ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF NURSING AND MIDWIFERY

DEPARTMENT OF NURSING AND MIDWIFERY

NUTRITIONAL STATUS AND ASSOCIATED FACTORS AMONG CHILDREN WITH CONGENITAL HEART DISEASE IN SELECTED GOVERNMENTAL HOSPITALS AND CARDIAC CENTER ADDIS ABABA ETHIOPIA, 2021.

Principal Investigator: Rediet Woldesenbet (BSC)

A THESIS SUBMITTED TO POST GRADUATE STUDIES, ADDISABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCE, SCHOOL OF NURSING AND MIDWIFERY, DEPARTMENT OF NURSING FOR THE PARTIAL FULFILMENT OF THE REQUIREMENTS FOR DEGREE OF MASTERS OF SCIENCE IN PEDIATRICS AND CHILD HEALTH NURSING

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APPROVAL BY THE BOARD OF EXAMINATION

This thesis by Rediet Woldesenbet 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 on a title **Nutritional Status And Associated Factors Among Children With Congenital Heart Disease In Selected Governmental Hospitals And Cardiac Center Addis Ababa Ethiopia,2021.**

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STATEMENT OF DECLARATION

By my signature below, I declare and affirm this thesis is my own work. I have followed all the ethical principles in the preparation, data collection, data analysis and completion of this thesis. All scholarly matters that are included in this thesis have been given recognition through citation. I confirm that all sources have been cited and referenced.

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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ABBREVIATION AND ACRONYM

ASD- Atrial Septal Defect

AVSD- Atrioventricular Septal Defect

BAZ- Body Mass for age Z score

CHD- Congenital Heart Defect/Disease

CoA- Coarctation of Aorta

EDHS-Ethiopian Demographic Health Survey

ETB- Ethiopian Birr

HAZ- Height for Z-score

MUAC- Mid Upper Arm Circumference

PDA- Patent Ductus Arteriosus

PFO- Patent Foramen Ovale

PAH- Pulmonary Hypertension

PS- Pulmonary Stenosis

SAM-Sever Acute Malnutrition

SD- Standard Deviation

TAPVR- Total Anomalous Pulmonary Venous Return

TGA- Transposition of Great Artery

TOF- Tetralogy of Fallot

TR-Tricuspid Regurgitation

UNICEF- United Nations Children's Fund

VSD – Ventricular Septal Defect

WAZ- Weight for Age Z-Score

WHZ- Weight for Height Z-Score

WHO –World Health Organization

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ABSTRACT

Background: Children with congenital heart disease are at risk for poor growth and under-nutrition compared with healthy children. Inadequate energy intake, high energy requirement or both of these reasons are thought to be the reason for malnourishment of children with congenital heart disease. **Objectives**: This study aimed to assess the nutritional status of children with congenital heart disease and associated factors in selected governmental hospitals and cardiac center Addis Ababa, Ethiopia 2021 **Method**: Institutional based cross sectional study was conducted from Feb. to Mar. 2021 among 395 Children under15years old age diagnosed with CHD. Data was collected with structured questionnaire and chart review. Anthropometric measurement was measured and medical history of the child was taken from patient medical card. Data was coded and entered to EPI data version 4.6 and WHO Anthro Plus version 1.0.4 tool and exported to SPSS version 25 for analyses. Multivariable regression model was developed after p value of<0.25 in the binary logistic analysis then after p value< 0.05 was taken as significant. **Result:** Out of 395 samples 373 children were participated with a response rate of 94.4%. The prevalence of wasting and stunting among the study participants was 144(38.6%) and 134(35.9%) respectively. The prevalence of underweight in children under 10years and was 143(43.1%). Children in the age group of 13months -5years were 56.6% and 64% less likely to be wasted andunderweight compared to children age 0 -12months [AOR=0.434, 95%CI :(0.231, 0.816)] nd[AOR=0.360, 95%CI :(0.183, 0.711)]. Compared diagnosed with PAH children were1.885 times more likely to be underweight [AOR=1.885, 95%CI :(1.094, 3.246)]. When the hemoglobin level increases by every unit per g/dl the chance to be wasting and underweightdecreases by 13.1% and 18.6%[AOR=0.869, 95%CI :(0.792, 0.955)] and [AOR=0.869, 95%CI :(0.792, 0.955)] respectively. And also when SPO2 increases by 1% the chance ofbeing malnourished decreases by 3% and 6.4% [AOR=0.970, 95%CI :(0.943, 0.998)] and [AOR=0.970, 95%CI :(0.943, 0.998)] respectively for stunting and underweight. **Conclusion and Recommendation:** The prevalence of malnutrition in children with CHD is pretty high. The responsible bodies should act on the accessibility of early treatment; work in multidisciplinary way to prevent malnutrition and its consequences.

Key words: Anthropometry, Children, Congenital Heart Disease, Nutritional Status

1. INTRODUCTION

1.1. Background

Congenital heart disease is a defect in the structure of the heart walls and vessels that present at birth(1). Children with congenital heart disease are at risk for poor growth and under-nutrition compared with healthy children. Nutrition takes a major role in managing chronic illness; in congenital heart disease, it is the major factor for the recovery of patients after surgical intervention and decreasing the risk of infection(2–4). Even though having good nutrition is good for the outcome of treatment, children with chronic illnesses including congenital heart disease are being malnourished and have incomparable growth with peers (5).

"Child malnutrition is explained as a gap between body energy requirement and intake which results in total deficits of energy, protein, or micronutrients that may negatively affect growth, development, and other relevant outcomes" (6).

Having high energy requirement, inadequate energy intake decreased mesenteric perfusion, lagged enteral feeding, delayed feeding milestone also in addition not knowing their nutritional desire and preference are some of the presumptions explained in the studies done to clarify the cause of malnutrition among children with a congenital heart disease (7,8). In addition to this children who have congenital heart defect have increased resting energy expenditure especially before corrective surgery (9).

Management of nutritional inadequacy in children with congenital heart disease starts from assessing the problem by using different kinds of nutritional assessment techniques (10).

There are different methods used to assess the nutritional status of a person. Clinical history, anthropometry, body composition, dietary intake are some of the known and common methods. All these methods are used to identify different aspects of the nutritional status. Clinical history and examination are used to assess if there is any problem related to gastrointestinal function like vomiting, diarrhea, and constipation which show malabsorption of the nutrients taken also different signs and symptoms are checked to enable the physician to predict micronutrient deficiencies. Dietary intake assessment on the other hand used to analyze if there is any change of food intake or desire for food and also asks about appetite (physical

sense of hunger). There are different mechanisms used to estimate the dietary intake of a person which are 24hour dietary recall, food diary, and food frequency questionnaire even though this method is likely to be biased as the patient or the caregiver might provide the nutritional history(11).

The anthropometric measurement is the most common and easy-to-use method while assessing nutritional status. There are different components under anthropometry in which the main components are height, weight, Mid-upper arm circumference (MUAC), body mass index (BMI), body circumferences (waist, hip, and limbs), and skinfold thickness. Different indicators like Height for age, weight for height, and weight for age are used to interpret the result and also used to monitor how long the malnutrition has stayed(12).

When assessing the nutritional status of children the results might be normal or malnourished. Malnutrition sub-classified as stunting, wasting, underweight, overweight, and hidden hunger. The other classification is done based on the degree which interprets as severe, moderate, and mild in addition to this based on the duration of malnutrition, it can be sub-classified as acute and chronic malnutrition(13,14).

1.2. Statement of the Problem

Globally around 1.35 million live births are diagnosed with CHD every year(15). In 2017, the incidence rate of CHD (congenital heart disease) was 17.9/1000 worldwide, with 19.1/1000 for males and 16.6/1000 for females(16). It's estimated that around 500,000 children in Africa are born with congenital heart disease every year. In low middle-income countries, the burden of congenital heart disease is vast(17).

Malnutrition is highly prevalent in children with congenital heart disease studies show prevalence as high as 90.4%. Also Poor weight gain was explained as a major problem and it's among the reasons for hospitalization besides the disease itself. Around 41.7% of children with CHD were found to have poor weight gain and growth failure in the study done in Bangladesh also poor weight gain is listed among the reason for hospitalization in India (18–20).

Even though medical and surgical management of congenital heart defects are improved day by day many parents in sub-Saharan Africa including Ethiopia could not afford to get the treatment because the availability of the treatment locally is almost none and the affordability of sending their children abroad is not a choice for the families in low income countries. Since getting treatment early in this society is unaffordable, unwanted consequences of not getting treatment is inevitable these are high mortality because of the disease itself and comorbidities like malnutrition and failure to thrive. Although the treatments are improved balancing the nutritional intake is still affecting the outcome and success of treatment. (10,21–23)

Malnutrition in children with congenital heart disease has a great contribution in increasing the risk of infection which results in poor treatment outcomes. Pre-operative nutritional status affects postoperative outcomes, poor growth, and the high mortality rate is also seen in this group. Nowadays improvements are seen on the management and it is going beyond surgery and medicine and gives attention to growth, development nutrition, and ensuring the quality of life of children with congenital heart disease(10,24)

Studies show there is a big difference in the result of the nutritional assessment of healthy children and children with congenital heart disease. A study in India claims that stunting and underweight were 58.72% and 82.53% in children with congenital heart disease(25). Another

study done in Nigeria showed the prevalence of malnutrition in children with CHD was 90.4% and 21.1% in healthy children(20).

More than half of the children diagnosed with congenital heart disease experience malnutrition in the study done in Hawassa, Ethiopia(26). About 66.7% of children with structural heart disease develop heart failure. It's known that heart failure is a risk for malnutrition and vice versa(27).

Different factors affect the relationship between congenital heart disease and malnutrition. From those type of disease, the complexity of the defect, age, time to get treatment, comorbidities, socioeconomic status of parents is the common ones(28).

Children with congenital heart disease are more prone to develop malnutrition compared to healthy children. Screening the nutritional status of these children helps to get a good outcome of treatment afterward(29)(30)

Even though both malnutrition and congenital heart disease are seen in children of Ethiopia, there are fewer researches done about the relationship between these cases as far as my knowledge(26). This study aims to define the prevalence and types of nutritional status in congenital heart disease among children in the research setting by using some nutritional assessment techniques.

1.3. Significance of the Study

Even though there are a lot of researches done about malnutrition in children of Ethiopia there are not enough studies about children with congenital heart disease and their nutritional assessment specifically(26). This study aims to give insight into the impact of this disease on the nutritional status of children with CHD.

The study will have a great contribution to design preventive action on malnutrition in children with CHD. The result of this study targets to identify the nutritional status and prevalence of malnutrition in children with congenital heart disease this will help policymakers to plan the use of resource directly for the affected part of the population. Governmental and the non-governmental organization those are responsible for child health will be benefitted from the result of this study in terms of planning for early intervention based on the gaps. The generated results of the study will also be useful for future researchers as baseline data.

2. Literature Review

Malnutrition and cardiovascular disorders have a two-way relationship in which that malnutrition becomes a cause of the cardiovascular disorder at the same time chronic diseases like congenital heart disease are a major cause of malnutrition in children. In children with congenital heart disease, it's expected that normal hemodynamics to be disturbed therefore this change becomes a reason to create inadequate intake, increased energy/metabolic requirement, and also absorption will not be adequate combination of these reasons might contribute for the malnutrition in this group (8,10,31).

2.1. Nutritional Status of Children with CHD

Children with congenital heart disease most of the time experience growth restriction and they are undernourished it may be associated with their nutritional intake and metabolic disturbance. Although studies describe that Subtypes of CHD have no effect to cause malnutrition (4,32).

The prevalence of underweight was found on around 11%of neonates in the study done in United Kingdom (4). In another study done at the University of Santiago, Chile 55.4% of participants were stunted, 12.1% were wasted, 8.3% of them were having a risk of obesity, and 3.3% of them were obese (33).

Based on the pattern of malnutrition it was presented that among the total 40% of malnourished children with CHD in the study in Bangkok 28% of them were underweight, 22%wasted, 16 %stunted, and overweight accounts for 3% the study also reveals there is a difference between cyanotic and acyanotic groups in which the prevalence of underweight, wasting and stunting in the cyanotic group was 36%, 31%, 18% while in the acyanotic group the result was 25%, 19%, and 15% respectively(34).

A study in Indonesia on anthropometric Profile of Children with Cyanotic and acyanotic children shows severe undernutrition in cyanotic and acyanotic group which was 42.3% and 42.5% based on weight for age; severe under-nutrition based on weight for length was 42.3% and 22.5% in cyanotic and acyanotic children's respectively. Stunting in this study was 26.9% in cyanotic children and 17.5% in children with acyanotic CHD (35).

The prevalence of malnutrition was mentioned as 64%-86% in different studies in Egypt the studies put this prevalence based on the predictors and wasting was found in 6.7%, 23.8% and 37.5 study participants and the prevalence of stunting were 29.7%-68.7% also about 14.3%-44% of study participant were exhibiting underweight(29,36,37).

