PHARMA COLLEGE

SCHOOL OF PUBLIC HEALTH

DETERMINANTS OF STUNTING AMONG CHILDREN AGED BETWEEN 0-24 MONTHS IN HAWASSA CITY SELECTED PUBLIC HEALTH FACILITIES, 2023/24. UNMATCHED CASE CONTROL STUDY

MPH THESIS

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AUGUST 2024

HAWASSA, ETHIOPIA

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ADVISOR APPROVAL SHEET

PHARMA COLLEGE SCHOOL OF PUBLIC HEALTH

I, the undersigned, student declare that this thesis result is my original **"Determinants of stunting among children aged between 0-24 months in Hawassa City selected public health facilities, 2023/24"** work in partial fulfillment of the requirement for the Masters of Public Health in Reproductive Health

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Place of submission: **School of Public Health, Pharma College.**

Date of Submission: **_____**

 This thesis report work has been submitted with my approval as a college advisor(s).

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EXAMINERS APPROVAL SHEET

We the undersigned members of the board of Examiners of the final Thesis Result open defense by *Samrawit Ermiyas* have read and evaluated her thesis entitled **"Determinants of stunting among with children aged between 0-24 months in Hawassa City selected public health facilities, 2023/24"** and examined the candidate. This is therefore to certify that the thesis proposal has been accepted in partial fulfillment of the requirements for the degree of the Masters of Public Health in Reproductive Health.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATION AND ACRONYMS

AOR : Adjusted Odds Ratio

CI : Confidence Interval

COR : Crude Odds Ratio

DM : Diabetes Mellitus

ENA: Emergency Nutrition Assessment

FNL : Food and Nutrition Knowledge

GMP: Growth Monitoring and Promotion

GTP: Growth and Development Plan

HAZ: Height for Age Z score

HIV : Human Immune Deficiency Virus

HSTP: Health Sector Transformation Plan

MOH : Ministry of Health

SDG: Sustainable Development Plan

SMART: Standardizing Monitoring and Assessment of Relief and Transition

SPSS : Statistical Package for Social Science

SSA: Sub-Saharan Africa

WHO : World Health Organization

ABSTRACT

Background: Despite Growth, Monitoring and Promotion (GMP) service continual implementation as one of the health care priorities to assess and control growth faltering of children under 2 years old, yet there are high numbers of stunted children in Ethiopia. Therefore, this study aimed to identify the determinants of Stunting among children aged less than 24 Months in Hawassa City Selected Public Health Facilities, 2023/24.

Methods and materials: Institution based unmatched case-control study was conducted in Hawassa City, Ethiopia (May 1-June 15, 2024) to identify determinants of stunting among 120 cases and 240 controls. Data collection included face-to-face interviews and anthropometric measurements. Epi data version 4.6.0 and SPSS version 25 were used for data entry and analyses respectively. Descriptive statistics and logistic regression analyses were used to assess factors associated with the outcome variable. Statistical significance was set at p-value < 0.05.

Result: Accordingly, children who receive complementary feeding (AOR = 0.39, 95% CI: 0.16, 0.94), Children whose mothers attend ANC (AOR = 0.11, 95% CI: 0.038, 0.32), Children who received early breastfeeding (before one hour) (AOR = 0.36, 95% CI: 0.15, 0.84) and Children in households that treat drinking water (AOR = 0.04, 95% CI: 0.01, 0.10) were significantly less likely to be stunted. On the other hand, poor maternal knowledge regarding food and nutrition (AOR = 3.12, 95% CI: 1.36, 7.16), Children with a dietary diversity score below 4 food groups (AOR = 6.81, 95% CI: 2.50, 18.60), and Children born with a birth interval of less than 2 years (AOR = 11.58, 95% CI: 4.57, 29.30) are linked to higher risk to be stunted.

Conclusion: The study found that children with complementary feeding, early breastfeeding, and treated drinking water were less likely to be stunted, while poor maternal knowledge, limited dietary diversity, and short birth intervals increased the risk. It recommends to advocates for the timely introduction of complementary feeding, increased access to ANC services, improved maternal nutrition education, and widespread household water treatment methods.

Keywords: Stunting, Determinants, Case Control, Hawassa, Sidama Region, South Ethiopia

1. INTRODUCTION

1.1 Background

According to the World Health Organization (WHO), malnutrition refers to deficiencies, excesses or imbalances in a person's energy and nutrient intake (1). Types of malnutrition include undernutrition, over nutrition, specific deficiency diseases, and nutritional imbalances (2). Stunting is generally described as low height for age (HAZ), meaning a child with less than minus two standard deviations from the WHO new growth norms (3). Stunting reflects a process in which linear growth potential is not achieved due to suboptimal health and/or nutritional conditions. Stunting has become a consolidated risk indicator of inadequate child development, especially in sub-Saharan Africa (4).

The global variation in the prevalence of stunting is thought to range from 5 to 65% in the least developed countries. In developing countries, the prevalence of stunted growth begins to increase around three months of age and then decreases around three years of age (5). It has been noted that 90% of the world's stunted children live in 36 developing countries of which Sub-Saharan Africa and South Asia are home to three quarters of the world's stunted children (6, 7). In Sub-SaharanAfrica it dropped from 34.5% to 31.1%, but not enough to meet the global target (8).

Stunting and other forms of malnutrition reduce a child's chances of survival while impeding optimal health and growth. Stunting before age two predicts poorer cognitive and educational outcomes later in childhood and adolescence, with significant educational and economic consequences at the individual, family, and community levels (9). Malnutrition is one of the biggest health problems among children under five, leading to a loss of 16.5% of GDP in Ethiopia (10).

The United nation' sustainable development goals (SDGs) have marked stunting along with other nutrition indicators as the main focus areas to eradicate global malnutrition (11). Stunting is regarded by the Ethiopian government as a major public health issue and an obstacle to its economic goals(12). The Health Sector Transformation Plan (HSTP), part of GTP II, aimed to reduce mortality rates by 30 per 1,000 live births in less than five years in Ethiopia and reduce stunting to 26 % in less than five years (13).

1

While the effects of stunting are obvious, the causes are more complex (14). Poor nutritional and health status of a mother, inadequate dietary habits for infants and young children, micronutrient deficiencies and infections are primary factors leading to stunted growth (15-17).   To tackle stunning on a sustainable basis, it is important to interpret prevalence and cause factors at the local level. Therefore, this study aimed to identify the determinants of stunting among children aged less than 24 Months in Hawassa City Selected Public Health Facilities, 2023/24.

1.2. Statement of the problem

Malnutrition during the 'first 1000 days from conception to the second birthday has significant adverse effects on physical and cognitive health, as this period is critical for brain development and linear growth (18).

. Underweight children weigh less than they should for their age, indicating health and nutritional problems, such as recurring illnesses and/or undernourishment. Stunted children suffer from growth retardation as a result of persistent nutritional deficiencies, often resulting in delayed mental development, reduced intellectual capacity, and poor academic performance (2). Undernutrition accounts for 45% of deaths in children under the age of 5 worldwide (3).

According to the report, in 2020, 149.2 million (22%) children under the age of five were affected by stunting, and 45.4 million (6.7%) by wasting (4). In low- and middle-income countries, the prevalence of wasting, underweight, and stunting in children under 5 years was 6.3%, 13.7%, and 29.1%, respectively(5). A high prevalence of underweight (46.0%), stunting (41.9%), and wasting (24.7%) was observed in Tanzania in 2017(6). Undernutrition remains a serious challenge in Ethiopia. As a result, 45% of child deaths in Ethiopia are related to undernutrition, with a variety of causes (7).

Lack of dietary diversity and consumption of micronutrient-rich foods, as well as inappropriate eating habits among children, contribute to high rates of child undernutrition (8). Research shows that food/nutritional knowledge can play an important role in shaping a child's eating behaviour(9). Understanding available food and nutrition information and adhering to dietary guidelines can promote dietary diversity and nutritional adequacy (9).

Mothers are the most important providers of primary health care that their children need during the first six years of life (10). Limited maternal knowledge of food choices, nutrition, and health care contributes significantly to adverse nutritional outcomes for children in most developing countries. Various research findings indicate that maternal nutritional knowledge is a fundamental factor in improving a child's anthropometric parameters. A study conducted in Iran found that one of the factors that had a statistically significant association with anthropometric parameters was maternal nutritional knowledge, which was the mean score of

nutritional knowledge among mothers with wasting, underweight, and stunting children was lower than mothers with normal children (11).

Although, improving the nutrition knowledge of individuals, families and communities along the food value chain to make informed decision on the uptake of nutrition services is one of the objectives of the newly formulated food and nutrition policy of Ethiopia, yet little has known in this regard nationally(12). Moreover, identifying the link between food and nutritional knowledge and children's nutritional status is critical for developing effective prevention and control strategies in these age groups.

To the best of our knowledge, there are no similar studies reported in Hawassa City. Therefore, this study aims to identify the determinants of stunting among mothers with children aged between 0-24 months in Hawassa city selected public health facilities, 2023/24.

1.3. Significance of the study

In Ethiopia malnutrition in general and stunting specifically among young children is not only the worst, but also the mother's limited knowledge about food choices, feeding and health care seeking practices contributes significantly to negative nutrition outcomes for children.

Therefore, this study could minimize this gap through assessing the association of mother's nutrition and food knowledge with children stunting. Moreover, the assessed associated factors will contribute to generate data which could be used for better planning and strengthening the strategies and policies to reduce child stunting.

Findings from this study would help program managers on how to reduce child stunting and consequently, improve child nutritional status in the study areas and probably other parts of the country with similar problems.

