UNDERNUTRITION AND ASSOCIATED FACTORS AMONG RURAL PRIMARY SCHOOL CHILDREN IN ZALA DISTRICT, SOUTHERN ETHIOPIA . A COMPARATIVE STUDY IN SCHOOLS WITH AND WITHOUT FEEDING PROGRAM .

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ABSTRACT

Background:-Malnutrition in school-age children have different health impacts that result in delayed maturation, deficiencies in muscular strength, low work capacity, reduced bone density later in life, and poor school performance. In developing countries, 52% and 34-62% of the school-age children are stunted and underweight. To mitigate this burden School feeding program was primarily designed to increase equity, access to education, enrollment, attendance, and nutritional status and health of school children.

Objective: This study was aimed to determine undernutrition and associated factors among rural primary school children in schools with and without a feeding program in Zala district, Southern, Ethiopia.

Method: - A school-based comparative cross-sectional study was conducted among 514 rural primary school children of 7-14 years old from March 8-18, 2020. A Stratified sampling technique was employed and simple random sampling was used to select the study participants from each stratum. Data were collected using a structured questionnaire and analyzed by a statistical package for social science version 22software. Both bivariate and multivariable logistic regression analyses were undergone.

Results and discussions: The overall prevalence of stunting, thinness, and underweight among school children in the study area was 26.1%, 14.2%, 16.5% respectively. A higher stunting, thinness, and underweight prevalence was observed among school children from non- feeding schools 31.1%, 17.5%, and 20.2% respectively than in schools with feeding programs 21%, 10.9%, and 12.6% respectively. There was a statistically significant difference in stunting [COR=1.69, 95%CI (1.14-2.53)/P=0.009)] and thinness [COR=1.74, 95%CI (1.05-2.88)/P=0.033)] among school children in feeding and non- feeding groups. Meal frequency per day, missed meal schedule, latrine availability, father's occupation, and deworming were found to be significantly associated with stunting among the school children, whereas the availability of hand washing facility and latrine were factors associated with thinness among school children.

Conclusion: - The findings suggest that the School feeding program can improve the nutritional status of school children.

Key Word:-School feeding, Zala district, school children, undernutrition

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ACRONYMS AND ABBREVIATIONS

AOR	Adjusted Odds Ratio
BMI	Body Mass Index
CI	Confidence Interval
CSA	Central Statistical Agency
EDHS	Ethiopian Demographic Health Survey
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agriculture Organization
GSFP	Government School Feeding Program
HAZ	Height for Age Z-Score
MUAC	Mid Upper Arm Circumference
NSFP	None School Feeding Program
PCA	Principal Component Analysis
SD	Standard Division
SFP	School Feeding Program
SHN	School Health and Nutrition
SNNPR	Southern Nation Nationalities and Peoples Region
USA	United State Of America
WAZ	Weight for Age Z-Score
WFP	World Food Program
WHO	World Health Organization

CHAPTER ONE

1. Introduction

1.1 Background.

The school-age child is a child who is old enough to go to school. Or the age of a person when attending lower-level schools is customary. The period during a person's life when one is legally required to attend school. According to the world demographic report of 2020, about 16.75% of the world population and 25.43% of the African population are school-age children from 5-14 years old(1).

Nutritional status is the condition in which the health of an individual is influenced by nutrient intake and utilization in the body. Malnutrition in school-aged children has different health impacts that result in delayed maturation, deficiencies in muscular strength, low work capacity, reduced bone density later in life, and poor school performance. (2).

School-age children have not received as much attention from health providers/planners as that of under-fives globally and also in Ethiopia. In a world workshop at Kentucky, United State of America (USA) in 1994, it had been agreed that there was insufficient information on the health status of school-age children from developing countries, particularly at the community level. Under-five years old children are targeted for priority care under various maternal and child, but these age groups 5-15 year remain neglected(3).

School health services provide a perfect platform to detect health problems early and treat them. At least 170 million children are suffering from stunting, this means that they were likely to enroll in class later and had a poor performance in the academic area. They were also predicted to earn an average of 20 percent less when they become adults(4).