Based on the type of CHD from children who have acyanotic CHD prevalence of stunting were 57.89%, wasting 11.84%, and underweight 14.47%. and the prevalence of stunting wasting and underweight in the cyanotic group was 33.33%, 45.83%, and4.16% respectively(36)

A study in Lagos, Nigeria about Prevalence, profile, and predictors of malnutrition in children with congenital heart defect revealed that wasting is more common in acyanotic group and stunting was more common in the group with cyanotic CHD. Wasting in children with acyanotic CHD was 58% and 68% of children with cyanotic CHD was stunted. Underweight was accounted for 25%of children with acyanotic CHD. In this study wasting, stunting, and underweight in general accounts for 41.1%,28.8%, and 20.5% respectively (20).

The study was done in Hawassa, Ethiopia about Severe Acute Malnutrition among un-operated Ethiopian children with Congenital Heart Disease reveals that the prevalence of wasting, stunting, and underweight was 63%, 29.8%, and 49.6% respectively(26).

2.2. Prevalence of congenital Heart Disease Subtypes

The trend from 1990 to 2017 shows the highest incidence of CHD is in developing regions of the globe like Africa and Asia about 31.9/1000 and 30.6/1000 in Somalia, and Burundi respectively (16).

A congenital heart defect is classified into two groups based on measurement of arterial oxygen and presence of cyanosis or not. These two groups are called cyanotic CHD and acyanotic CHD. Further, these groups also sub-classified based on pulmonary vascular markings supported by electrocardiogram. Some of acyanotic CHD subtypes are (Ventricular Septal Defect (VSD), Atrial Septal Defect (ASD), Patent Ductus Arteriosus (PDA), Pulmonary Stenosis (PS), Coarctation of Aorta (CoA)) And the cyanotic one is classified (Tetralogy of Fallot (TOF), Trans Position of Great Arteries (TGA), Total anomalous pulmonary venous return (TAPVR), pulmonary atresia(PA), Single ventricle) (38).

Studies done about the nutritional status of children with CHD classify their study subjects based on the type of congenital heart defect they have. Acyanotic lesion was the major diagnosis among the study subjects in the study done in Thailand and India which accounts for 80.16% in India and 79% in Thailand While Cyanotic CHD accounts for 19.84% and 21% in India and Thailand respectively. Also, the study in Iran shows among the study subjects 36.7% of them have cyanotic CHD with pulmonary hypertension 33.8% have cyanotic CHD without pulmonary hypertension, acyanotic CHD with pulmonary hypertension accounts for 30.5% and the rest 28.7% were having acyanotic CHD without pulmonary hypertension(25),(34),(39).

Among subtypes of acyanotic CHD, studies show VSD, ASD, PDA, CoA are common. A study done in India reveals among the study participants 39.6% of them have VSD, 27.2% ASD, and PDA were about 25.74% TOF was the common one from the cyanotic which is about 56% followed by pulmonary stenosis. Another study in Thailand shows among the study participants 29% of them have VSD, 20% of them have ASD and 22% were diagnosed with PDA and among cyanotic 16% of them were having TOF. In Iran, they revealed that VSD accounts for 42.9%.and among Subjects with cyanotic lesions TOF accounts (17.3%) (25,34,39).

Studies in Africa revealed that among common acyanotic CHD subtypes in Egypt ASD was the common diagnosis among subtypes of CHD which accounts for 35.3% followed by 25.7% of VSD, while PS (pulmonary stenosis), TR (tricuspid regurgitation), PFO (patent foramen ovale), and PDA accounts for 18.3%, 17%, 13%, and 10% respectively. In Ethiopia the acyanotic subtypes accounts for ASD (23.7%), VSD (30.9%), PDA (15.5%), AVSD (9.3%) and CoA (4.1%). Among cyanotic sub-group, TGA (transposition of great arteries) accounts for 12 in Egypt the other study in Ethiopia shows that TOF(11.3%)and TGA(2.1%) (37,40).

2.3. Factors Affecting Nutritional Status of Children with CHD

Different conditions are related to malnutrition with CHD the first one is the type of cardiac lesion (cyanotic versus acyanotic), the second one is low energy intake, hyper metabolism, multiple infective experiences, increased oxygen consumption, increased basal body temperature, low body fat stores, and age at the time of operation the last is prenatal factors(41).

2.3.1. Socio-Demographic Factor

Age

In the study done in India underweight and severe wasting was seen in children in the age group of 6 - 10 and 5 - 10 years old respectively. Also, children whose age was 28 days up to 10 years was having 82.53% and 58.72% of underweight and stunting respectively(25). Also, a study Done in Nigeria reveals that children under five years of age were at high risk of developing malnutrition (20). Wasting was more common in children age 0 to 5 and also underweight (WFA) was common in children age between 0-10 years in the study which is done in Uganda (22). Also, Infants whose age is 2months to 12 months were four times at high risk of being malnourished in the study done in Hawassa Ethiopia(26).

Sex

In the study done in India about malnutrition in children with CHD, there was no association found between malnutrition and the gender of the child(42). Similarly, in a study done in Indonesia, there was no association between sex and anthropometric finding of the children with CHD(35).

Education and occupation

A study in India revealed that parental occupation was associated with child malnutrition but there was no association found between parental employment status and malnutrition (42). The study done in Cairo, Egypt reveals that neither parental occupation nor parental educational status had an association with the nutritional status of children with CHD(37). A study about malnutrition and growth failure also shows parental education was not significantly associated with malnutrition(7).

Income

The death rate because of CHD showed a higher difference among high-income countries and low and low-middle-income countries. Sub-Saharan Africa is detected to be an area with the highest infant mortality related to congenital heart disease(43). A study done in India reveals that low socioeconomic status and malnutrition in children with CHD were associated (42). In contrast, the study done in Indonesia and Turkey shows there was no significant association

between income and child malnutrition in children with CHD(7,35). financial status of the family were having a significant relationship with the nutritional status of the child in the study done in Cairo, Egypt in which families who have an income better than their expense and families who had an income which is less show a significant difference in the nutritional status of their children(37).

Family size and birth order

A study done in India explains that there is an association between birth order and wasting(42) contrarily study done in Lagos Nigeria claims that there was no significant association found in between malnutrition with family size and birth order(20) another study in Nigeria also mentioned that there is no association found between family size and malnutrition(44)

2.3.2. Childs Health Condition

Children diagnosed with pulmonary hypertension are prone to malnutrition in the study done in china about risk factors of malnutrition in children with CHD also revealed that cyanotic children are more likely to be stunted and acyanotic ones are more likely to be underweight when compared with each other(28).

In the study done in India, 83.16% of children diagnosed with acyanotic CHD were found to be underweight the prevalence of underweight in cyanotic children was 72%.also the prevalence of stunting was higher in children with acyanotic CHD than cyanotic ones which were about 60.39% and 48% respectively. In this study, congestive heart failure, low hemoglobin, and pulmonary hypertension were significantly associated with malnutrition(25). Pulmonary hypertension and cyanotic CHD are significantly associated with malnutrition in the study done in Iran while children with acyanotic CHD had normal nutritional status compared to children with cyanotic CHD(39).

In the study done in Indonesia claims that the prevalence of malnutrition was higher in acyanotic children. There was no significant association found between stunting and type of CHD in this study but wasting was found to be associated. Also this study explains children with cyanotic CHD were less likely to be wasted (45).

In the study done at Aswan University, Egypt the type of CHD (cyanotic and acyanotic) had no significant association with the nutritional status. Although wasting was more common in children with cyanotic CHD and stunting was common in acyanotic. Also in this study anemia, heart failure and pulmonary hypertension are factors associated with malnutrition(29). There is no significant difference found in children with cyanotic and acyanotic children in association with malnutrition in the study in Cairo universities, Egypt (37).

Another study in Egypt revealed that wasting is more common in cyanotic CHD than acyanotic ones and stunting is common in acyanotic CHD compared to children diagnosed with cyanotic CHD. Anemia, low arterial oxygen, heart failure, and pulmonary hypertension are shown to be significantly associated with the nutritional status of the child with CHD(36).

The study done in Nigeria about the nutritional status of children with CHD shows that there is a significant association between low hemoglobin, heart failure, low arterial oxygen, and duration of the symptom of CHD with the nutritional status at the same time in this study it explained that children with cyanotic CHD are more likely to be stunted and acyanotic children are more likely to be wasted(20). Another study in Ozalla Nigeria, also supports this result in which children with cyanotic CHD and pulmonary hypertension were prone to be stunted and wasting was common in children with acyanotic CHD compared to cyanotic children(44).

Children with anemia were found to be at high risk of wasting in the study done in Uganda stunting was more likely to happen in the case of children with heart failure. Also this study explained that children diagnosed with both heart failure and anemia are at high risk of thinness(22).

In the study done in Hawassa Ethiopia about severe acute malnutrition in children with CHD children diagnosed with anemia were four times more at risk of developing SAM. Also, children diagnosed with heart failure but not having acyanotic CHD were 58% less likely to develop SAM(26).

2.3.3. Dietary Factors

A study done in India about malnutrition of children with CHD revealed there is an association between age at intervention (old age when corrective surgery done)(42). Also Presenting age

for treatment was a factor that determines the nutritional status of children in the study done in Ozalla Nigeria which shows children who are brought by older age are more at risk of having malnutrition (44). In contrary to this a study done in china shows that presented by older age for the treatment is good for the children in case not to develop malnutrition but this study also says that infants especially those who are under age one are at high risk of developing malnutrition(28).

In the study done in France, it's explained that children with pulmonary hypertension have low caloric intake. And on this study, its described that children with CHD are needed to get 50% more calories(46).

A study in India shows weaning and dietary intake of calories have no association with malnutrition of children with CHD(42). Other studies in India mentioned feeding problem as among the commonest reasons of hospitalization in children with congenital heart disease and it accounts for 63% and 18.18% of totally admitted CHD cases in two different studies also the studies done in Thailand and Bangladesh support this statement and reveals that children with congenital heart disease in their study also experience feeding problem which accounts 58% and 26.1% respectively(18,19,34,47).

A study in Cairo, Egypt about the prevalence and profile of malnutrition in under 5-year children with CHD reveals that complementary feeding is significantly associated with malnutrition than breastfeeding and bottle-feeding(37).

In the study in Egypt children with CHD were found to have feeding difficulty and as a result, poor dietary history was recorded Also revealed there is a poor nutritional history in children with CHD when compared to a healthy child(29,36).

A study done in Nigeria shows that age at weaning is not associated with malnutrition but poor dietary fat intake was significantly associated with the nutritional status of children with CHD. Even though in this study it's explained that time of breastfeeding has no difference in children with CHD and normal children the starting of weaning is early in children with CHD. A poor dietary history is also seen in these children(20).

2.4. Conceptual Framework

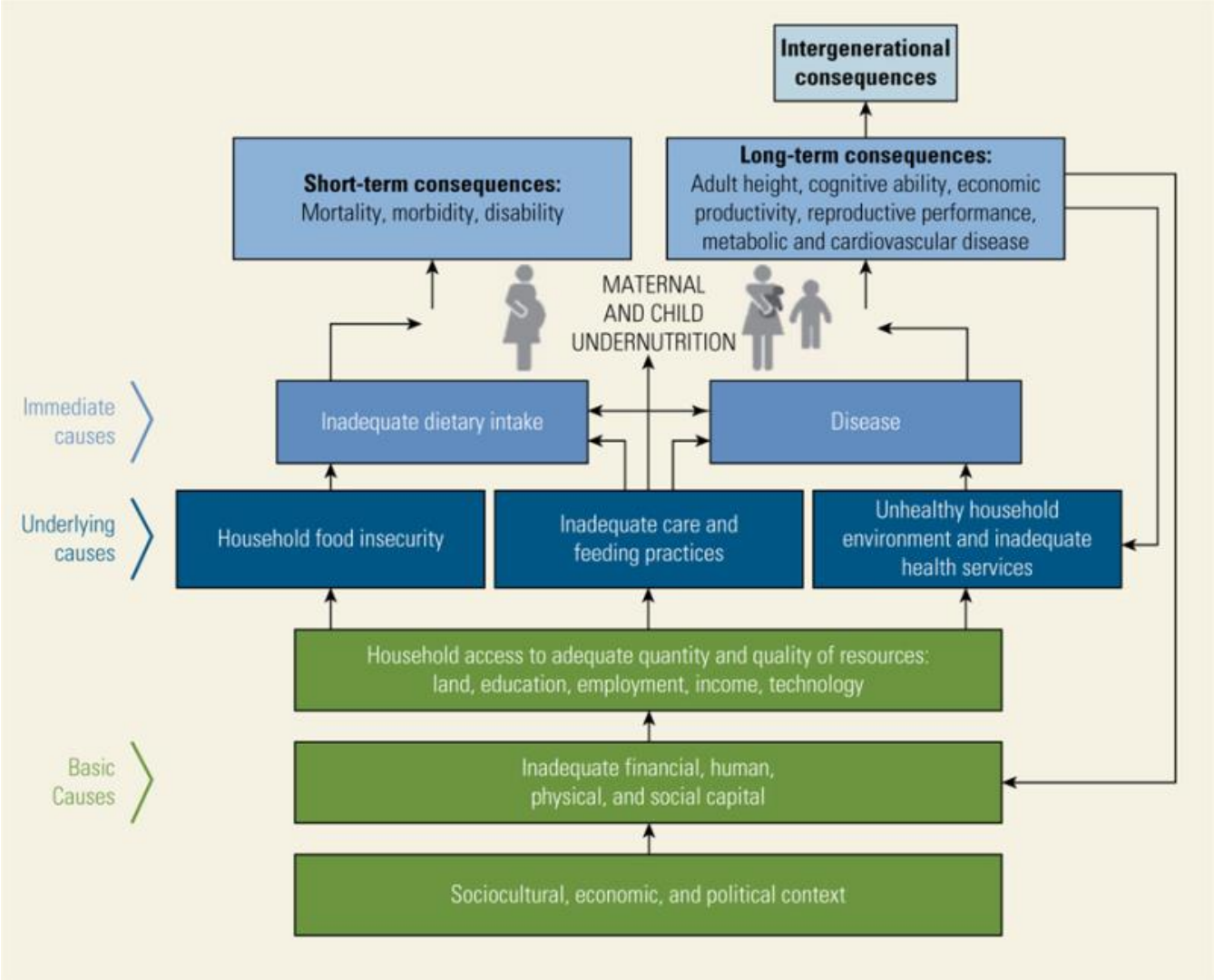


Figure 1 Conceptual Framework source UNICEF (2013)