2. LITERATURE REVIEW

2.1 Burden of stunting among 0-24 months children

Globally, Stunting has affected about 178 million under five children and the two continents; Asia and Africa are the home to most children who are stunted (13). In Africa, one in three children are stunted, and the greatest share of the prevalence limited to 14 countries including Ethiopia which are home to 80% of stunting among children in the world (14).Ethiopia, the trend of stunting has revealed a decreasing pattern over the last 8 years from 44% in 2011 to 37% in 2019.However, this does not mean that the intended target has attained nationally (15).

The government of Ethiopia has taken several steps toward reducing undernutrition in the country. The recently endorsed 2019 Food and Nutrition Policy aims to achieve optimal nutritional status throughout the life cycle via coordinated implementation of nutrition-specific and nutrition sensitive interventions. In addition, through the Seqota Declaration, Ethiopia has committed to ending Stunting in children under age 2 by 2030 (15).

2.1 Determinants of stunting among 0-24 months children

2.1.1 Socio-economic and demographic factors

According to the cross-sectional study conducted in the Gaza Strip, found that large family size was associated with child stunting (21). Another study found that educational status of mother has significant association with children stunting (22).Another study reported that those with poor wealth quintile and food insecure households had shown strong association with children stunting (24).

2.1.2 Child health and feeding practices related factors

A Bayesian multilevel approach study in sub-Saharan African countries revealed that sex and age of a child was found to be positively associated with a child stunting(22).Another community based cross sectional study done in Northwest Ethiopia found that being female and increased child age had significant association with child stunting(23).According to the results from study conducted in Central rural China in 2019 found that children who didn't meet the minimum requirements of dietary diversity and having below 4 meal frequencies was at risk of being a stunted (24). Similarly; a case control study done in North East Ethiopia showed that not fed colostrums, breast fed for less than 24 months and non-

6

exclusive breast feeding were identified as the determinants of stunting (25). Likewise, another study done in Ethiopia also found that children with undiversified food were stunted (29).

2.1.3 Maternal obstetric and reproductive health related factors

A community based cross sectional study found that stunting was more prevalent among children born from mothers who do not use family planning (26).A Bayesian multilevel approach study among children in sub Saharan African Countries evidenced that children who born at home was more affected by stunting than born at health institution children (22). Another study done in Ethiopia reported that number of children in the household was associated with stunting (29).

2.1.4 Environmental factors

A study found that unimproved toilets, unsafe feces disposal, source of drinking water and not washing hands during child feeding had found to be significantly associated with child stunting (29). Another study also found that using unprotected water for drinking purpose had found to be significantly associated with children stunting (27).

2.8 Conceptual framework

This framework provides a comprehensive approach to studying the determinants of stunting. By considering factors across these categories, we could gain a deeper understanding of the complex interplay of influences that contribute to this public health challenge (Figure 1).

Figure 1: Conceptual framework for determinants of Stunting among children aged less than 24 Months in Hawassa City Selected Public Health Facilities, 2023/24.

Source: adapted by literature review different peer reviewed articles (21, 23, 25, 28).

3. OBJECTIVES OF THE STUDY

- To identify the determinants of Stunting among children aged less than 24 Months in Hawassa City Selected Public Health Facilities, 2023/24.

4. METHODS AND MATERIALS

4.1 Study area

The study was planned to be conducted in Hawassa city, which served as the capital city of the Sidama region. Located 275 kilometers south of Addis Ababa, the city was surrounded by various administrative zones:North: Oromia Regional State, West Arsi Zone; West: Hawassa Zuria Woreda; Southwest: Boricha Woreda; Southeast: Malga Woreda; South: Shabadino Woreda and Southeast: Wondogent Woreda, and Oromia Region. According to projections from the Central Statistical Authority of Ethiopia, the total population of Hawassa city was estimated to be 436,992. This population was divided as (male: 224,907 / 51.4%) and female (212,085 / 48.6%).The city had 7 hospitals, with 3 of them being governmental (1 referral, 1 general, and 1 public primary). The remaining 4 were primary private facilities. Additionally, there were 11 health centers (10 public and 1 NGO) and 17 health posts.

4.2 Study design and period

Facility based unmatched case-control study design was used to identify the determinants of stunting among mothers with children aged between 0-24 months in selected public health facilities in Hawassa City, Southern Ethiopia from May 1-June 15, 2024.

4.3 Source and study population

4.3.1 Source population

- The source population for this study were all mothers or caregivers with children aged between 0-24 months who will visit public health facilities in Hawassa City, Southern Ethiopia

4.3.2 Study population

- The study population were all mothers or caregivers with children aged between 0-24 months attending randomly selected public health facilities in Hawassa City, Southern Ethiopia

4.4. Cases and Controls

4.4.1 Cases

- Cases were defined as children aged between 0-24 months who were diagnosed with stunting, as per the World Health Organization's definition of height-for-age z-score below two standard deviations from the median of the WHO Child Growth Standards(25).

4.4.2 Controls

- Controls were selected from the study population and consisted of children aged between 0-24 months that did not have stunting.

4.5 Inclusion and exclusion criteria

4.5.1 Inclusion criteria for Cases

- All mothers/caregivers with their children aged less than 2 years who were stunted at Hawassa City Public Health facilities were included in the study.

4.5.2 Inclusion criteria for Controls

- All mothers/caregivers with their children aged less than 2 years who were not stunted at Hawassa City Public Health facilities were included in the study.

4.5.3 Exclusion criteria Cases:

- Mothers/caregivers having children aged less than 2 years who have lived in the study area for less than 6 months,
- Critically sick mothers/caregivers, and
- Mothers with children suffering from medical conditions affecting growth.

4.5.4 Exclusion criteria Controls:

- Mothers/caregivers having children aged less than 2 years who have lived in the study area for less than 6 months,
- Critically sick mothers/caregivers, and
- Mothers with children suffering from medical conditions affecting growth.

4.6 Sample Size determination

Sample size was determined by using a double population proportion using Epi-info version 7.1 considering the proportion of % of Controls exposed 35.5%, level of confidence 95%, power of the study 80% and Ratio of controls over cases 2:1 and AOR=2. Then by substituting the above values in to the Stat Calc, 109 cases and 218 controls are obtained. Then after adding of 10% for the potential none response rate was considered as the result the final minimum calculated sample size of 360 (120 cases and 240 controls) (Table 1).

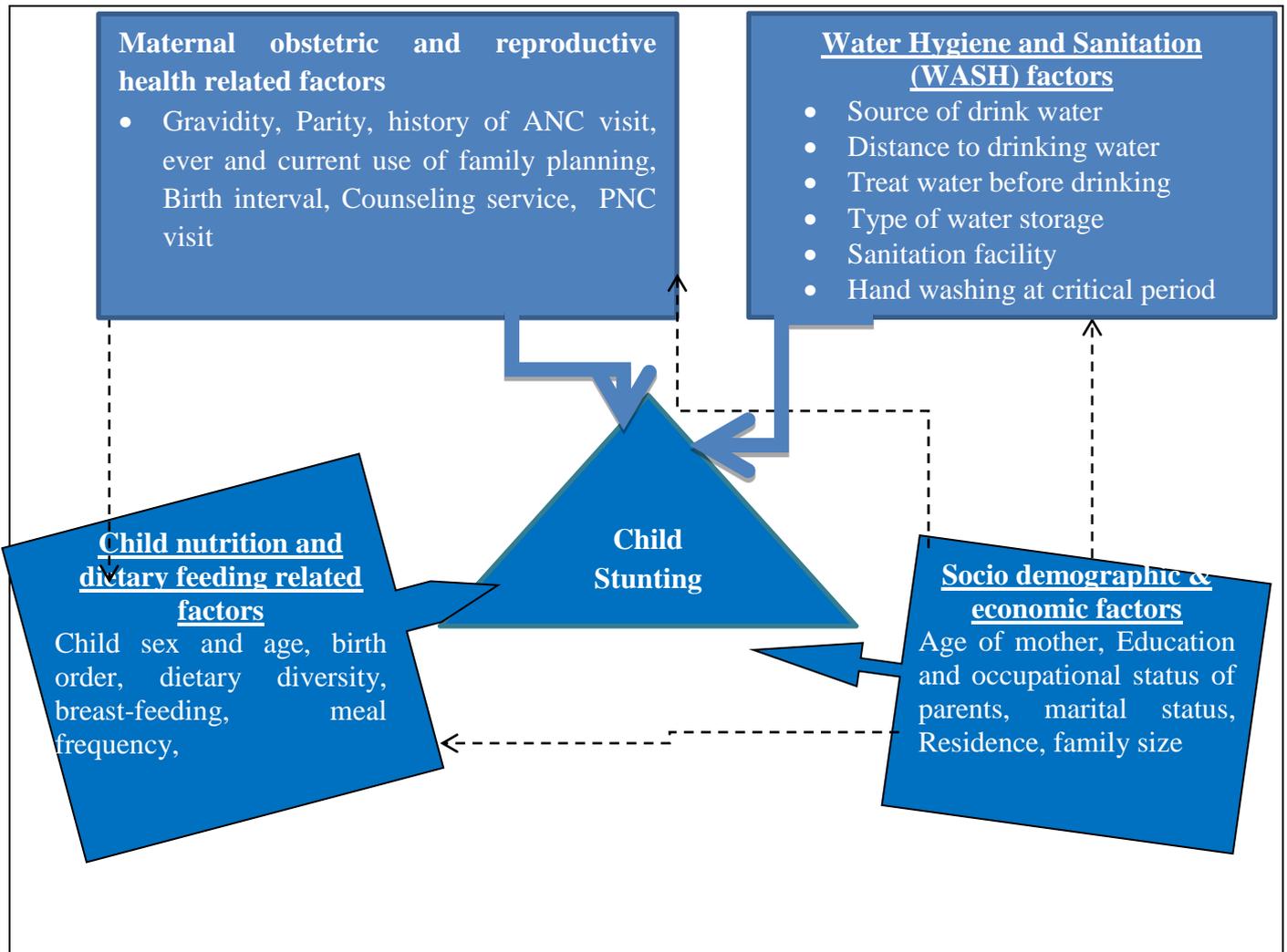Table 1: Sample size determination for determinants of stunting among children aged less than 24 Months in Hawassa City Selected Public Health Facilities, 2023/24.

