ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF NURSING AND MIDWIFERY

PREVALENCE AND DETERMINANTS OF STUNTING AND WASTING AMONG UNDER-FIVE CHILDREN AT HARGEISA HEALTH FACILITIES, HARGEISA SOMALILAND 2021: CROSS-SECTIONAL STUDY.

INVESTIGATOR: MOHAMED ABDIRAHMAN ALI

ADVISOR: DR. RAJALAKSHMI MURUGAN (PHD).

CO-ADVISOR: SR. FEKERTE MARIYAM ABEBE (MSc).

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This thesis by Mohammed Abdirahman is accepted in its present form by the board of examiners as satisfying thesis requirement for the degree of masters in pediatrics and child health nursing.

INTERNAL EXAMINER:

Bereket Gebremichael	(Assistant Professor)	_____	_____
NAME	**RANK**	**SIGNITURE**	**DATE**
ADVISORS			
Dr. Rajalakshmi Murugan	(PhD, Assistant Professor)	_____	_____
NAME	**RANK**	**SIGNITURE**	**DATE**
Sr. Fikertemariam Abebe	(BSC, MSC)	_____	_____
NAME	RANK	SIGNITURE	DATE

DEPARTMENT HEAD

Nigussie Tadelle	(Assistant Professor)	_____	_____
NAME	**RANK**	**SIGNITURE**	**DATE**

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This thesis is submitted in partial fulfillment of the requirement for a graduate degree from the Addis Ababa University at college of health science school of nursing and midwifery department of nursing. The thesis will be deposited in the digital library of Addis Ababa University. I declare that this thesis has not been submitted to any other institution anywhere for the award of any academic degree, diploma or certificate.

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STUDENT

Mohammed Abdirahman (BSc) Signature: _____Date_____

RESEARCH ADVISORS:

Dr. Rajalakshmi Murugan	(PhD, Assistant Professor)	_____	_____
NAME	**RANK**	**SIGNITURE**	**DATE**
Sr. Fikertemariam Abebe	(BSC, MSC)	_____	_____
NAME	RANK	SIGNITURE	DATE

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ABBREVIATIONS

AAU: Addis Ababa University

AIDS: Acquired Immune Deficiency Syndrome

ENA: Emergency Nutritional Assessment

HAZ: Height-for-Age z-score

HGH: Hargeisa Group Hospital

HHS: Household Health Survey

HIV: Human Immunodeficiency Virus

HMCH: Hawadle Maternal and Child Health

MAS: Mohamed Adan Sheikh Hospital

MCH: Maternal and Child Health

MDG: Millennium Developmental Goals

MOHD: Ministry of Health Development

MUAC: Mid Upper Arm Circumference

NFHS: National Family Health Survey

NGO: Non-Governmental Organizations

OPD: Outpatient Department

PDHS: Pakistan Demographic and Healht Survey

SD: Standard Deviation

SMCH: Sahardid Maternal and Child Health

SNNPR: Sothern Nations Nationalities and People's Region

SPSS: Statistics Package for Social Sciences

SUN: Scale Up Nutrition

UN: United Nations

UNICEF: United Nations children's Fund

WHO: World Health Organization

WHZ: Weight for Height Z score

MOSHA: Ministry of Science and Higher Education

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ABSTRACT

Background: Children are most vulnerable to stunting and wasting in under developing countries since insufficient dietary intakes, lack of in accurate care, and biased distribution of nourishment inside the family. Stunting and wasting are the most causes of morbidity and mortality among children all throughout the world. Stunting and wasting in Hargeisa Somaliland were distinguished as 30.1% and 20.1% separately in children below five years.

Objectives: To identify the prevalence and determinants of stunting and wasting among under five children at Hargeisa Somaliland, 2021.

Methods: Institutional based cross-sectional study design including 403 study participants chosen by purposive sampling method was done at Hargeisa Somaliland from January to June 2021. Data Information were collected utilized structured questionnaire from child-parents/caregiver by face-to-face interview method used Kobo Collect tool. Anthropometric information is changed over into records of dietary status of Emergency Nutrition Assessment (ENA) software 2012, and SPSS version 25 were used for data analysis. Multivariable logistic regression models were fitted to identify determinants of stunting and wasting.

Result: Total of 403 respondents were investigated in the study with a response rate of 100%. Prevalence of stunting was 30.1% and prevalence of wasting was 20.1%.
Age of child (AOR= 0.061; (95%CI: 0.004-0.891, P=0.041), child's father educational status (AOR=2.390; (95%CI: 1.146-4.984, P=0.020) and give child above 6 months meat, fruits, vegetables and porridge (AOR= 2.271; (95%CI: 1.137-4.540, P=0.020) were statistically to be significant associated with stunting.

Under five live in the household (AOR= 0.565; (95%CI: 0.288-1.107, P=0.000) and caring children less than 2 years on lab when feeding (AOR= 3.564; (95%CI: 2.119-5.992, P=0.000) were statistically significant associated with wasting.

Conclusions: In Hargeisa the prevalence of stunting and wasting were high in the studied health facilities and cooperated with the relation of many independent variables which needs accurate determinant factor specific assessment.

Keywords: Stunting, Wasting, Determinants, Prevalence, under five children, Hargeisa, Somaliland.

CHAPTER ONE: INTRODUCTION

1.1 Background

Stunting (low height for age), defined to a child who has a low height for their age. Stunting caused by due to long term insufficient food intake and recurrent infections. Stunting generally occurs early childhood. Stunting has an effect such motor development to be delayed, cognitive function impairment and later poor social school performance. in the developing countries approximately one third of children under five are stunted(1,2).

Wasting (low weight for height), defined to a child who is too low for their height. Wasting causes the immunity of the children to be weak and vulnerable to long term improvement delays, and also increased risk of death, especially when the wasting is severe. Wasting is a strong predictor of mortality among children under five years. usually wasting is the result of an acute condition associated to illness or insufficient of food (1,2).

Child stunting and wasting has been a serious global public health problem for the past many years, especially developing countries, It is considered as a very critical public health problems, when the prevalence of stunting and wasting among children are higher than 40% and 15% respectively(3).

The causes of childhood stunting and wasting reported by UNICEF in 2016 include; insufficient diet, frequent infections, poor breastfeeding practices, delayed introduction of complementary foods and inadequate protein in diet, and factors that influence food intake include heath status, growth and personal choice related to diet(4).

Bottle feeding, less educated mother, low maternal nutritional status are the risk factors of stunting and wasting for children under five years of age. Over 90% of child deaths are due to malnutrition, neonatal problems, pneumonia, diarrhea diseases, malaria, Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome (HIV/AIDS), infections or sometimes the combination of two or more of these conditions(5).

Globally in 2017, around 8% and 26% of children less than five years of age were wasted and stunted respectively. The most highest prevalence of stunting and wasting were found in Africa (38.2%) and southeast Asia (27.6%), while the lowest prevalence were found in Latin America and Caribbean countries(13.5%)(6).

The prevalence of stunting and wasting in thanh Hoa, north province Vietnam, a study done in January 2013 a total of 400 children under five years of age indicates that 28.3% and 10% respectively(7).

Prevalence of under nutrition among children according to the National Family health survey 4 (NFHS 4) from 2015 to 2016 conducted in India showed that a total of 601,509 under five children 38.4% were stunted and 21% were wasted(8).

A Household Health Survey (SHHS)-Round 2 done in Sudan in 2010 a total of 1635 children under five, 1081 (66.1%) were boys and 554 (33.9%) were girls. The mean age of the children (±SD) was 30.32 (±15.44) months with males being slightly younger 30.67 (±15.95) months than females 29.69 (±14.40) months revealed that the prevalence of children under 5 years, 35% were stunted, 16% were wasted(9).

Regionally a study done in Shabelle Zone, Somali region, Eastern Ethiopia in 2014 showed that the prevalence out of 415 children under five years of age 30.4% were stunted, and 20.2% were wasted, of which 17.3%, and 8% were severely stunted, and wasted respectively(5). The prevalance of stunting and wasting significally increased with age of child. Male children were chronologically stunted and wasted (p=0.016)(5).

Locally in Somaliland due to is considered as one of the developing countries that faces increased morbidity and mortality rate due to stunting and wasting among children less than 5 years due to droughts and conflicts.

1.2 Statement of problem

Globally in 2018, 149 million children under five were stunted and over 49 million children were wasted(10), and 2017 around 8% and 26% of children less than five years of age were wasted and stunted respectively. The highest prevalence of children under nutrition were found in Africa (38.2%) followed by southeast Asia (27.6%), while the lowest magnitude were found in Latin America and Caribbean countries(13.5%)(6).

Stunting and wasting are the foremost common causes of mortality and morbidity among children under five years of age. Stunting and wasting causes 60% of deaths annually among children under five years of age(11,12). Stunting and wasting are leading causes of childhood deaths in low-and middle-income countries (13).

In developing countries study conducted revealed that children under five years of age 32% and 10% were stunted and wasted, respectively (14).

Prevalence of stunting and wasting among under five children according to the National Family health survey 4 (NFHS 4) from 2015 to 2016 conducted in India showed that a total of 601,509 under five children 38.4% were stunted and 21% were wasted(8).

Pakistan Demographic and Healht Survey (PDHS) conducted between 2012–2013, a total sample of 3071 Pakistani children aged between 6-59 months about 44% were stunted, and 10.7% were wasted (15).

Stunting and wasting among under-five declined from 32.6% to 22.2% between 2000 and 2017 worldwide(16). In 2018, UNICEF reported that about 3.1 million children died of under nutrition and malnutrition contributes to more than half of global child deaths(17).

Though there is a global decline in the stunting and wasting rate of under-five years, the risk of stunting and wasting remains high and they are the major cause of under-five morbidities and mortalities of African especially Sub-Saharan Africa(18). In 2010 about 39.4% and 10.3% of under five years in Africa were stunted and wasted respectively(19).

Burundi has the highest stunting (57.7%), followed by Malawi (47.1%); Niger has the highest wasting (18%), followed by Burkina Faso (15.5); and Burundi has the highest stunting (28.8%), followed by Niger (36.4%), Chat (28.8%), and Nigeria (28.7%). Ethiopia also has

high wasted (8.70%) and underweight (25.2%) under five children among East African countries(20).

In 2015 the stunting and wasting in Sub-Saharan African accounts for one-third of the global estimation(20).The burden of stunting and wasting are often greatest in areas suffering complex emergencies such as droughts or conflicts(21).

Sub-Saharan Africa bears one of the highest burdens of stunting and wasting. In 2016 more than one third of stunted children (36%) and more than one quarter of wasted (27%) children lived in Sub-Saharan Africa. However, a more detailed look into the distribution of wasting and wasting within Sub-Saharan Africa shows that Eastern Africa (36.7%) has a higher prevalence of stunting compared to Western Africa (21.4%), Central Africa (32.5%), and Southern Africa (28.1%)(22), while Western Africa (8.5%) has the highest rate of wasting then Central Africa (7.3%), Southern Africa (5.5%), and Eastern Africa (6.5%)(22).

Epidemiological studies identified that the factors associated with stunting and wasting include; inadequate breastfeeding, birth order, and environmental factors such parental education, socioeconomic status, sanitation, vaccination and infectious diseases(9).

In Somaliland there is no conducted study, but in Somalia the latest prevalence data from 2011 to 2013 a total sample of 1600 showed that prevalence of less than five children of stunting was 25.3%, and the prevalence of wasting under five children was 15%(23).

Somaliland is in one of low-middle income countries in sub-Saharan Africa. Poverty, conflicts, civil war, climate change displacement and endemicity of infectious diseases are considered as risk factors contributing to stunting and wasting(24).

Long period of insecurity and political instability has affected all facets of human life and development(25). Somaliland now ranked as fifth poorest country globally and has among the highest child and maternal mortality rates and currently is estimated to have the highest rate of stunting and wasting in the world(13).

So that the now progress is not quickly sufficient to reach the World Health Organization (WHO) target of a diminishing the number of stunting and wasting children by 2025(26).