3. OBJECTIVE

3.1. General Objective

To assess the nutritional status of children with congenital heart disease and associated factors in selected governmental hospitals and cardiac center Addis Ababa, Ethiopia 2021

3.2. Specific Objective

- To identify nutritional status in children with congenital heart disease in selected governmental hospitals and cardiac center Addis Ababa ,Ethiopia 2021
- To assess factors related with nutritional status in children with CHD in selected governmental hospitals and cardiac center Addis Ababa ,Ethiopia 2021

4. METHOD AND MATERIAL

4.1. Study Area

The study was conducted in governmental hospitals and cardiac center Addis Ababa Ethiopia. Addis Ababa is the capital city of Ethiopia and Seat of African Union and the United Nations World Economic Commission for Africa. It covers an area of 527 square kilometers and has 11 sub cities with a population of 3,384,569 according to the 2007 census.(48) The city has sub-tropical highland climate. There are 13 governmental public hospitals in Addis Ababa, those are one university hospital; six federal hospitals and the rest six are regional hospitals. Three hospitals (Black Lion Hospital, St. Peter specialized Hospital and yekatit 12 Hospital) and cardiac center are selected to conduct the research because this hospitals have an outpatient department specifically for children with cardiac cases.

4.2. Study Period

The study was conducted from February 27 to March 25, 2021G.c.

4.3. Study Design

Institutional based cross sectional study design was used.

4.4. Source Population

All children diagnosed with congenital heart disease in a selected institutions.

4.5. Study Population

All children age under 15 years diagnosed with congenital heart disease and have follow up in selected governmental hospitals of Addis Ababa and cardiac center Ethiopia.

4.6. Eligibility Criteria

4.6.1. Inclusion Criteria

Children diagnosed with congenital heart disease whose age is less than 15 years during the study period and come to cardiac OPD for their follow up.

4.6.2. Exclusion Criteria

Children presented with another congenital anomaly related to feeding and children who were critically ill were excluded.

4.7. Sample Size Determination

The sample size was calculated using single proportion formula. It is determined by using the prevalence 63% wasted and 29.8% stunted children with congenital heart disease according to the study done in Hawassa, Ethiopia(26). Based on this assumption, the actual sample size for the study is determined using the formula for single population proportion.

$$n=\frac{(Z\alpha/2)^2 P(1-P)}{d2}$$

Where Zα/2 = standard normal distribution corresponding to significance level at α = 0.05 or confidence interval (CI), 95% = 1.96

P = prevalence from a study done about severe acute malnutrition is wasting 63% (26)

d= margin of error (5%)

α=0.05

n= minimum sample size

Therefore:

$$n=\frac{(1.96)^2 0.63(1-0.63)}{(0.05)^2}$$

n =358.19……based on the prevalence of wasting

$$n=\frac{(1.96)^2 0.298(1-0.298)}{(0.05)^2}$$

n =321.45……based on the prevalence of stunting

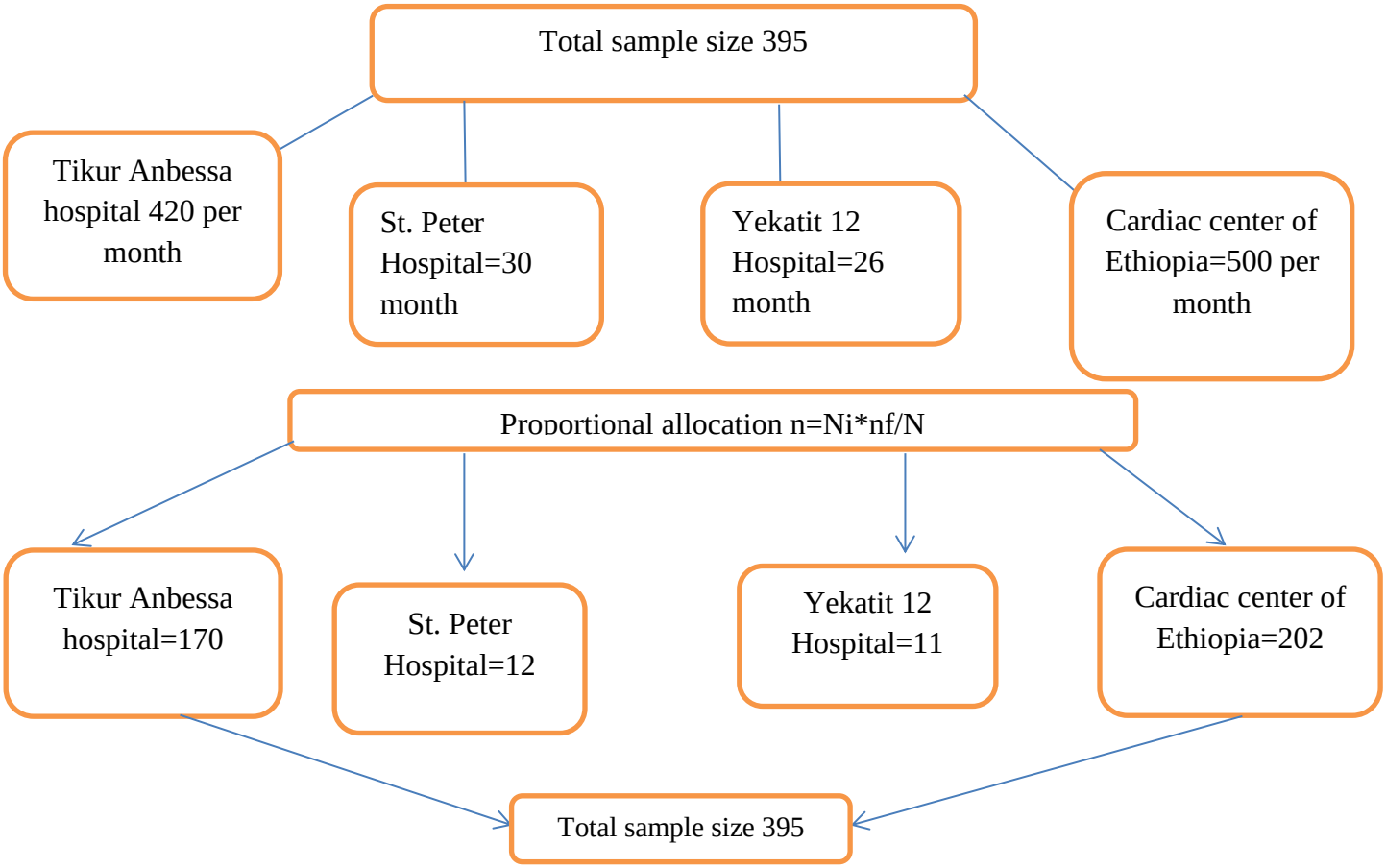
So as the sample size calculation shows it's better to take the larger number which is

n =358.19

After adding non response rate of 10% of non-response rate the final sample size is 359*0.1=35.9 359+35.9=394.9 approximately 395.

4.8. Sampling Method

Three of the hospitals (Tikur Anbessa Hospital, St. Peter specialized Hospital, Yekatit 12 Hospital) and cardiac center of Ethiopia was selected for conducting the research intentionally. These hospitals were selected because they have cardiac follow up clinic and a better patient load as they are referral hospitals. And also cardiac center is the only center for children with heart disease in Ethiopia in which they get corrective surgery for CHD. Children come to cardiac follow up to the selected areas 3 months prior to the data collection was counted and the proportional allocation was done based on that. Study subjects were selected by consecutive sampling technique.



Where

Ni =the number of children who were having follow up in selected hospitals

nf =the final sample size from single population proportion

N=total population

Figure 2: Schematic diagram of sampling procedure for the study to assess the nutritional status of children with congenital heart disease and associated factors in selected governmental hospitals in Addis Ababa, Ethiopia 2021

4.9. Study Variables

4.9.1. Dependent Variable

- Nutritional status of children with CHD

4.9.2. Independent Variables

- Socio Demographic Characteristics (Age, Sex, Birth order, Parental Education, Income, Religion, Parental Occupation, Residency)
- Child Medical Condition: (Child Illness, Type of CHD (Cyanotic And Acyanotic, Pulmonary Hypertension, Heart Failure, Low Arterial Oxygen Saturation and low hemoglobin)
- Dietary Factor: (Complementary Feeding, Feeding Practice(Breast Feeding, Bottle Feeding, Early Weaning) And Difficulty To Take Food/feeding problem)

4.10. Operational and Standard Definition

- Children : For this study age group is taken as child who aged under 15
- Dietary diversity: Individual food group taken during the 24 hour
- Adequate dietary diversity: When child have 4 or more food groups dietary diversity.
- Inadequate dietary diversity: When child have less than 4 food groups dietary diversity
- Wasting: WFH Below two standard deviation from median weight-for-Height of a reference population (weight –for-Height < -2SD Z-score) for above 2 years BMI for age < -2SD Z-score) (49).
- Underweight: Below two standard deviation from median weight-for-age of a reference population (weight –for-age < -2SD Z-score.) (49)

- Stunting: Below two standard deviations from median height-for-age of a reference population (height-for-age < -2 SD Z-score)(49)
- Malnutrition: If a child has one among wasting, stunting, underweight, overweight, and obesity.
- Congenital heart defect: major or minor congenital anomalies defined as anatomical structural and functional defect present at birth which was confirmed by pediatricians with echocardiography

4.11. Data Collection Instrument and Procedures

4.11.1. Data Collection Tool

In order to collect data on nutritional status of children with congenital heart disease structured questionnaire was used to interview parents or care givers of the children. And anthropometric measurement was measured by the data collectors. Both primary and secondary data was used to collect data from the respondents and the patient card for the medical conditions respectively in this study. Questioners were prepared in English translated to Amharic language and then retranslated to English for consistency and clarity. Questionnaires were prepared after reviewing literatures focused on the area(50–53).

The data collection instrument consists of four parts, part one anthropometric measurement, and part two socio -demographic characteristics, part three dietary history and part four child medical conditions.

4.11.2. Data Collection Technique and Procedures

Four nurses with qualification of BSc in nursing were selected as data collectors and one other BSc holding nurse was selected as a supervisor with the principal investigator. Data collectors and supervisor was trained for one day by the principal investigator about purpose of the study, data collection, and how to measure the anthropometric measurement.

Socio demographic data and family history was collected through structured questionnaires. Child medical history was collected from the patient card as well as parents. The dietary history of the child was assessed by using 24-hour recall method.

Anthropometric measurement was assessed as follows

- Infants and children under24 months of age were assessed their lengths measured lying down (supine). Heights children over 24 months of age was measured while standing to the nearest 0.1 cm. Patient positioning should be with the shoulder blades, buttocks, and heels on the vertical backboard.
- Weight was measured in kilograms. Infants or children who are unable to stand alone on the scale, was measured first an adult stand on the scale and zero the scale with the adult standing on the scale. Then the child was handed to the adult to obtain an accurate measurement of the child. Children who can stand on the weight by themselves were measured with light clothing. weight was measured to the nearest 0.1kg

The result of WFH, HFA, and WFA was interpreted by using WHO standard guide line(49). Weight for age z-score data was done for children 0-10 years old and weight for height z-score was done for children age 0-5years and the rest two were done for all the children.

4.12. Data Quality Control

To maintain data quality, health professionals were selected as a data collector. Pretest was done in Zewditu memorial Hospital on 5% of the study subjects who are not included for the final data collection to check the suitability of the question and to correct confusing and misleading questions and the data collection tool was modified after that. Orientation was given for the data collectors about how to fill the questionnaire and how to measure the anthropometric measurements. Data collectors were trained and communicated in each and every day of data collection. Lastly data was checked for completeness every day by the principal investigator.

4.13. Data Processing and Analysis

After editing and sorting the questionnaire's it was entered to EPI data version 4.6 and analyzed through SPSS version 25. The descriptive data was presented in tables, charts and texts. Binary logistic analysis followed by multivariable analysis was done to review the factors associated with nutritional status of children with CHD. To identify the strength of association crude (COR) and adjusted odds ratios (AOR) was calculated with the corresponding 95% confidence interval (CI). Variables with<0.25 p-value on binary was taken

to multivariable analysis and variables with < 0.05 p- values was considered statistically significant in multivariable analysis.