Variable	CI (%)	Power	Ratio	% of controls exposed	AOR	Sample size		Ref
						Case	Control	
Wealth status Poor	95	80	2:1	39	2.4	100	200	(19)
Household food insecurity Severely insecure	95	80	2:1	25.4	2.9	52	103	(20)
Meal frequency ≤ 4 meals/day	95	80	2:1	35.5	2	109	218	(21)

4.7. Sampling technique and procedure

Three health centers and one hospital (Millennium Health, Adare and Tilte Health Centers, and Alamura Hospital) were selected using a simple random sampling technique with a lottery method. The determined sample size was then distributed proportionally based on the number of clients at each health center. Because the number of cases was expected to be rare, all identified cases were included in the study until the proportionally allocated sample size was reached during the study period. Subsequently, for each case, two controls from the same day were selected. If a woman had more than one child under 2 years old, one child was chosen using a lottery method (Figure 2).
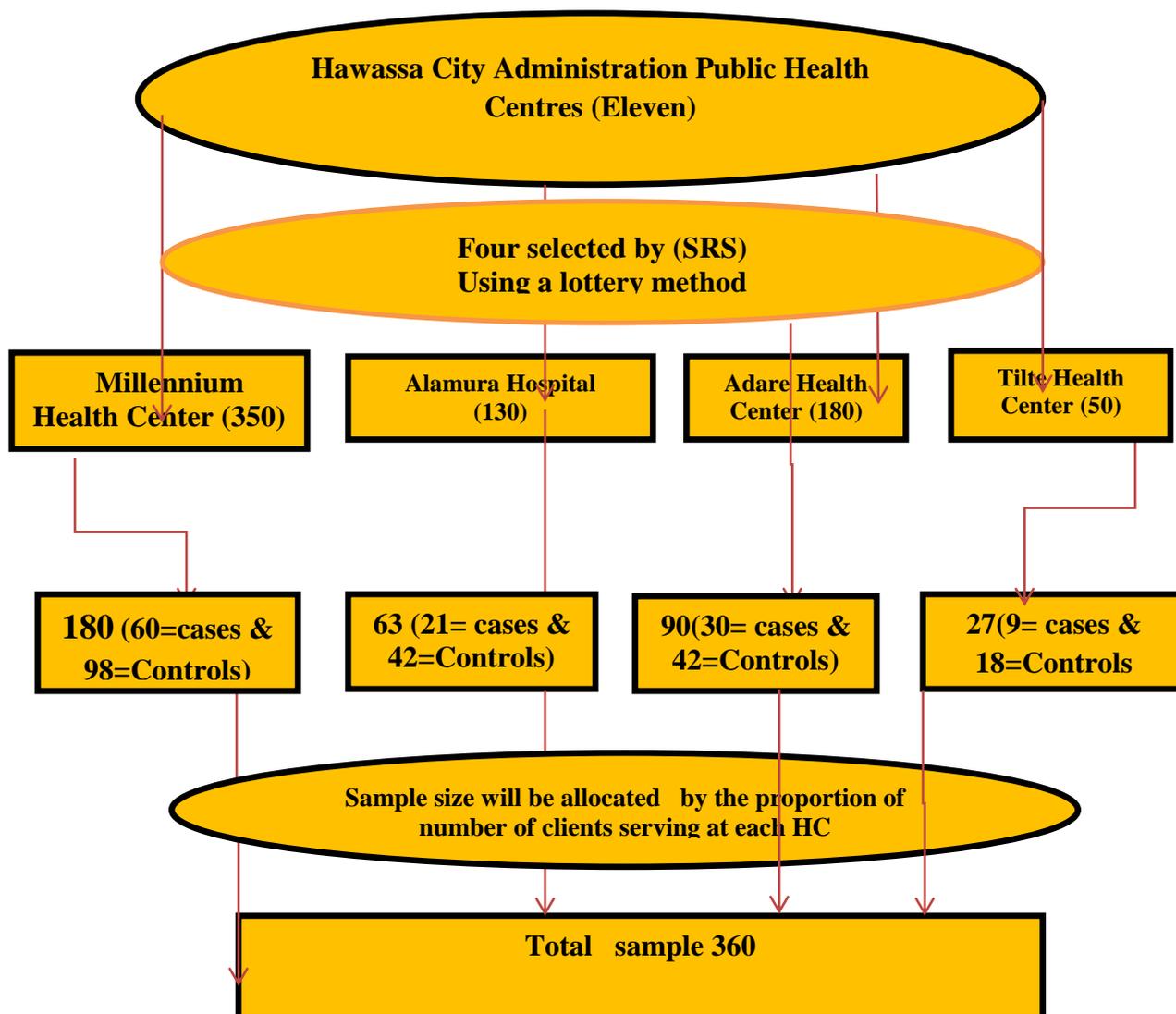
Figure 2: Schematic presentation of sampling procedure to identify the determinants of Stunting among children aged less than 24 Months in Hawassa City Selected Public Health Facilities, 2023/24.

4.8 Study variables

4.8.1 Dependent variable

Stunting (Yes/ No)

4.8.2. Independent variables

- **Socio demographic & economic factors** (Age of mother, Education and occupational status of parents, marital status, Residence, family size, income)

- **Maternal obstetric and reproductive health related factors** (Gravidity, Parity, number of <2 years children, history of ANC visit, ever and current use of family planning, Birth interval, Counseling service, PNC visit)

- **Child health & dietary characteristics** (Sex, age, birth order, illnesses, dietary diversity, breast-feeding, meal frequency, tea and coffee drinking habit)

- **Environmental factors** (Availability of improved water, water storage mechanism, Sanitation facility, and hand washing at critical period)

4.9. Operational definition and terms

Stunting: Defined as a child with a height for-age Z-score (HAZ) less than minus two standard deviations (<-2 SD)(25).

Dietary diversity score*:* This is the number of food groups consumed by a child aged 6 to 23 months in the last 24 hours out of seven food groups which include (i) grains, roots, and tubers; (ii) legumes and nuts; (iii) dairy products; (iv) flesh foods; (v) eggs; (vi) vitamin-A-rich fruits and vegetables; and (vii) other fruits and vegetables (22).

Minimum dietary diversity: A child aged 6 to 23 months having the minimum diet diversity in the last 24 hours he or she consumed at least four food groups out of the seven food groups. Thus, a child with a DDS of less than five was classified as poor dietary diversity while a DDS of greater than five was good dietary diversity (22)

4.10. Data collection instrument, methods and procedures

The questionnaire were constructed by adapting from previous peer reviewed and published articles. Initially prepared in English (Annex-3) and then translated into Amharic (Annex 6) language by a language expert for both languages, and then it was translated back to English to check its consistency. The data were collected by through a face-to-face interview technique and anthropometric measurements by four trained degree holder nurses and supervised by one master of public health professional. The tool has mainly addresses Socio-economic and demographic factors, maternal obstetric and reproductive health factors, child health & dietary related factors, environmental factors, and maternal food and nutrition knowledge. Anthropometric data were gathered through anthropometric measurements through referring to different national and global standards. Height was measured using

measuring board without shoe in lying down position and recorded to the nearest 0.1 cm. The weight and height of the children was converted into weight-for-age and height-for-age standard deviation units (z-scores) using ENASMART software based on WHO Child Growth Standards.

4.12 Data quality assurance

To assure the quality of data, properly designed data collection instruments were provided after appropriate training for data collectors and supervisors. The training was include a briefing on general objectives of the study, approach of study participants; approach in the instrument, data collection procedure, and how to access the study participants, data submission, data handling and time management. The questionnaire was pretested prior to the actual data collection on 5 % of the sample size in Adare Hospital and no amendment was done. The overall activity of data collection was supervised and coordinated by the principal investigator. The collected data were checked for consistency, completeness and relevance on a daily basis during the entire data collection by the supervisors and principal investigator.

4.13 Data processing and analysis

The collected data were coded, cleaned and entered to Epi-data version 4.6 and exported to statistical package for social science (SPSS) version 25.0 for analysis. Descriptive statistics run to describe the data based on the distribution of the data. Nutritional indices (HFA) determined using the Emergency Nutrition Assessment (ENA) for Standardizing Monitoring and Assessment of Relief and Transition (SMART) 2011 software and nutritional status determined in reference to age and sex specific growth charts. Bivariable and multivariable binary logistic regression analysis were conducted to identify the determinant factors. Variables which showed statistical significance during bivariable analysis at (p-value <0. 25) were entered into multivariable logistic regression to control the potential confounding variables. Multicollinearity was checked by using Variance Inflation Factor and the value was less than 5. The Hosmer-Lemeshow's test used to check the model fitness for analysis. Adjusted odds ratios (AOR) with 95% CI were used to assess the strength of associations and statistical significance were declared at a p-value < 0.05. Results were presented using tables, figure, and texts.