School feeding is the provision of food in the form of breakfast or lunch to school children. This can be classified into two main groups based on their modalities such as in-school feeding, where children are fed in school; and take-home rations, where families are given food if their children attend school. (5).

Throughout the developing world, different stack holders are supporting the programs which are organizations with national governments, bilateral arrangements, and NGOs. The primary assumption of SFPs is that education and learning depend upon good nutrition. Although this assertion has been debated, with many asserting that it’s unlikely that school feeding improves

nutritional status since the critical time for nutrition is during pregnancy and the first two years of life has an impact in the entire life for the future. These programs operate in conjunction with other health and nutrition initiatives to extend their success and impact. (6)

School feeding programs and other school-based nutrition and health programs can motivate parents to enroll their children in school and to see that they attend regularly; programs effectively reduce absenteeism and dropouts. Alleviating this hunger in school children helps them to perform better in school (7).

The objective of school feeding was to increase equity, access to education, enrollment, and attendance. Additionally, it was expected to help students to be able to concentrate on their education and achieve better results, the program had a diverse array of designs, implementation arrangements, and management structures. Thus way almost all school feeding programs target primary school students(8).

According to the world food program (WFP) report estimates that at least 368 million children worldwide receive school meals, annually(9). Currently, more than 850,000 students in Ethiopia benefit from school feeding. Also, more than 125,000 girls benefit from a school feeding program initiative aimed at narrowing gender disparities (10).

1.2 Statement of the problem

School-age is a dynamic period of growth and development as children of this age undergo (rapid physical, mental and emotional development). Their social interaction also broadens out of their family, which poses a further risk through reduced nutritional care and support. Like that of under-five children, school-age children are the foremost vulnerable group of the population and need special attention including their nutrition and other health issues(11).

Globally, more than 200 million school-age children were stunted and underweight and if there is no action taken, the number will grow to nearly one billion by 2020 (12). The global prevalence of malnutrition among school-age children (5-14 years old) in terms of stunting, was approximately 28% (171 million children), wherein developing country particularly in Eastern Africa suffering a higher rate of 45% (13). Childhood malnutrition in terms of Stunting is one of the most serious and still one of the challenging public health problems in the world. It is largely invisible in many countries but affects 149 million children worldwide (14).

In developing countries, 52% and 34-62% of the school-age children were stunted and underweight, respectively(15). Different studies in different regions of Ethiopia showed that the prevalence of stunting was different which ranges from 8.9%(16)- 57%(17) among school children. Undernutrition, in school-age children, was reported in the forms of underweight (7.2% to 59.7%) in different parts of Ethiopia(18). Different studies from different areas in south nation nationalities and people's regional state of Ethiopia showed that the prevalence of stunting was different which ranges from 25.6- 41.9% and thinness 14% and underweight 8-19%among school children,(20,21).

Undernourishment has different Social and Economic Impacts in Ethiopia such as high child mortality28%, high school repetitions16%, reduces workforce by 8%, and also interims of health costs 1,831 million Ethiopian Birr per year were lost, Students who were stunted as children will have reduced cognitive capacity and are therefore 3.9% more likely to repeat grades in school because of this Ethiopia lost 93 million Birr. Total losses related to undernutrition are estimated at 55.5 billion Ethiopian Birr, for the year 2009. Those losses are equivalent to 16.5% of GDP of that year(21).

Children are most susceptible to undernutrition because of their low dietary intake, less access to food, inequitable distribution of food within households, improper food storage and preparation, dietary taboos, and infections with pathogens(15). Child undernutrition is often mitigated through nutritional information campaigns, broader access to maternal and child health care practices, and availing affordable, diverse, and nutrient-rich food (22).

In Ethiopia there were different efforts made to achieve universal access to basic education, many more children now have the opportunity to go to school, and hence, more children can be reached by the variety system than ever before. From the attitude of the health sector, a school health nutrition (SHN) strategy would enable the health and nutrition status to be improved for an enormous proportion of Ethiopia’s population, promoting healthy attitudes, knowledge, and behavior’s throughout their lifetime(23).