To reach successfully this worldwide target for 2025 in Somaliland a circumstance analysis is required to determine how numerous children under the age of five are stunted and wasted and to identify the key determinants of stunting and wasting. This study will identify prevalence and determinant factors of stunting and wasting among children under five years of age at Hargeisa, Somaliland.

1.3 Significance of study

Here there is no sufficient data to identify the progress that Somaliland has made towards achieving the target of a reduction in number of stunting and wasting children by 2025. the latest data from 2011 to 2013 in Somalia include Somaliland, revealed that prevalence of under five children of stunting was 25.3%, and the prevalence of wasting under five children was 15%(23). The findings of this study will be importance for the stakeholders include mothers, children and hospitals, also it will assist Ministry of Health Development (MOHD) to take actions in reduction of stunting and wasting. Also, this study will contribute valuable knowledge to the field of pediatric nursing in general, Thus, any responsible body can use the outcome or result of this study which will be useful tool in policy and decision makers in developing and designing appropriate strategy to tackle the problem from the root. Also, this study may help as a base line for other studies on similar issues.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Stunting and wasting is foremost problems, but slightly addressed within the world. The human and financial costs are enormous and hardest happening on the poor children. enough food is fundamental for children's wellbeing, growth and development (27).

insufficient diet, frequent infections, poor breastfeeding practices, delayed introduction of complementary foods, inadequate protein in diet, less educated mother are the risk factors of stunting and wasting for children under five years of age. Over 90% of child deaths are due to malnutrition, neonatal problems, pneumonia, diarrhea diseases, malaria, Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome (HIV/AIDS) infections or sometimes the combination of two or more of these conditions(5,13).

In worldwide estimated that stunting and wasting causes 35% of deaths in children under five years of age(28).

2.2 Magnitude of the problem of stunting and wasting

Globally, 2017 around 8% and 26% of children less than five years of age were wasted and stunted respectively. The highest prevalence of children under nutrition were found in Africa (38.2%) followed by southeast Asia (27.6%), while the lowest magnitude were found in Latin America and Caribbean countries(13.5%)(6).

About 151 million children under five years of age suffer from chronic malnutrition and 67 million under five were stunted and wasted in 2017(29). Among these malnourished under five, 55% of all stunted children under five years of age have been from Asia and 39% were living in Africa.

Stunting and wasting among under-five declined from 32.6% to 22.2% between 2000 and 2017 worldwide(16). In 2018, UNICEF reported that about 3.1 million children died of under nutrition and malnutrition contributes to more than half of global child deaths(17).

Though there is a global decline in the malnutrition rates of under-five years, the risk of malnutrition remains high and it is the major cause of under-five morbidities and mortalities of

African especially Sub-Saharan Africa(18). In 2010 about 39.4% and 10.3% of under five years in Africa were stunted and wasted respectively(19).

In developing countries a study done in conducted revealed that 186 million and 55 million children under five years of age were stunting and wasting respectively(14).

Prevalence of stunting and wasting among children according to the National Family health survey 4 (NFHS 4) from 2015 to 2016 conducted in India showed that a total of 601,509 under five children 38.4% were stunted and 21% were wasted(8).

Pakistan Demographic and Healht Survey (PDHS) conducted between 2012–2013, a total sample of 3071 Pakistani children aged between 0-59 months about 44% were stunted, and 10.7% were wasted (15).

Burundi has the highest stunting (57.7%), followed by Malawi (47.1%); Niger has the highest wasting (18%), followed by Burkina Faso (15.5); and Burundi has the highest underweight (28.8%), followed by Niger (36.4%), Chat (28.8%), and Nigeria (28.7%). Ethiopia also has high wasted (8.70%) and underweight (25.2%) under five children among East African countries. In 2015 the stunting and wasting in Sub-Saharan African accounts for one-third of the global estimation(20).

A study in Niakhar, Senegal which was conducted in 2018 a total sample of 12000 showed that the prevalance of wasting and stunting children between 6 to 69 months were 16.3% and 24.2 respectively (30).

Sub-Saharan Africa bears one of the highest burdens of stunting and wasting. In 2016 more than one third of stunted children (36%) and more than one quarter of wasted (27%) children lived in Sub-Saharan Africa. However, a more detailed look into the distribution of wasting and wasting within Sub-Saharan Africa shows that Eastern Africa (36.7%) has a higher prevalence of stunting compared to Western Africa (21.4%), Central Africa (32.5%), and Southern Africa (28.1%)(22), while Western Africa (8.5%) has the highest rate of wasting then Central Africa (7.3%), Southern Africa (5.5%), and Eastern Africa (6.5%)(22).

A Household Health Survey (SHHS)-Round 2 done in Sudan in 2010 a total of 1635children under five, 1081(66.1%) were boys and 554 (33.9%) were girls. The mean age of the children (±SD) was 30.32 (±15.44) months with males being slightly younger 30.67 (±15.95) months

than females 29.69 (±14.40) months revealed that the prevalence of children under 5 years, 35% were stunted, 16% were wasted(9).

Study conducted Khartoum capital city of Sudan in 2010 a total of 780 children between the aged 6-59 months showed that the prevalence of stunting and wasting were 51% and 19% respectively(31).

Study in Nairobi during 25 March - 4 April 2018, a total sample of 1310 showed that the prevalence of stunting, severe stunting, wasting and severe wasting among children aged 6-59 months were 47% and 2.6%, 23.4% and 0.65 respectively(32).

The prevalence of stunting and wasting in Ethiopia ranges from 8.9%(33) to 42.7%(34) and 8%(35) to 26.1% respectively(36,37).

Stunting and wasting in Ethiopia is 44% and 10% of children under five years of age respectively. Also in Ethiopia it is estimated that stunting and wasting contributes 270000 deaths of under-five children each year(14).

Study done in lalibela Town, North Ethiopia from August 19 to September 2012 a total of 844 children aged between 6- 59 months showed that the prevalence of stunting and wasting were 47.3% (95%CI: 43.2-51.1) and 8.9% with a response rate of (95%CI: 6.9.-10.2) (11).

Regionally study done in Shabelle Zone, Somali region, Eastern Ethiopia in 2014 showed that the prevalence out of 415 children under five years of age30.4% were stunted, and 20.2% were wasted, of which 17.3%, and 8% were severely stunted, and wasted respectively. The prevalance of stunting and wasting significally increased with age of child. Male children were chronologically stunted and wasted (p=0.016)(5).

In Somaliland there is no recent study but in Somalia the latest prevalence data from 2011 to 2013 showed that prevalence of under five children of stunting was 25.3 and the prevalence of wasting under five children was 15%(23).

2.3 Causes of stunting and wasting

The causes of childhood stunting and wasting reported by UNICEF in 2016 include; insufficient diet, frequent infections, poor breastfeeding practices, delayed introduction of complementary foods and inadequate protein in diet, and factors that influence food intake include heath status, growth and personal choice related to diet (4).

Study conducted in Ghana revealed that the causes of stunting and wasting under five years include; place of residence, mother's education status, child's age, sex and children's nutritional status(38).

In Ethiopia study done revealed that the causes of stunting and wasting caused by insufficient availability of food and provision of a health environment such as sanitation and personal hygiene (39).

2.4 Determinant factors of stunting and wasting

2.4.1 Socio-economic and demographic factors

Study done in Vietnam November 2017 a total sample of 372, 179 (48.1%) were boys and 193 (51.9%) were girls. the means (±SD) of the children's age were 20.96 months (±8.94) children under five years of age indicated that the highest risk of stunting and wasting was among children aged between12-23 months with a response rate of (AOR=1.93,95%CI=1.07,3.46) and children in the youngest age between 6-11 months with a response rate of (AOR=1) respectively had a significant less risk of be stunting and wasting when compared to the children in older age with a response rate of (AOR=4.28,95%CI=1.93,9.46) (AOR=16,95%CI=3.76,69.79)(40).

Study of data analysis from Demographic and Health Survey conducted in Nepal 2016 a total of sample 5262 shows that urban children are more likely to be stunted and wasted compared to rural children. 32% and 13% of rural children are stunted and wasted against 27% and 8% of urban with a response rate of (AOR=1.05,95%CI=0.89,1.25) and (AOR=1.16,95%CI=0.98,1.36) respectively(41).

Study done south Africa in 2010 a total of 400 children between 6-59 months showed that male were stunted when compared to their counterpart female with a response rate of (COR=1.23,95%CI=1.03-1.47) (42).

Study done in democratic republic of Congo in 2011a total sample of 3690 under five children showed that the prevalence of stunting was higher among boys (46.1%) compared to their counterpart girls(41.7%) with a response rate of (AOR=2.5,95%CI=0.18-0.06), and higher in the age groups ranging from 4 years, followed by 3 years, 2 years, 1 years(43).

Study in Nigeria 2010 of total sample of 423 under five children showed that stunting and wasting were higher in incompletely immunized children(44).

Study in Nairobi conducted during 25 March - 4 April 2018, a total sample of 1310 showed that the prevalence of stunting and wasting, severe stunting and severe wasting among children aged 6-59 months were 47% and 2.6%, 23.4% and 0.65 respectively. And the prevalence increased with age, through children aged 36-47 months had the highest prevalence (58%) of stunting while the highest prevalence (4.1%) of wasting was in children aged 6-11 months. Boys were more stunted than girls ($p<0.01$), and older children were significantly ($p<0.001$) stunted to younger children. In the third year of life, girls were more likely than boys to be wasted ($p<0.01$) (32).

Study done in Nairobi 2010 a total of 5156 aged between 6-59 months showed that 43% children from mothers primary educational level can develop stunting when compared children from mothers with secondary education level by 37%(45).

In Sudan study conducted revealed that the determinants factors causes stunting for under five children were age and sex of the children(46).

Also, another study done in lalibela Town, North Ethiopia from August 19 to September 2012, a total of 844 children aged between 6- 59 months showed that the children from illiterate mothers were more wasted (0.2%) than children of mothers with higher education (5.6%) with a response rate of (95%CI: 14.1-18.4). Children from mothers who had not been breast feed their children were about 4.2 times more likely to be developed by wasting when compared to those children who had been taking breast milk per day (AOR=4.40,95%CI=0.20-0.78)(11).

2.4.2 Child caring practices

Children who were exclusively breastfed less than six months were 1.6 times less likely to be stunted than those not breastfed long(31).

A recent study done in 21 countries in the world include Asian countries like japan show that 87.9% of 6-12 months were breastfed at this time(43).

Study conducted in Vietnam 2009 a total of 383 aged under five years revealed that the determinant factors for under-five children were duration of breastfeeding, types of food giving to the child, age of initiation of complementary feeding and times of feeding per day(40).

Study done in different regions in Ethiopia such Amhara, Tigre, Oromia and SNNPT revealed that the breastfeeding behaviors is 98%. Although 26% of the younger children they gave fluids rather than exclusive breast milk and 59% of the children were fed with colostrum(47).

2.4.3 Behavioral factors

Study conducted in Niger 2016 children aged between 0-59 months indicated that unhygienic personal habits and adverse behavioral practices related to child rearing, breast-feeding and weaning among tribal communities (48).

Study conducted in central, eastern and southern parts of Ethiopia states that traditional beliefs such as children couldn't digest meat, colostrum and thick porridges, and fruits and vegetables are excluded to eat lactating women and your children(49).

Another study in Sothern Nations Nationalities and Peoples' Region (SNNPR) which was conducted in 2010 showed that mothers initiate water and bottle-feeding by thinking as excellent behavior for the younger children(50).

2.4.4 Environmental factors

Study done in Vietnam 2018 in a 12 weeks study among 50 households showed that the most common method used for treating their water were 34% boiling, 19% filtration and 24% chlorination(51).

Study conducted in Srilanka March 2012 revealed that 57% of household uses their sources of drinking water from unprotected well, 10% from Piped water, 11% from boreholes and 10% from tube wells, (52).

Study conducted in Mao, Chad showed that children who have diarrhea were 10.7 times more likely to develop stunting and wasting with a response rate of (AOR=10.7, 95%CI=4.2-27.3) (53).

