbidity and mortality, malnutrition cases, and an improved nutrition status of mothers and children.

> *"…In the recent past, we have seen children being forced to feed by blocking their noses for the mouth to open up...but nowadays we don't see such practices. CHVs have taught us that children should not be forced to feed…instead, they should be made happy during feeding time…"* (Mur Malanga FGD).

Moreover, the participants also attributed increased referrals and significant uptake of vitamin A supplementation, deworming, and health education to the work of CHVs in the households.

"…We often see CHVs in the company of hospital staff visiting households and giving young children vitamin A and deworming tablets… we are always told these medicines help our children to see well and have healthy life…" (Sumba FGD).

4.5 Relationship between Demographic and Socio-economic Characteristics, the Service Delivery of CHVs, and Nutrition Outcomes of the Households with Children 6-59 Months

The objective of this section was to establish the relationship between the service delivery of Community Health Volunteers and the nutrition outcomes of households with children aged 6-59 months. Fisher's Exact Test and Multinomial Logistic Regression were used to test the relationship, and the findings are reported in Tables 4.10, 4.11, 4.12, and 4.13.

4.5.1 Relationship between Demographic and Socio-economic Characteristics of Households and Service Delivery of CHVs

To establish whether there's any relationship, various demographic and socio-economic variables were cross-tabulated against different variables addressing service delivery of CHVs in households with children 6-59 months. The independent and dependent variables and their statistical p-values after performing Fisher's Exact Test and Multinomial Logistic Regression Analysis are shown in Tables 4.10 and 4.11. Tests with p-values <0.05 were considered statistically significant, hence confirming solid relationships.

The results showed a significant relationship between the settlement status of the households and household visitation, referrals, and follow-up services, children with MCH booklets, and education on kitchen gardens, with p-values <0.05. CHVs in the rural settlements were more likely to visit, do referrals and follow-ups, and offer nutrition education in the households. However, there was no significant relationship between the settlement status of households and households' knowledge about CHVs, counseling services by CHVs, and place of birth.

4.5.2 Relationship between Demographic and Socio-economic Characteristics of the Households and the Nutrition Outcomes

This section presents findings on the relationship between the demographic and socio-economic characteristics of the households and the nutrition outcomes.

4.5.2.1 Relationship between the settlement status of the households and the nutrition outcomes

As shown in Table 4.10, there was no significant relationship between the settlement status of households and MDD, MMF, and MAD (p-values>0.05, FET).

4.5.2.2 Relationship between the Education of Primary Caregivers and the Nutrition Outcomes

As shown in Table 4.10, the study findings revealed a strong relationship between primary caregivers' education level and the other foods given to children within two days of birth (p-value <0.05, FET). However, there were no significant relationships found between the level of education of primary caregivers and initiation of breastfeeding and bottle-feeding (p-values >0.05, FET)

4.5.2.3 Relationship between Occupation of the Primary Caregivers and the Nutrition Outcomes

As shown in Tables 4.10 and 4.11, there was a strong relationship between the occupation of the primary caregivers and bottle feeding and MMF (p-values ≤ 0.05, FET). Primary caregivers who practiced farming were three times more likely not to bottle-feed than those in other occupations (OR = 2.720, 95% CI = 1.085 – 6.820, p-value = 0.033). Caregivers who practiced farming were also five times more likely to achieve MMF than primary caregivers in other occupations (OR = 5.192, 95% CI = 1.727 – 15.613, p-value = 0.003). However, no significant relationship was established between giving other foods in the first two days of birth and initiating breastfeeding, MDD, and MAD (p-values >0.05, FET). The number of children who achieved MDD and MAD was negligible and hence could not be used to make any conclusion.

4.5.2.4 Relationship between Households' Income and Nutrition Outcomes

As shown in Tables 4.10 and 4.11, the study revealed significant relationships between the household income and other foods given in the first two days of birth, MMF, and food security status of the households (p-values <0.05 FET). Children from households with low income also had higher chances of achieving MMF compared to their counterparts from households with higher income. Households with monthly earnings of between Ksh. 30,000 and 50,000 were one and a half times likely to be food secure, compared to households with less than Ksh. 30,000 (OR = 1.498, 95% CI = 3.196 – 7.020, p-value < 0.01). However, there were no significant relationships between household income and bottle feeding, initiation of breastfeeding, MDD, and MAD (p-values > 0.05, FET).

4.5.2.5 Relationship between the type of Caregivers and the Nutrition Outcomes.

As reflected in Table 4.10, a significant relationship was observed between the type of caregivers and other foods given to children in the first two days of birth other than breast milk (p-value=0.006, FET). About 40% of the children under the care of older siblings received foods other than breast milk in the first two days of birth, followed by children under the care of their grandparents and mothers at 7.8% and 7.4% respectively. There was, however, no significant relationship between the types of caregivers and food security status of the households, deworming in children 12-59 months, growth monitoring and promotion, initiation of breastfeeding, bottle-feeding, MDD, MMF, and MAD (p-values >0.05, FET).

Table 4. 10 Relationship between Demographic and Socio-economic Characteristics of Households, Service Delivery of CHVs, and Nutrition Outcomes using Fisher's Exact Test

Demographic & Socio-economic Characteristics	CHVs' Service Delivery / Nutrition Outcomes		Fisher's Exact Test	
		df	Value	P-value
Household Settlement Status	Household's knowledge about CHVs	1	0.448	0.691
	Frequency of household visitation	4	45.812	**0.000**
	Last month visitation	2	7.181	**0.014**
	Newborns visited within 48 hours of birth	3	31.423	**0.000**
	Counseling services by CHVs	2	0.608	0.806
	Informed about the kitchen garden	2	7.278	**0.015**
	Presence of the MCH booklet	1	4.947	**0.033**
	Place of birth	1	1.331	0.256
	Referral services by CHV	2	27.426	**0.000**
	Use of referral notes for referral	2	26.573	**0.000**
	Visiting a health facility after referral	2	26.219	**0.000**
	Escorted to the health facility by CHV	2	24.33	**0.000**
	Follow-up post referral by CHV	2	26.162	**0.000**
	Duration of follow-up	3	26.045	**0.000**
	MDD	2	3.896	0.147
	MMF	2	5.7	0.057
	MAD	2	3.275	0.194
	FSS	3	6.314	0.097
The level of education of the primary caregiver	Bottle feeding	6	5.275	0.501
	Other foods given in the first two days of birth	6	14.048	**0.017**
	Initiation of BF	12	20.167	0.064
	MDD	6	1.739	0.926
	MMF	6	12.046	0.047
	MAD	6	2.424	0.892
	FSS	9	32.184	**0.000**
	VAS	3	5.162	0.118
	Deworming	6	1.918	0.118
	GMP	3	2.378	0.482

*BF – Breastfeeding * FSS – Food Security Status *MDD – Minimum Dietary Diversity *MMF – Minimum Meal Frequency *MAD - Minimum Acceptable Diet *FIC - Fully Immunized Children *VAS – Vitamin A Supplementation *GMP – Growth Monitoring and Promotion

Table 4.10 - Continued

Demographic & Socio-economic Characteristics	CHVs' Service Delivery / Nutrition Outcomes	Fisher's Exact Test		
		df	**Value**	**P-value**
Occupation of primary caregiver	Bottle feeding	14	26.864	**0.002**
	Other foods given in the first two days of birth	14	13.312	0.690
	Initiation of BF	28	15.382	0.974
	MDD	14	20.594	0.113
	MMF	14	31.119	**0.05**
	MAD	14	20.184	0.124
Household Income	Bottle feeding	8	8.098	0.368
	Other foods given in the first two days of birth	8	9.224	**0.046**
	Initiation of BF	8	5.455	0.214
	MDD	4	6.394	0.148
	MMF	4	9.725	**0.032**
	MAD	4	6.178	0.185
	FSS	6	30.529	**0.000**
Type of caregiver	Bottle Feeding	8	7.782	0.391
	Other foods given in the first two days of birth	8	21.544	**0.006**
	Initiation of BF	16	19.617	0.238
	MDD	8	9.759	0.274
	MMF	8	5.383	0.697
	MAD	8	7.958	0.578
	FSS	12	10.846	0.472
	VAS	4	4.385	0.367
	Deworming	8	3.723	0.937
	GMP	4	1.917	0.707

*BF – Breastfeeding *FSS - Food Security Status *MDD – Minimum Dietary Diversity *MMF – Minimum Meal Frequency *MAD - Minimum Acceptable Diet *VAS – Vitamin A Supplementation *GMP – Growth Monitoring and Promotion

Table 4. 11 Relationship between Demographic and Socio-economic Characteristics of Households, Service Delivery of CHVs, and Nutrition Outcomes using Multinomial Logistic Regression Analysis

Demographic & Socio-economic Characteristics	CHVs' Service Delivery / Nutrition Outcomes	Std Error	OR	95% CI	P-value
H/Hs in rural settlements	Visited the previous month by CHVs	0.748	1.019	2.353-4.413	**0.000**
	Newborns visited within 48 hours of birth	0.248	2.902	1.784-4.720	**0.000**
	Educated on kitchen gardens by CHVs	0.233	4.171	2.644-6.583	**0.000**
	Presence of MCH booklets	0.489	2.975	1.141-7.758	**0.026**
	Referrals by CHVs	0.307	3.664	2.000-6.668	**0.000**
	Use of referral note	0.317	3.878	2.082-7.221	**0.000**
	HF visitation upon referral by CHVs	0.307	4.093	2.240-7.477	0.000
	Follow up by CHVs after referral	0.316	4.201	2.262-7.801	**0.000**
	Follow up by CHVs the same day	0.604	3.176	0.973-10.370	**0.056**
Farmers	No bottle feeding	0.469	2.720	1.085-6.820	**0.033**
	MMF	0.562	5.192	1.727-15.613	**0.003**
H/Hs with income Ksh. 10,000 – 30,000	Food secure	0.387	1.498	3.196-7.020	**0.000**

*H/Hs – Households *MCH – Mother Child Health *HF – Health Facility *OR – Odds Ratio *CI - Confidence Interval

4.5.3 Relationship between Service Delivery of CHVs and Nutrition Outcomes

This section presents findings on the relationship between the services offered by CHVs and the various household nutrition outcomes.