The Federal Government of Ethiopia has been working to reduce undernutrition significantly through public education and providing nutritional supplements and financial support to vulnerable families. However, the risk factors of undernutrition were diverse and could potentially change in areas and time. Because of this there was an insignificant change in malnutrition and it also becomes the public health problem today. Especially in my study area,

there was no nutrition-related study conducted before. Therefore, the present study aimed to determine undernutrition and associated factors among school-age children (7 - 14 years) in rural primary schools in Zala district southern Ethiopia to review the pitfalls and design effective strategies in the area.

1.3 Significance of the study

It generates evidence for different stakeholders such as health, education, agriculture, and other sectors to design effective school intervention programs for school children.

To show the gaps of undernutrition in school children in schools with and without a school feeding program in rural district areas of Zala in Ethiopia .

Moreover, the study will be used as baseline data for other researchers, different NGOs, and policymakers who had an interest in the area.

Identifies the children who need nutritional intervention to reduce future negative results in the health of children .

Used to identify factors associated with undernutrition in the area and to work upon the factors .

CHAPTER TWO

2. Literature review

The School feeding program was primarily designed to increase equity, access to education, enrollment, attendance, and nutritional status and health of school children but in the case of the chines school feeding program, there was a failure to meet the improvement in nutritional status in children. The absence of improvement in health outcomes following implementation of China's SFP suggests that the program is not meeting its goal of providing sufficiently micronutrient-rich meals that improve student nutrition and health, a significant share of students in rural China still suffers from malnutrition. Despite significant budgetary outlays between 2012 and 2015, China's SFP has not reduced the prevalence of malnutrition among school children(24).

According to Cochrane Review on SFPs, there were four various factors linked to program success, including clear nutritional deficiency in the target group, well-organized schools, localized implementation of SFP, and close supervision of food consumption even if those criteria's meet but the program do not improve the nutritional status of children (25). According to the Ghana school feeding program, it was hypothesized that the nutritional status of participants was better than that of non-participants. There was no such a big statistically significant difference within the nutritional status of participants and non-participants (26)..

2.1 History of the school feeding program

School lunch has evolved quite a bit over the last century. Serving a standard lunch to school children started, in both Europe and the United States, with private organizations that were interested in child welfare. It was not a nationwide event, but rather something that took place in individual states and cities over an extended period. At the turn of the 20th century, concern over malnutrition in children inspired philanthropic groups to provide balanced meals to students during their lunch hour. At that time, the midday meal was considered the main meal of the day. Philadelphia and Boston were the first major cities to actively attempt to implement a school lunch program in the United States. Philadelphia began by serving penny lunches at one school in 1894. In January 1910, home Economics classes in Boston began an experimental program serving an early lunch to elementary school children, three days every week. Finally, in 1946, the

school lunch program was made official when the 79th congress recognized its importance. President Harry S. Truman signed the National School Lunch Act, authored by Senator Richard B. Russell Jr (28).

The new Liberal government elected in Britain in 1906 passed various measures to try to deal with the health of children. They passed laws to ensure midwives were notified of each new-born baby, they introduced School Medical Examinations and, in 1906, they permitted schools to offer meals to their pupils(29).

Brazil pioneered School Feeding Programme (SFP) established in 1953 followed by India within the ’80s. The cooperation between Brazil and India is an example of a partnership between two developing countries that focus their efforts on the global issue of fighting poverty. School Feeding Programmes (SFP) across the world have now been established and are seen as a social safety net for vulnerable sections of the population and as an educational intervention aimed at ensuring that children go to school and learning was improved by the elimination of hunger in the classroom(30). In 2018, around 16.4 million school children were benefitted from nutritious WFP meals and snacks. It also built the capacities of 65 governments, which led to improved national school feeding programs for another 39 million children (6).