Similarly study done in Congo showed that children with history of chronic and recurrent diarrhea were 10.34 times more likely to have stunting and wasting than children who have no history of recurrent and chronic diarrhea with a response rate of (AOR=10.34,95%CI=4.94-21.62) (54).

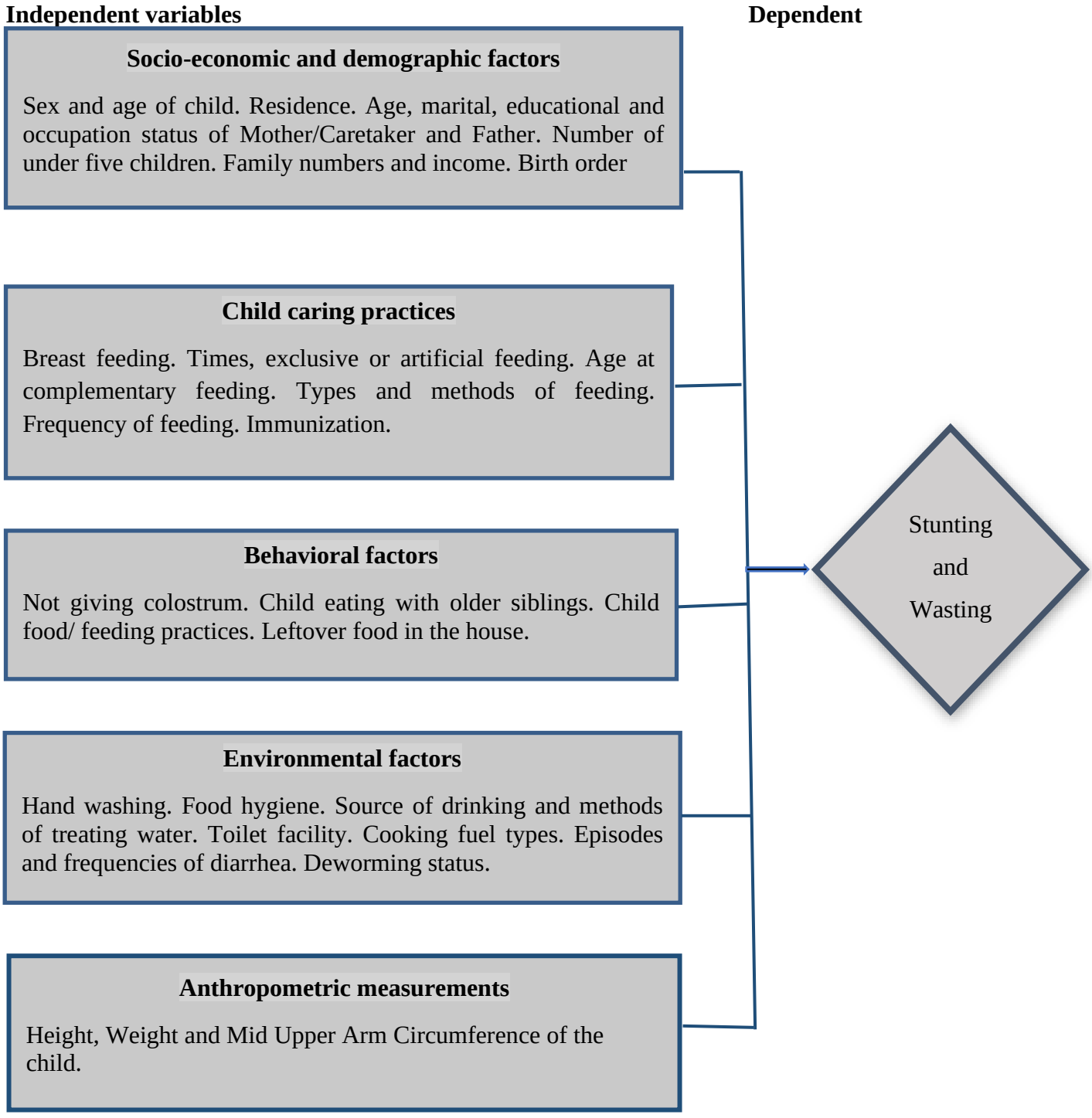
A studies done in Ghana and Ethiopia show that the most significant factors affect the stunting and wasting of under five children were after coughing children to not wash their hands (65%), not wash hands after handling rubbish 11% and also in adequate and in accurate cleaning for raw food 9%(55).

Another study in Gambela, 60.5% of cases and 29.4% of controls had history of diarrhea in two weeks before the data collection. children who had history of diarrhea in the last two weeks preceding survey were 2.74 times more likely to affecting by stunting and wasting with a response rate of (AOR=2.74,95%CI=1.32-5.68)(56).

2.5 Conceptual frame work

The conceptual framework of this study (**Figure 1**) has developed from after reviewing similar related different literatures (9,15,50), about the prevalence and determinants of stunting and wasting among under five children. This study will be showed the interaction between socio-economic and demographic factors, child caring practices, behavioral and environmental factors, and relationship between independent and dependent variables.

Figure 1: Conceptual Framework for Prevalence and Determinants of Stunting and Wasting among Children under Five in Hargeisa, Somaliland, 2021.



Sources : From different literatures (9,15,50)

CHAPTER 3: OBJECTIVES

3.1 General objectives

- ✓ To determine the prevalence and determinants of stunting and wasting among under five children at Hargeisa health facilities, Hargeisa Somaliland, 2021

3.2 Specific objectives

- ✓ To determine the prevalence of stunting among under five years children at selected health facilities.
- ✓ To determine the prevalence of wasting among under five years children at selected health facilities.
- ✓ To identify the determinant factors of stunting and wasting among under five children at selected health facilities

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Study area

The study was carried out in Hargeisa Somaliland. Hargeisa is a city in the Marodi-Jeh region, capital and largest city in Somaliland, a self-declared independent state without international recognition. Geographically Hargeisa situated in northern part of the country, not far away from the border with Ethiopia. Hargeisa is situated in a valley in the Galgodon (Ogo) highlands and sits an elevation of 1334m (4377ft), above sea level and area of 78km^2, population of 1.5 million and density of 1600/km^2, with a latitude and longitude 9.5624^O N, 440770^{O}E.

Population data on children in Hargeisa under five years of age is not available.

The city has 11 health facilities, seven hospitals (two public and five private), and five primary health centers. Four health facilities will be included in the study.

Figure 2: location Map of Study Area (Hargeisa Somaliland)

4.2 Study period

Study period caried from October 2020 to June 2021, and data collection period was from January 08 to March 08, 2021.

4.3 Study design

Institutional based cross-sectional study design was conducted in the study.

4.4 Source of populations

All children under 5 years of age who resided at Hargeisa city during the study period.

4.5 Study population

Children under 5 years who resided at Hargeisa city in selected health facilities those fulfilled the inclusion criteria during data collection period.

4.6 Study population

Study subject were children under 5 years in selected health facilities.

4.7 Inclusion and Exclusion criteria

4.7.1 Inclusion criteria

Under five children attended immunization, pediatric OPD and under five inpatients in selected health facilities during data collection period.

4.7.2 Exclusion criteria

Children below 6 months and above 59 months who are critically ill, children having physical disability that can interfere the anthropometric measurement and mothers who refused to give consent to participate in the study were excluded during data collection period.

4.8 Sample size calculation

The calculation of sample size was computed single population proportion formula by used: CI=95%, margin of error=5%, and 50%=prevalence of stunting and wasting among under five children because in Somaliland prevalence of stunting and wasting is not known, and considering 5% of non-response rate and finally a total sample size of 403 was proposed.

Single population proportion formula.

$n = z^2 p (1-p)/d^2$	**Calculation**
Where Z= level of confidence $(1.96)^2$	**n= $(1.96)^2$ * 0.5 (1-0.5) / $(0.05)^2$**
P= single population proportion (50%)	**n= 0.960/ 0.0025 =384**
D= margin of error (5%)	**5% non-response rate**
n= sample size	**Total sample size will be 384+19= 403**

4.9 Sampling procedure

Hargeisa has 11 health facilities, seven hospitals (two public and five private) and four primary health centers. Four of health facilities in the town was selected by purposive sampling technique (Hargeisa Group hospital, Mohamed Adan Sheikh Pediatric Hospital, Sahardid and Hawadle), because of they had inpatient treatment and high follow of malnutrition. The participants assigned to select health facilities proportionally based on their under-five population 1 months follow up. To get proportional allocation for each health facility, the total population of under-five 1 months follow up of one health facility was divided by the sum of total population of all health facility under 5 years 1 months follow up times the total sample size.

$$n_i = N_i/N*n$$

Then, the study participants selected by using systemic sampling technique. The K value was calculated by dividing the total number of under five in each section by the number of under-five included in the study. The first student was selected randomly between one and K using lottery method, and the next ones was chosen in accordance with K values until the sample size was achieved.

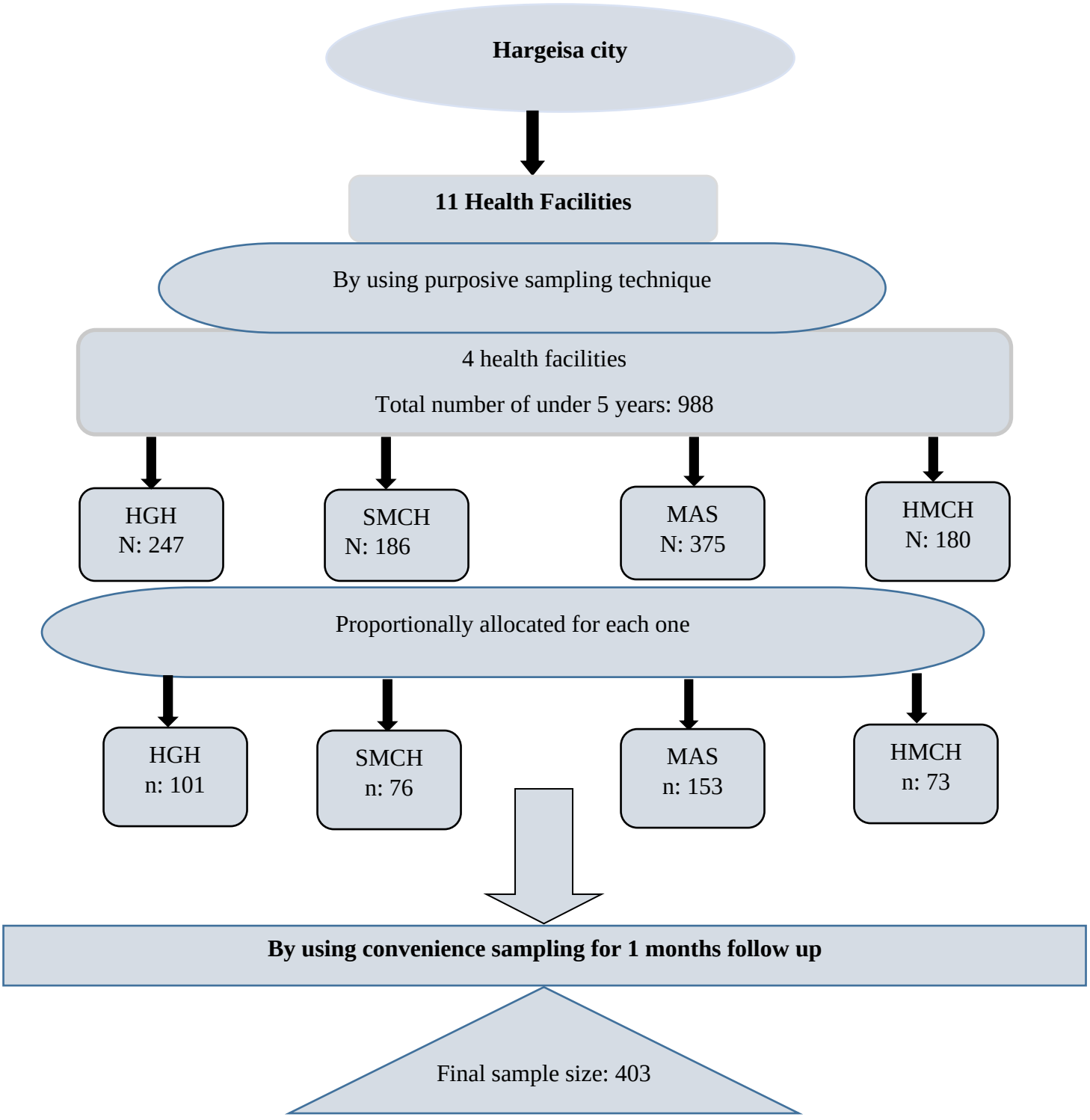


Figure 3: Schematic representation of sampling techniques on prevalence and determinants of stunting and wasting among under five children at Hargeisa Somaliland, 2021.