4.13 Ethical considerations

The study proposal was reviewed and approved by the Pharma College Institutional Research Ethics Review Committee (PC-IRERC) before commencement. Based on the approval, a research ethical clearance letter was written to Hawassa City Health Department. Likewise, the city Health department wrote a supporting letter to the health centers for cooperation. The study ensured that parents/guardians of participating children were provided with clear and concise information about the study objectives, procedures, and potential risks and benefits. Informed consent was obtained before data collection. All participant data was anonymized and kept confidential. Data collection was conducted in a way that protected the privacy of participants and their children. The study procedures were designed to minimize any potential risks to participants. The potential benefits of the study in contributing to knowledge about stunting outweighed any minimal risks to participants. Furthermore, all the study participants were encouraged to participate in the study and were also informed that they had the right not to participate

4.14. Dissemination of Results

The final finding of this study will be submitted to Pharma College School of Public Health for a partial fulfillment of the requirements for the degree of Master of Public Health in Reproductive Health and the finding will present be defended publicly. Moreover, manuscript will be prepared and an attempt for publication will be considered.

5. RESULTS

5.1 Socio-demographic & economic characteristics

The Table 2 reveals several statistically significant differences between cases and controls regarding maternal and sociodemographic characteristics. The mean (±SD)) age of mother among controls 29.05 (±5.11) years and for cases 31.17 (±4.90) years is statistically different (p-value < 0.001). Similarly, a significantly higher proportion of mothers in the case group were aged ≥35 years (25.0%) compared to controls (10.0%). Likewise, mothers in the case group have had larger families (≥5 members) compared to mothers in controls group (53.3% vs. 26.7%)

Table 2: Socio-demographic & economic characteristics of mothers with children less than 24 months of age in Hawassa City Selected Public Health Facilities, 2023/24.

Variable	Category	Control No (%)	Case No (%)
Age of mothers	≤25 years	54 (22.5)	12 (10)
	26-34 years	160 (66.7)	78 (65)
	≥35 years	26 (10.8)	30 (25)
Residence	Urban	206 (85.8)	104 (86.7)
	Rural	34 (14.2)	16 (13.3)
Educational status of mothers	No formal Education	57 (23.8)	34 (23.3)
	Primary	97 (40.4)	38 (31.7)
	≥Secondary	86 (35.8)	48 (40)
Educational status of husband	No formal Education	8 (3.3)	11 (9.2)
	Primary	86 (35.8)	32 (31.7)
	Secondary	56 (23.3)	12 (10)
	Tertiary & above	90 (37.5)	59 (49.2)
Maternal occupation	Merchant	86 (35.8)	70 (58.3)
	Housewife	115 (47.9)	32 (26.7)
	Others*	39 (16.3)	18 (15)
Occupation of husband	Government employee	100 (41.7)	79 (65.8)
	NGO employee	54 (22.5)	14 (11.7)
	Merchant	55 (22.9)	18 (15)
	Others#	31 (12.9)	9 (7.5)
Marital status	Married	230 (95.8)	112 (93.3)
	Others	10 (4.2)	8 (6.7)
Family size	<5	112 (46.7)	32 (26.7)
	≥5	128 (53.3)	88 (73.3)

***: student, private employee, government employee, merchant; # Daily laborer, private employee, students**

5.2 Maternal Obstetrics and reproductive health characteristics

Mothers of cases were significantly less likely to be multigravida (had more than one pregnancy) compared to mothers of controls (72.1% vs. 85.0%, p<0.001). However, Parity showed no significant difference. Cases were considerably more likely to have had a birth interval of less than two years compared to controls (40.8% vs. 80.8%, p<0.001). This indicates closer pregnancies might be a risk factor for the cases. Similarly, mothers among cases were significantly less likely to have received ANC visits (87.5% vs. 70.0%, p<0.001) and postnatal care (PNC) (67.5% vs. 36.7%, p<0.001) compared to mothers among controls. Mothers among cases were significantly more likely to have poor maternal food and nutrition knowledge compared to mothers among controls (38.3% vs. 72.5%, p<0.001) (Table 3).

Table 3: Obstetrics and reproductive health characteristics of mothers with children less than 24 months of age in Hawassa City Selected Public Health Facilities, 2023/24

Variables	Categories	Control No (%)	Case No (%)
Gravidity	Primigravida	67 (27.9)	18 (15)
	Multigravida	173 (72.1)	102 (85)
Parity	Primiparous	36 (15)	16 (13.3)
	Multiparous	204 (85)	104 (86.7)
Birth interval in years	<2	98 (40.8)	97 (80.8)
	≥2	142 (59.2)	23 (19.2)
History of ANC visit	Yes	210 (87.5)	84 (70)
	No	30 (12.5)	36 (30)
Place of delivery	Health facility	196 (81.7)	91 (75.8)
	Home	44 (18.3)	29 (24.2)
Ever use of family planning	Yes	179 (74.6)	87 (72.5)
	No	61 (23.4)	33 (27.5)
Have you received Nutrition Counseling service during ANC	Yes	188 (78.3)	85 (70.8)
	No	52 (21.7)	35 (29.2)
Do you have PNC	Yes	162 (67.5)	44 (36.7)
	No	78 (32.5)	76 (63.3)
Maternal Food & Nutrition Knowledge	Poor	92 (38.3)	87 (72.5)
	Good	148 (61.7)	33 (27.5)

18

5.3 Infant and young child feeding characteristics

The sex distribution of children in both cases and controls was similar, with no statistically significant difference (p > 0.05). A significantly higher proportion of children in the control group had ever been breastfed compared to controls (95.8% vs. 76.7%, p < 0.05). Children in the control group were more likely to have started complementary feeding compared to cases (84.2% vs. 65%, p < 0.05). Children in the control group had significantly greater dietary diversity compared to cases. A substantially higher proportion of controls consumed at least 4 food groups (86.3% vs. 43.8%, p < 0.05). Children in the control group were significantly more likely to consume Vitamin A rich fruits and vegetables compared to cases (88.4% vs. 11.6%, p < 0.05). However, no significant difference was observed in the consumption of other fruits and vegetables between cases and controls (Table 4).

Table 4: Infant and young child feeding characteristics in Hawassa City Selected Public Health Facilities, 2023/24.

Variables	Categories	Case No (%)	Control No (%)
Sex of the child	Male	96 (40)	59 (49.2)
	Female	144 (60)	61 (50.8)
Age of the child	<6months	21 (8.8)	25 (20.8)
	6-11 months	84 (35)	22 (35)
	12-23 months	135 (56.3)	33 (44.2)
How long after birth, did you first put the child to breastfeed?	Within one hour	197 (82.1)	64 (53.3)
	After one hour	43 (17.9)	56 (46.7)
Has the child started complementary feeding	Yes	202 (84.2)	78 (65)
	No	38 (15.8)	42 (35)
Did your child consume Grains, white roots, and tubers	No	86 (39.3)	85(57.9)
	Yes	133 (60.7)	40 (42.1)
Legumes and nuts	No	138 (63)	76 (80)
	Yes	81 (37)	19 (20)
Milk and dairy foods	No	97(44.3)	61 (64.2)
	Yes	122 (55.7)	34 (35.8)
Flesh foods	No	147 (67.1)	79 (83.2)
	Yes	72 (32.9)	16 (16.8)
Eggs	No	97(44.3)	73 (76.8)
	Yes	122 (55.7)	22 (23.2)
Vitamin A, fruits, & végétales	No	110 (50.2)	84 (88.4)
	Yes	109 (49.8)	11 (11.6)
Other fruits and vegetables	No	115 (52.5)	55 (57.9)
	Yes	104 (47.5)	40 (42.1)
Minimum meal frequency (MMF)	< 3 times a day	60 (27.4)	32 (33.7)
	≥3 times a day	159 (72.6)	63 (66.3)

Dietary diversity	< 5 food groups	123 (56.2)	82 (86.3)
	≥ 5 food groups	96 (43.8)	13 (13.7)

5.4 Water, Sanitation, and Hygiene (WASH) practices

Table 5 shows that mothers of children among cases group were more likely to have unimproved drinking water sources compared to mothers of children's among controls (76.3% vs. 63.3%). Additionally, mothers of controls group were more likely to treating water before drinking (76.7% vs. 23.3%). Likewise, mothers of children among controls were more likely to have improved latrines compared to mothers of children among cases (76.7% vs. 85%).

Table 5: Water, Sanitation, and Hygiene (WASH) practices related characteristics of mothers with children less than 24 months of age in Hawassa City Selected Public Health Facilities, 2023/24.

Variables	Categories	Control No (%)	Case No (%)
Drinking water source	Improved sources [a]	183(76.3)	76 (63.3)
	Unimproved sources [b]	57 (23.7)	44 (36.7)
Do you treat water before drinking	Yes	178(74.2)	28 (23.3)
	No	62 (23.8)	92 (76.7)
Wash hands before feeding a child	No	40 (16.7)	46 (38.3)
	Yes	200 (83.3)	74 (61.7)
Hand washing after visiting a toilet	No	44 (18.3)	47 (39.2)
	Yes	196 (81.7)	73 (60.8)
Hand washing after cleaning animal dung	No	56 (23.3)	75 (62.5)
	Yes	184 (76.7)	45 (37.5)
Hand washing before food preparation	No	44 (18.3)	65 (54.2)
	Yes	196 (81.7)	55 (45.8)
Type of latrine	Improved [c]	204 (85)	92 (76.7)
	Unimproved [d]	36 (15)	28 (23.3)

[a]: *Public Tab, Protected spring, Pond, Well, Private tap;*
[b]: *Unprotected spring, Pond, Well and River:*
[c]: *flush/pour flush toilets to piped sewer systems, septic tanks, and pit latrines; ventilated improved pit (VIP) latrines; pit latrines with slabs;*
[d]: *Open field, shared latrine*

5.5 Determinants of stunting among <24 months children

In the bivariable binary logistic analysis, 11 variables were found to be significant at a p-value <0.25 with a 95% confidence interval. These variables were further analyzed in a multivariable binary logistic regression model to adjust for confounding variables. According to the final multivariable logistic regression analysis, 7 variables were identified as independent determinants of children stunting.