The anthropometric data was entered and analyzed using WHO AnthroPlus tool for analyzing child anthropometric status whose age is 0 to19 years old. The Z-scores displayed by the software are using the exact age in days for the WHO standards and months from the WHO reference 2007. So the result was interpreted by using WHO standard guideline.

4.14. Ethical Clearance

Ethical clearance was obtained from institutional review board of Addis Ababa University, college of health sciences, School of Nursing and Midwifery, Department of Nursing. Also support letter was received from Addis Ababa health bureau research and emergency directorate. Official letter of permission was written from the department to the respective hospitals to get permission to carry out the study. Informed verbal consent was obtained from each respondent (parents and guardians) after explaining the purpose and procedure of the study. Name or other personal identifying information were not included in the instrument.

4.15. Dissemination of the result

The thesis will be presented to Addis Ababa University, College of Health Sciences, School of Nursing and Midwifery and Department of Nursing as partial fulfillment of master's degree in pediatric and child health nursing. After defense the result of the study will also be disseminated to Federal Minister of Health, Addis Ababa public health research and emergency management core process and Addis Ababa town governmental hospitals and cardiac center Ethiopia. Hard and soft copy will be available in the library of Addis Ababa University for graduate students as well as for other concerned readers.

5. RESULTS

5.1. Socio Demographic Characteristics

A total of 373 participants were interviewed with response rate of 94.4%. Among this 373 respondents 190(50.9%) were females. The median age was 45 months among all children 57.7% of them were in the age group of 0-59 months. Male female ratio in the study was (M: F = 0.96:1). About 358(96%) of the participants get their drinking water from improved sources. One hundred and eighty seven (50.1%) of mothers were unemployed and 166(46.3%) of the fathers were employed. (See Table 1)

Table 1: Socio demographic characteristics of children with congenital heart disease in selected governmental hospitals and cardiac center Addis Ababa, Ethiopia 2021

Variables	Category	Frequency (n=373)	Percent
Gender	Male	183	49.1%
	Female	190	50.9%
Age	0-12 months	76	20.4%
	13months-5years	139	37.3%
	6-15years	158	42.3%
Relationship with the child	Mother	255	68.3%
	Father	92	24.7%
	Other	26	7.0%
Residency	Urban	342	91.7%
	Rural	31	8.3%
	Total	373	100%
Family size	<4	309	82.8%
	>=4	64	17.2%
Income	<=5000 ETB	227	60.9%
	>=5001ETB	146	39.1%
Birth order	First order	139	37.3%
	2nd - 3rd	171	45.8%
	4th and more	63	16.9%
Birth interval	>=24 months	214	90.7%
	<24 months	22	9.3%
Head of the house	mother	30	8.0%
	Father	167	44.8%
	both of them	159	42.6%
	Other	17	4.6%

Source of drinking water	Improved	358	96%
	Unimproved	15	4%
Ways of water treatment(n=167)	Boiling	40	24.%
	Traditional herbs	6	3.6%
	Chemicals	42	25.1%
	Filters(machine/sieves)	79	21.2%
Kind of toilet	Improved	350	93.8%
	Un improved	23	6.2%
Water and soap service around toilet	Yes	259	69.4%
	No	114	30.6%
Occupation		Father(n=358)	Mother(n=373)
	Farmer	31(8.6%)	28(7.5%)
	employee (government or non-government)	166(46.3%)	81(21.7%)
	Merchant	60(16.8%)	44(11.8%)
	daily laborer	36(10.1%)	26(7.0%)
	Unemployed	16(4.5%)	187(50.1%)
	Self employed	49(13.7%)	7(1.9%)
Education		Father	Mother
	No formal education	39(10.9%)	56(15%)
	Primary school	78(21.8%)	100(26.8%)
	Secondary school	115(32.1%)	126(33.8%)
	College and above	126(35.2%)	91(24.4%)

5.2. Dietary History

Breast Feeding and Complementary Feeding Practice (0 To 24 Months)

Among 132 children 83(62.9%) of them breast feed immediately with in the 1st hour delivery. Ninety eight (74.2%) of them are still breastfeeding and 95 (72%) of them has started complementary feeding and 88(66%) use bottle feeding. (See table2)

Table 2: Information about 0-24 months children with congenital heart disease in selected governmental hospitals and cardiac center Addis Ababa, Ethiopia 2021 (n=132)

Variable	Categories	Frequency (n=132)	Percentage
Time when the child was first breastfeed	Immediately	83	62.9%
	Within first day	21	15.9%
	Within 3 days	9	6.8%
	More than 3 days	19	14.4%
colostrum	Yes	101	76.5%
	No	31	23.5%
do you still breast feed	Yes	98	74.2%
	No	34	25.8%
Frequency of breast feeding	>=8 times	86	87.8%
	<8 times	12	12.2%
bottle feeding	Yes	88	66.7%
	No	44	33.3%
have you start complementary feeding	Yes	95	72%
	No	37	28%
Introduction of complementary feeding	>=6 months	82	85.4%
	< 6 months	14	14.6%

Of the respondents 215(57.6%) said that they are getting information about the child's medical status and nutrition by a health professional. Based on 6 questions asked to determine if the child is experiencing feeding difficulty 179(48%) were having feeding difficulty. Among all children above 2 years and children below two years who started complementary feeding 229(68%) of participants had consumed the suggested minimum adequate dietary diversity which is 4 food categories or more from the 8 food groups according to EDHS 2016.

5.3. Child Medical Condition

About 130(34.9%) of participants were sick in the past two weeks. Of the 373 participants 138(37%) have pulmonary hypertension and heart failure is found in 26(7%) of them. Corrective surgery was done for 51(13.7%) of children who have participated in this study. Mean age for corrective surgery was 50.8 months. Among children's with acyanotic CHD 129(34.6%) of them were having pulmonary hypertension and 9(2.4%) of children with cyanotic CHD have pulmonary hypertension. (See table3) The level of hemoglobin, and SPO2 among the study participants was found to be (13.254±2.64) g/dl, (89.26±8.848) %.

Table 3: Medical status of children with congenital heart disease in selected governmental hospitals and cardiac center Addis Ababa, Ethiopia 2021

Medical condition	Categories	Frequency	Percentage
Type of CHD	Acyanotic CHD	298	79.9%
	Cyanotic CHD	44	11.8%
	Acyanotic plus cyanotic CHD	31	8.3%
Sickness in the last two weeks	Vomiting	30	23%
	Diarrhea	30	23%
	Cough/common cold	54	41.5%
	Other	49	37.6%
Pulmonary hypertension	Yes	138	37%
	No	235	63%
Heart failure	Yes	26	7%
	No	347	93%
Corrective surgery	Yes	51	13.7
	No	322	86.3
Acyanotic CHD*PAH[2]	-	129	34.6%
Cyanotic CHD *PAH[1]	-	9	2.4%

1-cyanotic congenital heart disease with pulmonary hypertension

2-acyanotic congenital heart disease with pulmonary hypertension

5.3.1. Type of congenital heart disease

Among 373 of study participants 298 (79.9%) have acyanotic CHD and 44(11.8%) of them have cyanotic CHD and the rest 31(8.3%) children diagnosed for both cyanotic and acyanotic CHD at the same time.(see table3) Among children with acyanotic congenital heart disease VSD takes the biggest portion which was 137(31.8%) followed by PDA 112(26%). And from the cyanotic CHD group TOF 32(40%) is the major one followed by TGA 12(15%).

(See Fig.3)

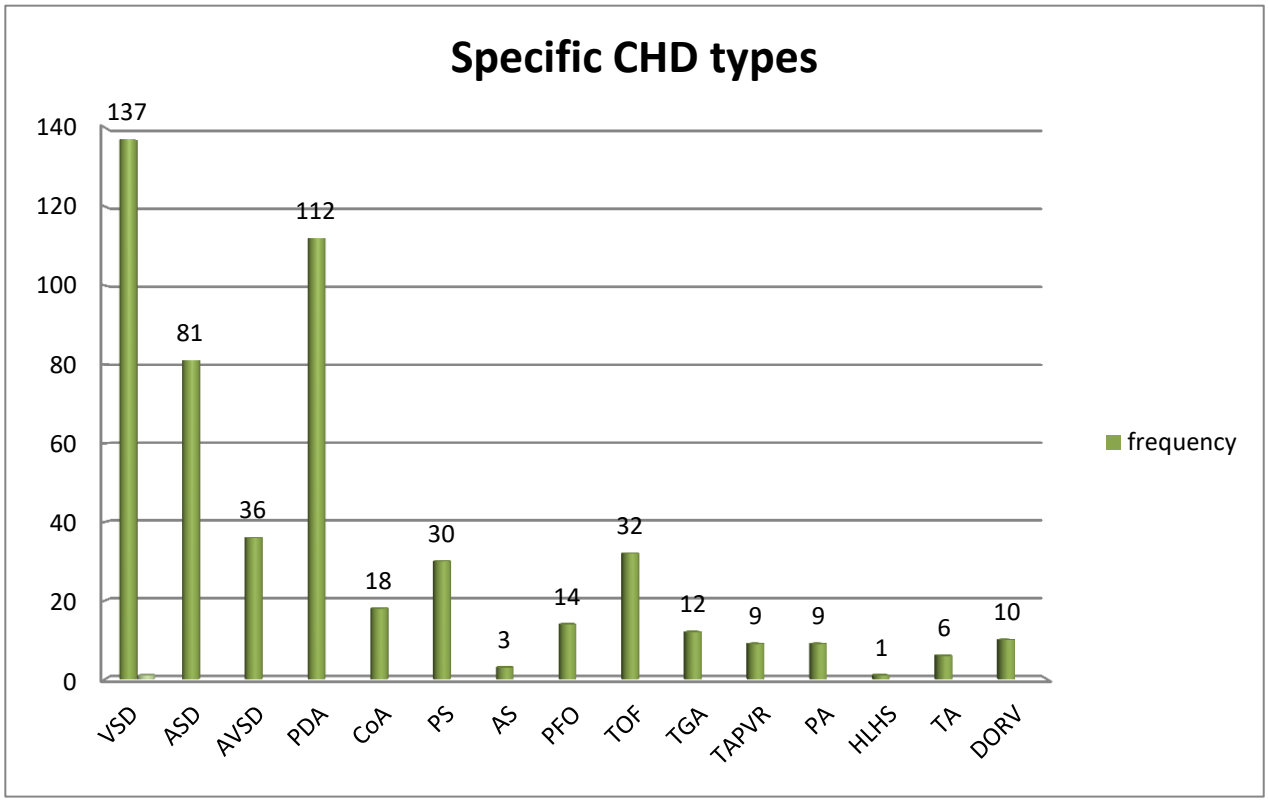


Figure 3: Specific types of congenital heart disease among children with congenital heart disease in selected governmental hospitals and cardiac center Addis Ababa, Ethiopia 2021

5.3.2. Immunization status of the child

The immunization history of the child is taken from the parents/caregiver as the immunization card is not attached in the cardiac follow up patient sheet. Only fully immunized and children who get their vaccine according to their age are taken as immunized. Among 233 children's who aged 0-5 years 192(82.4%) of them take their vaccine accordingly. (See fig. 4)

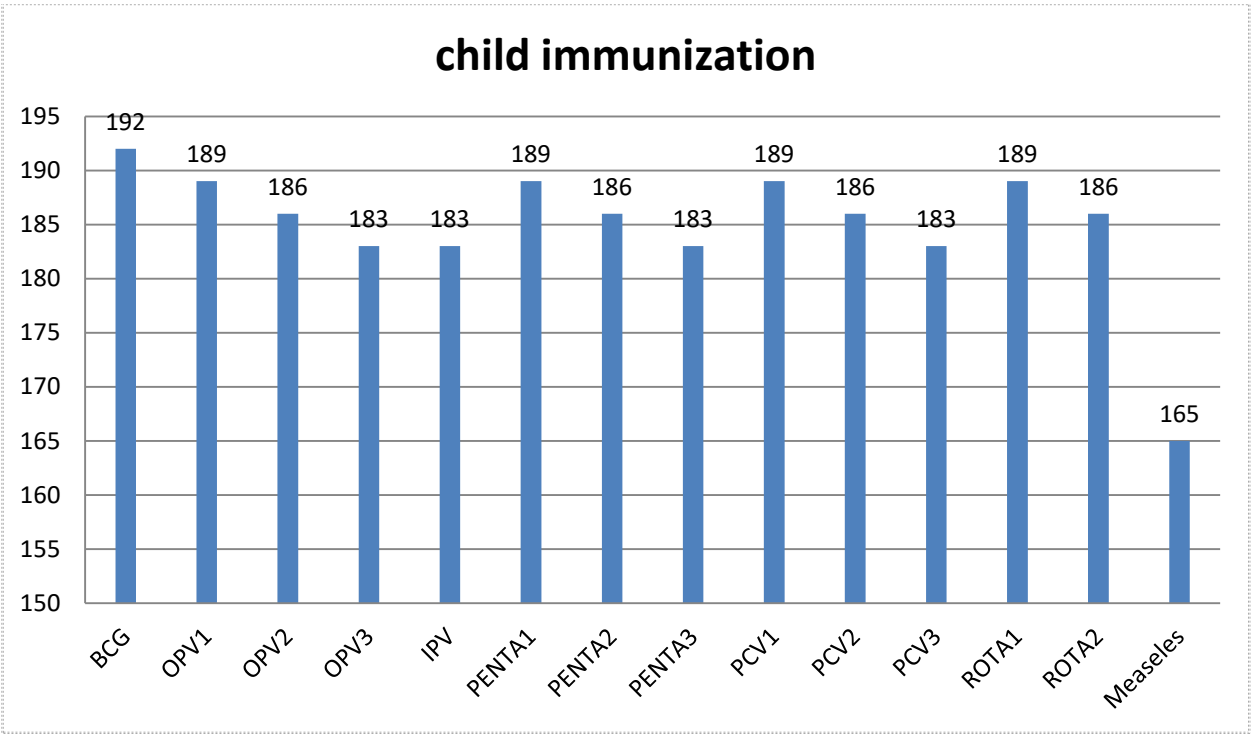


Figure 4 Immunization status of under 5 year age children with congenital heart disease in selected governmental hospitals and cardiac center Addis Ababa, Ethiopia 2021

5.4. Nutritional status

The prevalence of wasting and stunting was 144(38.6%) 95%CI (33.64%, 43.57%) and 134 (35.9%) 95%CI (31.03%, 40.82%) respectively. Underweight was measured for children aged under 10years and the prevalence was 143(43.1%) 95%CI (37.7%, 48.4%). The prevalence of obesity and overweight in this study was 16(4.3%) 95%CI (2.2%, 6.3%), and 15(4%) respectively.