4.10 Operational definition

Duration of breastfeeding: Time of breast feeding per day

Exclusive breast feeding: The infant receives breast milk only, no other liquids or solids, but with the exceptional of oral rehydration solutions, drops, syrups of vitamins, minerals or medicines.

Complementary feeding: It is the process of starting when the breast milk alone is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are needed along with breast milk.

Anthropometric measurement: Are series of quantitative measurement of the muscles, bones, and adipose tissue used to assess the composition of the body. The core elements of anthropometry are height, weight, age and mid upper arm circumference.

Stunting of the child: WHO defines child with height for age z-score below -2 standard Deviations of the median of a reference standard population (57).

Wasting of the child: WHO defines child with weight for height z-score below -2 standard Deviations of the median of a reference standard population (57).

4.11 Variables

4.11.1 Dependent variables

The dependent variables of this study will be:

Stunting and wasting.

4.11.2 Independent variables

The independent variables of this study will be:

Socio-Economic and demographic factors (Sex and age of the child, residence, age of Mother/Caretaker, marital status of Mother/Caretaker, educational and occupation status of Mother/Caretaker and Father, number of under five children, family numbers and income).

Child caring practices (Birth order, breast feeding, times of breast feeding, exclusive breastfeeding, artificial feeding, age at complementary feeding started, types and methods of feeding, frequency of feeding and immunization).

Behavioral factors (Not giving colostrum, caring child while feeding, child eating with older siblings, child food/ feeding practices, leftover food gives to the child).

Environmental factors (Hand washing, food hygiene, source of drinking water, methods of treating water, toilet facility, cooking fuel types, episodes and frequencies of diarrhea and deworming status).

Anthropometric measurements (Height, Weight and Mid Upper Arm Circumference of the child)

4.12 Data collection instrument

The questionnaire was adopted from after reviewing different literatures of similar studies (9,58).

The data collection instruments consisted of four parts, parts one socio-economic-demographic characteristics, part two child caring practices, part three behavioral factors and part four environmental factors.

Before the actual data collection, the questionnaire was prepared in English and translated into local language (Somali), and then retranslated into English to maintain the consistency of each question.

4.13 Data collection procedure

A semi structured questionnaire was used to collect data from child-parents/caregiver by face-to-face interview method used Kobo Collect tool box version 1.29.3, and for the data collection period, four trained diploma nurses and two BSc supervisor nurses was involved.

Children aged between 6-23 months their length were measured in a recumbent position to the nearest 0.1 cm, without shoes and standard-length measuring board, and the children aged between 24 – 95 months their height were measured without shoes and standard position which is called Frankfurt position (head, shoulder, buttocks, knee and heals touch the vertical board) to the nearest 0.1 cm.

Also, children were measured their weight without shoes and with light clothing to the nearest 0.1 kg, but for the children that can't stand in the weight scale were measured together with his/ her mother or caregiver. The mother was weighted first with the child and then were weighted without the child, and subtracted total weight from the weight of the mother, finally the child's weight is the difference between the two measures.

Immunization card was used to precise of imaging age of the child to the nearest months for the mothers who don't know exactly the age of their child.

Determinants of stunting and wasting according to WHO standard reference child growth by using <-2SD cut point of stunting and wasting(59).

4.14 Data quality control

Intensive training was given to the data collectors and supervisors for 1 day for effective and quality of data collection based on the objectives, consent, confidentiality, relevant of the study, participant rights, and methods and techniques of interviewing. 5% of pretest was done on the sample size that was not included the final study at Gargaar Hospital. Then inconsistence and incorrect questions were corrected and modified before the actual data collection. Voluntary participation and privacy of the patients were protected by the study procedures. To ensure the consistency and completeness of the collected data, the data collectors and supervisors were followed every day. Anthropometric measurement was used standardized technique and equipment. During data analysis a frequency check was done to control errors.

4.15 Data processing and analyzing

Consistency and completeness of the data was checked and then it was downloaded into the computer excel 2013, and transferred to SPSS version 23 for further analysis.

To identify determinants of stunting and wasting both bivariate and multivariate logistic regression was used, and the variables with 95% Confidence Interval (CI) and P-value at <0.02 during bivariate analysis were included in multivariate logistic regression analysis to get determinant effect of confounding variables. Crude (COR) and adjusted odds ratio (AOR) with the corresponding 95% confidence interval (CI) was calculated to identify the determinant

factors. The variables with < 0.05 p-values were considered statistically significant. Finally, texts, tables and figures were summarized for the descriptive statistical data.

Anthropometric data information was changed over into indices of nutritional status with Emergency Nutrition Assessment (ENA) software 2020. A child was considered stunted and wasted the corresponding Height-for-Age z-score (HAZ) and Weight-for-Height z-score (WHZ) less than -2 standard deviations and -3SD the child was considered severely stunted and wasted.

4.16 Ethical consideration

The clearance of ethics obtained from the Institutional Review Board of school of Nursing and Midwifery, College of Health Science University of Addis Ababa.

Hargeisa for the local authorities of the selected health facilities acceptance letters were prepared. The importance and the purposes of the study explained and informed consents was secured each health facility.

Data have no any negative unintended consequences on different aspects of their life were guaranteed, and were maintained the confidentiality by not sharing any one for the information collected from the respondents.

Without restrictions was informed respondents who were not want voluntary to interview at selected health facilitates on their verbal consent.

4.17 Dissemination of the results

Hargeisa study health facilities will be shared the findings of the study. The results will be presented to the School of Nursing and Midwifery, College of Health Sciences Addis Ababa University. Peer review through publication and for implementation to find financial cost it will be presented in meeting.

CHAPTER 5: RESULTS

This chapter focused on the presentation and interpretation of data about the prevalence and determinants of stunting and wasting among under five children four health facilities at Hargeisa, Somaliland. Also, it covers three parts of research, the first parts is an introductions, the second parts are Socio-Economic and Demographic respondents, and while the third part is research interpretations and data presentations.

5.1: Socio-Economic and Demographic factors

A total of 403 respondents were included in the study giving the response rate 100%. The primary demographic variable of the caregivers was asked to classify as either male or female was the sex of the child. A response 235 (58.6%) Out of the 403 respondents were males and 167 (41%) were females. The findings of this study showed that male children are the majority of respondents. 19.65 months and 13.17 months was the mean age and standard deviation of the children respectively. The age between 12-23 months is the most age holds those position in Hargeisa health facilities, which has response rate of 150 (37.8%).

The majority of the mothers were married 359 (89.1%), and all Islam religion followers 403 (100%). 392 (97.3%) out of these respondents were mothers, while 6 (1.5%) were fathers and 5 (1.2%) were child's sisters. However, this table shows that the majority relationship with the child were mothers. 29.19 years and 6.16 SD years were the mean age and standard deviation of the mothers/caregivers respectively. 280 (69.5%) out of total respondents were urban, 99 (24.6%) were rural, while 24 (6%) were semi-urban. However, it showed that the majority of respondents were urban.

mothers most of them were able to read and write which had response rate 225 (55.8%), while the compering figure of fathers 370 (67%) were more than double of the mothers, and the mothers who cannot read and write were 178(44.2%).

Most of the mothers were housewife which had response rate 324 (80.4%), while only a response rate 48 (11.9%) were government employee, and father's occupation of a response rate 134 (33.3%) were government employee and a response rate of 112 (27.8%) were unemployed.

Most of the children live in the house were three children which had response rate of 146 (36.2%), the second were two children which had response rate 131 (32.5%), and the third was one child whose response rate was 126 (31.3%).

Most of the total family numbers currently live in the house which had a response rate 193 (47.9%) were between 6-8 members.

Most of the respondents live in the house their total income per month were $300-$400 which had response rate of 184 (45.7%). Most respondents for their child birth order was 2 which had response rate of 97 (24.1%).

Table 1: Socio-Economic and Demographic profile of children under five years, Hargeisa Somaliland, 2021.

Variables	Frequency (n=403)	Percentage (100%)
Gender of the child		
Male	236	59
Female	167	41
Age of the child in months		
6-11	122	30.3
12-23	150	37.2
24-35	63	15.6
36-47	38	9.4
48-59	30	7.4
Relationship with the child		
Mother	392	97.3
Father	6	1.5
Sister	5	1.2
Residence		
Urban	280	69.5
Rural	99	24.6
Semi-urban	24	6.0
Age of the caregiver/mother in years		
16-26	154	38.2
27-37	215	53.3
38-48	32	7.9
49-59	1	.2
60-70	1	.2
Religion		
Muslim	403	100
Marital status of mother/caregiver		
Never married	29	7.2
Married	359	89.1
Separated	3	.7
Divorced	7	1.7
Widowed	5	1.2

Educational status (Care giver/ mother)		
Illiterate	178	44.2
Primary (1-8)	126	31.3
Secondary (9-12)	54	13.4
College/university	45	11.2
Occupation status (Care giver/ mother)		
Housewife	324	80.4
Employee	48	11.9
Student	11	2.7
Merchant	10	2.5
Unemployed	10	2.5
Child's father educational status		
Illiterate	133	33.0
Primary (1-8)	75	18.6
Secondary (9-12)	88	21.8
College/university	107	26.6
Child's father occupational status		
Student	93	23.1
Merchant	53	13.2
Daily laborer	11	2.7
Unemployed	112	27.8
Employee	134	33.3
Children under five live in house		
One	126	31.3
Two	131	32.5
Three	146	36.2
Total family members currently living in the house		
3-5	187	46.4
6-8	193	47.9
9-11	23	5.7
Total family income per month		
$300-$400	184	45.7
<$100	131	32.5
$100-$200	87	21.6
>$400	1	.2
Child birth order		
1	68	16.9
2	97	24.1
3	83	20.6
4	69	17.1
5	35	8.7
6	26	6.5
7	14	3.5
8	11	2.7

5. 2: Child caring practice

From a total 403 mothers 349 (86.6%) breastfed their children per day. 244 (60.6%), breastfeed their children 2-6 times per day. Most of mothers 336 (83.4%) were exclusively breastfed their children for firs 6 months.

A total of 255 (63.3%) give children artificial feeding for now. Mothers a response rate of 262 (65.1%) were start their child complementary feeding the age between 4-6 months. Most of the respondents a response rate of 328 (81.4%) give their children as an artificial feeding for cow milk, and in a response rate 286 (71%) prepare complementary feeding for their children by adding 2 cup of milk powder and 1 cup of water and a response rate of 380 (94.4%) give their children between 3- 5 times complementary feeding, and most of the respondents a response rate of 331 (82.1%) used to give their children complementary feeding for bottle.

Most of the respondents a response rate of 393 (97.5) wash their hands before feeding the child. Out of 302 (74.9%) they feed their children above 6 months per day between 3-5 times.

Most of the respondents a response rate of 285 (70.7%) gave vaccination their children for BCG, Penta, Polio and Measles, the second respondents a response rate of 38 (9.4%) they gave vaccinate their children for Polio, Penta and BCG, the third respondents a response rate of 35 (8.7%) they gave vaccinate their children for Measles only, for the fourth respondents a response rate of 30 (7.4%) they gave vaccinate their children for BCG also only, and fifth respondents a response rate of 14 (3.5%) they gave vaccinate their children for Penta, Polio and Measles, while the sixth respondents a response rate of 1 (.2%) they gave vaccinate their children for BCG and Measles. Therefor most of the respondents they vaccinate their children for BCG, Penta, Polio and Measles.