2.2 Prevalence of undernutrition among primary school children

A cross-sectional study done in Sri Lanka showed that the prevalence of underweight and stunting were, 25.93% and 43.92%(31). A study in Sullia town, South India showed that the prevalence of thinness, underweight, and stunting were 26.5%, 19.2%, and 26.5% respectively (32). A study was done in Ibadan, South-West Nigeria the prevalence of stunting, underweight, and wasting among NFP boys pupils was 44.8%, 43.1%; 41.1%, and among girls was 38.8%, 43.5%, and 40.2%, respectively. For the pupils from FP schools, the prevalence of stunting, underweight, and wasting, respectively, among boys was 34.2 %, 27.7%; 30.7 %, and among girls was 27.7%; 27.19 %, and 5.55 %.(33).

According to a study done in Hohoe Municipality, Ghana the overall prevalence of underweight, stunting, thinness in the study population was 9.3, 8.5, 5.7 % respectively(34). According to a study done in Dhaka City, Bangladesh's total 60% of children were stunted and 84% were underweight(35). A Study done in Patna India shows that among children, boys are more malnourished (54.2%) than 45.7% (36). A study done in urban Meerut India states the

prevalence of wasting was 44.6%, Stunting was found in 43.8%(37). According to a study in Karimnagar, Telangana, among rural children 29.3% were underweight, 21.5% of children were stunted in rural (38).

According to a comparative study done in Urban and Rural Nigerian School Children, the overall prevalence rates of underweight, wasting, and stunting were 61.2%, 16.8%, and 27.6%, respectively. In the rural area there were 70.5%, 17.8% and 35.8%, while in the urban they were 52.2%, 15.9% and 19.8%, respectively(39). According to a study done in Nigeria, the school children were affected by underweight 18.2%, stunting 41.6%, thinness 20.0%. Across sectional study conducted in Malawi, the overall prevalence of stunting, underweight, and thinness was 34.9%, 36.9%, and 11.2%, respectively(40). According to a study in school feeding in Nkwanta south district –volta region of Ghana Prevalence of stunting 50.3% and thinness 19.4%(41). Study in Nairobi Kenya Among the children surveyed, 24.5% were stunted, 14.9% underweight and 9.7% were wasted(42). A study done in Egypt showed that the prevalence of stunting, underweight, and wasting was 34.2%, 3.4%, and 0.9%, respectively(43). A comparative cross-sectional study in school feeding children done in Denkyembour district, eastern region, Ghana showed that the prevalence of stunting among children in schools on the SFP was 16.2% compared with 17.2% among children in schools that do not implement the SFP. The prevalence of thinness was two times higher (9.3%) among children in schools on the SFP than in children in schools that do not implement the SFP 4.6%(44).

A study conducted in Mekite woreda states that the prevalence of stunting, wasting among feeding and non-feeding children was 58.5%, 48.3%, and 27.8%,37.6% respectively(45). A study conducted in Sidama zone south Ethiopia showed that the common nutritional prevalence in the area, were stunting 25.6%, based on the BMI for age status, 14% of studied children had a wasting while 19% of studied children had underweight(19). A study done in Gobu Seyo District prevalence of stunting and underweight was 17.0% and 18.8% respectively(46). A study conducted in schools with a school feeding program in Addis Ababa showed that 26% stunted,16 % underweight, in participated children(47).

Across sectional study done in Chencha district south, Ethiopia showed that the overall prevalence of malnutrition, stunting, and underweight among SAC was 12.3%, 8.9%, and 4.2% respectively(48). A study done in Addis Ababa showed that prevalence of undernourished 19.6% stunted, 15.9% underweight(49). A study in Asella Luther Child Development Project Oromiya

showed that 47%, 34%, and 19% undernutrition, stunting, and wasting respectively(50). A study conducted in Wolayta zone Humbo district showed that the prevalence of stunting was 57%(17). A study in Dangla north Ethiopia the prevalence of stunting and thinness was 24.8 % and 7.1 %, respectively(51).