4.5.3.1 Relationship between Household Visitation and Nutrition Outcomes

As reflected in Tables 4.12 and 4.13, the study established significant relationships between the frequency of household visitation by CHVs and MDD, growth monitoring and promotion clinic attendance, deworming in the past six months, and availability of kitchen gardens in the households (p-values<0.05, FET). There was also a strong relationship between visitation within 48 hours of birth and initiation of breastfeeding (p-value 0.000, FET). Households that were frequently visited had a high uptake of MDD, growth monitoring and promotion, deworming, kitchen gardens in the households, and initiation of breastfeeding after birth. For instance, households visited weekly had a high uptake compared to those visited monthly and rarely in that order. Likewise, households visited monthly had a more significant impact than those that the CHVs rarely visited. However, no significant relationships were established between the frequency of household visitation and MMF, MAD, FIC at 11 months, vitamin A supplementation in the last six months, treating drinking water, availability of functional latrines and handwashing facilities in the household (p-values>0.05, FET).

4.5.3.2 Relationship between Referral Services and Nutrition Outcomes

As shown in Tables 4.12 and 4.13, the study established significant relationships between referral for immunization and FIC at 11 months, referral for growth monitoring and promotion, and the number of children attending growth monitoring and promotion clinics (p-value < 0.05, FET). Children referred for immunization were two times more likely to be fully immunized at 11 months than those not referred (OR = 2.224, 95% CI = 1.026-4.819, p-value = 0.043). However, there were no significant relationships

between referral for vitamin A supplementation and deworming and the number of children supplemented with vitamin A and dewormed in the last six months preceding the interview period (p-values > 0.05, FET).

4.5.3.3 Relationship between Counseling Services and Nutrition Outcomes

As shown in Tables 4.12 and 4.13, the study established significant relationships between counseling on complementary feeding and other foods consumed by children 6-23 months other than breast milk, counseling on complementary feeding and MDD and MFF, counseling on growth monitoring and promotion and attendance of growth monitoring and promotion clinics, and counseling on the importance of kitchen garden and availability of kitchen gardens in the households (p-values <0.05, FET). Children aged 6-23 months whose caregivers were counseled on complementary feeding by CHVs were more than two times likely to consume foods other than breast milk than those who did not (OR = 2.582, 95% CI = 1.248-5.338, p-value = 0.011). Children aged 6-23 months whose caregivers were counseled on complementary feeding were more than three times likely to achieve MMF than those whose caregivers received none (OR = 3.527, 95% CI = 1.542-8.069, p-value = 0.003). Children of caregivers counseled on growth monitoring and promotion were two times likely to attend growth monitoring and promotion clinics than those whose caregivers did not (OR = 2.323, 95% CI = 1.023-5.316, p-value = 0.044). Notably, households educated on the importance of kitchen gardens by the CHVs were more likely to own kitchen gardens (OR = 0.158, 95% CI = 0.095-0.262, p-value <0.000). However, no significant relationships were established between counseling on breastfeeding and the number of children breastfed the previous day and night, counseling on complementary feeding and MAD, counseling on micronutrient supplementation and

vitamin A supplementation in the last six months, counseling on water and water treatment by the households, counseling on sanitation and availability of functional pit latrines in the households, and counseling on hygiene and availability of functional handwashing facilities in the households (p-value > 0.05, FET).

4.5.3.4 Relationship between Water, Sanitation, and Hygiene and diarrhea cases in children aged 6-59 months

No significant relationship was established between water treatment, availability of functional pit latrines and handwashing facilities, and cases of diarrhea in children 6-59 months in the last two weeks (p-values > 0.05, FET). The results are reflected in Table 4.12.

4.5.3.5 Relationship between Household Food Security Status and Complementary Feeding Practices

The results in Table 4.12 show a significant relationship between food security status and MMF (p-value 0.011, FET). However, no significant relationships were established between the food security status and MDD and MAD (p-values < 0.05, FET). Neither was there a significant relationship between the households that benefited from the education offered by CHVs on the importance of kitchen gardens and the status of household food security (p-value 0.746, FET).

Table 4. 12 Relationship between Service Delivery and Nutrition Outcomes using Fisher's Exact Test

Service Delivery	Nutrition Outcomes	Fisher's Exact Test		
		df	Value	P-value
Frequency of household visitation	MDD	8	16.428	**0.038**
	MMF	8	12.291	0.096
	MAD	8	15.288	0.080
	GMP clinic attendance	4	10.494	**0.026**
	FIC at 11 months	4	4.341	0.391
	VAS in the last six months	4	5.318	0.504
	Deworming in the last six months	8	18.125	**0.029**
	Drinking water treatment	4	2.685	0.66
	Availability of functional pit latrine/toilet	4	9.08	0.064
	Availability of functional handwashing facilities	4	3.527	0.489
	Availability of kitchen garden	4	14.152	**0.002**
Visitation within one hour of birth	Initiation of breastfeeding	12	34.507	**0.000**
Referral for immunization	FIC at 11 months	2	7.329	**0.022**
Referral for VAS	VAS in the last six months	2	0.792	0.688
Referral for deworming	Deworming in the last six months	4	1.703	0.794
Referral for GMP	GMP clinic attendance	2	9.061	**0.002**
Counseling on BF	Breastfed yesterday during the day and night	4	7.774	0.098
Counseling on CF	Consumed foods other than breast milk	4	8.853	**0.047**
	MDD	4	11.704	**0.014**
	MMF	4	15.895	**0.003**
	MAD	4	8.068	0.062
Counseling on MNS	Vitamin A supplementation in the last six months	2	0.168	1.000
Counseling on GMP	GMP clinic attendance	2	14.124	**0.001**
Counseling on water	Drinking water treatment	2	0.197	0.913
Counseling on hygiene	Availability of functional handwashing facilities	2	4.721	0.094
Counseling on sanitation	Availability of a functional pit latrine/toilet	2	0.714	0.72

*MDD – Minimum Dietary Diversity *MMF – Minimum Meal Frequency *MAD - Minimum Acceptable Diet *FIC - Fully Immunized Children *VAS – Vitamin A Supplementation *GMP – Growth Monitoring and Promotion

Table 4.12 – Continued

Service Delivery	Nutrition Outcomes		Fisher's Exact Test	
		df	Value	P-value
Talked about the importance of having a kitchen garden	Availability of a kitchen garden	2	52.191	**0.000**
Drinking water treatment	Children with diarrhea in the last two weeks	1	2.165	0.162
Availability of functional handwashing facilities	Children with diarrhea in the last two weeks	1	2.264	0.129
Availability of a functional pit latrine/toilet	Children with diarrhea in the last two weeks	1	0.004	1.000
FSS	MDD	6	6.279	0.360
	MMF	6	16.303	**0.011**
	MAD	6	5.174	0.477
Talked about the importance of a kitchen garden	Food Security Status	6	4.236	0.746

*BF – Breastfeeding *CF- Complementary Feeding *FFS - Food Security Status *MDD – Minimum Dietary Diversity *MMF – Minimum Meal Frequency *MAD - Minimum Acceptable Diet *MNS – Micronutrient Supplementation *FIC - Fully Immunized Children *VAS – Vitamin A Supplementation *GMP – Growth Monitoring and Promotion

Table 4. 13 Relationship between Service Delivery and Nutrition Outcomes using Multinomial Logistic Regression Analysis

Service Delivery in the Household	Nutrition Outcomes	Std Error	OR	95% CI	P-value
Households Visited monthly	MFF	0.297	0.554	0.310-0.993	**0.047**
	Dewormed in the last 6 months	0.420	3.266	1.434-7.437	**0.005**
	Availability of a kitchen garden	0.290	0.360	0.204-0.634	**0.000**
	GMP clinic attendance	0.414	0.686	0.305-1.546	0.364
Households Visited within 48 hours of birth	Initiation of BF within 1 hour of birth	0.340	0.445	0.228-0.867	**0.017**
Referral for immunization	FIC at 11 months	0.395	2.224	1.026-4.819	**0.043**
Referral for deworming	Dewormed in the last 6 months	0.353	1.036	0.518-2.070	0.920
Referral for GMP	GMP clinic attendance	0.404	0.797	0.361-1.758	0.573
Counseled of CF	MMF	0.422	3.527	1.542-8.069	**0.003**
Counseled on CF	MAD	1.576	11.540	0.525-253.497	0.121
Counseled on CF	Consumption of foods other than BM	0.371	2.582	1.248-5.338	**0.011**
Counseled on BF	Breastfed yesterday day and night	0.292	1.504	0.849-2.666	0.162
Counseled on GMP	GMP clinic attendance	0.420	2.332	1.023-5.316	**0.044**
Counseled on MNS	VAS	0.725	0.992	0.240-4.108	0.992
Counselled on water	Drinking water treatment	0.386	0.812	0.381-1.730	0.589
Counseled on sanitation	Availability of pit latrines	0.464	0.974	0.393-2.417	0.955
Education on the kitchen garden	Availability of a kitchen garden	0.259	0.158	0.095-0.262	**0.000**
Availability of pit latrine	Diarrhea in the last 2 weeks	0.393	1.785	0.826-3.857	0.141
Availability of handwashing facilities	Diarrhea in the last 2 weeks	0.372	0.914	0.441-1.896	0.809

*BF – Breastfeeding *CF- Complementary Feeding *FSS - Food Security Status *MDD – Minimum Dietary Diversity *MMF – Minimum Meal Frequency *MAD - Minimum Acceptable Diet *MNS – Micronutrient Supplementation *FIC - Fully Immunized Children *VAS – Vitamin A Supplementation *GMP – Growth Monitoring and Promotion *Std – Standard *OR – Odds Ratio *CI – Confidence Interval

CHAPTER FIVE

DISCUSSION

5.1 Introduction

The chapter discusses the study's findings with emphasis on demographics, socio-economic characteristics of the households, service delivery of CHVs, nutrition outcomes, and the relationship between the study variables. Community Health Volunteers, as the crucial link between households, communities, and health facilities, are the backbone of our community health system. They disseminate health messages, track defaulters, and refer them for appropriate care at the health facilities. This study, along with the work of Githinji and Ngala (2023), highlights the instrumental role of CHVs in improving the health and nutritional status of children aged 0-59 months. They enhance access to health care, raise health and nutrition awareness, and contribute to the well-being of children. Their role is not just significant but indispensable. Their challenges must be addressed to ensure the continued improvement of community health and nutrition services.

5.2 Demographic and Socio-Economic Characteristics of the Households

Among children aged 6-59 months, 51.7% were male and 48.3% were female. This aligns with the KNBS (2019) results, which found that the proportion of males was higher at 50.6% compared to females at 49.4% in Alego Usonga Sub-County. However, the proportions of males and females in the entire population of Alego Usonga are different at 47.2% and 52.8%, respectively, indicating that there are more females than males (KNBS, 2019). Mothers formed the majority of the caregivers to children aged 6-59

months at 78%, which aligns with the societal norms and culture that young children are always in the custody of their mothers. The study also found that 78.7% of the caregivers were married; this would justify why most caregivers were mothers, since most of the married partners would stay together, and the mother would be so close to the children most of the time.