Table 2: Child caring practice respondents under five years, Hargeisa Somaliland, 2021.

Variables	Frequency (n=403)	Percentage (100%)
If breast feed child per day		
Yes	349	86.6
No	54	13.4
Times breastfeed child per day		
2-6	244	60.6
7-11	158	39.2
Above 11	1	.2
Gave child only breast feeding for the first 6 months		
No	67	16.6
Yes	336	83.4
Give child complimentary feeding after 6 months		
Yes	148	36.7
No	255	63.3
Time started giving complementary feeding to child (in months)		
1-3	136	33.7
4-6	260	64.6
7-9	3	.7
10-12	4	1
Type of food give as a complementary feeding to child		
Cow milk	328	81.4
Milk powder	72	17.9
Porridge	3	.7
Way of preparation complementary feeding		
1 cup of milk powder + 1 cup of H2O	63	15.6
2 cup of milk powder + 1 cup of H2O	286	71.0
1 cup of milk powder + 2 cup of H2O	54	13.4
Times give complementary feeding to child		

3-5	334	82.9
6-8	68	16.9
9-10	1	0.2
Tools used to give complementary feeding to the child		
Spoon	59	14.6
Bottle	331	82.1
Cup	6	1.5
Mother's hand	7	1.7
Wash hands when feeding child		
No	10	2.5
Yes	393	97.5
Times feed child per day (above 6 months)		
3-5	302	74.9
6-8	101	25.1
child immunization		
BCG, Penta, Polio and Measles	285	70.7
Polio, Penta and BCG	38	9.4
BCG	30	7.4
Measles	35	8.7
BCG Measles	1	.2
Penta, Polio and Measles	14	3.5

5. 3: Behavioral factors

Most of the respondents a response rate of 348 (86.4%) gave their children for the first colostrum. Almost mothers a response rate of 305 (75.5%) gave their children left food. Mothers a response rate of 372 (92.3%) they wash hands with soap after toilet usage.

Most of the respondents a response rate of 240 (59.6%) didn't care their child less than 2 months on lab when they are going to feed.

Children always a response rate of 208 (51.6%) eat with their older siblings. Most of the mothers a response rate of 343 (85.1%) started between 6-8 months to give their child meat, fruits, vegetables and porridge. Most of the mothers a response rate of 205 (50.9%) they Introduce their child water, bottle feeding and rice as early as two months. Most of the

mothers a response rate of 346 (85.8%) age between 0-1 months old they started to introduce water, bottle feeding and rice as early months.

Mothers out of a response rate of 108 (26.8%) give their child for breakfast injera. A response rate of 316 (78.4%) give their child for lunch a Rice. and most of the respondents a response rate of 126 (31.3%) they give their child for dinner time a bread.

Table 3: Behavioral profile of children under five years, Hargeisa Somaliland, 2021.

Variables	Frequency (n=403)	Percentage (100%)
Gave child first colostrum		
No	55	13.6
Yes	348	86.4
Left food in the household		
Give to child	305	75.7
Dispose to dustbin	98	24.3
Habit wash hands with soap after toilet usage		
Yes	372	92.3
No	31	7.7
Caring child on lab when feeding (children <2years)		
No	240	59.6
Yes	163	40.4
Child always eat with older siblings		
No	195	48.4
Yes	208	51.6
Give child meat, fruits, vegetables and porridge(>6 months)		
No	111	27.5
Yes	292	72.5
Time started give child meat, fruits, vegetables and porridge (children above 6 months)		
6-8	343	85.1
9-11	44	10.9
Above 11	16	4
Introduce child water, bottle feeding or rice (<2 months)		
No	198	49.1

Yes	205	50.9
Time started introduce child water, bottle feeding or rice (early as 2 months)		
0-1	346	85.9
At 2	57	14.1
Type of food give the child for breakfast		
Injera	108	26.8
Bread	177	43.9
Biscuit	7	1.7
Batata	16	4.0
Egg	22	5.5
Breastfeeding	20	5.0
Milk	42	10.4
Rice	11	2.7
Type of food give the child for lunch		
Injera	1	.2
Batata	2	.5
Egg	1	.2
Breastfeeding	20	5.0
Milk	18	4.5
Rice	316	78.4
Pasta	39	9.7
Fish	1	.2
Meat	2	.5
Milk powder	2	.5
Potato	1	.2
Type of food give the child for dinner		
Injera	19	4.7
Bread	126	31.3
Batata	37	9.2
Egg	37	9.2
Breastfeeding	21	5.2
Milk	66	16.4
Rice	25	6.2
Pasta	23	5.7

Milk powder	2	.5
Beans	29	7.2
Recipes	8	2.0
Macaroni	5	1.2
Spaghetti	1	.2
Oats	4	1.0

5. 4: Environmental factors

Most of the respondents 275 (68.2%) their sources of drinking water are from Piped water. Most of the respondents a response rate of 298 (73.9%) for their methods uses for treating water were boiling. almost of the respondents 358 (88.8%) they have a toilet at their homes, and a response rate of 370 (91.8%) type of toilet they have used in their homes are the hole toilet.

Most of the respondents a response rate of 205 (50.9%) the type of fuel they use in their household were Charcoal. Almost of the respondents a response rate of 216 (53.6%) their children for the last two weeks did not sick, while respondents a response rate of 187 (46.4%) their children for the last two weeks sick and most of the respondents a response rate of 307 (76.2%) for their children suffer from Vomiting, while some respondents a response rate of 41 (10.2%) suffer from Diarrhea and most of the children a response rate of 358 (88.9%) were 2-4 times the frequency of diarrhea per day.

Most of the children a response rate of 150 (37.2%) deworming were partially completed.

Table 4: Environmental factors of children under five years, Hargeisa Somaliland, 2021.

Variables	Frequency (n=403)	Percentage (100%)
Sources of drinking water		
Unprotected well	69	17.1
Piped water	275	68.2
Protected well	59	14.6
Methods use for treating water		
Boiling	298	73.9
Chlorination	104	25.8
Others	1	.2
Have a toilet at home		
No	45	11.2
Yes	358	88.8

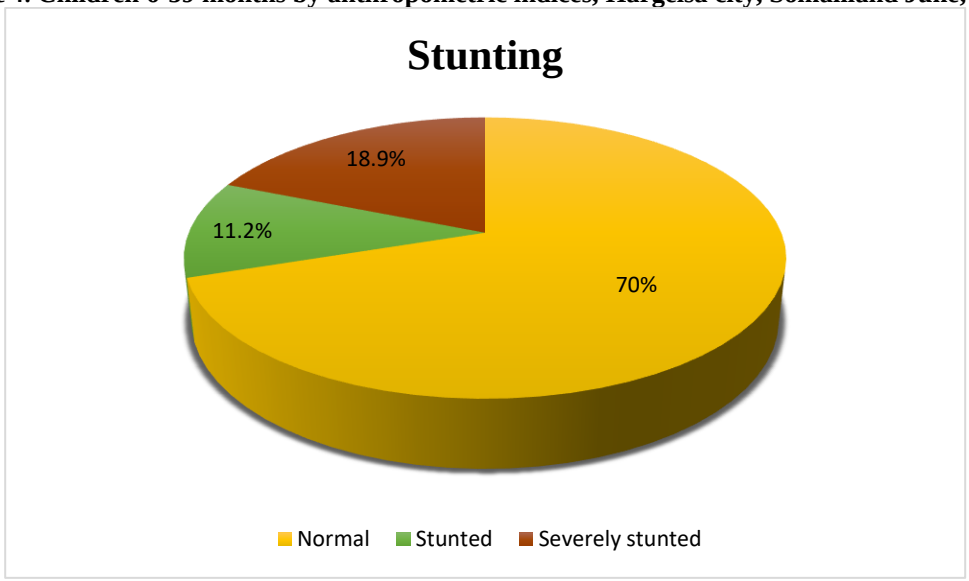
Type of toilet have		
Hole toilet	370	91.8
Flush toilet	31	7.7
Latrine toilet	2	.5
Type of fuel use in the household		
Electricity	142	35.2
Charcoal	205	50.9
Wood	56	13.9
If the child sick for the last two weeks		
No	216	53.6
Yes	187	46.4
Disease's child suffers from last two weeks		
Diarrhea	41	10.2
Vomiting	307	76.2
Malnutrition	5	1.2
Pneumonia	19	4.7
Cramping	2	.5
Fever	7	1.7
Dehydration	1	.2
Headache	2	.5
Measles	4	1.0
Congestive heart failure	3	.7
Common cold	11	2.7
Cough	1	.2
Frequency of diarrhea per day		
2-4	358	88.8
5-7	40	9.9
8-10	5	1.2
Deworming status of child		
Completed	135	33.5
Partially completed	150	37.2
Never took	118	29.3

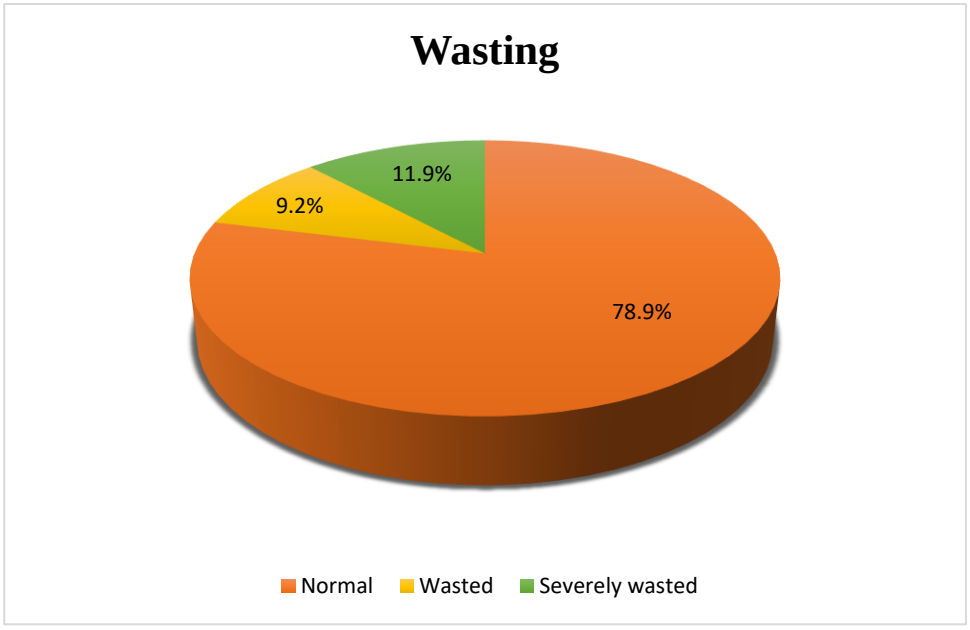
5. 5: Anthropometric Measurements

Height-for-age and weight-for-height of the anthropometric indices in the study area showed that 11.2% were stunted, 18.9% severely stunted, 9.2% wasted and 11.9 severely wasted.

Anthropometric Indices

Figure 4: Children 6-59 months by anthropometric indices, Hargeisa city, Somaliland June, 2021.