All three types of undernutrition were predominant among children in the age group of 0-12months in which the prevalence's of underweight, stunting and wasting was 46(60.5%), 31(40.8%), and 40(52.6%) respectively.

Underweight was predominant in children with acyanotic CHD 111(42%) and in children with cyanotic CHD stunting was more dominant 18(40.9%).

In children's diagnosed with cyanotic CHD with pulmonary hypertension stunting was the prevalent one and it accounted for 5(55%). Among children with acyanotic CHD with pulmonary hypertension 63(53.4%) of them were underweight.

Table 4: Nutritional status of children with congenital heart disease in selected governmental hospitals and cardiac center Addis Ababa, Ethiopia 2021

Variables	Underweight (WAZ<-2) (n=332)		Wasting (BAZ/WFH<-2) (n=373)		Stunting (HAZ<-2) (n=373)	
Sex	Yes	No	Yes	No	Yes	No
Male	74(45.7%)	88(54.3%)	80(43.7%)	103(56.3%)	67(36.6%)	116(63.4%)
Female	69(40.6%)	101(59.4%)	64(33.7%)	126(66.3%)	67(35.3%)	123(64.7%)
Age						
0-12 months	46(60.5%)	30(39.5%)	40(52.6%)	36(47.4%)	31(40.8%)	45(59.2%)
13months-5 years	56(46.3%)	83(59.7%)	45(32.4%)	94(67.6%)	50(36%)	89(64%)
6-15 years	41(35%)	76(65%)	59(37.3%)	99(62.7%)	53(39.6%)	105(66.5%)
Type of CHD						
Acyanotic CHD	111(42%)	153(58%)	117(39.3%)	181(60.7%)	105(35.2%)	193(64.8%)
Cyanotic CHD	15(38.5%)	24(61.5%)	12(27.3%)	32(72.7%)	18(40.9%)	26(59.1%)
Acyanotic + cyanotic	17(58.6%)	12(41.4%)	16(51.6%)	15(48.4%)	11(35.5%)	20(64.5%)
Cyanotic CHD * PAH([1])	4(50%)	4(50%)	3(33.3%)	6(66.7%)	5(55.6%)	4(44.4%)
Acyanotic CHD* PAH([2])	63(53.4%)	55(46.6%)	59(45.7%)	70(54.3%)	55(42.6%)	74(57.4%)

1-cyanotic congenital heart disease with pulmonary hypertension

2-acyanotic congenital heart disease with pulmonary hypertension

5.5. Factors associated with nutritional status

5.5.1. Wasting

All the independent variables were checked for the association in bivariate analysis and among all factors child's sex, age, residence, occupation of the mother, time to start breast feeding, getting colostrum ,nutritional information, feeding difficulty, being sick in the past two weeks, having acyanotic CHD, pulmonary hypertension, heart failure, having surgery, age of getting surgery level of HGB and SPO2 found to have a p- value less than 0.25 and after entered to multivariate analysis child's age ,sickness in the past two weeks, age at getting surgery, and level of hemoglobin were significantly associated with wasting independently p-value of less than 0.05.

Based on multivariable analysis results, compared to children age 0-12 month, children in the age group 13months-5 year were 56.6% times less likely to be wasted and when hemoglobin level increases by every unit in gram per deciliter the chance of being wasted decreases by 13.1%. Children who were sick in the previous two weeks before the study period were 2.203 times more likely to be wasted. The chance of being wasted increases 1.072 times when the age to getting corrective surgery increases by 1 year. (See table 5)

Table 5: Factors associated with wasting Binary logistic regression and multivariable analysis among children with congenital heart disease in selected governmental hospitals and cardiac center Addis Ababa, Ethiopia 2021

Variables	Yes	No	COR (95% CI)	p-value	AOR (95% CI)	p- value
Sex						
Male	80(43.7%)	103(56.3%)	1		1	
Female	64(33.7%)	126(66.3%)	0.654(0.430,0.995)	0.047	0.722(0.456,1.144)	0.166
Age						
0-12 months	40(52.6%)	36(47.4%)	1		1	
13 months-5 years	45(32.4%)	94(67.6%)	0.431(0.243,0.765)	0.04	0.434(0.231,0.816)	**0.01***
6-15 years	59(37.3%)	99(62.7%)	0.536(0.308,0.933)		0.684(0.363,1.287)	0.239
Residency						
Urban	126(36.8%)	216(63.2%)	1		1	
Rural	18(58.1%)	13(41.9%)	2.374(1.125,5.007)	0.023	1.934(0.718,5.207)	0.192
Mothers occupation						
Employee	27(33.3%)	54(66.7%)	-		-	

Farmer	15(53.6%)	13(46.4%)	1.802(0.811,4.005)	0.148	1.109(0.383,3.214)	0.849
			-	-	-	
Merchant	19(43.2%)	25(56.8%)	-	-	-	
daily laborer	8(30.8%)	18(69.2%)	-		-	
Unemployed	73(39%)	114(61%)	1		1	
Self employed	2(28.6%)	5(71.4%)	-		-	
Breastfeeding						
Within 1st hour	32(38.6%)	51(61.4%)	0.397(0.192,0.820)	0.013	0.490(0.180,1.330)	0.161
After 1st hour	30(61.2%)	19(38.8%)	1		1	
Colostrum						
Yes	44(43.6%)	57(56.4%)	1		1	
No	18(58.1%)	13(41.9%)	1.794(0.794,4.051)	0.16	1.625(0.533,4.961)	0.393
Nutrition information						
Yes	71(33%)	144(67%)	1		1	
No	73(46.2%)	85(53.8%)	1.742(1.141,2.658)	0.01	1.344(0.845,2.137)	0.211
Feeding difficulty						
Yes	80(44.7%)	99(55.3%)	1		1	
No	64(33%)	130(67%)	0.609(0.40,0.927)	0.021	0.826(0.509,1.339)	0.438

Sickness in the last two weeks						
Yes	69(53.1%)	61(46.9%)	2.534(1.633,3.930)	0.00003	2.203(1.367,3.551)	
No	75(30.9%)	168(69.1%)	1		1	**0.001***
Acyanotic CHD						
Yes	132(40.1%)	197(59.9%)	1		1	
No	12(27.3%)	32(72.7%)	0.560(0.278,1.126)	0.104	0.635(0.289,1.398)	0.260
Pulmonary HTN						
Yes	62(44.9%)	76(55.1%)	1		1	
No	153(65.1%)	82(34.9%)	0.657(0.428,1.009)	0.055	0.730(0.450,1.184)	0.202
Heart failure						
Yes	131(37.8%)	216(62.2%)	1		1	
No	13(50%)	13(50%)	0.606(0.273,1.348)	0.22	0.834(0.345,2.015)	0.687
Having surgery						
Yes	11(21.6%)	40(78.4%)	1		1	
No	133(41.3%)	189(58.7%)	2.559(1.267,5.169)	0.009	1.801(0.834,3.889)	0.134
Age of surgery	-		1.020(1.005,1.036)	0.011)	1.072(1.001,1.049)	**0.046***

Hgb level	-	0.918(0.844,0.998)	0.045)	0.869(0.792,0.955)	**0.03***
SPO_2 level	-	0.981(0.959,1.005)	0.114)	0.982(0.956,1.010)	0.212

N.B. p-value <0.25 Binary logistic regression**, *p-value < 0.05 in multivariable analysis**

5.5.2. Stunting

All the independent variables were checked for the association in bivariate analysis and among all factors (family size, residence, birth order, occupation and education status of both the mother and the father, bottle feeding, having complementary feeding, feeding difficulty, pulmonary hypertension, heart failure, having surgery, age at getting surgery, level of HGB and SPO2) found to have a p- value less than 0.25 and after entered to multivariate analysis fathers occupation, bottle feeding, age at getting surgery, and level of SPO2 found to be significantly associated with stunting independently with p-value of less than 0.05.

Based on multivariable analysis results, in comparison to children whose fathers are employed to governmental or non-governmental job, children who had fathers that are merchants were 61.6%less likely to be stunted. The delay in age of the children when getting surgery increases the chance of being stunted by 1.040 times. The odds of being stunted decreases by 3% when the level of SPO2 increases by 1%. Children who were not bottle feed were 2.993 times more likely to be stunted. (See table 6)

Table 6 Factors associated with stunting Binary logistic regression and multivariable analysis among children with congenital heart disease in selected governmental hospitals and cardiac center Addis Ababa, Ethiopia 2021

Variables	Yes	No	COR (95% CI)	p-value	AOR (95% CI)	p-value
Family size						
<4	106(34.3%)	203(65.7%)	1.409(0.862,2.574)	0.153	0.709(0.724,4.034)	0.222
>=4	28(43.8%)	36(56.3%)	1		1	
Residency						
Urban	119(34.8%)	223(65.2%)	1		1	
Rural	15(48.4%)	16(51.6%)	1.757(0.839,3.677)	0.135	0.925(0.308,2.781)	0.890
Birth order						
First order	45(32.4%)	94(67.6%)	1			
2^{nd} - 3^{rd}	60(35.1%)	111(64.9%)	-		-	
4^{th} and above	29(46%)	34(54%)	1.782(0.968,3.278)	0.063	1.810(0.711,4.605)	0.213
Mothers education						
No formal education	24(42.9%)	32(57.1%)	2.217(1.091,4.509)	0.028	1.482(0.443,4.956)	0.523
Primary	40(40%)	60(60%)	1.971(1.061,3.662)	0.032	1.610(0.579,4.477)	0.361

Secondary	47(37.3%)	79(62.7%)	1.759(0.97,3.189)	0.063	2.126(0.928,4.870)	0.074
College and above	23(25.3%)	68(74.7%)	1		1	
Fathers occupation						
Employee	56(33.7%)	110(66.3%)	1		1	
Farmer	19(61.3%)	12(38.7%)	3.11(1.41,0.686)	0.005	9.677(0.945,99.094)	0.056
Merchant	10(16.7%)	50(83.3%)	0.393(0.185,0.833)	0.015	0.384(0.157,0.944)	**0.037***
Self employed	22(44.9%)	27(55.1%)	1.601(0.837,3.061)	0.155	1.810(0.547,5.994)	0.332
Bottle feeding						
Yes	30(34.1%)	58(65.9%)	1		1	
No	22(50%)	22(50%)	1.933(0.925,4.041)	0.080	2.993(1.111,8.065)	**0.03***
Complementary feeding						
Yes	34(35.8%)	61(64.2%)	1		1	
No	18(48.6%)	19(51.4%)	1.824(0.839,3.961)	0.129	0.654(0.219,1.950)	0.446
Feeding difficulty						
Yes	76(42.5%)	103(57.5%)	1		1	

No	58(29.9%)	136(70.1%)	0.578(0.377,0.886)	0.012	0.613(0.365,1.029)	0.064
Pulmonary HTN						
Yes	60(43.5%)	78(56.5%)	1		1	
No	74(31.5%)	161(68.5%)	0.598(0.378,0.923)	0.02	0.668(0.402,1.109)	0.119
Heart failure						
Yes	14(53.8%)	12(46.2%)	1		1	
No	120(34.6%)	227(65.4%)	0.453(0.203,1.011)	0.053	0.513(0.205,1.288)	0.155
Having surgery						
Yes	13(25.5%)	38(74.5%)	1		1	
No	121(37.6%)	201(62.4%)	1.76(0.901,3.435)	0.098	1.416(0.641,3.131)	0.390
Age of surgery	-		1.018(1.003,1.033)	0.02	1.040(1.007,1.074)	**0.018***
Hgb level			0.952(0.877,1.035)	0.248	0.935(0.851,1.028)	0.164
SPO_2 level			0.978(0.955,1.001)	0.063	0.970(0.943,0.998)	**0.037***

N.B. p-value<0.25 Binary logistic regression**, *p-value<0.05 in multivariable analysis**

5.5.3. Underweight

All the independent variables were checked for the association in bivariate analysis and among all factors child's age, birth order, educational status of both parents, occupation of the mother, time to start breast feeding, nutritional information, feeding difficulty being sick in the past two weeks, pulmonary hypertension, heart failure, having surgery, level of HGB and SPO2 found to have a p- value less than 0.25 and after entered to multivariate analysis and child's age , feeding difficulty, being sick in the past two weeks, pulmonary hypertension, level of hemoglobin, level of SPO2 found to be significantly associated with underweight independently with a p-value of less than 0.05.