The main economic activity of the caregivers was farming, aligning with KNBS (2019), which singled out agriculture as the main economic activity in Alego Usonga Sub-County. KNBS (2019), however, shows a higher percentage of households practicing farming than in this study. The variation could be because the study concentrated on the main economic activities of the primary caregivers of the children aged 6-59 months and not the entire households or the household heads. The study was also conducted in semi-urban villages, which formed 30.9% of the settlements, where most occupants are business people; hence, the justification of business as the second main economic activity.

A majority of the households had a monthly income of less than USD 77, with more than three-quarters living in temporary and semi-permanent houses, an indicator of low economic status, especially in a County with a poverty index of 47.5% (Siaya, CIDP, 2023-2027). Almost all primary caregivers had some formal education, with over 97% having achieved primary education. The literacy rate is higher than in the entire Siaya County and Kenya, which stand at 73.6% and 82.6%, respectively (County Government of Siaya, 2024; KNBS, 2019). The low socio-economic status, as established in this study, is likely to affect the health and nutrition outcomes negatively.

According to the study, the average household size was 6, with the smallest and largest being 2 and 14, respectively. This is larger than the figure provided by the KNBS (2019),

which found the average to be 4. KNBS (2019), however, covered all the households, while this study covered only the households with children aged 6-59 months. A large family is also likely to affect the nutrition and health outcomes of households.

5.3 Service Delivery of Community Health Volunteers

5.3.1 Household Visitation

The study reveals that CHVs are household names in Alego Usonga, as nearly all the households interviewed recognized them. However, there were variations in the duration of household visitations by CHVs, as some households reported that they were rarely visited or never visited. Despite these responses, the study also revealed that CHVs visited 93% of the households in the month preceding the interview. It was, however, established that in that month, the Government of Kenya was registering households for mass bed net distribution. Therefore, CHVs were engaged in the exercise with some payment attached.

According to routine data extracted from the KHIS (2022), CHVs do cover an average of 70% of the households assigned to them every month; this is in agreement with the findings of this research, whereby 71.9% of the households were visited monthly by their CHVs, and the findings of Mohammed & Mosmar (2018) which found the monthly visitation rate by CHVs to be 75.2%. This would mean one CHV can comfortably visit 70 against the target of 100 households in a month, as set by the government of Kenya (MOH, 2020a).

In one of the FGDs conducted in this study, some participants said they felt that CHVs are not well prepared to offer nutrition services in the households because they are few and cannot cover all the households assigned to them. They also noted that some CHVs

were not facilitated to be mobile so that they could visit all corners of the villages. In agreement with these observations, Perry *et al.* (2014) found that CHV programs are hampered by high workload. Woldie *et al.* (2018) also noted the challenges in using CHVs to perform more complex activities and recommended that CHVs be engaged in activities that match their qualifications, abilities, and capacities. Woldie *et al.* (2018) also presented sufficient evidence to support using CHVs to offer preventive health services in the community. However, there are gaps in engaging CHVs to perform complex assignments, emanating from the community, health system, and the CHVs themselves (Woldie *et al.,* 2018).

Community Health Volunteers not covering all the households assigned to them would imply that some targeted beneficiaries may not be served on time, or completely miss the services. Therefore, it would be important for CHVs to do targeted household visits whereby the needy ones are identified and prioritized. The Kenya Community Health Policy 2020-2030 should also be reviewed to align CHVs' capabilities with the expected outputs.

Nevertheless, Olaniran *et al.* (2019) noted that CHVs are geographically and socially well-positioned to provide health services to the community. Therefore, with adequate tools and commodities, CHVs can be further empowered to offer community preventive and promotive health services (Commetto *et al.*, 2018; Woldie *et al.*, 2018).

5.3.2 Referral and Follow-up Services

The study findings confirm the usefulness of CHVs in referral services. Almost a third of the households confirmed having benefited from the referrals done by CHVs in their

lifetime, from which 86% confirmed they were issued with referral notes, and 96.5% had obeyed the referrals and sought services at the health facilities. This finding aligns with that of Lopar & Lotulya (2023) in a study conducted in Pokot South, where 86.9% of the referrals were accompanied by referral notes. However, the referral rates in Pokot South were lower than in this study, at only 14.1%. Interestingly, in this study, 58.2% of the referrals were escorted to the service delivery points by CHVs, and 92.1% of them followed up to check on their progress post-referral, a majority being on the same day. This justifies the effort CHVs put into ensuring their clients access health services. It also shows CHVs' interest in ensuring the referred cases are healed and lead a healthy life.

In one FGD, participants noted that referrals done by CHVs in the community have helped improve the uptake of nutrition services like vitamin A supplementation and deworming. This observation is coherent with the findings of a study in Ghana and underscores the potential of CHVs to impact nutrition outcomes significantly (Ma *et al.*, 2019).

To further confirm the importance of CHVs in nutrition service delivery, most referrals were specific to nutrition services like growth monitoring, diarrhea, vitamin A supplementation, malnutrition management, and deworming. This is in line with WHO recommendations allowing CHVs to perform preventive and promotive health services, including identification of needy cases, tracing and referral of patients, disease surveillance, monitoring, data collection, effective communication, community engagement, mobilization, and maintenance of personal safety (Cometto *et al.*, 2018; Lopez-Ejeda *et al.*, 2018; Mohammed & Mosmar, 2018).

However, community stakeholders interviewed during a focus group discussion cited inadequate nutrition tools, equipment, commodities, and nutrition education as some of the limitations hindering service delivery by CHVs. They believed that if CHVs had adequate nutrition knowledge and were provided with appropriate and adequate tools and equipment, they would be better placed to offer nutrition services like referrals.

Moreover, following the revelation that not all households are visited by the CHVs every month, it may be assumed that some cases that need referral may be missed out completely, or may be identified late. Late identification and referral of malnutrition cases may cause poor prognosis, leading to preventable deaths. Therefore, intensive case finding should be prioritized, especially in areas where CHVs do not conduct regular household visits.

5.3.3 Counseling and Education Services

As per the dictates of public health policies, counseling and education services are both promotive, preventive, and curative in the sense that healthy and unhealthy individuals should benefit. The study, however, revealed low counseling services in the households, as only 34.8% of the respondents confirmed having benefited from the counseling services offered by CHVs at any given time. These rates are low compared to the frequency of household visitations by CHVs, as revealed in the study.

It would, therefore, be perceived that CHVs only provide counseling or health education to households with health problems, not the healthy ones. Low counseling rates would translate to low uptake of nutrition messages, thus the risk of poor nutrition outcomes.

Nevertheless, it is encouraging to note that most of the counseling services offered to the households by the CHVs were nutrition-based.

5.4. Nutrition Outcomes

5.4.1 Infant and Young Child Feeding Practices

The study shows that breastfeeding is highly acceptable, as nearly all children aged 6-23 months had an opportunity to be breastfed at any given time. Almost three-quarters of these children were initiated on breast milk within the recommended one hour after birth. A majority of the children initiated on breast milk within one hour had their mothers as primary caregivers. However, very few fathers could recall when breastfeeding was initiated – implying that male caregivers may not have been in the hospital when the mothers started breastfeeding.

As much as the proportion of newborns initiated on breast milk was low in this area, it was above the national rate of 60.1% (KNBS, 2023). However, there are variations across Africa – thus the need to establish the causes and factors behind them. For instance, Ethiopia recorded a lower prevalence of 59.6% (Gebretsadik *et al.,* 2023), while in South Africa, a higher prevalence of 94.2% was documented (Mphadha *et al.,* 2023).

Timely initiation of breastfeeding is critical for the nutritional well-being of a child (Saha *et al.*, 2008). It comes with several benefits that, if not achieved in time, may negatively affect the health and development of children (WHO, 2021b). It would, therefore, be important that all children are initiated on breast milk in time, and when not possible, stringent measures should be taken to mitigate the negative impact. Male involvement

should also be embraced when practicing IYCF so that fathers become part of their children's upbringing.

It is an alarming concern that 7.4% of caregivers start giving their newborns other foods apart from breast milk in the first two days of birth. Further, most prefer giving water, followed by porridge, animal milk, and infant formula, in that order. This finding is consistent with that of Gilano *et al.* (2023), which found the prevalence of prelacteal feeding to be 7.95% in Ethiopia. It is also consistent with that of Sorrie *et al.* (2020), where the most common type of prelacteal feed was plain water, followed by butter, cow milk, and glucose water in that order. It is, however, different from the findings of Wondmeneh (2024), where the most common prelacteal feeds were dairy products, water, and certain plant species in that order. Nevertheless, lower rates of prelacteal feeding have been reported in other parts of Ethiopia and Lower & Middle-Income Countries – confirming improved adherence to exclusive breastfeeding (Sorrie *et al.*, 2020; Megersa *et al.*, 2021; Neves *et al.*, 2022; Gashaw & Mitku, 2024).

The WHO recommends exclusive breastfeeding up to six complete months (WHO, 2023b). In this case, no other food even water, should be given, except medication prescribed by a qualified physician. This would ensure maximum benefits accruing from breast milk. In circumstances where prelacteal feeds are given, children may be exposed to preventable illnesses like diarrhea. Therefore, it is important to disseminate nutrition messages focusing on such unwanted practices. This would be through intensive nutrition education targeting community gatherings and households. Moreover, the implementation of the Baby-Friendly Community Initiative (BFCI) should be prioritized in Alego Usonga.

The rate of bottle feeding in this study is way above the national rate (KNBS, 2023). It is also higher than in other studies conducted in Ethiopia (Hunde *et al.*, 2023; Belay *et al.*, 2022a; Kabebe & Assaye, 2017; Berde, 2017). However, it is lower than the findings of Seid *et al.* (2019), which established a rate of 93.2% in South West Ethiopia, though in children under 12 months. The variation in bottle feeding rates could be attributed to differences in study area, sample size, socio-economic status, perception, and knowledge of mothers towards optimal child and infant feeding, and data type (Mekonen, 2024). Bottle feeding practice is discouraged because it affects optimal breastfeeding and appropriate complementary feeding, and is also a source of contamination, resulting in diarrheal diseases (Kebebe & Assaye, 2017). It therefore negatively affects the growth and development of children.