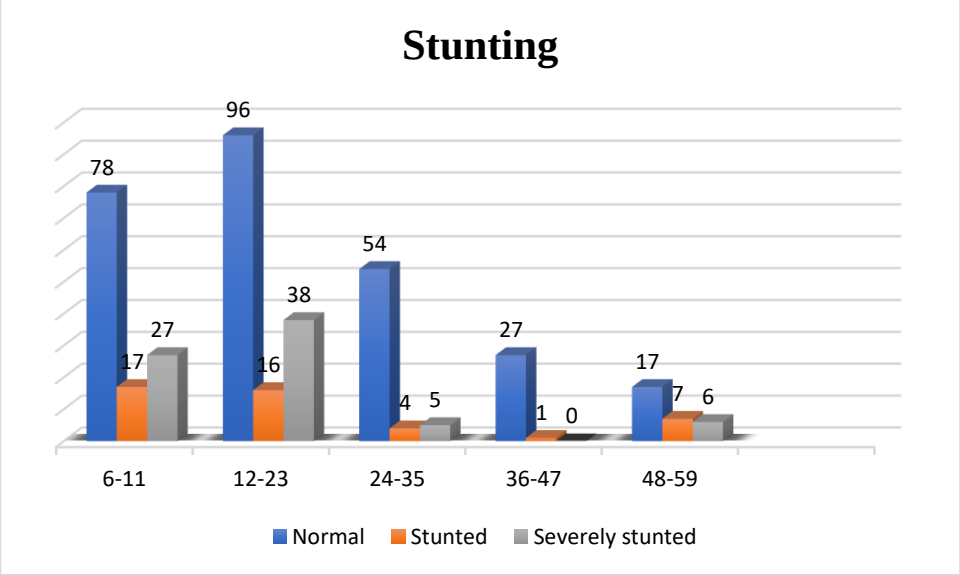




5.5.1 Stunting/ height for age

Children aged between 6-59 months 45 (11.2%) were stunted while severely stunted (below -3SD) were 76 (18.9). stunting among children showed that higher is male children 33 (8.2%) when compared to female children 12 (3%), while severely stunted (below -3SD) among children revealed slightly higher in female children 40 (9.9%) when compared to male children 36 (8.9%). Gender of aged children between 6 to 59 months which had a response rate of 121 (30.1%) with (95%CI: 0.334-0.954) were stunted. For the younger children stunting is high and the aged between 24 to 35 months is low and decreases after that age. Boys which had a response rate 69 (17.1%) and girls which had a response rate 52 (12.9%) a little difference between them. Urban children which had a response rate 86 (21%), rural which had a response rate 26 (6.5%), and semi-urban children which had a response rate 9 (2.2%) there is a difference between them. children from mothers of primary educational level in a response rate 44 (10.9%) and those from mothers with no education in a response rate 47 (11.6%) were more likely to be affected by stunting when compared children from highly educated mothers for their children with a response rate 14 (3.4%).

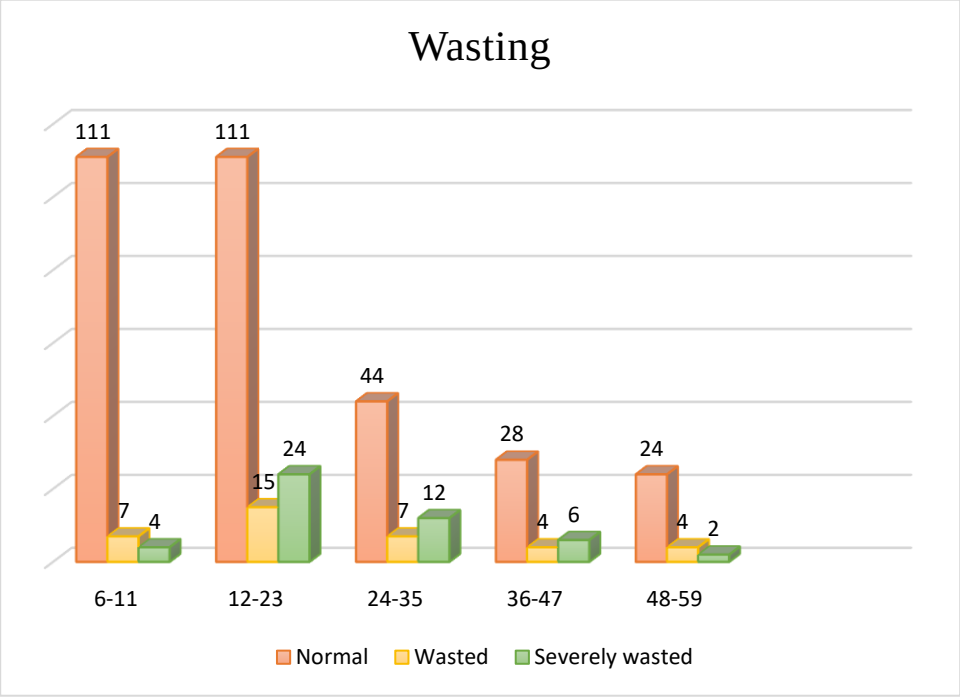
Figure 5: Children 6-59 months stunted by age category, Hargeisa city, Somaliland June, 2021.



5.5.2 Wasting/ weight for height

Children aged between 6 to 59 months, 37 (9.2%) were wasted, while 48 (11.9%) were severely wasted. Wasting among children revealed that higher is male children 20 (5%) when compared to the female children 17 (4.2%), while severely wasted (below -3SD) unlike stunting among children revealed slightly higher in male children 26 (6.5%) when compared to female children 22 (5.5%). When compared to younger children with older children, the younger children were wasted than older children, younger children may be susceptible to infectious diseases such as diarrheal diseases. Urban children had slightly wasted in a response rate of 25 (6.2%) when compared to both rural children which had a response rate 8 (2%) and semi-urban children which had a response rate of 4 (1%). This may be due to availability of fruits and green vegetables. Mothers with higher education for their children were less wasted in response rate of 2 (0.5%) when compared to both children from mothers with primary education level in a response rate of 10 (2.5%) and with no education a response rate of 20 (5%).

Figure 6: Children 6-59 months wasting by age category, Hargeisa city, Somaliland June, 2021.



5.6 Determinant factors for stunting and wasting

5.6.1 Determinant factors for stunting

For the analysis bivariate logistic regression showed that the relationship of the child, child's father occupational status, children under five live in the house, total family members live in the house, child birth order, if the child breastfed per day, gave child only breast milk for the first 6 months, times feed child per day, child immunization, give child first colostrum, left food in the house, caring child less than 2 years on lab when feeding, child always eat with older siblings, time started give child above 6 months meat, fruits, vegetables and porridge, introduce water, bottle feeding and rice early in 2 months and time started it, type of food give child at breakfast, habit wash hands with soap after toilet usage, sources of drinking water and deworming status of child revealed some association at p-value <0.25.

For the analysis multivariate logistic regression showed that the age of child, child's father educational status, and give child above 6 months meat, fruits, vegetables and porridge were statistically associated with stunting at p-value less than 0.05.

When compared children aged between 36- 47 months with children aged between 6-11 months old were 93.9 percent less likely to be affected by stunted (AOR= 0.061; (95%CI: 0.004-0.891, P=0.041).

Children aged between 6-59 months for their fathers are primary educational level were 2 times more likely to be affected by stunting when compared with children whose fathers are university level with (AOR=2.390; (95%CI: 1.146-4.984, P=0.020).

Children aged above 6 months who had not been receive meat, fruits, vegetables and porridge were about 2 times more likely to be affected by stunting when compared with children who had been received meat, fruits, vegetables and porridge with (AOR= 2.271; (95%CI: 1.137-4.540, P=0.020).

Table 5: Determinant factors for stunting children under five years, Hargeisa Somaliland, 2021.

Determinants	Frequency of stunting among children age 6-59 months		p-value	COR (95% CI)	p-value	AOR (95% CI)
	Stunting	Normal				
Age						
6-11	44	78		1		1
12-23	54	96	0.003	0.997 (0.606,1.640)	0.256	1.453(0.762,2.769)
24-35	9	54	0.003	0.295 (0.133,0.655)	0.289	0.453(0.104,1.961)
36-47	1	37	0.462	0.048 (0.006,0.361)	0.041***	0.061(0.004,0.891)
48-59	13	17	0.991	1.356 (0.602,3.051)	0.684	1.486(0.220,10.053)
Child's father educational status						
College/university	28	79		1		1
Secondary (9-12)	39	49	0.679	1.129 (.637-2.000)	0.056	2.196 (0.979-4.929)
Illiterate	38	95	0.454	0.765 (.380-1.542)	0.511	0.761 (0.337-1.719)
Primary (1-8)	16	59	0.008	2.246 (1.230-4.101)	0.020***	2.390 (1.146-4.984)
Give child meat, fruits, vegetables and porridge (>6 months)						
Yes	103	189		1		1
No	18	93	0.000	2.816 (1.610-4.924)	0.020***	2.271 (1.137-4.540)

Note: *** Significant at P value 0.05

5.6.2 Determinant factors for wasting

For the analysis bivariate logistic regression showed that the marital status, mothers/caregiver's educational status, child's father educational status, child birth order, Times feed child per day, Child immunization, child always eat with older siblings, type of food give child for dinner, sources for drinking water, if the child sick for last two weeks and the diseases he/ she suffer from showed some association at p value <0.25.

For the analysis multivariate logistic regression revealed that the children under five live in the house and caring children less than 2 years on lab when feeding were statistically associated with wasting at p value <0.05 level of statistically significance.

Family live with one child under five in the household, the child was 43.5% less likely to be affected by wasting when compared three children under five live together in the household with a (AOR= 0.565; (95%CI: 0.288-1.107, P=0.000).

Children below 2 years who did not caring on lab when feeding were 3 times more likely to be affected by wasting when compared to their counterpart with a (AOR= 3.564; (95%CI: 2.119-5.992, P=0.000).

Table 6: Determinant factors for wasting children under five years, Hargeisa Somaliland, 2021.

Determinants	**Frequency of wasting among children age 6-59 months**		**p-value**	**COR (95% CI)**	**p-value**	**AOR (95% CI)**
	Wasting	**Normal**				
Children under five live in the house						
One	38	88		1		1
Two	30	101	0.188	0.688 (0.394-1.201)	0.096	0.399(0.207-0.770)
three	17	129	0.000	0.305 (0.162-0.575)	0.006***	0.565(0.288-1.107)
Caring child on lab when feeding (children <2 years)						
Yes	57	106		1		1
No	28	212	0.000	0.246 (0.148-0.409)	0.000***	3.564(2.119-5.992)

Note: *** Significant at P value 0.05

Chapter 6: Discussions

Stunting and wasting among children under five years old is a major health problem at Hargeisa study health facilities and other developing countries (60). In the present study the prevalence of stunting and wasting were 30.1% and 20.1% respectively. This study consistent with previous studies conducted in Ethiopia specially northwest part (30%, 20%) respectively(61), Shinile zone (31.1%, 19.7%) respectively(62) and south west of the Ethiopia(30.4%, 20.4%) respectively(63).

The prevalence of stunting is low when compared the findings of this study to the Ethiopian demographic health survey (EDHS)(52%)(64), Afar region(51.4%)(65), and northern part of Ethiopia(41.4%)(66), Kenya(45.9%)(32), Uganda(33.3%)(67), Bangladesh(42.2%)(68) and India(49.6%)(69). The prevalence of wasting is higher when compared to national Ethiopian report(15.5%)(64) and similar studies (9.53%,14%,9.53%(61,62,70–73). Data collection methods, study population and sample size, as well as seasonal variation and socioeconomic factors may be the causes of differences when compared to the present study with the other studies. The prevalence of stunting was lower than the prevalence of stunting study population in east Africa (48%) as well as developing countries (32%)(74%) respectively(75). The difference between the prevalence may be due to socio-economic and demographic factors as well as cultural differences and topographic developmental.

The most primary important demographic variables in the current study were Sex and the age of the children. Stunting increases with younger age and decrease with older age. Children aged between 12- 23 months which had a response rate of (37.8%) had the highest risk of stunting. Male children which had a response rate of (8.2%) had higher prevalence of stunting when compared to female counterpart which had a response rate of (3%).

When compared children aged between 36- 47 months with children aged between 6-11 months old were 93.9 percent less likely to be affected by stunted (AOR= 0.061; (95%CI: 0.004-0.891, P=0.041). the findings of this study was similar another study conducted in Sudan especially the capital city Khartum, which revealed that the most contributing determinant factors for under five stunting children were found age of the child(76). Also the findings of this study is similar study done in Vietnam which indicates that the prevalence of

stunting was high in children aged between 12-23 months and youngest age group 6-11 months(38%, 30%) respectively(77).