According to a study done in Addis Ababa the overall prevalence of children is 10.2%were wasted, the prevalence of underweight was 18.4%, 1.7% Stunting was 19.1%, the prevalence of malnutrition among children with feeding program is 7.6% wasting,16.2% stunting,10.2% underweight and for those without feeding program 12.8% wasting 22.2% stunting 26.5% underweight respectively(52). A comparative cross-sectional study was employed among children of school feeding and not feeding in Addis Ababa results in the prevalence of wasting among the feeding group was found to be 7.1% and for the non-feeding, it was 10%, 5.6% were underweight from the feeding group and 10.5% from the non- feeding group, the prevalence of stunting for the feeding group was found to be 23.6% and for the non-feeding, it was 16.5%(53).

A cross-sectional study conducted in Gonder town among school children states that the prevalence of stunting, wasting, and underweight were 27%,50%,34.8% respectively(54). Across sectional study done in Arbaminch states that the prevalence of stunting and thinness was 41.9% and 8.0% respectively(20).

2.3 Factors associated with undernutrition among school children

2.3.1. Socio-demographic factors associated with child undernutrition

In a study done in India Mothers' educational level, low economic status, and family size were significantly associated factors with the nutritional status of the child(55). A study conducted in Sullia town, South India showed that Boys had a higher prevalence of malnutrition than girls. (32). A study was done in Hohoe Municipality, Ghana showed that malnutrition was highly significant in children whose parents were formal sector employees, farmers, unemployed, artisans, and petty traders respectively(34). Children whose mothers are illiterate are 1.83 times more stunted than those children whose mothers are the literate educational status of the mother, working status of mother (non-working and low socioeconomic status were significantly associated with stunting (56). According to a study done in Bangladesh, the odds of stunting were significantly high in school dropout children, children of illiterate parents, and children having a housewife mother (35). In a study done in Patna India states that school children whose

mothers and fathers are graduate, children whose mothers and fathers were lower education and illiterate were more malnourished(36). A study conducted in Urban and Rural Nigerian School Children by place of a resident was significantly associated with stunting, wasting and underweight meaning living in rural is protective of malnutrition(39). According to the study gender of household head, household income, weekly food expenditure, and age of the kid were significantly associated with underweight. household income is Significantly associated with stunting, weekly food expenditure, sex of the child, age of the kid, (57). According to a study in Rural Area Of North Karnataka Region the higher the level of the mother's education, the lower the level of child's underweight was observed(58).

A study done in Egypt stated that age and maternal education were highly associated with children's nutritional status especially underweight(59). A study done in Egypt Increasing age were associated factors for stunting(43). In a study done in the Beni-Suef governorate, Egypt identified age more than 10 years, mother education, father education, and family size were factors associated with undernutrition (60). A study was done in Denkyembour district, eastern region, Ghana showed that Sub-district, sex, age of the pupil, area of residence, and community type were significantly associated with stunting (44). A study in Nigeria states that Undernutrition was more prevalent in children aged 12 years (64).

A study was done in Sidama zone south Ethiopia states older age group increased the odds of being stunted, children whose mothers have completed primary education were less likely to be stunted than children whose mothers do not have formal education, having a large family size, and children whose mothers completed primary education are less likely to be underweight(19). A study done in the GobuSeyo district showed that a predictor of stunting was fathers' occupation. Sex and age of the respondents (46). A Study in Chencha showed that children originating from rural kebeles and born from less educated mothers, housewives, or farmers were factors associated with undernutrition (48). According to a study was done in Addis Ababa being male, higher birth order (>2), larger family size (6–8), were significantly associated with undernutrition(57). A study in Wolayta zone Humbo district declares that sex, Age groups 10–12, big family size were factors significantly associated with stunting(17). Male gender, factors associated with thinness were being male, and having more than five family members were significantly associated with thinness(51). A study done in Arbaminch states stunting was

significantly associated with the age group of 12–14 years old, sex, children living in households with medium wealth tertiles (20).