The study reveals that very few children aged 6-23 months achieved MDD and MAD. Implying that, despite the majority having received meals at the appropriate frequency, their foods were limited in variety. These rates are comparable to the findings of studies in North West Ethiopia among the Orthodox religious communities (Mulat *et al.*, 2019). However, they are relatively lower than the Kenyan national rate (KNBS, 2023), as well as in Nepal and North East Ethiopia (Sapkota *et al.*, 2022; Birie *et al.*, 2021). Low rates of MAD were also reported in 11 East African countries by Worku *et al.* (2022) and in Sub-Saharan Africa by Belay *et al.* (2022b). It is therefore evident that low rates of MDD and MAD are common in the LMICs, and urgent action is needed to reverse them.

The findings signify poor nutrition outcomes and diet inadequacy in Alego Usonga Sub-County. According to UNICEF (2024), children who consume, at most, two out of eight defined food groups per day are considered to be in severe child food poverty.

Appropriate feeding practices are also crucial in achieving positive child health and nutrition outcomes (Pretorius *et al.*, 2021). Consequently, with diet inadequacy, children may not reach their full potential in growth and development, resulting in poor health (WHO, 2021b). Despite not investigating the nutrition status in this study, the poor IYCF practices observed can explain the high malnutrition rates in Alego Usonga (Uganda Bureau of Statistics, Makerere University School of Public Health, and UNICEF., 2019). Therefore, this community should be targeted with diet diversification programs involving nutrition-sensitive and nutrition-specific interventions.

The data was collected from February to May 2024 – when the Country was experiencing hard economic times exacerbated by high inflation rates of 5.0 – 6.1% in all sectors of the economy (KNBS, 2024). This could justify the low rates of MDD and MAD. Therefore, the study recommends the application of correctional factors to remove the bias. In line with the WHO recommendations, this study defined MDD as the consumption of at least five of the eight defined food groups (WHO, 2021b). However, in most previous studies, MDD is defined as the consumption of at least four of the eight defined food groups.

The study also revealed low consumption of animal protein, including insects, whose consumption was zero among children aged 6-23 months. This is supported by UNICEF (2024), where less than 5% of African children are fed on nutrient-dense foods such as eggs, fish, poultry, or meat. However, it contradicts the findings of a study conducted by Aboge *et al.* (2022), which rated high the acceptability of insect-enriched porridge among women of reproductive age in Alego Usonga. This would mean consumption of insects is allowed in other cohorts but not children 6-59 months. The low consumption of animal

protein could be associated with the low MDD in the study area. According to Janmohamed *et al.* (2020a), children eating foods from at least four food groups are likely to consume at least one animal source food. Therefore, children in Alego Usonga cannot achieve optimal growth and development due to low consumption of protein-rich foods.

5.4.2 Household Food Security

Household food insecurity is considered a global challenge. This study reveals that most households with children aged 6-59 months in Alego Usonga Sub-County are food insecure. Although agriculture was found to be the main economic activity in this study, livestock production remained on a low scale. This was evidenced by the low proportion of households owning sheep, goats, bulls, heifers, cows for milk, and cows not for milk in Alego Usonga. Despite two-thirds of the households rearing chickens, the average flock per household remained low. The study shows that low-income households were more likely to rear chickens than those with higher earnings. The justification could be that starting a poultry project requires less income compared to other livestock.

The Household Food Insecurity Access Scale Score of households with children 6-59 months was 8.2, with over 60% suffering from different forms of food insecurity. This prevalence is lower than that of Kiboi *et al.* (2022), where only 23.33% of households in Kenya were food secure. However, it is consistent with that of FAO *et al.* (2020), where 63% of East Africans did not have access to nutritious and sufficient food, even without hunger. The study also found that households with children aged 6-59 months in the semi-urban villages were more food secure than those in rural villages. This contradicts Kiboi *et al.* (2022), who reported high food security in rural Western Kenya. The variation in food security between the rural and semi-urban villages can be attributed to the difference

in income levels. The study shows that semi–urban households earned more than rural ones. However, the study covered all households and was not restricted to those with children aged 6-59 months only, as in this study.

Studies in SSA and South Asia have also reported high rates of food insecurity-confirming its global magnitude (Gebre & Rahut, 2021; Hussein *et al.*, 2018). Using HFIAS, Gebre & Rahut (2021) found food insecurity in East Africa to be 48%; with mild, moderate, and severe levels reported at 15%, 26%, and 7% respectively. According to Hussein *et al.* (2018), the overall food insecurity among people living with HIV/AIDs in Bahir Dar, Ethiopia was 56.5%. Similarly, among the rural communities in Nepal, a third of the households experienced high levels of food insecurity across the Kaligandaki Basin - with severity in Lumle and Upper Mustang, where more than half of the households were affected (Hussein *et al.*, 2018).

5.4.3 Health-Seeking Behavior and Uptake of Nutrition Services

The study revealed a high uptake of nutrition services in households with children aged 6-59 months. The uptake of mother-child health booklet, skilled delivery, and growth monitoring and promotion, was 94.9%, 93.3%, and 85.4%, respectively. Full immunization at 11 months, Vitamin A supplementation and deworming in the previous six months stood at 85.11%, 97.2%, and 97.1%, respectively. Diarrhea cases were also relatively high at 19.9%, with 69% of them getting treated with ORS and zinc sulfate, while 31% accessing no treatment at all. These figures are comparable to the KNBS (2023) data, where skilled delivery stood at 95% and 89% in Siaya County and Kenya, respectively; Fully Immunized children stood at 88% and 80% in Siaya County and

Kenya, respectively; diarrhea cases among under-fives and those treated with ORS and zinc sulfate stood at 14% and 32% respectively.

The high uptake of nutrition services indicates a strong health-seeking behavior. This may signify the community's trust in the health care system. It can also be attributed to the efforts of the CHVs, who, presumably during their household visits, provide relevant health and nutrition messages that encourage action from the community (Kananura *et al*., 2024). This suggests that most households recognize the benefits of seeking care at health facilities, thereby reducing potential risks within the community. This trend is further justified by the high rates of health facility visits following referrals made by the CHVs. During a FGD in Karapul CU, respondents reported that CHVs' household visits and education have led many community members to prefer seeking hospital services instead of relying on traditional healers. Therefore, more efforts should focus on strengthening the connection between the community and health facilities, and health education should be prioritized in households.

Moreover, in a county where health facilities are within a radius of five kilometers, coupled with 100% functionality of the community health strategy, health services uptake is expected to be high. The fact that over 96% of the referred cases sought services at the health facilities further justifies good health-seeking behavior in Alego Usonga.

Shadrack *et al.* (2019), however, reported low uptake of Vitamin A supplementation and deworming in Siaya, Kilifi, and Kwale counties. This study, therefore, shows a significant improvement in vitamin A supplementation and deworming in Siaya County in five years – a gain that should be sustained to promote good immunity, good eyesight, optimal growth, and development in children. Moreover, biannual vitamin A supplementation and

deworming coverage in the three counties remained low (Shadrack *et al.*, 2019). Lower coverage of vitamin A supplementation has also been reported in Nigeria, Burkina Faso, and Kenya, especially in Wajir County (Kannan *et al.*, 2022; Nuria *et al.*, 2021). Therefore, concerted efforts should be employed to enhance routine vitamin A supplementation and deworming.

The low uptake of zinc sulphate and ORS should be a major concern especially with reported high rates of diarrhea, low handwashing uptake, high bottle-feeding rates, and prelacteal feeds. According to Lam *et al.* (2019), Kenya had catalyzed the uptake of ORS and zinc from 0.8% in 2011 to 15%, and ongoing efforts were necessary to further build on the gains. Schroder *et al.* (2019) also found that ORS and zinc coverage in diarrhea-high-burden counties increased from 1% to 24% in pre- and post-program-based populations. However, the finding of Bruck *et al.* (2024) where only half (53.3%) of diarrhea cases are treated with ORS and zinc sulfate in East Africa, seems to negate the gains being made. Consequently, with low zinc and ORS supplementation uptake, health and nutrition status are poised to deteriorate further. Therefore, preventive measures should be prioritized in the area by promoting safe water usage, proper hygiene, and high sanitation levels.

5.4.4 Water, Sanitation, and Hygiene

The study findings show high latrine use and water treatment rates, higher than the national rates (KNBS, 2023). However, there was a shallow coverage of handwashing facilities in the study area, indicating a potential area for improvement that could significantly enhance the health and nutrition outcomes of the community. The main sources of drinking water were wells, springs, and boreholes; aligning with KNBS (2019),

where a majority of households in Alego Usonga had springs, wells, and boreholes as their main source of drinking water. It can therefore be concluded that most of the households of Alego Usonga do rely on open sources of water for domestic consumption - a situation that predisposes them to poor hygiene and sanitation, hence the vulnerability to waterborne diseases. It is also a major concern that very few households consider handwashing as a regular practice, owing to the low coverage of handwashing facilities. However, most households preferred chlorine-based chemicals to treat their drinking water, a common practice that could help prevent waterborne diseases. Therefore, this area should be targeted with WASH programs, focusing mainly on water safety and hand hygiene.

5.5 Relationship between Independent and Dependent Variables of the Study

5.5.1 Relationship between the Demographic and Socio-economic Characteristics of Households and Service Delivery of CHVs

There was a significant relationship between the settlement status of households in the study and the service delivery of CHVs. The study revealed that CHVs from rural villages were more active in service delivery than those from semi-urban settlements. CHVs conducted more visitations, referrals, follow-ups, and education services in rural areas than in semi-urban areas (p-values <0.05). There was, however, a significant difference between the settlement of households with children aged 6-59 months and knowledge about CHVs and counseling services. This implies that the settlement status of households was neither significantly associated with the households' knowledge about CHVs nor the counseling services offered by CHVs.

5.5.2 Relationship between the Demographic and Socio-economic Characteristics of Households and the Nutrition Outcomes

The primary caregivers' education level was significantly related to other foods given to children within two days after birth (prelacteal feeds). More caregivers with higher education levels gave other foods to their children in the first two days after birth compared to those with lower education levels. This contradicted several other studies conducted in Ethiopia, where mothers' low level of education significantly contributed to children being given prelacteal feeds (Megersa *et al.*,2012; Sorrie *et al.*, 2020; Nerves *et al.*, 2022; Girma *et al.*, 2023; Gashaw & Mitku, 2024). However, there was no significant relationship between primary caregivers' education level and breastfeeding initiation. This finding contradicted other studies conducted in Ethiopia, South Africa, Nigeria, and Nepal, where maternal education was significantly associated with a high likelihood of early initiation of breastfeeding (Gebretsadik *et al.*, 2023; Mphadha *et al.*, 2023; Arikpo *et al.*, 2018; Acharya & Khanal, 2015).

There was no significant relationship between primary caregivers' education level and bottle feeding. This contradicts other studies showing relationships between bottle feeding and the mother's educational status (Belay *et al.*, 2022a; Sowumni & Folake, 2023; Seid *et al.*, 2019; Berde, 2017).