Multivariable analysis results show that, the chance of being underweight decreases by 18.6% when the level of hemoglobin increases by 1g/dl. Compared to children who were not sick children who had sickness in the past two weeks were 1.834 times more likely to be underweight. The level of SPO2 increases by 1% the chance of being underweight decreases by 6.4%. The odds of being underweight decreased 64% in children age 13months-5 years compared to children age 0-12 months also its decreased by 56.1% in children 6-10years. Compared to children who have not feeding difficulty children who experience feeding difficulty were 1.744 times more likely to be underweight. Also children diagnosed with pulmonary hypertension were 1.885 times more likely to be underweight. (See table 7)

Table 7 Factors associated with underweight Binary logistic regression and multivariable analysis among children with congenital heart disease in selected governmental hospitals and cardiac center Addis Ababa, Ethiopia 2021

Variables n=332	Yes	No	COR (95% CI)	p-value	AOR (95% CI)	p-value
Age						
0-12 months	46(60.5%)	30(39.5%)	1		1	
13months-5 years	56(46.3%)	83(59.7%)	0.440(0.249,0.779)	0.005	0.360(0.183,0.711)	**0.003***
6-10years	41(35%)	76(65%)	0.352(0.194,0.693)	0.001	0.439(0.212,0.909)	**0.027***
Birth order						
First order	47(37.9%)	77(62.1%)	1		1	
2nd - 3rd	72(45.6%)	86(54.4%)	1.372(0.849,2.215)	0.196	1.477(0.817,2.672)	0.197
4th and above	24(48%)	26(52%)	1.512(0.779,2.934)	0.221	0.863(0.363,2.055)	0.74
Mothers education						
No formal education	21(46.7%)	24(53.3%)	2.205(1.045,4.653)	0.038	1.361(0.397,4.665)	0.624
Primary	44(50%)	44(50%)	2.520(1.350,4.703)	0.004	1.148(0.415,3.177)	0.791
Secondary	53(47.7%)	58(52.3%)	2.303(1.271,4.173)	0.006	1.481(0.632,3.469)	0.366

College and above	25(28.4%)	63(71.6%)	1		1	
Breastfeeding						
Within 1st hour	44(53%)	39(47%)	0.599(0.289,1.243)	0.169	1.036(0.382,2.806)	0.945
After the 1st hour	32(65.3%)	17(34.7%)	1		1	
Nutrition information						
Yes	77(39.9%)	116(60.1%)	1		1	
No	66(47.5%)	73(52.5%)	1.362(0.877,2.115)	0.169	0.763(0.441,1.318)	0.332
Feeding difficulty						
Yes	87(52.1%)	80(47.9%)	2,117(1.360,3.296)	0.001	1.744(1.003,3.031)	**0.049***
No	56(33.9%)	109(66.1%)	1		**1**	
Sickness in the last two weeks						
Yes	63(53.4%)	55(46.6%)	1.919(1.217,3.026)	0.005	1.834(1.043,3.226)	**0.035***
No	80(37.4%)	134(62.6%)				
Pulmonary HTN						
Yes	67(53.2%)	59(46.8%)	1.942(1.239,3.047)	0.004	1.885(1.094,3.246)	**0.022***

No	76(36.9%)	130(63.1%)	1		**1**	
Heart failure						
Yes	15(62.5%)	9(37.5%)	1		1	
No	128(41.6%)	180(58.4%)	0.427(0.181,1.005)	0.051	0.726(0.265,1.992)	0.534
Having surgery						
Yes	8(15.7%)	33(64.7%)	1		1	
No	135(41.9%)	156(53.6%)	3.57(1.594,7.993)	0.002	2.461(0.994,6.090)	0.051
Hgb	-		0.885(0.810,0.968)	0.007	0.814(0.731,0.906)	**0.00001***
SPO_2	-		0.945(0.921,0.970)	0.000023	0.936(0.906,0.968)	**0.00008***

N.B. p-value <0.25 binary logistic regression, *p-value < 0.05 in multivariable analysis

6. Discussion

The objective of this study was to assess the nutritional status of children with congenital heart disease in selected hospitals in Addis Ababa. The prevalence of wasting and stunting was found to be 144(38.6%), and 134(35.9%) respectively and the prevalence of underweight in children age under 10years was 143(43.1%). The prevalence of obesity and overweight in this study was 16(4.3%), and 15(4%) respectively.

The prevalence of underweight in the present study was 43.1% 95%CI(37.72%, 48.43%) this was relatively similar to a study done at Uganda and Egypt in which the prevalence was 42.5% and 44%respectively(22,37). The similarity is might be because of the similarity in the study settings. In contrast the prevalence of underweight in the study done in London was 11% (4) in which the study was done among children who undergone surgery for CHD the difference might be explained by this and also the economic difference in the population may contributed. Also the result in this study is higher than the prevalence in a study done in Nigeria which was 20.5% (20). The difference is may be because in the study in Nigeria children with acute and chronic illness other than CHD was excluded in the study.

The prevalence of wasting in the present study is 144(38.6%) 95%CI (33.64%, 43.57%). In consistent with this a study done in Egypt and Nigeria the prevalence was 37.5% ,and 41.1% respectively (20,29). But in contrast to the present study a study in the Chile found only 12.1% (33). This difference is might be explained by the subjects participated in the Chile have gotten treatment (surgery) early year of their life. The studies in Egypt also founds 6.7%, and 23.8%of the participants to be wasted(36,37) which had less prevalence compared to the present study the discrepancy is may be because a difference in clinical history of the patients as this study in Egypt excludes children with additional cardiac disorders and other disease. A study done in Hawassa Ethiopia reveals that 63% of the study subjects were wasted this is higher compared to the present study(26). This variation might be because the study done on only un-operated and hospital admitted children it's expected that children on OPD follow up to be healthier than who are admitted.

The prevalence of stunting in the present study is 134(35.9%) 95%CI (31.03%, 40.82%). In contrast with this a study in Egypt found 61.9% of the participants to be stunted this shows a

big discrepancy with the present study(36). The difference of the study subjects may be the case for the gap that the study population in the study done in Egypt were un operated plus to this there was a difference in clinical characteristics like hemoglobin level the mean hemoglobin level was less than a result in this study which was mentioned to affect the nutritional status in different literatures. The results in the study done in Thailand shows less prevalence of stunting when compared with the current study which is about 16%(34) this might be because of the accessibility of treatment, distribution of CHD and economical difference among the population.

The prevalence of overweight and obesity in the present study reported to be 4% 95%CI(2.2%,6.3%) and 4.3% respectively. this was consistent with the result of the study done in Thailand in which the prevalence's of overweight was 3% (34).

The commonest type of cardiac lesion from the acyanotic group of CHD in the present study was VSD which accounts for 31.8% and from the cyanotic CHD group TOF was the major type which accounts for 40%. Similar to this study done in India, Indonesia, Thailand, Iran, Egypt, Nigeria and Hawassa, Ethiopia which VSD and TOF was the major type of lesions from the acyanotic and cyanotic CHD respectively although there was a difference in prevalence VSD that ranges between (13%-56%) and TOF (10.5%-56%) (20,25,26,34–36,39). The discrepancy may be explained by the difference in study setups most of the studies were single-center studies so the sample may be small in size to explain the real prevalence.

In the present study child age, being sick in the past two weeks, age at getting surgery, and hemoglobin level was associated with wasting. And stunting was found to be associated with occupation of the parent, bottle feeding, age at time of surgery, and level of SPO2. On the other hand underweight was associated with age, sickness, pulmonary hypertension, level of hemoglobin, and SPO2.

Compared to children aged 0-12 month children aged 13months-5 years were less likely to be wasted in the present study [AOR=0.434, 95% CI:(0.231,0.816)] likewise a study done in Hawassa Ethiopia also mentioned children under age 1 year are more likely to be malnourished(26). also a study in China revealed that children age less than one years were more likely to be malnourished with high prevalence in the three indicators(28). The similarity can be defined by that children under 1 years of age need more nutrients for growth and

development than the older children and also the study setting were similar with the previous one.

Similar to the current study, studies done in India, Egypt, Nigeria and Ethiopia found a significant association between malnutrition and pulmonary hypertension, low SPO2 and low Hgb (20,25,26,29,36,39,44). These reports are in line with our study the plausible explanation for the similarity is as oxygen and hemoglobin are useful in the metabolism of nutrients in a human body so decreasing of this two in the cells may cause disturbance in normal metabolism which may lead to malnutrition.

Compared to children who are not diagnosed with pulmonary hypertension children diagnosed with pulmonary hypertension were 1.885 times more likely to be underweight. This could be explained by that pulmonary hypertension increase energy requirement as the heart works hard to get blood to the lungs and the rest of the body against high pressure in the blood vessels and it also precipitates decreased nutritional intake and interrupts feeding due to the feeling of fatigue and shortness of breath this could lead to malnourishment.

Age at surgery was associated with wasting and stunting in which children having treatment later have a relatively high risk of being malnourished [AOR=1.072, 95%CI:(1.001,1.049)], and [AOR=1.040, 95%CI:(1.007,1.074)] respectively. The results were consistent with the study in India, Thailand, and Nigeria older age at corrective surgery was one of the predictor of malnutrition. Different literatures reveals that early corrective surgery found to have a good impact on positive outcomes of nutritional status(34,42,44).

7. LIMITATION AND STRENGTH

7.1. Limitation

- The sampling technique in this study was consecutive sampling technique because it's hard to determine the probability about children who come to follow up even though the study tries to include all the hospitals with cardiac follow up the non-probability technique makes hard to generalize the result.
- Using single 24 hour recall method is also another limitation for this study because there will be misinformation or biased response.

7.2. Strength

- This research considers children with CHD for nutritional assessment as studies done in the area are rare in Ethiopia.
- Hospitals in Addis Ababa with the outpatient department which gives service for children with a cardiac problem specifically were included in this study.

8. CONCLUSION AND RECOMMENDATION

8.1. Conclusion

The prevalence of wasting and stunting among the study participants was 144(38.6%) and 134(35.9%) respectively. Underweight measured for children under 10 years and 143(43.1%) found to experience underweight.

Child's age, feeding difficulty, bottle feeding, being sick in the prior two weeks of the study, pulmonary hypertension, level of hemoglobin, level of SPO2 was the factors in this study which were found to be associated with malnutrition.

8.2. Recommendation

For government and policy maker

Getting the corrective surgery in the late years shows a significant impact on nutritional status so the federal ministry of health, Ethiopia should work on the promotion of early surgery/treatment and organizing additional cardiac treatment centers for easy accessibility.

Hence the high prevalence indicates there is a need to intervention policy makers, responsible organs (governmental and non-governmental) should design a strategy to decrease the risks of malnutrition and promote nutritional status specifically for this group of children.

Also a strategy has to be designed about including different professional (nutritionists, nurses, counselors and doctors) while caring for this children.

For health facilities and staffs

Since this study find a high prevalence of malnutrition hospitals should assess the nutritional status of the child continuously to act accordingly for the improvement of the nutritional status.

Also the staffs who work in the cardiac follow up unit in the hospital should always work on giving advice on feeding and nutrition. As children who are under 12months, children with additional problem like pulmonary hypertension, and feeding difficulty found to be more susceptible to malnutrition special attention should be given for this children.

For Researchers

This research focused on the anthropometric measurements so future researchers should have to assess nutrient deficiency by using different types of dietary assessment techniques also including further laboratory investigations will end up giving a good result also its better to include some intervention and long term follow ups.

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APPENDIXES

Appendix A: Consent and Information Sheet

Consent

There is no risk in participating in this research project.

Benefits

If you participate in this research project, there may not be direct benefit to you or your child but your participation is likely to help us in assessing the nutritional status of children with congenital heart disease. Ultimately, this will help us to identify the gap and take the appropriate intervention by the authorized stakeholder. You will not be provided any incentive or payment to take part in this project.

Confidentiality

The information collect from this research project will be kept confidential and information about you and your child that will be collected by this study will be stored in a file, without your name, but a code number assigned to it. In addition, it will not be revealed to anyone except the principal investigator.