2.3.2 Dietary factors associated with undernutrition in children

According to a study was done in Hohoe Municipality, Ghana children who consumed only two meals per day were more likely to be underweight, stunted, and thinness as compared to those who had at least three meals daily(34). A study conducted in Bangladesh showed that children who had meal frequency 1-2 times were also associated with increased odds of stunting(35). According to a study in Malawi children having lower household dietary diversity scores were more likely to be underweight(40). A study in Egypt reduced poultry consumption, and escaping breakfast were associated factors for stunting(43). A study was done in Sidama zone south Ethiopia states inadequate intake of carbohydrate, were independent predictors of wasting(19). A study was done in Addis Ababa state low meal frequency (≤3 times) in a day before the survey was significantly associated with undernutrition(49). A study in Dangila north Ethiopia states infrequent food intake was associated with stunting (51). A study in Arbaminch states thinness was 63% less common among children who had a dietary diversity score of <4 food groups(20).

2.3.3 Water and sanitation factors associated with undernutrition in children

A study done in Bangladesh showed that the odds of stunting were higher among children who did not drink boiled water, also, the likelihood of being stunted was significantly higher among children who did not take bath regularly, used temporary latrine (35). A study done in Addis Ababa state mud floor house was significantly associated with undernutrition (49). A study conducted in the Wolayta zone Humbo district states open field disposal of wastes was a factor significantly associated with stunting(17). Study in Dangila north Ethiopia states unavailability of the latrine, and poor hand washing practice were independent predictors of stunting(51)

2.3.4. Morbidity factors associated with nutritional status of school-age children

A study done by Sidama zone south Ethiopia states having Trichuris Trichina infection is significantly associated with stunting(19). A study in Dangila north Ethiopia states children who developed an illness in the last two weeks had 2.9 times more chance to be thinner than those who do not have (51). A study done in Kenya indicates that the Incidence of diarrhea, colds/coughs increased the risk of stunting and underweight(42).