Caregivers involved only in domestic work practiced bottle-feeding more than caregivers engaged in other occupational activities. This implies that these caregivers had adequate time to practice bottle feeding. The finding contradicts two studies conducted in Nigeria and Ethiopia, which showed that the rate of bottle-feeding increases with the increase in

caregivers' occupation level (Seid *et al.*, 2019; Sowumni & Folake, 2023). Following these two studies, it can be concluded that caregivers actively engaged in economic activities were more likely to practice bottle feeding. Further suggesting that when they were away at work, they would probably leave their children at home to be bottle-fed by other caregivers.

The study's unique findings are worth noting, as it shows that in households with higher monthly income, children had higher chances of being given foods other than breast milk in the first two days of birth. This is consistent with the findings of Girma *et al.* (2023), which found a strong association between wealth index and prelacteal feeding in Ethiopia. This could probably mean that high income enables caregivers to easily access prelacteal feeds. Meanwhile, these households could also be deficient of knowledge on proper IYCF practices.

The study findings also showed that food security status increased with household income. In most cases, it is evident that high-income levels lead to food security, as stable income increases households' production capacity and purchasing power. However, this study's unique finding is that households with lower incomes were likelier to achieve MMF than those with higher incomes. This reiteration of unique findings should make researchers feel intrigued and engaged, encouraging further exploration of these topics and potentially informing future interventions to improve nutrition outcomes in low-income households.

5.5.3 Relationship between service delivery of CHVs and the nutrition outcomes

Household visitation by CHVs was significantly related to MDD, growth monitoring and promotion clinic attendance, deworming, availability of kitchen gardens, and initiation of breastfeeding. Households visited monthly showed better uptake of MDD, growth monitoring and promotion clinic attendance, and deworming, compared to those rarely visited and those never visited. These findings are consistent with a study conducted in Bangladesh, where CHVs' visits to caregivers of children aged 0-23 months improved complementary feeding practices, especially when IYCN was integrated into a mainstream nutrition program **(**Rahman *et al.*, 2023).

A study in Kenya also revealed that during home visits, CHVs assess children's growth and overall health, provide health education, and support caregivers in making decisions on the well-being of their children (Githinji & Ngala, 2023). It was also found that CHVs' home visits increased breastfeeding initiation by 1.5-fold and exclusive breastfeeding by 4.42-fold among Mongolian children (Janmohamed *et al.*, 2020a). Moreover, it is recommended that home visits by CHVs should be prioritized when integrating complementary feeding practices into mainstream nutrition programs (Rahman *et al*, 2023).

Referral services done by CHVs resulted in a high uptake of nutrition and health services in the households. In this study, children referred for immunization by CHVs got fully immunized compared to those who were never referred. The study also showed that more children referred for growth monitoring attended growth monitoring clinics than those never referred. It is considered that CHVs can play a key role in preventing, identifying, and managing child undernutrition (Bridge & Lin, 2024). These findings are further

supported by two other studies that established that CHVs are effective in active case finding, early identification, and referral of cases for nutrition management (Lopez-Ejeda *et al,* 2018; Mohammed & Mosmar, 2018).

Counseling on complementary feeding, growth monitoring, and kitchen garden conducted by the CHVs at the households showed significant relationships with various related nutrition outcomes. These findings agreed with those of a study conducted by Dewidar *et al.* (2023) in Low and Middle-Income Countries, where nutrition counseling improved breastfeeding initiation after birth, maternal behavior, and health outcomes. According to Dewidar *et al.* (2023), while there is some uncertainty about the effects of nutrition counseling, primarily due to the low certainty of evidence and the limited number of studies for specific key outcomes, this research has shed light on the crucial role of CHVs in nutrition service delivery.

As much as the study shows no significant relationship between WASH indicators and diarrhea cases, several studies have established significant associations between WASH parameters and the prevalence of diarrhea. Poor WASH practices have been significantly associated with high rates of diarrhea, particularly in children below five years old. In India, WASH practices were independent predictors of diarrhea among children under 3 years old (Roy *et al.*, 2023). In Sub-Saharan Africa, it was established that the source of drinking water and toilet facilities had a significant effect on childhood diarrhea (Amadu *et al.*, 2023). Likewise, a strong relationship was established between handwashing behavior and cases of diarrhea in school-age children (Nuraeni *et al.*, 2022). In Low & Middle-Income Countries, various WASH interventions have proven effective in reducing the prevalence of diarrhea cases in children (Darvesh *et al.*, 2023; Giri *et al.*,

2022; Mehari *et al*, 2023; Wolf *et al.*, 2022). Therefore, strategies for improving access to clean water, proper sanitation, and hygiene should be prioritized to reduce the incidence and prevalence of diarrhea, especially in children. This would help in reducing child morbidity and mortality, and hence the realization of Sustainable Development Goals 3 and 6.

The study established a significant association between food security status MMF. Among the food-secure households, 31.9% received MMF; in the food-insecure without-hunger households, 19% achieved MMF; in the food-secure with moderate hunger households, 27.6% received MMF; and in the food-insecure with severe hunger households, 32.4% achieved MMF. This implies that food-insecure households were more likely to consume at least five out of the eight recommended food groups than the food-secure ones - a revelation that should be interrogated further. However, in Urban Informal Settlements of Nairobi, Macharia *et al.* (2018b) found that, except MMF, food-secure households were significantly more likely to achieve appropriate IYCF practices than those in food-insecure households.

The study concurs with the findings of various studies across the globe. For instance, in North Uganda, household food security was considered a strong determinant of child dietary diversity (Elolu *et al.*, 2023). In rural Zambia, Bwalya *et al.* (2023) established that food-secure households based on dietary diversity score were significantly more likely to achieve MMF, MDD, and MAD. In Ethiopia, Ahmed *et al.* (2022) established a significant association between food security and MDD, MMF, and MAD. In Nigeria, a significantly strong association was found between household food security and MMF (Afolabi *et al.*, 2021). Also, in Ghana, Agbadi *et al.* (2017) found that food-secure

households were significantly more likely to receive MAD, but noted that in 80% of food-secure households, children did not achieve MAD. Thus, the caution about the notion that an increase in the proportion of food-secure households would necessitate an improvement in a child's diet.

In concurrence with Bwalya *et al.* (2023), this study reveals that poor IYCF practices manifest even in food-secure households since most of them failed to achieve MAD criteria - an implication that, other than food insecurity, there are other factors influencing IYCF practices. These factors include the occupation of primary caregivers, household income level, counseling on complementary feeding, and frequency of CHVs' household visitation. Therefore, improvement of IYCF practices calls for a multifaceted approach involving different strategies.

CHAPTER SIX

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

6.1 Introduction

This chapter presents the summary, conclusions, and recommendations based on the study objectives.

6.2 Summary

The study intended to evaluate the performance of Community Health Volunteers on nutrition outcomes of households with children 6-59 months in Alego Usonga, Siaya County, Kenya. The specific objectives were**:** to assess the service delivery of Community Health Volunteers in households with children aged 6-59 months; to assess the nutrition outcomes in households with children aged 6-59 months; and to establish the relationship between the service delivery of Community Health Volunteers and nutrition outcomes of households with children aged 6-59 months, in Alego Usonga, Siaya County.

The study results were as follows:

Service delivery of CHVS: Monthly household visitation -71.9%, referrals - 32%, follow-up on referrals - 92.1%, and household counseling - 34.8%.

Household nutrition outcomes: MDD-6.1%, MMF - 65.5%, MAD - 2.7%, Bottle feeding - 44.6%, HFIAS score - 8.2, food insecurity - 60.4%, skilled delivery - 93.3%, FIC - 81.5%, growth Monitoring - 85.4%, Vitamin A supplementation - 97.2%, Deworming - 97.1%, functional latrines - 89.6%, functional handwashing facilities - 15.7%, and Water treatment - 75.8%.

Community Health Stakeholders' Views during the FGDs: CHVs actively interact with the households they serve, CHVs are well prepared and equipped to offer nutrition services, CHVs' involvement in nutrition service delivery has greatly promoted positive health behavior, promoted food security, improved the knowledge of the community, reduced child malnutrition, morbidities and mortalities, and improved uptake of nutrition and health services in the community.

However, the stakeholders reported the following challenges faced by CHVs: hostility from some households, ignorance of some community members, inadequate resources and motivation, and the influx of religious beliefs hindering the uptake of nutrition and health services. Therefore, they proposed the following solutions to the challenges facing CHVs: stakeholders' involvement in resource mobilization, continuous training of the CHVs on their roles, and sensitizing the community about nutrition and health services, and the role of CHVs in the community.

Relationship between service delivery and household nutrition outcomes: The study revealed significant relationships between the services offered by CHVs and various nutrition outcomes in the households.

6.3 Conclusions

Community Health Volunteers are indispensable in nutrition service delivery. Their contribution to household visitations, intensive case finding, referral of needy cases, follow-up on referral cases, and counseling services, is significant. However, the study reveals that CHVs visited only 71.9% of the designated households in a month, with 32%

and 34.8% benefitting from referral and counseling services, respectively. This calls for a review of existing policies to align CHVs' capacity with their expected outputs.

CHVs are also significant in ensuring community access and uptake of nutrition services. The study further reveals that CHVs in rural villages are more active in nutrition service delivery than those in semi-urban villages, calling for further investigation to establish the cause. Despite CHVs' efforts, most children aged 6-23 months in Alego Usonga do not achieve the recommended IYCF practices, such as MDD and MAD, while bottle feeding remains exceptionally high. The high rates of food insecurity and low uptake of handwashing further exacerbate the situation. These poor indicators need urgent attention to reverse the high rates of malnutrition and deaths in children under five years old. Nevertheless, the stakeholders interviewed highly recognized CHVs for their selfless service. They felt that CHVs are the right persons to offer nutrition services in the households since they are in touch with the reality on the ground and are easily accessible to everyone in the villages. However, CHVs should be motivated and facilitated to optimize their performance. Consequently, a significant relationship was established between CHVs' service delivery and household nutrition outcomes. Effective service delivery of CHVs demonstrated a positive impact on the nutrition outcomes of households with children aged 6-59 months.

6.4 Recommendations

6.4.1 Recommendation for Policy Direction

For appropriate policy direction, the study recommends the review of the Kenya Community Health Services Policy 2020 – 2030 to realign CHVs' capacity and capability

with their expected outputs. This would enable CHVs to engage in activities that match their qualifications, abilities, and capacities.