Right to refuse or withdraw: Childs participation in the study will totally be based on your agreement and the child has the right not to participate from the beginning, or may stop participating at any time after starting participation. The Childs refusal has no effect on the care he/she gets from the hospital

Contact address for any compliant: If there are any questions or queries any time about the study or the procedure, please contact, Rediet Woldesenbet (the Principal Investigator), Tel. 09-79-55-91-14, as well contact to Addis Ababa University College of Health Sciences Institutional Research Ethics Review Committee's Chairperson

Information sheet

I am ……. (Interviewer) I am working with Rediet Woldesenbet she is from Addis Ababa University College of health science and working on her post graduate study on pediatric and child health nursing.

I undersigning this document, I and the child will be giving our consent to participate in the study entitled as "Nutritional status of children with congenital heart disease in selected governmental hospital Addis Ababa and cardiac center of Ethiopia." We are informed that the purpose of this study is to assess Nutritional status of children with congenital heart disease in selected governmental hospital Addis Ababa and cardiac center of Ethiopia. We are told that participation in this study is entirely voluntarily. We are told that our answers to the questions will not be given to anyone else and no reports of this study ever identify us in any way.

- ✓ Do you have any question?
- ✓ Do I have your agreement to proceed? If yes continue, if no .Stop, Thank you!

Identification	**Remark**
✓ Code of the child_____ ✓ Name of the interviewer_____ ✓ Signature _____ ✓ Date of interview: ____/_____/ ____day /month / year ✓ Result of interview **1.** Completed **2.** Partially completed **3.** Refused **4.** Other _____ ✓ Checked by supervisor **1.** Name____ signature _____date_____	

Appendix B: English version Questioners

Nutritional status of children with congenital heart disease and associated factors in selected governmental hospital Addis Ababa and cardiac center of Ethiopia.

Anthropometric measurement

1. Height: _____In Cm.
2. Weigh: _____In Kg.

Part 1 Socio Demographic Characteristics

Serial no.	Question	Answers	Skip
101.	What is the sex of the child?	1. Male 2. Female	
102.	What is the age of the child?	_____	
103.	What is your relationship with the child?	A. Mother B. Father C. Brother D. Sister E. Others, Specify_____	
104.	Total number of people living in the house?		
105.	Birth order of the present (sick) child?		
106.	What is the birth interval between this child and his/her immediate elder?		
107.	Where is your residence?	A. Urban B. Rural	
108.	Income per month		

109.	Who is the head of the household	1. Mother 2. Father 3. Both 4. Other	
110.	Educational status of the father	1. Unable to read & write 2. Able to read & write 3. Primary school 4. Secondary school 5. College level & above	
111.	Educational status of the mother	1. Unable to read & write 2. Able to read & write 3. Primary school 4. Secondary school 5. College level & above	
112.	Occupational of father	1. Farmer 2. Employee 3. Student 4. Merchant 5. Unemployed 6. Other(specify) _____	
113.	Occupation of mother	A. Farmer B. Employee (government or non-government) C. Student D. Merchant E. Unemployed F. Other (specify) _____	
WATER AND SANITATION			

114.	What is your main source of drinking water?	1. Tap 2. Borehole (protected) 3. Borehole (not protected) 4. River 5. spring 6. rain water 7. Others (specify) _____	
115.	Do you treat your drinking water?	1. Yes 2. No	
116.	If yes, how do you treat your water?	1. Boiling 2. Use traditional herbs 3. Use of chemicals (water guard) Filters/sieves 4. Others (specify).....	
117.	Do you have a toilet?	1. Yes 2. no	
118.	What kind of toilet facility does your household have?	1= Flush toilet 2=Traditional pit latrine 3= Ventilated improved latrine 4= None/Bush/Field 5= Digging a hole 6=other(specify).....	
119.	Is there a hand washing facilities with soap near the toilet?	1. Yes 2. No	

Part 2 Dietary History

Questions 201 to 207 are only asked for parents or care giver of children whose age is 0- 24 months

No.	Questions	Answers	skip
201.	When do you start breast feeding after birth?	1. Immediate (within 1 hr) 2. Within first day 3. Within first 3 days 4. More than 3 days 5. Do not know 6. Other specify_____	
202.	Did your child get colostrum?	1. Yes 2. No	
203.	Does your child still breast feed?	1. Yes 2. No	If No skip to205
204.	How many times in 24 hours do you give breast milk?		
205.	Do you bottle feed to your child?	1. Yes 2. No	If No skip to207
206.	Have you started complementary feeding to your child?	1. Yes 2. No	
207.	If yes at what age do you start giving complementary feeding?	Age in month_____	

208. Is there any health professional who advice you how to feed your child from your previous follow up? 1. Yes 2. No

Breakfast	Lunch	After lunch	Snack	Dinner	Overnight

Dietary diversity questions				
No	Food items	Examples	Yes	No
209.	Cereals and WHITE ROOTS AND TUBERS	Any [Injera, bread, rice noodles, biscuits, or any other foods made from millet, sorghum, maize, rice, wheat], or other locally available grains Any potatoes, yams, manioc, cassava or any other foods made from roots or tubers?		
210.	Any vegetables?	pumpkin, carrot, squash, or sweet potato that are orange inside dark green leafy vegetables, including wild forms + *locally available vitamin A rich leaves such as amaranth, cassava leaves, kale, spinach) other locally available vitamin A rich vegetables (e.g. red sweet pepper*		
211.	Any fruits and other vegitables?	mango, cantaloupe, apricot (fresh or dried), ripe papaya, dried peach, and 100%fruit juice made from these+ *other locally available vitamin A rich fruits* other vegetables (e.g. tomato, onion, eggplant)		
212.	Meat and Fish seafood	Any beef, pork, lamb, goat, rabbit wild game, chicken, duck or other birds, liver, kidney, heart, or other organ meats Fresh or dried fish or shellfish?		
213.	Eggs	eggs from chicken or other egg		

214.	LEGUMES, NUTS AND SEEDS	dried beans, dried peas, lentils, nuts, seeds or foods made from these (eg. hummus,peanut butter)		
215.	MILK AND MILK PRODUCTS	cheese, yogurt, milk or other milk products		
216.	OILS AND FATS	oil, fats or butter added to food or used for cooking		
217.	SWEETS	sugar, honey, sweetened soda or sweetened juice drinks, sugary foods such as chocolates, candies, cookies and cakes		
218.	SPICES, CONDIMENTS, BEVERAGES	spices (black pepper, salt), condiments (soy sauce, hot sauce), coffee, tea, alcoholic beverages		

NB: the last two groups in the questionnaire are not included in the score

Child feeding condition questions			
301.	Is the child on feeding tube?	1. Yes 2. No	If yes skip to 308
302.	Does your child cough, gag or choked while feeding?	1. Yes 2. No	
303.	Does your child respiration change while you feed?	1. Yes 2. No	
304.	Does your child feel tired while feeding?	1. Yes 2. No	
305.	Does your child cry while feeding?	1. Yes 2. No	
306.	If breast feed does he/she suck well?	1. Yes 2. No	
307.	Can your child take full feeds orally?	1. Yes 2. No	
308.	Does your child get sick in the past 2 weeks?	1. Yes 2. No	If no skip to 311

309.	If yes, does he/she have	vomiting	1. Yes 2. No	
		Diarrhea	1. Yes 2. No	
		constipation	1. Yes 2. No	
310.	If diarrhea how many episodes per day in the past 2 weeks		1. One times 2. Two times 3. Three and above	
311.	Is your child vaccinated?		1. Yes 2. No	

BCG	OPV					PENTA			PCV			ROTA		Measeals
YES(1) NO(2)	0 YES (1)NO(2	1 YES(1) NO (2	2 YES(1) NO (2	3 YES(1) NO (2	IPV YES(1) NO (2	1 YES(1) NO (2	2 YES(1) NO (2	3 YES(1) NO (2	1 YES (1) NO(2	2 YES(1) NO (2)	3 YES (1) NO(2	1 YES (1) NO(2	2 YES (1) NO(2	YES(1) NO(2

Part 3 Child Medical Condition (secondary data) filled in patient card

s.no	Type of CHD	Answer	Skip
312.	Acyanotic CHD	Yes No	If no skip to 314
313.	If yes list types		
314.	Cyanotic CHD	Yes No	If no skip to 316
315.	If yes list types		
Other disease			
316.	Pulmonary hypertension	Yes No	

317.	Heart failure	Yes No	
318.	Does your child have corrective surgery?	Yes No	
319.	If you say yes for question 308 at what age does he/she get the surgery?		
320.	Last recorded hemoglobin count	_____gram per deciliter	
321.	Last recorded Arterial oxygen saturation	_____%	

Thank you for being a member of our study and thank you for your collaboration

Appendix C: የስምምነት እና የመረጃወረቀት

ስምምነት

በዚህ የምርምር ስራ ስለተሳተፉ ምንም አይነት ስጋት ሊሰማዎት አይገባም፡፡

ጥቅማጥቅሞች

በዚኽ ጥናት ዉስጥ ስለተሳተፉ እርስዎ ወይንም ልጅዎ በቀጥታ የሚያገኙት ጥቅም ላይኖር ይችላል፡፡ነገር ግን በተፈጥሮ የልብ በሽታ ያለባቸዉን ህጻናት የአመጋገብ ሁኔታ ላይ ለምናደርገው ጥናት ሊረዳን ይችላል ፡፡በመጨረሻም ያሉትን ክፍተቶች እና ችግሮች ከተገቢው አካል ጋር በመሆን ለመፍታት ይረዱናል፡፡ በዚህ ጥናት ዉስጥ ስለተሳተፉ ምንም ዓይነት የገንዘብ ወይንም ሌላ ክፍያ አያገኙም፡፡

ሚስጥራዊነት

በዚህ ጥናት ዉስጥ በተሳተፉበት ወቅት የሰጡት ማንኛውም መረጃ ሚስጢራዊነቱ የተጠበቀ ነው፡፡የሰጡት መረጃ ስምምነት ሳዩጠቀስ በኮድ ቁጥር ብቻ ይቀመጣል፡፡ በተጨማሪም ከዋና አዘጋጇ በስተቀር ለማንም አይገለጥም፡፡

የ መሳተፍና ያለመሳተፍ መብት፡

የልጅዎት በዚህ ጥናት ዉስጥ መሳትፍ በርሶ ፍቃድ ላይ የተመሰረተ ነው፡፡በዚህ ጥናት አለመሳተፍ ወይንም ከጀመሩ በኋላ ማቋረጥ ይችላሉ፡፡ባለመሳተፈዎ ወይንም በማቋረጥዎ በልጅዎ የህክምና ክትትል ዉስጥ ምንም አይነት ተጽዕኖ የለውም፡፡

አድራሻ፡ ማንኛውም ጥያቄ ካለዎት ረድኤት ወልደሰንበት ብለው ወደ 0979559114 በመደወል ወይንም ወደ አዲስ አበባ ዩኒቨርሲቲ የጤና ሳይንስ ኮሌጅ የምርመር ስነምግባር ክትትል ኮሚቴ ሰብሳቢ በመቅረብ መጠየቅ ይችላሉ፡፡

የመረጃ ወረቀት

እኔ. . . . . (ጠያቂ) የምሰራው ከረድኤት ወልደሰንበት ጋር ሲሆን መረጃ ሰብሳቢ ነኝ። ረድኤት በአዲስ አበባ ዩኒቨርሲቲ የጤና ሳይንስ ትምህርት ክፍል በህጻናት ሕክምና እና የልጆች ጤና ነርስነት የድህረ ምረቃ ትምህርትዋን እየሰራች ነው።እኔ እና ህጻኑ በተፈጥሮ የልብ ህመም ያለባቸውን ህጻናት የአመጋገብ ሁኔታ ለመመዘን በሚደረገው ጥናት ላይ ለመሳተፍ ፍቃደኛ መሆናችንን በፊርማዬ አረጋግጣለሁ። በዚህ ጥናት ለመሳተፍ ስንስማማ የጥናቱ አላማ ምን እንደሆነ በግልጽ ተነግሮናል። ተሳትፎአችነም በፍቃደኝነት ላይ የተመሰረተ ነው። ማንኛውም የሰጠነዉ መረጃም ለማንም ይፋ እንደማይደረግ ገልጸውልናል። ማንኛዉም በዚህ ጥናት የሚሰራ ሪፖርት በምንም መልኩ ማንነታችንን እንደማይገልፅ ተነግሮናል።

- ጥያቄ አለወት?
- ለመቀጠል ፍቃደኛ ናችሁ? አዎ ካላችሁ ቀጥሉ አይ ካላችሁ አቁሙ እናመሰግናለን።

መለያ	**አስተያየት**
የህጻኑ መለያ ቁጥር . . . . . የጠያቂው ስም. . . . . ፊርማ. . . . . ቃለ መጠይቁ የተካሄደበት ቀን. . . . . ቀን/ወር/አመት የቃለ መጠይቁ ውጤት 1 .አልቋል 2 .በግማሽ አልቋል 3. ፈቃደኛ አይደሉም 4. ሌላ ምክንያት የተቆጣጣሪው ስም. . . . . ፊርማ. . . . . ቀን.	