Contrary another finding from Kenya especially the capital city Nairobi found that the prevalence of stunting was high in children aged 24-35 months (58%)(32), and Ethiopia (48%)(78). This could be, it is critical age for the child shifting from mother's breast milk to other foods.

The findings of this study revealed that the highest rate of stunting was aged between 6-23 months that might be related to inappropriate food supplementation during weaning period to be stopping breastfeeding earlier than the suggested 2 years. So low risk might be due to the breastfeeding protective effect since all mothers 86.6% in the study area were breast feed per day and about more 60% breast feed 2-6 times per day and most of them continue to exclusively breastfed throughout the first 6 months of their life.

Children aged between 6-59 months for their fathers are primary were 2 times more likely to be affected by stunting when compared with children whose fathers are university level (AOR=2.390; (95%CI: 1.146-4.984, P=0.020). this findings was similar with a findings from South Somalia(25), Ethiopia(69,79), Tanzania(80), Nigeria(81), India(82), Iran(83), and Nepal(84). Fathers' higher education increases the knowledge about their children's nutrition and also the health which can have an impact on prevention of stunting. Also similar another studies done in Malawi, Tanzania, Nigeria and Zimbabwe(85–87). This is might be due to the fathers who have a higher education level have better health awareness behavior for childhood diseases when compared to primary as well as illiterate fathers.

Children aged above 6 months who had not been receive meat, fruits, vegetables and porridge were about 2 times more likely to be affected by stunted when compared to children who had been receive meat, fruits, vegetables and porridge with (AOR= 2.271; (95%CI: 1.137-4.540, P=0.020).

The findings of this study is similar study conducted in Wondo Genet in Ethiopia(88) and India(89). The reason might be fruit and vegetables as well as porridge have a different health benefits and good source of many different nutrients that is readily absorbable and convenient

form of foods and vegetables, that helps for the production of strong immunity that promotes the health status of children under five years of age and prevents developing for stunting.

The current study revealed that 21.1% of children aged between 6-59 months were wasted. The finding of current study were higher when compared with other studies findings such as Ethiopian regional and Ethiopian national figure (9.9%) and (10%) respectively(90). The difference may be due to the influences of seasons, because the current study was done in April month 2021, it was not rainy season to the study area which cannot help the respondents to get fruits and green vegetables and also low family income in Somaliland compared to Ethiopia.

Similar with stunting younger children aged between 6-23 months were more about to be wasted than older children. This might be due the infectious disease such diarrheal disease that increases the susceptibility of younger children to be wasted.

Family live with one child under five in the household, the child was 43.5% less likely to be affected by wasting when compared three children under five live together in the household with a (AOR= 0.565; (95%CI: 0.288-1.107, P=0.000). this study is similar with study conducted in Ethiopia (43%)(91), sub-Saharan Africa (43.2%)(92), Pakistan (43.6%)(93) and Vietnam (43.1%)(94). They found direct relationship between number of under-five children and wasting which is significantly positively associated with it. Children under five living with a larger sibling's size are exposed to nutritional associated problems like limited financial resources of the household versus increases demand for those resources such shortage of food, poor living and health conditions. Somaliland is one of the African sub-Saharan countries common in large children size which predispose children under five years to nutritionally related problem factors. But in contrary study done in Mwanza district, Tanzania(95) revealed that number of children had no association with wasting.

Children below 2 years who did not caring on lab when feeding were 3 times more likely to be affected by wasting when compared to children less than 2 years who caring on lab when feeding (AOR= 3.564; (95%CI: 2.119-5.992, P=0.000). the findings of this study was similar with a studies done in Ethiopia(96,97). The studies concluded that children below 2 years who did not caring on lab when feeding were more likely to be wasted. This might be majority of

the mothers/caregivers included in the study were illiterate and did not had awareness about the importance of children below 2 years caring on lab when feeding as they did not do that the child might out and not finish his/her food.

Chapter 7: Conclusions and Recommendations

7.1 Conclusions

This study conducted a cross-sectional study survey to gather information about the prevalence and determinant factors of stunting and wasting as well as socio-economic and demographic factors, behavioral and environmental factors and anthropometric measurements.

The source of information is mostly from mothers. Most of the respondents are from urban and they were illiterate with low income. The most children included in the study were in age group 12- 23 months. Most of the children were exclusively breastfed and most of the respondents start complementary feeding for their children aged between 4-6 months and also partially immunized. The water sources of the respondents were mostly piped water and majority of mothers had a good hand washing practice.

In Hargiesa selected health facilities stunting and wasting prevalence was high among the children aged between 6-59 months.

Age of child, child's father educational status, and give child above 6 months meat, fruits, vegetables and porridge were statistically associated with stunting and children under five live in the house and caring children less than 2 years on lab when feeding was statistically associated with wasting. This finding showed that early intervention is important for health programs that aim in reduction and prevention of stunting and wasting specifically within the first 2 years of life.

7.2 Recommendations

7.2.1 For the community

While feeding the child, the caregivers should give the child specific attention for his/her age.

To overcome the burden of child stunting and wasting, Community Based Nutritional program, importance of caring child under 2 years on mother's lab and giving food, exclusive breast feeding, IMNCI, maternal health services, hygiene and sanitation activities should be emphasis.

Exclusive breast feeding the first six months and after six months of age it needs combination with accurate complementary and supportive feeding and it should be engorged by the community.

Children aged between 6-59 months for the early initiation of complementary feeding and left food in the household giving to them were the most common habits that needs to address to change and advising caregivers by practicing appropriate and accurate feeding the child.

7.2.2 For the government health sectors

Families as well as caregivers and government health sectors should provide intensive health education to promote good behaviors about child caring and appropriate feeding practices.

Encouraging mothers breast feeding integration with appropriate and accurate complementary feeding after six months of age, for the child to grow well as well as to develop early.

Stunting and wasting Community management workshop should be promoted by the government health sectors. To get community supporting stunting and wasting children is a good behavior.

Health extension workers as well as care providers in the government should promote and strength education about giving specific nutrition and the importance of balanced food in children less than five years of age with their mothers as well as caregivers.

When visiting children in health facility the professional health care providers should screen signs of stunting and wasting under five children.

Government health sectors should provide regular deworming services to children and also it should promote and strengthened

7.2.3 For the educational and service sectors

Starting and Initiating education about community-based nutritional program implementing child feeding and the community strengthening their economic status are very important strategy to prevents and reduce stunting and wasting among under five children.

Children from illiterate mothers as well as fathers were more likely to be stunted and wasted when compared to literate fathers and mothers, so educated mothers and fathers on child feeding practices like giving fruits, vegetables as well as balanced diet, sanitation and important of first milk can reduce developing of stunting and wasting.

An educational institutional curriculum should be developed that promotes understanding and enhances the benefits of exclusive breast feeding to prevent stunting and wasting.

Health and human services sectors should promote use of improved toilet and the energy sector should help household to access clean energy.

Designing of stunting and wasting reduction strategy in hargeisa health facilities should consider family size such number under five children live in house, as well as age, feeding of child and educational status of mother and father. Further studies might be needed.

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APPENDIXES

Appendix I: Information Sheet

Good morning? / Good afternoon?

I am the member of research team from Addis Ababa University. We are conducting a study about the prevalence and determinants of stunting and wasting among under five age children. Your child is chosen by chance to participate in the study. We need to collect data about socio-economic and demographic factors, child caring practices, behavioral and environmental factors in the household; I want to assure you that all of your answers will be strictly confidential. You have the right to participate or not, to stop the interview at any time or to skip any questions that you don't want to answer. Your participation is completely voluntary but your experiences could be very helpful to design better stunting and wasting prevention and treatment strategy for under five children in the town. The interview may take approximately 15 minutes to complete.

Contact person: If you want to know more information, have any question, you can contact the researcher's address below.

Principal investigator:

Mohamed Abdirahman: Phone:25263-4307535/251-994895987 Email:
maxamedhanfi@hotmail.com

Do you agree to be interviewed? And do you agree your children to be participated?

Yes No

1. Completed
2. Partially completed

Interview information

- Name of the health facility _____
- Questionnaire IDN _____
- Date of interview _____
- Interviewer Name _____
- Checked by _____

Appendix II: English Version Questionnaire

Part one **Socio-Economic and Demographic Factors** ***I would like to ask you a few questions about you and your child***			
S.No	Questionnaires	Answers	skip to
101	What is the gender of your child?	1. Male 2. Female	
102	What is the age of the child in months?	_____	
103	What is your relationship with the child?	A. Mother B. Father C. Brother D. Sister E. Others, Specify_____	
104	What is your residence?	A. Urban B. Rural C. Semi-urban	
105	How old are you? *(Age of the primary care giver completed years)*	_____	
106	What is your religion?	A. Muslim B. Orthodox Christian C. Protestant D. Jeush E. Other, (specify) _____	
107	What is your Marital status?	A. Never married B. Married C. Separated D. Divorced E. Widowed	
108	What is your educational status? *(Care giver/ mother)*	A. Primary (1-8) B. Secondary (9-12) C. College/university D. Illiterate	

109	What is your occupation? *(Care giver/ mother)*	A. Housewife B. Employee C. Student D. Merchant E. Unemployed F. Others, (specify) _____	
110	What is your child's father educational status?	A. Primary (1-8) B. Secondary (9-12) C. College/university D. Illiterate	
111	What is your child's father occupation?	A. Employee of government/private B. Student C. Merchant D. Daily laborer E. Unemployed F. Other, (specify) _____	
112	How many children under five in your house?	A. One B. Two C. Three G. > three	
113	What are the total number of family members currently living in your house?	_____	
114	What is your total family income?	A. <$100 B. $100-$200 C. $300-$400 D. >$400	

Part two

Child caring Practices

Now I will ask you about the child caring practices

S.No	Questionnaires	Answers	Skip to
201	What is your child birth order?	_____	
202	Did you breast feed your child per day?	A. Yes B. No	If no skip to 205
203	How many times you breastfeed your child per day?	_____	

204	Did you give your child only breast milk for the first 6 months?	1. Yes 2. No	
205	Did you give your child artificial feeding?	1. Yes 2. No	If no skip to 211
206	What time you started the artificial feeding? (in months)	_____	
207	What is the type of food you give as a complementary feeding to your child?	A. Cow milk B. Milk powder C. Porridge D. Other kinds, (Specify) _____	If milk powder skip to 208
208	How you prepare it proportionally?	A. 1 cup of milk powder + 1 cup of H_2O B. 2 cup of milk powder + 1 cup of H_2O C. 1 cup of milk powder + 2 cup of H_2O	
209	How many times you give it?	_____	
210	What are the materials you used to give complementary feeding to the child?	A. Bottle B. cup C. Mother's hand D. spoon	
211	Do you wash your hands when you are feeding your child?	A. Yes B. No	
212	How many times you feed your child per day? (above 6 months)	_____	
213	Is your child immunized? *(Check immunization child card)*		

Immunization	Yes "√ "	No "× "	
BCG			
Penta (1-3)			
Polio (0-3)			
Measles (1)			

Part three

Behavioral Factors

Now I will ask you about the behavioral factors

S.No	Questionnaires	Answers	Skip to

301	Did you give your child first colostrum?	A. Yes B. No	
302	What you have done to the leftover food in the house?	A. Give to the children B. Dispose to the dustbin C. Others, (Specify) _____	
303	Did you care the child on your lap when you feeding? (*children less than 2years*)	A. Yes B. No	
304	Did your child always eat with older siblings?	A. Yes B. No	
305	Did you give your child a meat, fruits, vegetables and porridge? *(children above 6 months)*	A. Yes C. No	If no skip to 307
306	When you have started? Tell the Months?	_____	
307	Did you introduce your child Water, Bottle feeding or Rice? (*early as 2 months*)	A. Yes B. No	If no skip to 309
308	When you have started? Tell the Months?	_____	
309	What type of food you give the child for breakfast?	_____	
310	What type of food you give the child for lunch time?	_____	
311	What type of food you give the child for dinner time?	_____	

Part Four
Environmental Factors

Now I will ask you about the environmental factors

S.No	Questionnaires	Answers	Skip to
401	Do have habit to wash your hands with soap after toilet usage?	A. Yes B. No	
402	Do you wash your hands before food preparation?	A. Yes B. No	
403	What are the sources of your drinking water?	A. Piped water B. Protected well C. Unprotected well D. River	

404	What are the methods you use for treating water?	A. Boiling B. Chlorination C. Others, (Specify) _____	
405	Do you have a toilet at home?	A. Yes B. No	
406	What type of toilet you have?	_____	
407	What type of fuel you use in the household?	A. Electricity B. Charcoal C. Wood D. Others, specify _____	
408	Does your child sick for the last two weeks?	A. Yes B. No	If no go to 411
409	What are the diseases he/she suffer from?	_____	If diarrhea go to 410
410	What was the frequency of diarrhea per day?	_____	
411	What about his/ her deworming status? *(Check immunization child card)*	A. Completed B. Partially completed C. Never took	

Part five

Anthropometric measurements

501.Height of the child in centimeters (CM) _____

502.Weight of the child in kilograms (KG) _____

503. Mid Upper Arm Circumference (MUAC) of the child in centimeters (CM)

_____

Thank you very much for giving your precious time and your collaboration!!!