6.4.2 Recommendations for Programming

In order to improve nutrition service delivery in the households, CHVs should visit all households attached to them, with emphasis on those in the semi-urban villages. Efforts should be made to increase the frequency of household visitation, referrals, and counselling services**.** Also, with the support of CHAs, CHVs should undergo monthly mentorship and on-the-job training programs to help improve their nutrition knowledge and skills. The government should provide adequate nutrition assessment tools, educational materials, referral and reporting tools to CHVs, and train them on various nutrition modules. The community, being the primary consumers of CHVs' services, should explore ways of motivating them by providing non-monetary support such as transport and locally available resources. In this regard, they should be sensitized on their roles in community health services to own the entire process.

For improved nutrition outcomes, the County Government of Siaya should implement programs targeting diet diversification, food security, water safety, hand hygiene, and Baby Friendly Community Initiative (BFCI). More importantly, stakeholder involvement and partnership should be embraced for sustainable nutrition programs. As such, the County Government should foster more partnerships with the community and various development organizations to mobilize adequate resources for nutrition services in the community. Finally, the Community Health Committees, being the governors of

community health services, should also be involved at all levels of nutrition service delivery to foster ownership and sustainability.

6.4.3 Recommendations for further research

In this study, the performance of CHVs and the nutrition outcomes of households were examined using a cross-sectional study design. The study, however, did not directly link the CHVs with the outcomes in the households. Therefore, longitudinal studies should be used to test the performance of CHVs in nutrition service delivery by involving the CHVs themselves. Further, the long-term impact of CHVs on nutrition outcomes and the effect of different trainings on their effectiveness should be examined.

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APPENDICES

Appendix I: Informed consent

INFORMED CONSENT

Household / Participant / FGD code ……. Date of data collection …….

Name of Researcher Assistant ……

Title: Performance of Community Health Volunteers on Nutrition Outcomes of Households with Children 6-59 months in Alego Usonga, Siaya County.

Researcher:

Amos Odiwuor

Masinde Muliro University of Science and Technology

School of Public Health Biomedical Sciences and Technology

Department of Nutritional Sciences

P.O. Box 190-50100, Kakamega

Mobile Phone No. +254 721 339 068

Email: ongiroamos@gmail.com / ongiroamos@yahoo.com

Good morning/ afternoon,

I kindly request for your participation in this study that will help us evaluate the performance of Community Health Volunteers on nutrition outcomes in households with

children 6-59 months in Alego Usonga, Siaya County. The study aims to evaluate the performance of Community Health Volunteers and nutrition outcomes in households with children 6-59 months in Alego Usonga, Siaya County.

Our engagement will be very short and confidential, and the information shared between us will be treated with a lot of integrity and professionalism, and only used for the study. Your participation is voluntary, and as a respondent, you are entitled to read or be taken through this consent form and to comprehend and understand its content before participating. You are free to terminate your participation based on your conscience. There are no incentives attached to this session.

During the session, you are expected to seek clarification on issues that may seem unclear to you and need more input.

Consent

As a study respondent, having been taken through the content of this consent form, and the researcher having explained to me the purpose of the study, and I, having comprehended it, I voluntarily give my informed consent to participate.

Respondent: Signature ……. Date……

Confirmed and countersigned by:

Interviewer: Signature……... Date ……..

THANK YOU FOR YOUR ACCEPTANCE TO PARTICIPATE!

Appendix II: Structured Questionnaire

Questionnaire code…… Date of data collection……

Time started ……. Time ended…….

County ……. Sub-County…… Ward ……....

Community Unit ……... Village ……

Settlement status: Rural □ Semi-urban □ Urban / town □

Section 1: Demographic & Socio-economic information

1. How many children in the age bracket of 6-59 months live in this household? Indicate the absolute numbers……
2. What is the age in months of the child whose caregiver is selected for the interview? ……
3. What is the sex of the child whose caregiver is selected for the interview?

   Male □ Female □ Transgender □
4. Does the child have any form of disability or feeding disorder? Yes □ No □
5. If yes to the above question, which kind of disability?

   Physical □ Blindness □ Deaf □ Dumb □ Mental □ Neurological disorders □ Cleft palate □ Any other □ specify…….
6. Does the child seek any care for the disability or disorder he/she had? Yes □ No □

7. Who is the primary caregiver?

   Mother □ Father □ Grandparent □ Older sibling □ Other guardian □ specify……...

8. What is the age of the primary caregiver (in years)? ……..

9. What is the marital status of the primary caregiver?

   Single □ Married □ Divorced / Separated □ Widowed □

10. What is the occupation of the primary caregiver?

    Farmer □ Fisherman □ Transport operator □ Miner □ Casual laborer □ Business person □ Formal employment □ Domestic worker □

11. What is the monthly income of the household?

    Below Ksh. 10,000 □ Ksh. 10,000 – 30,000 □ Ksh. 30,000-50,000 □ Ksh. 50,000 & above □

12. What is the highest level of education of the primary caregiver?

    None □ Primary □ Secondary □ Tertiary □

13. Which type of housing does the household live in?

    Temporary / makeshift □ Semi-permanent □ Permanent □

14. How many people live in this household (both children and adults)? ……

Section 2: Household service delivery by CHVs (ask the primary caregiver)

15. Do you know your Community Health Volunteer? Yes □ No □

16. If yes, how often does he/she visit your household?

    Weekly □ Monthly □ Rarely □ He / she had never visited □

17. Did he/she visit your household last month? Yes □ No □

18. Has your child ever been referred to seek any care in the health facility by your CHV? Yes □ No □
19. If yes, did your CHV give you a referral note? Yes □ No □
20. Did you take your child to the health facility after being referred by the CHV? Yes □ No □
21. If yes to the question above, did your CHV escort your child to the health facility? Yes □ No □
22. Did the CHV make a follow-up visit to confirm if, indeed, your children were attended to at the hospital where the referral was made? Yes □ No □
23. If yes to the above question, after how long? The same day □ After one week □ After two weeks □ After one month □
24. For what services/illnesses did your child get referred?

    Immunization □ Fever and Diarrhea □ Chronic cough □ HIV services □ Vitamin A supplementation □ Deworming □ Malnutrition management □
25. Have you ever received any counseling on how to promote the health of your child from your CHV? Yes □ No □
26. If yes, what kind of counseling did you receive from your CHV?

    Breastfeeding □ Replacement feeding □ Complementary feeding □ Micronutrient supplementation □ Growth monitoring and development □ Water Sanitation and Hygiene □ Any other □ specify…….
27. Has your CHV ever talked to you about the importance of having a kitchen garden?

    Yes □ No □

Section 3: Household Nutrition Outcomes

28. Does your child have an MCH Booklet? Yes □ No □
29. Where was your child given birth to? At home □ In the hospital □
30. Was your child ever breastfed? Yes □ No □
31. How long after birth was your child first put on breastmilk?

    Immediately □ In less than 1 hour □ In less than 24 hours □ specify hours …..
32. In the first two days after delivery, was your child given anything other than breastmilk to drink or eat? Yes □ No □
33. Which food was he/she given?

    Water □ Animal milk □ Porridge □ Infant formula □ other foods □, specify…….
34. Did your child breastfeed yesterday during the day or at night? Yes □ No □
35. Did your child drink anything from a bottle with a nipple/teat yesterday during the day or at night? Yes □ No □ Don't know □
36. Now, I would like to ask you about (other) liquids or foods that your baby ate yesterday during the day or at night. I am interested in whether your child had the item, even if it was combined with other foods.

For example, if (*name of the baby*) ate a millet porridge made with a mixed vegetable sauce, you should reply yes to any food I ask about that was an ingredient in the porridge or sauce.

Please do not include any food used in a small amount for seasoning or condiments (like chilies, spices, herbs, or fish powder); I will ask you about those foods separately.

Yesterday, during the day or at night, did (*name of the baby*) eat:

(Read the food lists. Underline the corresponding foods consumed and tick the column Yes or No depending on whether any food item on the list was consumed. Record the number of times when relevant (Group 3)).

Group	Food lists	No	Yes
Group 1	Breast milk		
Group 2: ***Grains, roots and tubers***	Porridge, bread, rice, noodles, or other foods made from grains		
	White potatoes, white yams, manioc, cassava, or any other foods made from roots		
Group 3: ***Legumes and nuts***	Any foods made from beans, peas, lentils, nuts or seeds		
Group 4: ***Dairy products***	Infant formula, such as **[insert local examples]**		How many times? |___||___|
	Milk, such as tinned, powdered, or fresh animal milk		How many times? |___||___|
	Yogurt or drinking yogurt		How many times? |___||___|
	Cheese or other dairy products		
Group 5: ***Flesh foods***	Liver, kidney, heart, or other organ meats		
	Any meat, such as beef, pork, lamb, goat, chicken or duck		
	Fresh or dried fish, shellfish, or seafood		
	Grubs, snails, or insects		
Group 6: ***Eggs***	Eggs		
Group 7: ***Vitamin A***	Pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside		
	Any dark green vegetables [**insert local examples**]		

fruits and vegetables	Ripe mangoes (fresh or dried [not green]), ripe papayas (fresh or dried), musk melon **[insert other local vitamin-A-rich fruits]**		
	Foods made with red palm oil, red palm nut, or red palm nut pulp sauce		
Group 8: ***Other fruits and vegetables***	Any other fruits or vegetables		
Others ***(not counted in the dietary diversity score)***	Any oil, fats, butter or foods made with any of these		
	Any sugary foods, such as chocolates, sweets, candies, pastries, cash. or biscuits		
	Condiments for flavor, such as chilies, spices, herbs, or fish powder		

☐ The baby does not consume any food other than breastmilk

Preliminary analysis
Number of food groups consumed the previous day _____/8

37. As a caregiver, your role in (name of the baby) 's nutrition and health status is crucial. How many times did (*name of the baby*) eat foods, that is, meals and snacks other than liquids yesterday during the day or at night?

Number of times |___||___|

Do not know/no answer

Preliminary analysis (to be done after the interview) WHO (2008) recommendations for minimum meal frequency: **For breastfed children:**		
	□ 2–3 times for breastfed infants 6–8 months □ 3–4 times for breastfed infants 9–23 months	
For non-breastfed children:		
	□ four times for non-breast-fed children 6–23 months (including milk feeds, identified in question 37, Group 3)	

From questions 34, 36, and 37, determine if the child receives food the minimum number of times according to WHO recommendations:	
	□ Less than recommended □ The minimum number of times each day (follows the recommendation) □ More than recommended

38. Does your child attend the Growth Monitoring & Promotion clinic? (check MCH booklet) Yes □ No □
39. If yes to the question above, we appreciate your efforts in monitoring (name of the baby) 's growth. Are the growth curves in the MCH Booklet plotted up to date? Yes □ No □
40. If the growth curves are not plotted up to date, when last did you take your child to the Growth Monitoring & Promotion clinic?