Accordingly, children who receive complementary feeding were significantly 59% less likely to be stunted (AOR = 0.39, 95% CI: 0.16, 0.94) as compared to their counterparts. Poor maternal knowledge regarding food and nutrition was associated with a three times higher risk of stunting in children (AOR = 3.12, 95% CI: 1.36, 7.16).

Children with a dietary diversity score below 4 food groups were significantly more likely to be stunted (AOR = 6.81, 95% CI: 2.50, 18.60) as compared to Children with a dietary diversity score of above 4 food groups. Children born with a birth interval of less than 2 years had a much higher risk of stunting (AOR = 11.58, 95% CI: 4.57, 29.30) compared to those with a longer interval. Children whose mothers attend ANC were 89% less likely to be stunted (AOR = 0.11, 95% CI: 0.038, 0.32). Children who received early breastfeeding (before one hour) was 64% less likely of being stunted (AOR = 0.36, 95% CI: 0.15, 0.84). Children in households that treat drinking water were significantly less likely to be stunted (AOR = 0.04, 95% CI: 0.01, 0.10) (Table 6)

Table 6: Output of bivariable and multivariable binary logistic regression result of determinants of stunting among mothers with children less than 24 months of age in Hawassa City Selected Public Health Facilities, 2023/24

Variables	Category	Controls	Cases	COR	AOR
		No (%)	No (%)	(95% CI)	(95% CI)
Complementary feeding started	Yes	202 (84.2)	78 (65)	0.34 (0.21,0.58)	0.39 (0.16,0.94)*
	No	38 (15.8)	42 (35)	1	1
Maternal Food and Nutrition Knowledge	Poor	92 (38.3)	87 (72.5)	4.24 (2.63,6.83)	3.12 (1.36,7.16)**
	Good	148 (61.7)	33 (27.5)	1	1
Birth Interval	<2	98 (40.8)	97 (80.8)	6.11 (3.62,10.30)	11.58 (4.57,29.30)***

	≥2	142 (59.2)	23 (19.2)	1	1
Dietary Diversity Score (food groups)	< 4	123 (56.2)	82 (86.3)	4.74 (2.60,8.64)	6.81 (2.50,18.60)***
	≥ 4	96 (43.8)	13 (13.7)	1	1
Ever use of family planning	Yes	179 (74.6)	87 (72.5)	0.89 (0.54, 1.47)	0.78 (0.30, 2.00)
	No	61 (23.4)	33 (27.5)	1	1
Previous history of ANC visit	Yes	210 (87.5)	84 (70)	0.33 (0.19, 0.57)	0.11 (0.038, 0.32)***
	No	30 (12.5)	36 (30)	1	1
Nutrition Counseling during ANC	Yes	188 (78.3)	85 (70.8)	0.67 (0.40, 1.10)	0.48 (0.19, 1.16)
	No	52 (21.7)	35 (29.2)	1	1
Initiation of breast feeding time	Within one hour	197 (82.1)	64 (53.3)	0.24 (0.15, 0.40)	0.36 (0.15, 0.84)*
	After one hour	43 (17.9)	56 (46.7)	1	1
Mother Educational Status	No formal Education	57 (23.8)	34 (23.3)	1.06 (0.61, 1.85)	0.49 (0.19, 1.27)
	Primary	97 (40.4)	38 (31.7)	0.70 (0.41, 1.17)	0.63 (0.27, 1.47)
	≥ Secondary	86 (35.8)	48 (40)	1	1
Treating water before drinking	Yes	178(74.2)	28 (23.3)	0.10 (0.06, 0.17)***	0.04 (0.01, 0.10)***
	No	62 (23.8)	92 (76.7)	1	1
Family size	<5	112 (46.7)	32 (26.7)	0.41 (0.25, 0.67)	0.88 (0.39, 1.98)
	≥5	128 (53.3)	88 (73.3)	1	1

NB: 1= Reference, *=significant at p<0.05, **=significant at p<0.001

6. DISCUSSION

This study aimed to investigate determinants of stunting among children under 24 months in Hawassa City public health facilities. Thus, findings highlights the complex interplay of dietary practices, maternal knowledge and care, birth spacing, early infant feeding practices, and water quality in influencing childhood stunting. These findings provide valuable insights for public health interventions aimed at reducing stunting prevalence in Hawassa City. Efforts should focus on promoting optimal complementary feeding, dietary diversity, maternal nutrition education, ANC attendance, adequate birth spacing, early breastfeeding initiation, and access to safe drinking water.

This study in where resource limitations might affect access to nutritious foods, found that children who received breastfeeding within the first hour of birth were 64% less likely to experience stunting. This aligns with previous research showing a higher prevalence of stunting among children not breastfed early (17, 23, 24). These findings emphasize the ongoing importance of promoting and supporting breastfeeding practices, especially in such settings. Exclusive formula feeding can limit dietary diversity, reducing essential nutrient intake crucial for growth Breast milk, (25) on the other hand, fosters a healthy gut microbiome, enhancing nutrient absorption and immune function, both of which are essential for preventing stunting (8).

Study have indicated that a child's growth and development are adversely affected by closely spaced pregnancies(26). Our study findings revealed that children born to mothers with a birth interval of <2 years had a 11 times higher likelihood of stunting compared to those with shorter intervals. Consistent with this, numerous studies (27-29) have shown that short birth intervals are associated with an increased risk of stunting, while longer intervals are associated with a decreased risk (30-32). This might be due to the fact that consecutive pregnancies spaced closely together reduces the maternal recovery time and nutrient replenishment (33). Another possible explanation could be that, having a limited nutrient replenishment time during pregnancy can lead to malnutrition, with a significant link between stunting and chronic energy deficiencies in mothers found (17). Having a longer birth interval is associated with an average increase of hemoglobinlevel (34), may significantly reduce stunting in children by improving maternal health and nutrient status, (35) and also by providing mothers with more time, energy, and resources to breastfeed and feed their children

(36). This suggests that increasing the demand for family planning use is necessary to ensure the best possible health and development of children throughout crucial times.

The 2016 revised WHO guideline incorporates nutrition into ANC services, providing opportunities for nutrition counseling for women on maternal diet and weight gain during pregnancy(37). Our study provides strong evidence supporting the importance of integrating such counseling into ANC services. Accordingly children whose mothers have had history of ANC had 89% reduced odds of being stunted compared to their counterparts. In line with this, a systematic review and meta-analysis study reported that, counseling during ANC visits significantly reduce stunting by 18%, improvement in mean birth weight by 46 g, and birth length by 0.20 cm (38). Another meta-analysis study found that Nutrition education has significantly improved gestational weight gain by 0.45 kg, reduced anaemia risk by 30%, increased birth weight by 105g, and reduced preterm delivery risk by 19% (39). Moreover currently available evidences also reported the relevance of nutrition counseling during pregnancy on optimizing gestational weight gain(40), increase birth weight(41), reduce anemia(42), improve dietary intake (43)and lower preterm delivery risk, especially in undernourished populations with nutrition support (44).. This implies that health workers should prioritize nutritional counseling services for pregnant women, especially undernourished ones, to ensure successful counseling and potentially improve maternal and child health outcomes.

Numerous studies have reported the advantageous effects of maternal food and nutrition knowledge on children's nutritional outcomes (45-47). The study found a significant association between maternal food and nutritional knowledge and child stunting. Children whose mothers have poor maternal knowledge regarding food and nutrition was associated with a three times higher risk of stunting in children. This finding is consistent with previous studies that found a significant relationship between stunting and maternal nutritional knowledge (48-53). The similarities might be attributed to different reasons, one possible reason may be that a mother who empowered with the appropriate knowledge of nutrition and food knows how to feed her children on time, prepare healthy meals, and aware of early signs of diseases to her sick child (54). Another reason may be that, the nutrition information disseminated via television, internet, and social media may have boosted her' awareness of food and nutrition. Additionally, educational attainment and socioeconomic status have been found to be positively correlated with maternal nutrition knowledge in previous studies (55,

56). This result implies the need for overarching nutrition education programs for pregnant mothers, particularly those who are undernourished, to improve their knowledge and practices regarding child feeding and nutrition.

On the other hand, children living in households that treat drinking water were significantly less likely to be stunted. This is consistent with different studies conducted in Ethiopia (57-59). However, studies reported that having access to improved water is statistically insignificantly associated with the prevalence of stunting (60, 61).The study's discrepancies may be due to variations in measurements, designs, sample sizes, and confounding variables. In fact, the use of household water treatment curbs diarrhea and boosts microbiological quality (62). Moreover, contaminated water, containing pathogens like Giardia lamblia and Cryptosporidium, can cause chronic diarrhea infections, and stunted growth (62). Therefore, this result implies that, in order to lower childhood stunting, public health interventions should priorities hand-washing and access to clean water through behavioral modification, infrastructural development, and water quality monitor.