Appendix III: Xaashidamacluumaadka

Subaxwanaagsan? / Galabwanaagsan?

Waxaan xubin ka ahay kooxda cilmibaaristaee ka socota Jaamacadda Addis Ababa. Waxaan wadnaa daraasad ku saabsan baahsanaanta iyo go'aaminta istaatixinta iyo lumin tacarruurta ka yar shan sano jirka. Ilmahaaga waxaa bakhtiyaa nasiib loogu doortay inuu ka qayb qaato daraasadda. Waxaan u baahanahay inaan uruurino xogta kusaabsan arrimaha dhaqan-dhaqaale iyo arrimahabulshada, dhaqamada daryeelka carruurta, habdhaqanka iyo arrimaha deegaanka ee qoyska; Waxaan rabaa inaan kuu xaqiijiyo in jawaabahaaga oodhami ay noqon doonaa kuwo sir ah. Waxaad xaq u leedahay inaad ka qeyb gasho iyo inkale, inaad joojiso wareysiga waqtikasta ama aad ka boodo wixiisu'aalo ah ee aadan rabin inaad ka jawaabto. Ka qeybgalkaagu gabi ahaanba waa ikhtiyaari laakiin khibradahaaga ayaa caawinkara naqshadeyn istaahin wanaagsan iyo khasaarin istiraatiijiyad ka hortag iyo daaweynta carruurta shantasano kayar ee magaalada. Wareysiga waxaalagayaabaa inuuqaato kudhowaad 15 daqiiqo in la dhammaystiro.

Qofka lala xiriirayo: Haddii aadrabto inaado gaatomacluumaaddheeraad ah, su'aal qabtid, waxaad la xiriirikartaa cilmi-baaraha cinwaanka hoose.

Baadhe maamule:

Mohamed Abdurahman: Tell 252-63-4307535 / 251-994895987 Email **maxamedhanfi@hotmail.com**

Ma ogoshahay in lagu wareysto? Miyaadse ku raacsantahay ilmahaaga inuu ka qaybqaato?

Haa Maya

3. Dhamaystiray
4. Qayb dhamayrtiran

Macluumaadka wareysiga

- **Magaca xaruntacaafimaadka _____**
- **Su'aalaha IDN _____**
- **Taariikhda wareysiga _____**
- **Magaca Wareystaha _____**
- **Cida hubisay _____**

Appendix IV: Su'aalo waydiin Af-Somali

Qaybta kowaad Cunsuriyadaha Dhaqaale-Bulsheedka iyo Dadweynaha ***Waxaan jeclaanlahaa inaan ku weydiiyo xoogaa su'aalo ah oo adiga iyo ilmahaaga ku saabsan***			
S.No	Su'aalo	Jawaabo	U bood
101	Waa maxay jinsiga ilmahaagu?	A. Lab B. Dhedig	
102	Waa maxay dada ilmahagubiloahaan?	_____	
103	Muxuu yahayxiriirkaaad la leedahay ilmaha?	A. Hooyo B. Aabe C. Walaalkey D. Walashay E. Wax kale, Sheeg _____	
104	Waa maxay degenaanshahaagu?	A. Magaalo B. Miyi C. Tuulo	

105	Meeqa sano ayaad jirtaa? (*Da'dabixiyaha daryeelkaa asaasiga ah sannado dhammaystiray*)	_____	
106	Waa maxay diintaadu?	A. Islaam B. Orthodox Christian C. Protestant D. Jeush E. Kuwo kale, (sheeg) _____	
107	Waa maxay xaaladdaada guur?	A. Waliguursan B. Xaas ah C. kala maqanahy D. kala tagany E. lagadhintay	
108	Waa maxay xaaladada waxbarasho? (*daryeelbixiyaha/hooyada*)	A. Aasaasi ah (1-8) B. DugsiSare (9-12) C. Kuleejo / jaamacad D. Wax qorisla'aan	

109	Waa maxay shaqadadu? *(daryeelbixiyaha/hooyada)*	A. Hoygaguriga B. Shaqaale C. Arday D. Ganacsade E. Shaqola'aan F. Mid kale, (sheeg) _____	
110	Waa maxay xaaladda waxbarasho ee aabbaha ilmahaagu?	A. Aasaasi ah (1-8) B. DugsiSare (9-12) C. Kuleejo / jaamacad D. Wax qorisla'aan	
111	Waa maxay xaaladdas haqo ee aabbaha ilmahaagu?	A. Shaqaaledowladeed / gaar loo leeyahay B. Arday C. Ganacsade D. haqaalemaalinle ah E. Shaqola'aan F. Mid kale, (caddee) _____	
112	Immisa carruur ah oo ka yar shan sano ayaa gurigaaga kunool?	A. Kow B. Laba C. Saddex D. >Saddex	
113	Maxay yihiin tirade guud ee xubnahaqoyska ee hadda ku nool gurigaaga?	_____	
114	Waa maxay wadarta dakhliga qoyskaagu?	A. <$100 B. $100-$200 C. $300-$400 D. >$400	

Qaybta labaad

Hawlaha daryeelka ilmaha

Hadda waxaan ku weydiin doonaa wax kusaabsa ndhaqamada daryeelka ilmaha

S.No	Su'aalo	jawaabo	U bood
201	Waa maxay amarka dhalashada ilmahaagu?	_____	
202	Miyaad naaska siisa ilmahaaga maalintii?	A. Haa B. Maya	Haddii maya u bood 205
203	Immisa jeer ayaadnaaskanuujisaailmahaagamaalintii?	_____	
204	Ma siisay ilmahaaga naasnuujin gaar ah 6-da bilood	A. Haa	

	ee ugu horreysay?	B. Maya	
205	Miyaads iisay ilmahaaga quudis aan dabiici ahayn?	A. Haa B. Maya	Hadii maya u bood 212
206	Goormaayaad u bilowdayquudintamacmalka ah?	_____	
207	Maxay yihiin noocyada cuntada ee aad siiso quudinta kaabista ilmahaaga?	A. Caanahalo'da B. Budadacaanaha C. Boorash D. Noocyada kale, (sheeg) _____	
208	Sidee ayaad ugu diyaarisaa si dheellitiran?	A. 1 koob of caanobudo+ 1 kooboobiyo B. 2 kooboocaanobudo +1 kooboobiyo C. 1 kooboocaanobudo+ 2 kooboobiyo	
209	Imisa jeer ayaad siisaa?	_____	
210	Maxay yihiin qalabka aad ku siiso cunugga quudinta kaabista ah?	A. Dhalo B. koob C. GacantaHooyo D. Qaaddo	
211	Miyaad dhaqdaa gacmahaaga markaad ilmahaaga quudinayso?	A. Haa B. Maya	
212	Immisa jeer ayaad quudisaa ilmahaaga maalintii? (ka sareeya 6 bilood)	_____	
213	Ilmahaagu ma la tallaalay? (*Hubi karaka cunugga ee tallaalka*)	Talaal / Haa "√ " / Maya "× " BCG Penta (1-3) Dabayl (0-3) Jadeeco	
214	Ka warran xaaladdiisa goynta dirxiga? (*Hubi karaka cunugga ee tallaalka*)	A. Dhameystiray B. Qaybahaandhammaystiray C. Marna ma qaadan	

Qeybta seddexaad

Ciladaha Dabeecadda

Hadda waxaan kuweydiin doonaa waxyaabaha kusaabsan ciladaha dabeecadaha

S.No	Su'aalo	Jawaabo	U bood

301	Miyaad siisay ilmahaaga dambarkii u horeeyay?	A. Haa B. Maya	
302	Maxaad ku samaysaa cuntada ka hadhay guriga?	A. Siiyacarruurta B. Ku tuuraqashinqubka C. Kuwa kale, (Cadee) _____	
303	Miyaad kudaryeesha ilmaha dhabtaada markaad quudinaysid? *(caruurtakayar 2 sano)*	A. Haa B. Maya	
304	Cunuggu waligiis ma la cunteeyey walaalihiis ka waaweyn?	A. Haa B. Maya	
305	Ma siisay ilmahaaga hilib, miro, khudrad iyo boorash?	A. Haa B. Maya	Hadii maya u bood 307
306	Waqtigee u bilowday?	_____	
307	Ma bartay ilmahaaga biyo, quudin dhalo ama bariis? *(2 bilood u horeeyay)*	A. Haa B. Maya	Hadii maya u bood 309
308	Waqtigeeayaad u bilawday?	_____	
309	Cunto noocee ah ayaad cunuga siisaa quraacda?	_____	
310	Cuntonoocee ah ayaad siisaa ilmaha waqtigaq adada?	_____	
311	Cuntonoocee ah ayaad cunuga siisaa waqtiga cashada?	_____	

QaybtaAfaraad
WaxyaabahaDeegaanka

Hadda waxaan kuweydiin doonaa arrimaha deegaanka

S.No	Su'aalo	Jawaabo	U bood
401	Miyaad caado u leedahay inaad gacmahaaga ku dhaqdo saabuun ka dib isticmaalka suuliga?	A. Haa B. Maya	
402	Miyaad dhaqdaa gacmahaaga ka hor diyaarinta cuntada?	A. Haa B. Maya	
403	Maxay yihiin ilaha biyahiina lagacabbo?	A. Biyahatuubada B. Ceel Si fiican loo ilaaliyey C. Ceelaansifican loo ilaalin D. Doox	

404	Maxay yihiin hababkaaad u isticmaasho daaweyn tabiyaha?	A. Karinta B. Kalooriinka C. Kuwa kale (Sheeg) _____	
405	Musqul ma ku leedahay guriga?	A. Haa B. Maya	
406	Musqul noocee ah ayaad leedahay?	_____	
407	Shidaal noocee ah ayaad ku isticmaashaa guriga dhexdiisa?	A. Koronto B. Dhuxul C. Xaabo D. Kuwa kale, (sheeg) _____	
408	Ilmahaagu ma xanuunsanaa labadii usbuucee la soo dhaafay?	A. Haa B. Maya	Hadiihaa u bood 409
409	Waa maxay cudurada isaga / iyada kudhacay?	_____	Hadii ay tahayshu ban u bood 410
410	Muxuu ahaa soo noqnoqoshada shubanku maalintii?	_____	

Qaybtashanaad

Cabbiraadahajirka

501.Dhererka ilmaha oo sentimitir ah (CM) _____

502.Miisaanka ilmaha oo kiilogaraam ah (KG) _____

503.Wareegga gacanta dhexe-kore oo sentimitir ah (CM) _____

Aadbaad ugu mahadsan tahay waqtigaaga qaaliga ah iyo wada shaqeyntaaad na siisay!!!