    Two to six months ago □ Seven to twelve months ago □ More than twelve months ago □
41. Is your child fully immunized? (check in the MCH Booklet if all the scheduled antigens at 11 months were given, including vitamin A at six months) Yes □ No □
42. Did your child get a Vitamin A supplement in the last six months? (ask the caregiver and check the MCH Booklets for children 6-59 months) Yes □ No □
43. Did your child get de-wormed in the last six months? (ask the caregiver and check the MCH Booklet for children 12-59 months) Yes □ No □
44. Has your child suffered from diarrhea in the last two weeks? Yes □ No □
45. If yes, what treatment did the child receive?

Given ORS and zinc sulfate at home □ taken to the hospital and treated with ORS and zinc sulfate □ No treatment given □

46. What is the source of drinking water in this household?

    Water pan / Pond / stream / river / lake □ Wells / springs / borehole □ Rain harvested water □ Piped water □

47. Does the household treat its drinking water? Yes □ No □

48. If yes to the above question, which kind of treatment?

    Boiling □ Treatment with chemicals, i.e., water-guard, PUR, chlorine powder □ Other methods □ specify ……

49. Does the household have a functional pit latrine/toilet? Yes □ No □

50. If no, how does the household dispose of human wastes?.....

51. Does the household have a functional handwashing facility (leaky tin / tippy tap)? Yes □ No □

52. Does the household have a kitchen garden? Yes □ No □

53. Indicate in the table below the number of household-owned livestock.

Livestock	**Number**	**Livestock**	**Number**
a. Chicken		f. Cow (milking)	
b. Sheep		g. Cow (non-milking)	
c. Goats		h. Donkey	
d. Bull			
e. Heifer			

54. Household food insecurity access scale (HFIAS) (**In the last four weeks)**

No.	Question	Response option	Code
(i)a.	Did you worry that your household would not have enough food?	0 = No (skip to question 2) 1 = Yes	
(i)b.	How often?	1= rarely (once or twice in the past four weeks)	

		2= sometimes (three to ten times in the past four weeks) 3= often (more than 10 times in the past four weeks)
(ii)a.	Were you or any household member unable to eat the foods you preferred because of a lack of resources?	0 = No (skip to question 3) 1 = Yes
(ii)b.	How often?	1= rarely (once or twice in the past four weeks) 2= sometimes (three to ten times in the past four weeks) 3= often (more than ten times in the past four weeks
(iii)a.	Did you or any household member have to eat a limited variety of foods due to a lack of resources?	0 = No (skip to question 4) 1 = Yes
(iii)b.	How often?	1= rarely (once or twice in the past four weeks) 2= sometimes (three to ten times in the past four weeks) 3= often (more than ten times in the past four weeks
(iv)a.	Did you or any household member have to eat some foods you did not want to eat because of a lack of resources to obtain other types of food?	0 = No (skip to question 5) 1 = Yes
(iv)b.	How often?	1= rarely (once or twice in the past four weeks) 2= sometimes (three to ten times in the past four weeks) 3= often (more than 10 times in the past four weeks)
(v)a.	Did you or any household member have to eat a smaller meal than you needed because there was insufficient food?	0 = No (skip to question 6) 1 = Yes
(v)b.	How often?	1= rarely (once or twice in the past four weeks) 2= sometimes (three to ten times in the past four weeks) 3= often (more than ten times in the past four weeks

(vi)a.	Did you or any household member have to eat fewer meals daily because of insufficient food?	0 = No (skip to question 7) 1 = Yes
(vi)b.	How often?	1= rarely (once or twice in the past four weeks) 2= sometimes (three to ten times in the past four weeks) 3= often (more than ten times in the past four weeks
(vii)a.	Was there ever no food to eat in your household because of a lack of resources to get food?	0 = No (skip to question 8) 1 = Yes
(vii)b.	How often?	1= rarely (once or twice in the past four weeks) 2= sometimes (three to ten times in the past four weeks) 3= often (more than ten times in the past four weeks
(viii)a.	Did you or any household member sleep hungry at night because there was not enough food?	0 = No (skip to question 9) 1 = Yes
(viii)b.	How often?	1= rarely (once or twice in the past four weeks) 2= sometimes (three to ten times in the past four weeks) 3= often (more than ten times in the past four weeks
(ix)a.	Did you or any household member go all day and night without eating anything because there was not enough food?	0 = No (the questionnaire is finished) 1 = Yes
(ix)b.	How often?	1= rarely (once or twice in the past four weeks) 2= sometimes (three to ten times in the past four weeks) 3= often (more than ten times in the past four weeks

Source: CBHIS; WHO (2021b); Coates *et al.* (2007)

……. End ……

Appendix III: FGD guide

FGD GUIDE FOR COMMUNITY HEALTH STAKEHOLDERS

Group Discussion Code: …… Group Type: ……

Ward: ……..... Sub-County: …… County …….

Facilitators: …….

……

Date of Discussion: [___|___] / [___|___] / [___|___|___|___]

D D M M Y Y Y Y

Time Discussion Started : [__] : [__] Time Discussion Ended: [__] : [__]

Hour Minute Hour Minute

Results of Discussion:

Completed	1
Partially Completed	2
Refused	3

Name and Signature of Supervisor

_____

Date Checked: [___|___] / [___|___] / [___|___|___|___]

D D M M Y Y Y Y

Participants

Respondents (who may be male, female, or a mixed group) should include 10 to 15 Community Health Stakeholders.

Required Preparatory Steps

- Identification/selection of Community Health Stakeholders from the three wards selected for the research.
- For all participants in the group discussion, consent is mandatory.

- Eligibility should be verified, and socio-demographic information should be collected from participants individually.

Necessary Tools and Materials

- One room with sufficient space, with a sufficient number of chairs, that is well-ventilated and quiet
- FGD guide
- Two recorders with adequate capacity and well-charged.
- One notebook and one pen

Process

- The group should sit in a circle.
- The facilitator should ensure good participation from all respondents. The associate facilitator should take notes.
- The group discussion should be conducted as a conversation, with each question flowing from the answer to the previous one. Each of the topics should be covered during the discussion. The questions are there as examples. These types of information are to be collected, but how the questions are asked will depend on how the conversation flows. The questions are not meant to limit the discussion but to keep the discussant on track.

If participants have specific questions, responses to these questions should wait until the end of the discussion.

At the end of the discussion, the data collectors should thank participants for their participation and reimburse them for transportation expenses.

Demographic Information

S/no.	Name	Age	Education	Represented Group	Marital status	CU
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15						

Codes:

Education	0: No Formal Education 1: Primary 2: Secondary 3: Tertiary
Represented group	1: CHC 2: CBOs 3: FBOs 4: CSO 5: Traders 6: Youth 7: Women 8: PLWDs 9: County Administration 10. Elected leaders
Marital status	1: Single 2: Married 3: Separated / Divorced 4: Widowed

Discussion

Introduction of Group Members

1. Please go around the circle and share your name and the Community Unit you come from.
2. Have you ever had an opportunity to interact with CHVs?
3. If yes, how long and in what specific role have you always facilitated their work?
4. Do you feel CHVs are well equipped and are the right persons to offer nutrition services in the community?
5. If yes, explain why.
6. If no, explain why.

Benefits of using CHVs in nutrition service delivery

7. Can you share with me some of the benefits the community enjoys from using CHVs in nutrition service delivery?

The impact created by CHV involvement in nutrition service delivery

8. What changes have you witnessed from using CHVs to offer nutrition services in the community?

Challenges faced by CHVs when offering nutrition services in the community.

9. What challenges do CHVs face when delivering nutrition services in the community?
10. How can these challenges be solved?

Recommendations for improvement?

11. What recommendations can you give the County Government to help improve the performance of CHVs and nutrition outcomes in the community?
12. Plenary Session
13. Do you have any questions concerning what we discussed today?

Source: Maternal and Child Health Survival Program (MCSP) (2017). https://www.mcsprogram.org/wp-content/uploads/2017/12/FGD-tool-3-for-Community-Health-Workers.docx

……..End……

Appendix IV: DPS Approval Letter.

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

Tel: 056-30870
Fax: 056-30153
E-mail: directordps@mmust.ac.ke
Website: www.mmust.ac.ke

P.O Box 190
Kakamega – 50100
Kenya

Directorate of Postgraduate Studies

Ref: MMU/COR: 509099 **19th December 2023**

Amos Odiwuor
HPN/G/01-70020/2022,
P.O. Box 190-50100,
KAKAMEGA.

Dear Mr. Odiwuor

RE: APPROVAL OF PROPOSAL

I am pleased to inform you that the Directorate of Postgraduate Studies has considered and approved your Masters Proposal entitled: "***Performance of community health Volunteers on nutrition outcomes of households with children 6-59 months in Alego Usonga, Siaya County***" and appointed the following as supervisors:

1. Prof. Asenath Sigot - MMUST
2. Dr. Lucy Mutuli - MMUST

You are required to submit through your supervisor(s) progress reports every three months to the Director Postgraduate Studies. Such reports should be copied to the following: Chairman, School of Public Health, Biomedical Sciences and Technology Graduate Studies Committee and Chairman, Nutritional Sciences Department. Kindly adhere to research ethics consideration in conducting research

It is the policy and regulations of the University that you observe a deadline of three years from the date of registration to complete your Master's thesis. Do not hesitate to consult this office in case of any problem encountered in the course of your work.

We wish you the best in your research and hope the study will make original contribution to knowledge.

Yours Sincerely,

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY POSTGRADUATE STUDIES P.O. BOX 190-50100, KAKAMEGA (K)
Date:..... Sign:.....

Dr. Consolata Ngala
DEPUTY DIRECTOR, DIRECTORATE OF POSTGRADUATE STUDIES

Appendix V: ISERC Approval Letter

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY
Tel: 056-31375
Fax: 056-30153
E-mail: ierc@mmust.ac.ke
Website: www.mmust.ac.ke
P. O. Box 190,
50100.
Kakamega,
KENYA

Institutional Scientific and Ethics Review Committee (ISERC)

REF: MMU/COR: 40312 Vol 6(01) Date: January 15th, 2024

To: Mr. Amos Odiwuor

Dear Mr.,

RE: PERFORMNCE OF COMMUNITY HEALTH VOLUNTEERS ON NUTRITION OUTCOMES OF HOUSEHOLDS WITH CHILDREN 6-59 MONTHS IN ALEGO USONGA, SIAYA COUNTY.