This study's finding that children receiving complementary feeding were 59% less likely to be stunted compared to those who did not aligns with a substantial body of evidence demonstrating the crucial role of complementary feeding practices in preventing childhood stunting (63, 64). This might be due to the reason that complementary feeding expands a child's dietary profile by introducing diverse foods beyond breast milk, increasing their intake of essential nutrients for growth and development (64-66). This implies the protective effect of complementary feeding on childhood stunting, suggesting that promoting breastfeeding alongside complementary feeding practices can significantly improve child growth and development.

On the other hand, this study's finding that children with a dietary diversity score (DDS) below 4 food groups were significantly more likely to be stunted aligns with a substantial body of research demonstrating the protective effect of dietary diversity on child growth. In line with a study found a significant association, where children with a higher DDD score had a lower risk of stunting (67). A diverse diet, reflected by a higher DDS, provides a wider range of essential nutrients like protein, vitamins, and minerals crucial for linear growth and development (68). Conversely, a low DDS (below 4 food groups) suggests a limited dietary intake, potentially lacking key nutrients. This deficiency can hinder the child's ability to achieve optimal growth and potentially lead to stunting (5, 69).

7. STRENGTH AND LIMITATION OF THE STUDY

7.1 Strength of the study

- Using a Case Control study design for identifying potential factors that might increase the risk of stunting among mothers with children under 24 months.

7.2 Limitation of the study

- **Recall Bias**: Mothers in the case group may be more likely to recall past exposures (such as illnesses or dietary habits) that they believe are connected to their child's stunting, compared to the control group. This can also lead to inaccurate results.

- **Confounding:** Other factors not considered in the study design may influence the development of stunting in children. Without accounting for these factors, it can be difficult to isolate the true effect of the investigated risk factors.

8. CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion

The findings reveal several critical factors influencing a child's risk of stunting. Dietary Practices: Complementary feeding significantly reduces stunting risk. A diverse diet with at least four food groups offers significant protection against stunting. Maternal Knowledge and Care: Poor maternal knowledge about food and nutrition increases stunting risk. Attending antenatal care services significantly decreases stunting risk. Birth Spacing and Early Practices: Adequate birth spacing and early breastfeeding initiation reduce stunting risk. Water Quality: Children in households treated their drinking water less likely to be stunted.

8.2 Recommendations

Based on the results, the following recommendations are suggested:

- **Public health interventions:**
  - Promote and support early initiation and continued breastfeeding practices.
  - Develop and implement educational programs to improve maternal knowledge of child nutrition and complementary feeding practices.
  - Encourage ANC attendance and integrate child growth monitoring and nutritional counselling into ANC services.
- **Community-based interventions:**
  - Promote strategies to improve dietary diversity in households with young children.
  - Raise awareness about the importance of treating drinking water at home.
  - Encourage optimal birth spacing through family planning education and services.

Further research is warranted to explore the specific mechanisms by which these factors contribute to stunting in this context. By addressing these factors through targeted interventions, significant progress can be made in reducing the burden of childhood stunting in Hawassa City and similar settings

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9. ANNEXES

9.1. Information sheet

Introduction

My Name is_____ I am, a data collector working on a research project led by Principal Investigator Samrawit Ermiyas, a Master of Public Health student at Pharma College Hawassa Campus, School of Public Health. This research is supervised by Mr. Abdela Amano from Hawassa University College of Medicine and Health Sciences. We are inviting you to participate in a study investigating the factors that contribute to stunting (slow growth and development) in children under 2 years old. Stunting is a significant public health concern in our region. This information sheet provides details about the study. There is no pressure to decide right away. You can take your time to read the information and discuss it with anyone you feel comfortable with before making a decision. Please feel free to ask me to explain anything you don't understand or if you have any questions throughout the process. You can also reach out to the Principal Investigator, Samrawit Ermiyas, for further information

What is the purpose of this study?

The purpose of this study is to investigate the **determinants** associated with stunting in children under 2 years old attending selected public health facilities in Hawassa City. Stunting, defined as chronic inadequate linear growth, is a significant public health concern with detrimental consequences for child health and development. It is linked to increased risk of morbidity and mortality, impaired cognitive function, and reduced adult productivity. Understanding the factors associated with stunting in a specific population context like Hawassa City is crucial for designing effective prevention strategies. Therefore, by identifying these factors, we can contribute to a deeper understanding of the **etiology** (causal factors) of stunting in this specific population. This knowledge will be instrumental in developing targeted interventions and public health strategies to **prevent** stunting in the future.

Who can participate?

- A parent or legal guardian of a child aged less than 24 months old attending a selected public health facility in Hawassa City for their child's well-being check-up.

What will happen if I participate?

- You will be asked to complete a brief questionnaire about your child's health, household characteristics, and dietary practices.
- The questionnaire will take approximately 15-20 minutes to complete.
- Your child's weight and height will be measured by trained research staff following standard protocols.
- This is a completely voluntary study, and you have the right to withdraw at any point without penalty.

What are the benefits of participating?

- You will contribute valuable information to improve our understanding of child stunting in Hawassa City.
- The findings from this study may help develop strategies to prevent stunting and improve child health outcomes.

What are the risks or discomforts?

- There are no known risks associated with participating in this study. The questionnaire asks non-invasive questions and the anthropometric measurements (weight and height) are painless and routine procedures.
- You may feel uncomfortable answering some questions. You have the right to skip any questions you don't feel comfortable answering.

Confidentiality

All your information will be kept confidential. Nothing that you tell us today will be shared with anybody outside the research team, and your name and other identifying information will not be included in any reports or publications.

Who can I contact for more information?

If you have any questions about this study, please feel free to contact the Principal Investigator:

- Samrawit Ermiyas: samrifenan@gmail.com or +251941424685
- Dr. Abdela Amano (Advisor): Advisor's contact information, if available

Your participation is voluntary

Your decision to participate in this study is completely voluntary. You can choose not to participate or withdraw from the study at any point without penalty.

9.2 Consent Form

Title of the Study: Determinants of Stunting among children aged less than 24 Months in Hawassa City Selected Public Health Facilities, 2023/24. A facility based unmatched case control study

Principal Investigator: Samrawit Ermiyas

Advisor: Mr. Abdela Amano (PhD Cand. Ass't Professor)

Organization: Pharma College, Hawassa Campus

Sponsor: Self-Sponsored

Statement of Consent:

I have read the Information Sheet about the study titled "Determinants of Stunting among children aged less than 24 Months in Hawassa City Selected Public Health Facilities, 2023/24. A facility based unmatched case control study"

I understand the purpose of the study, the procedures involved, and the potential risks and benefits of participation.

I have had the opportunity to ask questions and have received satisfactory answers.

I understand that my participation is voluntary and that I have the right to withdraw from the study at any point without penalty.

I agree to allow my child to participate in this study.

Participant (Parent/Guardian Name): _____

Signature: _____ **Date:** _____

Witness (Research Staff Name): _____

Signature: _____ **Date:** _____

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9.3 English version questionnaire

PART I :SOCIO DEMOGRAPHIC CHARACTERISTICS OF THE STUDY PARTICIPANTS		
S. N	**Questions**	**Response**
001	Age of mother	(_____ Years).
002	Residence	1. Urban 2. Rural
003	Marital status	1. Single 2. Married 3. Divorced 4. Widowed 5. Separated
004	Educational Status of the mother	1. No formal education 2. Primary 3. Secondary 4. More than secondary
005	Educational status of husband	1. No formal education 2. Primary 3. Secondary 4. More than secondary
006	Occupation status of the mother	1. Government employee 2. House wife 3. Merchant 4. Daily labourer 5. Private employee 6. Other (specify) _____
007	Occupation of husband	1. Government employee 2. NGO 3. Merchant 4. Daily labourer 5. Private employer 6. Other (specify) ____
008	Family size	_____
009	Religion of the respondents	1. Orthodox 2. Protestant 3. Muslim 4.Catholic 5. Others
010	Ethnicity of the respondents	1. Sidama 2. Wolaita 3. Kembata 4. Silte 5. Others(specify____

S. No	Questions	Answers
	PART TWO– ENVIRONMENTAL HEALTH RELATED FACTORS	
	Questions	Answers
1	What is your main source of water?	1. Public Tab 2. Unprotected spring, Pond, Well 3. Protected spring, Pond, Well 4. Private tap 5. River
2	Distance to drinking water	1. Less than 30 minutes
		2. Greater or equal to 30 minutes
		3. Water on-premise
3	Treat water before drinking	1. Yes 2.No
4	Wash hand before feeding child	1. Yes 2.No
5	Do you have latrine	1. Yes 2.No
6	What type of water storage you are using?	1. Jerrycan 2. Bucket 3. Pot
		4.Other_____
7	Type of latrine	1. Pit latrine 2. Flush toilet 3. Open field
		4.Ventilated improved Pit latrine
8	Did you wash hand after visiting a toilet?	1. Yes 2.No
9	Do you wash your hand after cleaning animal dung?	1. Yes 2.No
10	Did you wash before food preparation?	1. Yes 2.No

No	Questions	Responses
PART THREE: OBSTETRIC AND REPRODUCTIVE HEALTH CHARACTERISTICS		
No	Questions	Responses
1.	Have you experienced pregnancy before?	1. Yes2. No
2.	If yes, what is the number of pregnancies?	_____
3.	Have you ever experienced birth before?	1. Yes2. No
4.	If yes for Q 3,no of parity	_____
5.	If yes for Q 3, Number of alive children	
6.	Have you ever utilized any family planning methods	1. Yes2. No
7.	Do you had previous history of ANC utilization	1 Yes2 No
8.	Where did you give previous child birth?	1Health facility2 Home
9.	Have you utilized post-natal care for your previous delivery	1. Yes2. No
10.	What is the birth interval between your two consecutive births?	_____months
11.	Have you ever received nutrition related counseling service during your recent pregnancy>	1. Yes 2. No