Appendix D: አማርኛ መጠይቅ

በኢትዮጵያ ልብ ህክምና ማእከል እና በተመረጡ የመንግስት ሆስፒታሎች በተፈጥሮ የልብ በሽታ ያለባቸዉ ህጻናት የአመጋገብ ሁኔታ እና ተያያዥ ተጽዕኖዎች ላይ ለሚደረግ ጥናት የቀረበ መጠይቅ

አንትሮፖሜትሪክ ልኬቶች

1. ቁመት---------- በ ሳ.ሜ
2. ክብደት---------- በኪ.ግ

ክፍል 1፡ ማህበርሰብዓዊና ስነህዝባዊ ባህርያት

ተራቁጥር	ጥያቄ	መልስ	ዝለል
101.	የህጻኑ ፆታ ምንድን ነው	1.ወንድ 2.ሴት	
102.	የህጻኑ እድሜ ስንት ነው		
103.	ከህጻኑ ጋር ያለዎት ግኑኝነት ምንድን ነው	1.እናት 2.አባት 3.ወንድም 4.እህት 5.ሌላ(ያብራሩ)	
104.	በ ቤት ዉስጥ ስንት የቤተሰብ አባላት ይኖራሉ		
105.	ህፃን ከቅርብ ታላቁ ጋር ምን ያክል የእድሜ ልዩነት አላቸዉ		
106.	መኖሪያዎ የት ነው	1. ከተማ 2. ገጠር	
107.	የወር ገቢዎ ምን ያክል ነው		
108.	የቤቱ አስተዳዳሪ ማን ነዉ	1. እናት 2. አባት 3. ሁለቱም 4. ሌላ	
109.	የህጻኑ አባት(አሳዳጊ) የትምህርት ደረጃ	1. ያልተማሩ 2. መጻፍናማንበብ 3. አንደኛደረጃ 4. ሁለተናደረጃ	

		5. ኮሌጅናከዛበላይ	
110.	የህጻኑ እናት(አሳዳጊ) የትምህርት ደረጃ	1. ያልተማሩ 2. መጻፍናማንበብ 3. አንደኛደረጃ 4. ሁለተናደረጃ 5. ኮሌጅናከዛበላይ	
111.	የህጻኑ አባት(አሳዳጊ) የስራ ዘርፍ	1. ገበሬ 2. ተቀጣሪ(የመንግስት ወይምሌላ) 3. ተማሪ 4. ነጋዴ 5. ስራየለውም 6. ሌላ(አብራሩ)	
112.	የህጻኑ እናት(አሳዳጊ) የስራዘርፍ	1. ገበሬ 2. ተቀጣሪ(የመንግስት ወይምሌላ) 3. ተማሪ 4. ነጋዴ 5. ስራየላትም 6. ሌላ(አብራሩ)	
የ መጠጥ ዉሀ እና የንፅህና ጥያቄወች			
113.	የቤተሰቡ ዋና የመጠጥ ውሃ ምንጭ ምንድነዉ	ı. የቧንቧ ውሀ 2. የጉድጓድ ዉሀ (የተጠበቀ) 3. የጉድጓድ ዉሀ (ጥበቃ የሌለዉ) 4. የ ወንዝ ዉሀ 5. የምንጭ ውሃ 6. የዝናብ ውሃ	

		7. ሌሎች (ይግለጹ)	
114.	የሚጠጡትን ዉሀ ያከማሉ	1. አዎ 2. አይደለም	አይደለም ካሉ ወደ ጥያቄ 119 ይለፉ
115.	አዎ ካሉ በምን አይነት መንገድ ነዉ የሚያከሙት	1. በ ማፍላት 2. ባህላዊ ዕፅዋትን በመጠቀም 3. ኬሚካሎችን በመጠቀም 4. በ ማጥለል 5. ሌላ ካለ ይግለፁ	
116.	የመፀዳጃ ቤት አለዎት	1. አወ 2. አይደለም	አይደለም ካሉ ወደ ጥያቄ 201 ይለፉ
117.	የመፀዳጃ ቤትወ ምን አይነት ነዉ	1. ሽንት ቤት ማጠቢያ ያለዉ 2. ባህላዊ የጉድጓድ መፀዳጃ ቤት 3. የተሻሻለ የመፀዳጃ ቤት አየር እንዲወጣ የሚያደርግ 4. የለም / ቡሽ / ሜዳ 5. ጉድጓድ መቆፈር **6.** ሌላ (ይግለጹ)	
118.	በ መፀዳጃ ቤትዎ አቅራቢያ የእጅ መታጠቢያ ሳሙና እና ዉሃ አለ	1. አወ 2. የለም	

ከፍል2፡ የአመጋገብ ታሪክ

<u>ከጥያቄ 201 እስከ 207 ያሉት መጠይቆች ከ0-24 ወራት ላሉ ህጻናት ወላጆች ወይም ተንከባካቢዎች ብቻ የሚጠይቅ ይሆናሉ፡፡</u>

ተራቁጥር	ጥያቄ	መልስ	ዝለል
201.	ህፃኑ ከተወለደ በኋላ ጡት ማጥባት መች ጀመርሽ	1.ወዲያውኑ(በ 1 ሰዓትዉስጥ) 2.በ 1ቀን ዉስጥ 3.በ3 ቀንዉስጥ 4.ከ3 ቀንበኋላ 5.አላውቅም 6.ሌላ(ያብራሩ)	
202.	ልጅሽ እንገር አግኝቷል	1. አዎን 2. የለም	
203.	ልጅሽን አሰካሁን ጡት ታጠቢዋለሽ	1. አዎን 2. የለም	የለም ከሆነ ወደ 205 ዝለል
204.	በ24ሰዓት ዉስጥ ምንያህል ጊዜ ታጠቢዋለሽ		
205.	ልጅሽን ጡጦ ማጥባት ጀምረሻል	1. አዎን 2. የለም	የለም ከሆነ ወደ 207 ዝለል
206.	ለልጅሽ ተጨማሪ ምግቦችን ትመግቢዋለሽ	1. አዎን 2. የለም	
207.	ከሆነ በስንት አመቱ ጀመርሽ	ዕድሜበወራት	

208. ከዚህ በፊት በነበረዉ ክትትል ልጂሽን እንዴት መመገብ እንዳለብሽ የነገረሽ ወይም ያማከረሽ የጤና ባለሞያ አለ?

1. አለ 2. የለም

ቁርስ	ምሳ	ከምሳ በሁላ	መክሰስ	እራት	ከ እራት በሁላ

የምግብ ስብጥር ጥያቄዎች				
ተራቁጥር	የምግብ አይነቶች	ምሳሌዎች	አዎ	የለም
209.	የ እህል ዘሮች እና ስራስሮች	እነጀራ፣ዳቦ፣ሩዝ፣ብስኩት፣ ወይንም ከበቆሎ፣ከገብስ፣ከማሽላ፣ከስንዴ ወይንም ሌላ በአካባቢው ከሚገኙ ጥራጥሬ የተዘጋጁ ምግቦችከድንች ከ ካሳቫና የመሳሰሉ ስራስሮች የተዘጋጁ ምግቦች		
210.	አታክልቶች	ዱባ ፣ ካሮት ፣ ዱባ ወይም ጣፋጭ ድንች እነዚህ ጥቁር አረንጓዴ ቅጠል ያላቸው አትክልቶች + በአከባቢው የሚገኙ ቫይታሚን ኤ የበለፀጉ ቅጠሎችን ማለትም ካሳቫ ቅጠሎችን ፣ጥቁር ጎመን ሌሎች በአከባቢው የሚገኙ አትክልቶች + እና ሌሎች በአከባቢው የሚገኙ ቫይታሚን ኤ የበለጸጉ አትክልቶች (ለምሳሌ ቀይ ጣፋጭ በርበሬ)		
211.	ፍራፍሬዎች እና ሌሎች አትክልቶችን	ማንጎ፣አካት፣ፓፓያ፣ ኮክ፣የፍራፍሬ ጭማቂ+ሌሎች አትክልቶችን (ለምሳሌ ቲማቲም ፣ ሽንኩርት)		
212.	ስጋ አሳ እና የባህር ምግቦች	የበሬ፣በግ፣የዶሮ፣የ አሳማ ፣የጥንቸል ወይንም የአዕዋፍ ስጋዎችን ወይንም ኩላሊት ጉበት እና የመሳሰሉ የእንስሳት አካላትትኩስ ወይንም የደረቁ አሳዎችን		
213.	አንቁላል	የዶሮ አንቁላል ወይም ሌላ		
214.	ጥራጥሬዎች	ከባቄላ፣ከሽንብራ፣ከምስርናየመሳሰሉ ምግቦች		
215.	ወተት እና የወተት ምርቶች	አይብ፣እርጎ፣ወተትናየወተትተዋጽዖች		

216.	ቅባታማ ምግቦች	ከዘይት፣ከቅቤና ቅባታማ ነገሮች የተሰሩ ምግቦች		
217.	ጣፋጭ	ስኳር ፣ ማር ፣ ጣፋጭ ለስላሳ ወይም ጣፋጭ ጭማቂ መጠጦች ፣ እንደ ቸኮሌት ፣ ከረሜላ ፣ ኩኪስ እና ኬኮች ያሉ ጣፋጭ ምግቦች		
218.	ቅመማቅማሞች እና መጠጦች	ቡና፣ ሻይ ወይንም ሌላ ቅመማቅማሞች		

የህጻኑ አመጋገብ ሁኔታዎች መጠይቅ				
301.	ህጻኑ በመመገቢያ ቱቦ ይጠቀማል		1. አዎን 2. የለም	አዎን ካሉ ወደ 308 ይለፉ
302.	ልጅዎት በሚመገብበት ጊዜ ያስላል፣ቋቅ ያስብለዋል ወይንም ያስመልሰዋል		1. አዎን 2. የለም	
303.	ልጅዎት በ ሚመገብበት ሰአት የመድከም ምልክት ያሳያል		1. አዎን 2. የለም	
304.	ልጅዎት በሚመገብበት ጊዜ የአተነፋፍስ ችግር ይገጥመዋል		1. አዎን 2. የለም	
305.	ልጂዎትን በሚመገቡበት ግዜ ያለቅሳል		1. አዎን 2. የለም	
306.	በሚያጠቡበት ጊዜ ልጅዎ ጡቱን በደንብ ይጎርሳል ወይም መሳብ ይችላል		1. አዎን 2. የለም	
307.	ልጀዎ በአፉ በደንብ ይመገባል ወይ		1. አዎን 2. የለም	
308.	ባለፉተ 2 ሳምነታት ልጅዎ ታሞ ያወቃል		1. አዎን 2. የለም	
309.	አዎን ካሉ የቱ አጋጠመው	ያሰታውከዋል	1. አዎን 2. የለም	
		ያስቀምጠዋል	1. አዎን 2. የለም	
		የሆድ ድርቀት አለዉ	1. አዎን 2. የለም	

		ሌላ ካለ ይጠቀስ		
310.	ተቅማጥ ካገጠመው ባለፉት 2 ሳምንታት በቀን ለምን ያክል ጊዜ ነበር		1.አንድ ግዜ 2. ሁለትግዜ 3. ሦስትግዜናከዛበላይ	
311.	ልጅዎ ክትባት ተከትባል			አዎ ካሉ ከታች ሚታየዉን ሰንጠረዠ ይሙሉ

BCG	OPV					PENTA			PCV			ROTA		Measeals
YES(1) NO(2)	0 YES(1)NO(2	1 YES(1) NO(2	2 YES(1) NO(2	3 YES(1) NO(2	IPV YES(1) NO(2	1 YES(1) NO(2	2 YES(1) NO(2	3 YES(1) NO(2	1 YES(1) NO(2	2 YES(1) NO(2)	3 YES(1) NO(2	1 YES(1) NO(2	2 YES(1) NO(2	YES(1) NO(2

ክፍል 3፡የህጻኑ የጤና ሁኔታዎች (ከህጻኑ የህክምና ካርድ ላይ የሚሞላ)

s.no	የልብ ህመሙ አይነት	ልጁ ያለበትን የጤና ሁኔታ ምልክት ያድርጉ	ዝለል
312.	Acyanotic CHD	1. አዎን 2. የለም	የለም ከሆነ ወደ 314 እለፍ
313.	If yes list types		
314.	Cyanotic CHD	1. አዎን 2. የለም	የለም ከሆነ ወደ 316 እለፍ
315.	If yes list types		
ተጨማሪ በሽታወች			
316.	Pulmonary hypertension	1. አዎን 2. የለም	
317.	Heart failure	1. አዎን 2. የለም	
318.	ልጅዎ ለልብ ህመሙ ቀዶ ጥገና ተሰርቶለታል?	1. አዎን 2. የለም	የለም ከሆነ ወደ 322 እለፍ
319.	ለ ጥያቄ 308 አዎ ብለዉ መልስ ከሰጡ በስንት አመቱ ነዉ የቀዶ ጥገናዉን ያገኘዉ?		
320.	Last recorded hemoglobin count	_____gram per deciliter	
321.	Last recorded Arterial oxygen saturation	_____%	

የዚህ ጥናት አባል ሆነው በጥናታችን ዉስጥ ስለተሳተፉ በጣም እናመሰግናለን፡፡

Curiginal

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