This is to inform you that the *Masinde Muliro University of Science and Technology Institutional Scientific and Ethics Review Committee (MMUST-ISERC)* has reviewed and approved your above research proposal. Your application approval number is MMUST/IERC/002/2024. The approval covers for the period *January 15th, 2024 to January 15th, 2025.*
This approval is subject to compliance with the following requirements;

i. Only approved documents including informed consents, study instruments, MTA will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by *MMUST-ISERC.*
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to *MMUST-ISERC* within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to *MMUST-ISERC* within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to *MMUST-ISERC.*

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://research-portal.nacosti.go.ke and also obtain other clearances needed

Yours Sincerely,

Prof. Gordon Nguka (PhD)
Chairperson, Institutional Scientific and Ethics Review Committee

Copy to:
- The Secretary, National Bio-Ethics Committee
- Vice Chancellor
- DVC (PR&I)

Appendix VI: NACOSTI Research License

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **567717**

Date of Issue: **07/February/2024**

RESEARCH LICENSE



This is to Certify that Mr.. Amos Odiwuor of Masinde Muliro University of Science and Technology, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in on the topic: Performance of Community Health Volunteers on Nutrition Outcomes of Households with Children 6-59 Months in Alego Usonga, Siaya County for the period ending : 07/February/2025.

License No: **NACOSTI/P/24/32711**

567717

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.

See overleaf for conditions

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013 (Rev. 2014)
Legal Notice No. 108: The Science, Technology and Innovation (Research Licensing) Regulations, 2014

The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was the established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Kenya is a signatory to
2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way;
    i. Endanger national security
    ii. Adversely affect the lives of Kenyans
    iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
    iv. Result in exploitation of intellectual property rights of communities in Kenya
    v. Adversely affect the environment
    vi. Adversely affect the rights of communities
    vii. Endanger public safety and national cohesion
    viii. Plagiarize someone else's work
3. The License is valid for the proposed research, location and specified period.
4. The license any rights thereunder are non-transferable
5. The Commission reserves the right to cancel the research at any time during the research period if in the opinion of the Commission the research is not implemented in conformity with the provisions of the Act or any other written law.
6. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research.
7. Excavation, filming, movement, and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
8. The License does not give authority to transfer research materials.
9. The Commission may monitor and evaluate the licensed research project for the purpose of assessing and evaluating compliance with the conditions of the License.
10. The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
12. Research, findings and information regarding research systems shall be stored or disseminated, utilized or applied in such a manner as may be prescribed by the Commission from time to time.
13. The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

National Commission for Science, Technology and
Innovation(NACOSTI),
Off Waiyaki Way, Upper Kabete,
P. O. Box 30623 - 00100 Nairobi, KENYA
Telephone: 020 4007000, 0713788787, 0735404245
E-mail: dg@nacosti.go.ke
Website: www.nacosti.go.ke

Appendix VII: CHMT Clearance Letter

REPUBLIC OF KENYA

COUNTY GOVERNMENT OF SIAYA

Department of Health

Correspondence should be addressed to:
The County Government of Siaya
Email: siayachd@gmail.com
In reply please quote:

County Health Headquarters
Adjacent to JCC Church
P.O. Box 597 – 40600
SIAYA

REF: CGS/CHD/RESEARCH/141/VOL.V(167)

13th February, 2024

- County Health Management Team
- Sub-County Medical Officer of Health
  Alego Usonga

CLEARANCE TO CONDUCT A STUDY ON THE PERFORMANCE OF COMMUNITY HEALTH VOLUNTEERS ON NUTRITION OUTCOMES OF HOUSEHOLDS WITH CHILDREN 6-59 MONTHS IN ALEGO USONGA, SIAYA COUNTY

Amos Odiwuor is pursuing a degree of Master Science in Public Health Nutrition at Masinde Muliro University of Science and Technology (MMUST). He has received authorization from the Masinde Muliro University of Science and Technology Institutional Scientific and Ethics Review Committee (MMUST-ISREC) application approval number MMUST/IERC/002/2024, and NACOSTI, License No: NACOSTI/P/24/32711 to conduct the above-referenced research in Siaya County.

The specific objectives of the study include;

1. To assess the service delivery of Community Health Volunteers in households with children aged 6-59 months in Alego Usonga, Siaya County.
2. To assess the nutrition outcomes in households with children aged 6-59 months in Alego Usonga, Siaya County.
3. To establish the relationship between the service delivery of Community Health Volunteers and the nutrition outcomes of households with children aged 6-59 months in Alego Usonga, Siaya County.

This is to notify you that the research has been approved by the office undersigned. The investigator is further instructed to remain within the confines of the study protocol and report the progress of the study to the undersigned office regularly.

Kindly accord him all the necessary assistance that he may need during the study period.

COUNTY DIRECTOR OF HEALTH
SIAYA COUNTY
13 FEB 2024
P.O. Box 597-40600,
SIAYA.

Kennedy Oruenjo, *MCHD, MPH, BCHD, Dip (EHS)*
County Director of Public Health

Copy to:

A globally competitive, healthy and productive County

- The CECM – Health
- The Chief Officer of Health
- The Ag. County Director of Medical Services
- Amos Odiwuor

Appendix VIII: Map of Study Area



Source: Siaya CIDP 2018-2022

Appendix IX: Framework Matrix of Themes, Sub-themes, and Codes Generated from the FGDs

Themes	**1. Roles of Stakeholders in facilitating service Delivery by CHVS**				**2. Why CHVs are Prepared to offer Nutrition Services**		**3. Why CHVs are unprepared to offer Nutrition Services**
Sub-themes	***Coordination of referrals***	***Mobilization and Sensitization***	***Support Supervision***	***Water Sanitation and Hygiene***	***Ability of CHVs***	***Visibility of CHVs***	***Capacity of CHVs***
Karapul FGD	Help them with referrals	Relaying health information to the households	Supervision of CHVs in their work Help CHVs when they are faced with complex cases		Can educate households on how to feed their children Can easily impact nutrition knowledge They do successful referrals Can assess nutrition status	CHVs in touch with households.	

Mur Malanga FGD	Assisting CHVs in referral services		Brainstorming together with CHVs Assisting CHVs in decision making Escort CHVs to the households Arbitration of difficult cases in the household		CHVs provide health and nutrition assistance Adequate knowledge	CHVs are in touch with households CHVs can easily reach households	CHVs lack requisite knowledge to handle nutrition cases in the households
Sumba FGD	Support CHVs in referring cases to the health facility	Helping reach the public with health information		Promoting sanitation and hygiene in the community	They are able to identify health problems in the community .	They are in touch with the households	They have no ability to address nutritional concerns They lack adequate tools and commodities to tackle nutrition problems The CHVs are few compared to the large area of coverage

Theme **4. Impact created by CHVs on Nutrition Outcomes**							
Sub-themes	***Behaviour change***	***Food Security***	***Information and knowledge***	***Mortality and morbidity***	***Nutrition Status***	***Referral Services***	***Uptake of Nutrition Services***
Karapul FGD	Increased health seeking behavior The community have preferred health services at the hospital compared to traditional healers	Presence of kitchen gardens in the community	Increased nutrition knowledge of mothers	Reduced mortality rates	Reduced cases of malnutrition Improved nutrition status of children Improved nutrition status of mothers hence healthier babies		
Mur Malanga FGD			CHVs had taught our mothers on IYCF	Reduction of mortality rates Reduced cases of other health problems	Reduced cases of malnutrition in the villages		Health education to the households

SUMBA FGD			Increased access to households with nutrition information Increased knowledge of households on nutrition		Reduced cases of malnutrition in the community	Increased referral of nutrition needy cases	Children get periodical supplementation with vitamin A Children getting dewormed periodically
Theme	**5. Challenges faced by CHVs in Nutrition Service Delivery**						
Sub themes	***High expectation from the community***	***Hostility of the community***	***Ignorance***	***Motivation***	***Religious beliefs***	***Resources***	
Karapul FGD		Hostility by some community members	Ignorance of some community members			Inadequate equipment and tools to assess nutrition status of children Inadequate resources to facilitate CHV's work	
Mur Malanga FGD	Our people have high expectation and they expect CHVs to provide them with goodies			Lack of motivation		Inadequate financial support Delayed payment of stipend	

Sumba FGD		Hostility by community members Community not responding to requests by CHVs to seek health services due to ignorance			Religious beliefs that affect uptake of nutrition services	
Themes	**6. Solutions to challenges faced by CHVs in Nutrition Service Delivery**			**7. Recommendations to the County Government on the improvement of CHVs performance and Nutrition Outcomes**		
Sub themes	***Resource mobilization***	***Stakeholders involvement***	***Training and Sensitization***	***Capacity building***	***Partnership***	***Planning and budgeting***
Karapul FGD	Provide nutrition assessment tools		Sensitize community on the importance of CHVs on matters nutrition through public barazas Train the CHVs Sensitize the community on nutrition	Recognize and support the CHCs who are the immediate supervisors of CHVs Improve ways of supervising the CHCs and CHVs work		Give CHVs first priority by organizing on how they can be paid for the work they do in the community. Enhance their mobility in the community

Mur Malanga FGD	Pay the CHVs stipend in time Stipend should be adjusted upwards Should be provided with nutritional commodities			Provide more trainings to CHVs on nutrition matters		provide the CHVs with adequate medical and nutrition supplies Provide agricultural subsidies to the CHVs to enhance food production Deploy nutritionists to the local facilities
Sumba FGD		Involve other stakeholders in tackling nutrition problems	Sensitize the community on the work of CHVs on tackling nutrition Sensitize and educate the community on nutrition	Nutrition trainings to the CHVs	Nutrition tools Nutrition commodities	Incorporate nutrition services in the annual development plans to facilitate budgeting for the same

Appendix X: Health Facilities in Siaya County

	Hospitals				Health Centers				Dispensaries				County Total			
	Public	**FBO**	**NGO**	**Private**	**Public**	**FBO**	**NGO**	**Private**	**Public**	**FBO**	**NGO**	**Private**	**Public**	**FBO**	**NGO**	**Private**
Alego Usonga	4	0	0	4	12	4	0	6	22	2	3	12	38	6	3	22
Bondo	4	0	0	4	11	1	1	3	22	3	1	18	37	4	2	25
Gem	3	1	0	2	10	1	1	3	20	1	0	7	33	3	1	12
Rarieda	2	0	0	0	11	1	0	2	17	1	1	11	30	2	1	13
Ugenya	2	1	1	2	3	0	0	1	19	1	0	9	24	2	1	12
Ugunja	2	1	0	0	6	0	0	3	5	2	5	7	13	3	5	10
Siaya County	17	3	1	12	53	7	2	18	105	10	10	64	175	20	13	94
County Totals				**33**				**80**				**189**				**302**