PART FOUR: <2 YEARS CHILDREN NUTRITION &ANTHROPOMETRICS CHARACTERISTICS		
S. No	Question	Answer
1.	Sex of child	1.Male 2. Female
2.	Age of child	_____months
3.	Had the child ever breastfed?	1.Yes 2. No
4.	How long after birth, did you first put the child to breastfed?	1.Within one hour 2.Within 2 hours 3. Within 3-6 hours 4. After one day
5.	In the first six months after delivery, did your child given anything other than breast milk?	1. Yes 2. No
6.	Was your child breastfed or did he/she consume breast milk yesterday day and night? *(continued breastfeeding practice)*	1. Yes 2. No
7.	**Grains, white roots and tubers**	1.Yes 2. No
8.	• Bread, Porridge, rice, maize, spaghetti or other food made from grains, white potatoes, cassava or any foods made from roots	
9.	**Legumes and nuts** • Any foods made from beans,peans,lentils, nuts or seed	1.Yes 2. No
10.	**Milk and dairy foods** • **Yoghurt, cheese, fresh animal milk, infant formula,**	1.Yes 2. No
11.	How many times did the child consume milk products?	_____
12.	**Flesh foods** • Liver, or other organ meatsChicken, fish, seafood,	1.Yes 2. No
13.	**Eggs**	1.Yes 2. No
14.	**Vitamin A, fruits, & vegetables** • Pumpkins, carrots, orange, dark green vegetables,	1.Yes 2. No
15.	**Other fruits and vegetables** • Tomato, cabbage, eggplant, onions, pineapple,	1.Yes 2. No
16.	**Meal frequency**	
17.	How many times did the child consumed yesterday day	____

	and night?	
18.	Height/length of the child	_____
19.	Weight in kg	
20.	Does the child breastfeed currently	1.Yes 2. No
21.	Does the child started complementary feeding	1.Yes 2. No
22.	Nutritional Status of a child	1. Stunted (Case) 2. Norma (Control)

9.4 Amharic version information sheet (የመረጃ ወረቀት)

መግቢያ

ስሜ _____ በዋና መርማሪ ሳምራዊት ኤርሚያስ በፉርጋ ኮሌጅ በህብረተሰብ ጤና ትምህርት ክፍል የሁለተኛ ዓመት የህብረተሰብ ጤና ማስተር ተማሪ እና በአቶ አብደላ አጋኖ ከሐዋሳ ዩኒቨርሲቲ ህክምናና ጤና ኮሌጅ በበላይነት ለሚመራው ጥናት መረጃ ሰብሳቢ ነኝ። ከ24 ወራት በታች የሀናቸው ህጻናት መቀንጨር መንስኤዎችን በመመርመር በምርምር ጥናት ላይ እንዲሳተፉ ተጋብዘዋል።

የዚህ ጥናት ዓላማ ምንድን ነው?

የዚህ ጥናት አላማ በሀዋሳ ከተማ ከ2 አመት በታች የሆኑ ህጻናት በተመረጡ የህዝብ ጤና ተቋማት ላይ ከሚደርሱት መቀንጨር ጋር ተያይዘው የሚመጡትን ምክንያቶች መለየት ነው። ሥር የሰደደ በቂ ያልሆነ የመስመራዊ እድገት ተብሎ የሚገለጽ፣ ለህጻናት ጤና እና እድገት ነጇ መዘዝ ያለው ጉልህ የህዝብ ጤና ስጋት ነው። ለበሽታ እና ለሞት የመጋለጥ እድሎች መጨመር, የእውቀት (ኮግኒቲቭ) ተግባር እና የዕልማሶች ምርታማነት መቀነስ ጋር የተያያዘ ነው. እንደ ሀዋሳ ከተማ ባሉ ልዩ የህዝብ ህዘባዊ ሁኔታዎች ውስጥ ከመቀንጨር ጋር ተያይዘው የሚመጡትን ምክንያቶች መረዳት ውጤታማ የመከላከያ ስልቶችን ለመንደፍ ወሳኝ ነው። ስለዚህ, እነዚህን ምክንያቶች በመለየት, በዚህ የተወሰነ ህዝብ ውስጥ የመቀንጨር መንስኤዎችን (ምክንያታዊ ምክንያቶች) በጥልቀት ለመረዳት አስተዋፅኦ ማድረግ እንችላለን። ይህ እውቀት ወደፊት የመቀንጨር ችግርን ለመከላከል የታለሙ ጣልቃገብነቶችን እና የህዝብ ጤና ስልቶችን ለማዘጋጀት አጋዥ ይሆናል።

ማን ሊሳተፍ ይችላል?

እርስዎ ከሆኑ በዚህ ጥናት ውስጥ መሳተፍ ይችላሉ:-

- እድሜዉ ከ24 ወር በታች የሆነ ልጅ ወላጅ ወይም ህጋዊ አሳዳጊ።

ብሳተፍ ምን እሆናለሁ?

- ስለ ልጅዎ ጤና፣ የቤተሰብ ባህሪያት እና የአመጋገብ ልምዶች አጭር መጠይቅ እንዲሞሉ ይጠያቃሉ።
- መጠይቁ ለማጠናቀቅ ከ15-20 ደቂቃ ያህል ይወስዳል።
- የልጅዎ ክብደት እና ቁመት የሚለካው መደበኛ ፕሮቶኮሎችን በመከተል በሰለጠኑ የምርምር ሰራተኞች ነው።
- ይህ ሙሉ በሙሉ በፈቃደኝነት የሚደረግ ጥናት ነው፣ እና በማንኛውም ጊዜ ያለ ምንም ቅጣት የመውጣት መብት አለዎት።

መሳተፍ ምን ጥቅሞች አሉት?

- በሃዋሳ ከተማ ያለንን ግንዛቤ ለማሻሻል ጠቃሚ መረጃ ታበረክታላችሁ።
- የዚህ ጥናት ግኝቶች መቀንጨርን ለመከላከል እና የህጻናት ጤና ውጤቶችን ለማሻሻል ስልቶችን ለማዘጋጀት ይረዳሉ።

አደጋዎቹ ወይም ምቾቶቹ ምንድናቸው?

- በዚህ ጥናት ውስጥ ከመሳተፍ ጋር የተያያዙ ምንም የሚታወቁ አደጋዎች የሉም። መጠይቁ ወራሪ ያልሆኑ ጥያቄዎችን ይጠይቃል እና አንትሮፖሜትሪክ መለኪያዎች (ክብደት እና ቁመት) ህመም የሌላቸው እና የተለመዱ ሂደቶች ናቸው።
- አንዳንድ ጥያቄዎችን ለመመለስ ምቾት ሊሰማዎት ይችላል። ለመመለስ የማይመቹዎትን ማንኛውንም ጥያቄ የመዝለል መብት አልዎት።

ሚስጥራዊነት

- ሁሉም መረጃዎ በሚስጥር ይጠበቃል። የእርስዎ ስም እና ሌላ መለያ መረጃ በማንኛውም ዘገባዎች ወይም ህትመቶች ውስጥ አይካተቱም።

ለበለጠ መረጃ ማንን ማግኘት እችላለሁ?

ስለዚህ ጥናት ማንኛውም አይነት ጥያቄ ካሎት፣ እባክዎን ዋና መርማሪውን ለማነጋገር ነፃነት ይሰማዎ:-

- ሳምራዊት ኤርሚያስ: samrifenan@gmail.com ወይም +251941424685
- አቶ አብደላ አማኖ (አማካሪ):_____

የእርስዎ ተሳትፎ በፈቃደኝነት ነው።

- በዚህ ጥናት ውስጥ ለመሳተፍ ያቀረቡት ውሳኔ ሙሉ በሙሉ በፈቃደኝነት ላይ የተመሰረተ ነው. በማንኛውም ጊዜ ያለ ቅጣት ላለመሳተፍ ወይም በጥናቱ ላለመሳተፍ መምረጥ ይችላሉ.

9.5 Amharic version of consent form (የስምምነት ቅጽ)

የጥናቱ ርዕስ:-ከ2 አመት በታች የሆኑ ህጻናት በተመረጡ የህዝብ ጤና ተቋማት ላይ ከሚደርሱት መቀንጨር ጋር ተያይዘው የሚመጡትን ምክንያቶች መለየት 2023/24

ዋና መርማሪ: ሳምራዊት ኤርሚያስ

አማካሪ: አቶ አብደላ አማኖ (ረ/ፕሮፌሰር)

ድርጅት: ፋርማ ኮሌጅ ሀዋሳ ካምፓስ

ስፖንሰር: በራስ ስፖንሰር

የፍቃድ መግለጫ:-

በ2023/2024 በሀዋሳ ከተማ የተመረጡ የህብረተሰብ ጤና ተቋማት ከ2 አመት በታች የሆኑ ህጻናት ላይ ከሚደርሱት መቀንጨር ጋር ተያይዘው የሚመጡትን ምክንያቶች መለየት በሚል ርዕስ ስለተደረገው ጥናት የመረጃ ወረቀት አንብቤያለሁ።

የጥናቱ ዓላማ፣ የተካተቱት ሂደቶች፣ እና የተሳትፎ ሊሆኑ የሚችሉትን አደጋዎች እና ጥቅሞች ተረድቻለሁ።

ጥያቄዎችን የመጠየቅ እድል አግኝቻለሁ እናም አጥጋቢ መልሶች አግኝቻለሁ።

የእኔ ተሳትፎ በፈቃደኝነት እንደሆነ እና በማንኛውም ጊዜ ያለ ምንም ቅጣት ከጥናቱ የመውጣት መብት እንዳለኝ ተረድቻለሁ።

ልጄ በዚህ ጥናት እንዲሳተፍ ለመፍቀድ ተስማምቻለሁ።

ተሳታፊ (የወላጅ/የአሳዳጊ ስም)፡ _____

ፊርማ፡ _____ ቀን፡ _____

ምስክር (የ ሰራተኛ ስም)፡ _____

ፊርማ፡ _____ ቀን፡ _____

9.6. Amharic version questionnaire

ክፍል 1፡- የሶሺዮ ዲሞግራፊያዊ ባህሪያት የጥናቱ ተሳታፊዎች		
ኤስ.ኤን	ጥያቄዎች	ምላሽ
001	የእናትነት እድሜ	(_____ ዓመታት)።
002	መኖሪያ	1. ከተማ 2. ገጠር
003	የጋብቻ ሁኔታ	1. ያላገባ 2. ያገባ 3. የተፋታ 4. ባል የሞተባት 5. ተለያይቲል
004	የእናትየዉ የትምህርት ሁኔታ	2. መደበኛ ትምህርት የለም 3. የመጀመሪያ ደረጃ 4. ሁለተኛ ደረጃ 5. ከሁለተኛ ደረጃ በላይ
005	ባል የትምህርት ደረጃ	1. መደበኛ ትምህርት የለም 2. የመጀመሪያ ደረጃ 3. ሁለተኛ ደረጃ 4. ከሁለተኛ ደረጃ በላይ
006	የእናትየዉ የሥራ ሁኔታ	1. የመንግስት ሰራተኛ 2. የቤት ሚስት 3. ነጋዴ 4. የቀን ሰራተኛ 5. የግል ሰራተኛ ሌላ (ይግለጹ) _____
007	የባል ሥራ	1. የመንግስት ሰራተኛ 2. NGO 3. ነጋዴ 4. የቀን ሰራተኛ 5 . የግል ቀጣሪ 6. ሌላ (ይግለጹ) _____

46

008	የቤተሰብ መጠን	_____
009	ምላሽ ሰጪዎች ሃይማኖት	1. ኦርቶዶክስ 2. ፕሮቴስታንት 3. ሙስሊም 4. ካቶሊክ 5. ሌሎች
010	ምላሽ ሰጪዎች ብሔር	1. ሲዳማ 2. ወላይታ 3. ከምባታ 4. ስልጤ 5. ሌሎች (_____ ይግለጹ

ክፍል ሁለት - ከአካባቢ ጤና ጋር የተያያዙ ምክንያቶች		
ኤስ. አይ	ጥያቄዎች	መልሶች
1	ዋናው የውሃ ምንጭዎ ምንድነው?	6. የህዝብ ትር 7. ያልተጠበቀ ጸደይ ፤ ኩሬ ፤ ደህና 8. የተጠበቀው ጸደይ ፤ ኩሬ ፤ ደህና 9. የግል መታ ማድረግ 10. ወንዝ
2	የመጠጥ ውሃ ርቀት	4. ከ 30 ደቂቃዎች በታች
		5. ትልቅ ወይም ከ 30 ደቂቃዎች ጋር እኩል ነው
		6. በግቢው ላይ ውሃ
3	ከመጠጣትዎ በፊት ውሃ ማከም	1. አዎ 2. . አይ
4	ልጅዎን ከመመገብዎ በፊት እጅን ይታጠቡ	1. አዎ 2. አይ
5	ሽንት ቤት አለህ?	1. አዎ 2. አይ
6	ምን አይነት የውሃ ማጠራቀሚያ እየተጠቀሙ ነው?	1. ጀሪካን 2. ባልዲ 3. ማሰሮ 4. ሌላ_____
7	የመጸዳጃ ቤት ዓይነት	1. የጉድጓድ መጸዳጃ ቤት 2. የመጸዳጃ ቤት እጥበት 3. ክፍት ሜዳ 4. የተሻሻለ ፒት ሽንት ቤት
8	ሽንት ቤት ከጎቦኙ በኋላ እጅዎን ታጥበዋል?	1. አዎ 2. አይ
9	የእንስሳትን እበት ካጸዱ በኋላ እጅዎን ይታጠቡታል?	1. አዎ 2. አይ
10	ምግብ ከማዘጋጀትዎ በፊት ታጥበዋል?	1. አዎ 2. አይ

ክፍል ሶስት ፡ የማኅፀን እና የጡነኛ ጤና ባህሪያት		
አይ	ጥያቄዎች	ምላሾች
12.	ከዚህ በፊት እርግዝና አጋጥሞህ ያውቃል?	1. አዎ 2. አይ
13.	አዎ ከሆነ፥ የእርግዝና ብዛት ስንት ነው?	_____
14.	ከዚህ በፊት ልደት አጋጥሞህ ያውቃል?	1. አዎ 2. አይ
15.	ለQ3 አዎ ከሆነ፥ ምንም እኩልነት የለም።	_____
16.	ለ Q 3 አዎ ከሆነ፥ በህይወት ያሉ ልጆች ቁጥር	
17.	ማንኛውንም የቤተሰብ ምጣኔ ዘዴዎች ተጠቅመህ ታውቃለህ	1. አዎ2 2. አይ
18.	ከዚህ ቀደም የኤኤንሲ አጠቃቀም ታሪክ ነበራችሁ	1. አዎ 2. አይ
19.	ከዚህ በፊት የት ነው የወለድከው?	1. የጤና ተቋም 2. ቤት
	ለቀድሞ ወሊድዎ የድህረ-ወሊድ እንክብካቤን ተጠቅመዋል	1. አዎ 2. አይ
	በሁለት ተከታታይ ልደቶችዎ መካከል ያለው የልደት ልዩነት ስንት ነው?	_____ ወሮች
	በቅርብ እርግዝናዎ ወቅት ከአመጋገብ ጋር የተያያዘ የምክር አገልግሎት አግኝተው ያውቃሉ	2. አዎ 3. አይ

ኤስ. አይ	ጥያቄ	መልስ
23.	የልጅ ወሲብ	1. ወንድ 2. ሴት
3.	የልጅነት ዕድሜ	___ ወሮች
4.	ልጁ ጡት አጥቦ ያውቃል?	1. 1.አዎ 2. አይ
5.	ከተወለደ በኋላ ምን ያህል ጊዜ, መጀመሪያ ልጁን ጡት እንዲጠባ አደረጉት?	1. በአንድ ሰዓት ውስጥ 2. በ 2 ሰዓታት ውስጥ 3. ከ3-6 ሰአታት ውስጥ 4. ከአንድ ቀን በኋላ
6.	ከወሊድ በኋላ በነበሩት በመጀመሪያዎቹ ስድስት ወራት ውስጥ ልጅዎ ከእናት ጡት ወተት በስተቀር ሌላ ነገር ሰጥተዋል?	1. አዎ 2. አይደለም
7.	ልጅዎ ጡት በማጥባት ነው ወይስ ትላንትና ቀን እና ማታ የጡት ወተት ጠጥቷል? (የቀጠለ የጡት ማጥባት ልምምድ)	1. አዎ 2. አይደለም
8.	ጥራጥሬዎች, ነጭ ሥሮች እና ቱቦዎች	1. አዎ 2. አይደለም
9.	• ዳቦ፣ ገንፎ፣ ሩዝ በቆሎ፣ ስፓጌቲ ወይም ሌላ ከእህል፣ ነጭ ድንች፣ ካሳቫ ወይም ማንኛውም ከስር የተሰሩ ምግቦች	
10.	ጥራጥሬዎች እና ፍሬዎች • ከባቄላ፣ አተር፣ ምስር ፣ ለውዝ ወይም ዘር የተሰሩ ማናቸውም ምግቦች	1. አዎ 2. አይደለም
3.	ወተት እና የወተት ምግቦች • እርጎ፣ አይብ፣ ትኩስ የእንስሳት ወተት፣ የሕፃን ፎርሙላ፣	1. አዎ 2. አይደለም
3.	ህጻኑ ስንት ጊዜ የወተት ተዋጽኦዎችን ይጠቀማል?	_____
4.	የስጋ ምግቦች • ጉበት ወይም ሌላ የሰውነት አካል ስጋ ዶሮ ፣ አሳ፣ የባህር ምግቦች፣	1. አዎ 2. አይደለም
3.	እንቁላል	1. አዎ 2. አይደለም
4.	ቫይታሚን ኤ ፣ አትክልቶች እና ፍራፍሬዎች • ዱባዎች ፣ ካሮት ፣ ብርቱካንማ ፣ ጥቁር አረንጓዴ አትክልቶች ፣	1. አዎ 2. አይደለም
3.	ሌሎች ፍራፍሬዎችና አትክልቶች • ቲማቲም ፣ ጎመን ፣ ኤግፕላንት ፣ ሽንኩርት ፣ አናናስ ፣	1. አዎ 2. አይደለም
3.	የምግብ ድግግሞሽ	

4.	ህጻኑ ትናንት ቀን እና ማታ ስንት ጊዜ በላ?	____	
5.	የልጁ ቁመት / ርዝመት	___	
6.	ክብደት በኪ..ግ		
7.	ልጁ በአሁኑ ጊዜ ጡት ያጠባል	1. አዎ	
		2. አይደለም	
8.	ልጁ ተጨማሪ ምግብ መመገብ ጀመረ?	1. አዎ	
		2. አይደለም	
9.	የልጁ የአመጋገብ ሁኔታ	3. የተደናቀፈ (Stunted)	
		4. የተደናቀፈ አይደለም (not stunted	