2.4 Conceptual framework

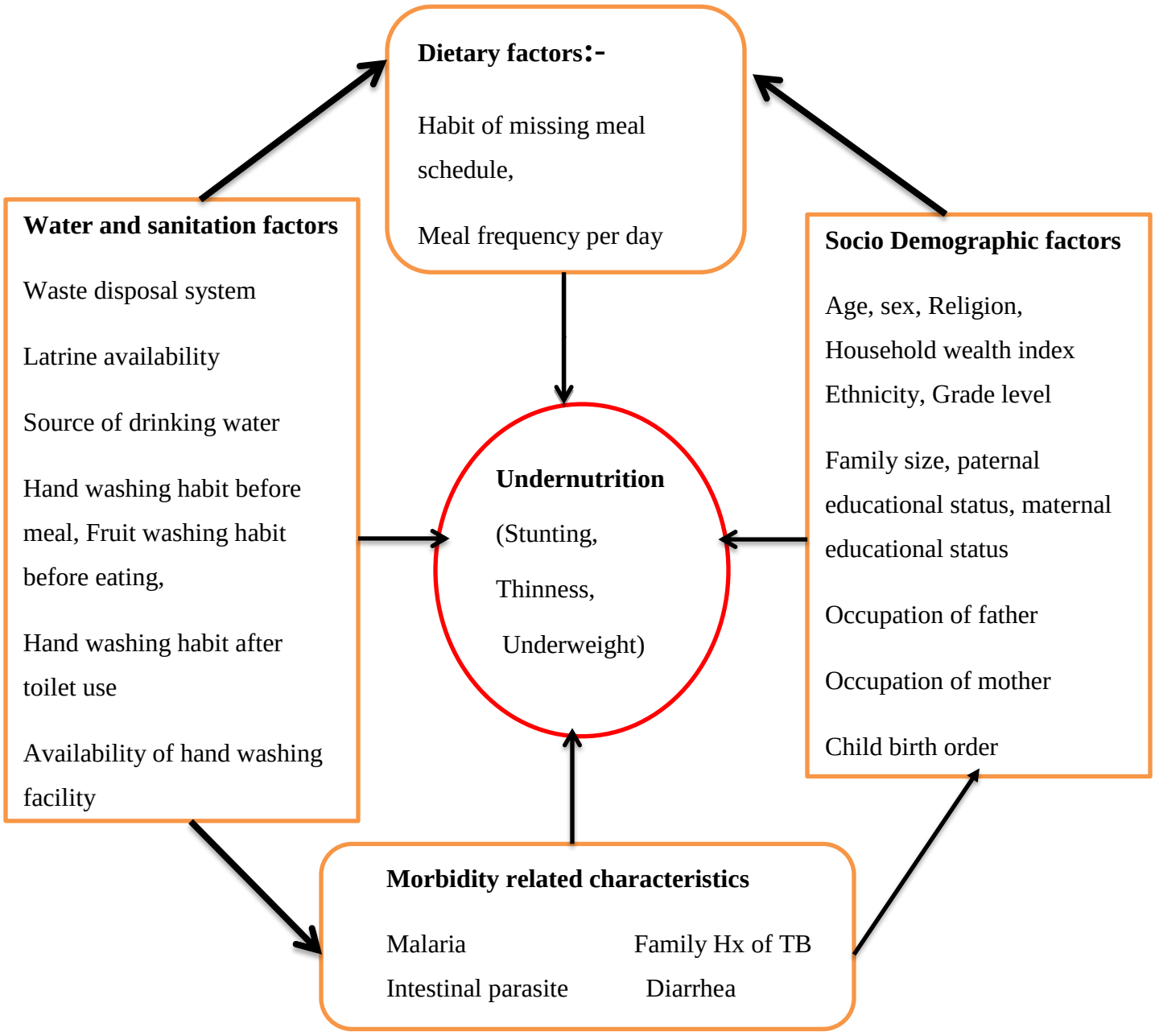

Figure 1: Conceptual frame work constructed after different literature review ((20),(35),(36), (51), (63).

CHAPTER THREE

3 Objectives and hypothesis

3.1 General Objective

To assess the prevalence of undernutrition and associated factors among rural primary school children in Zala district, Southern Ethiopia in 2020.

Specific objectives

To determine the prevalence of undernutrition among rural primary school children in Zala district, Southern Ethiopia, in 2020.

To compare the prevalence of undernutrition among rural primary school children in schools with and without feeding programs in Zala district, Southern Ethiopia, in 2020.

To identify factors associated with undernutrition among rural primary school children attending schools in Zala district, Southern Ethiopia in 2020.

3.2 Hypothesis

$H_{A:}$ There was a difference in the nutritional status of children in schools with and without feeding program

CHAPTER FOUR

4 Methods and material

4.1 Study area and period

The study was conducted in the Zala district, which was located 485 km south of Addis Ababa and 278 km from Hawassa, the capital city of Ethiopia and Southern Nations Nationalities and Peoples Region (SNNPR) respectively. Zala was one of the seven districts of the Gofa Zone. The district has 35 kebeles. (34- rural and 1-urban kebeles).According to the central statistics agency (CSA), the total population was estimated to be 100,969 and school-age children (7-14years) were 15, 003 among which 7615 were males and7388 were females.

Concerning health facilities distribution, the district had 34 health posts, 5 government health centers, 8 private clinics, and 1 rural drug vendor. Regarding school distribution, there were 33-primary schools, 4- high schools, and 1- preparatory school. Out of the total 33 primary schools in the district, only nine were implemented school feeding programs. The school feeding program was started in 2009e.c in the district. According to the feeding program protocol, a 150gram meal prepared from a bean, maize, wheat, iodized salt, and oil in the form of lunch was provided per child from Monday to Friday.

The major crops cultivated in the district were maize and teff. Regarding the common staple diet in the district was (Kita, and possess in the local language). The annual average temperature was 33-degree celsius. And there was no irrigation system in the area. The district agro-ecological zone was divided into kola 98% and weyna dega 2%. Malaria, diarrheal disease, typhoid fever were common health problems in the district (64). The study was conducted from March 8 to March 18/2020.

4.2 Study design

A school-based comparative cross-sectional study was employed.

4.3 Source Population

All school children studying in rural primary schools with and without SFP in the Zala district.

Study population

All school children studying in selected rural primary schools with and without SFP in the Zala district.

4.3.1 Study unit

Individual student

4.4 Inclusion and Exclusion criteria

4.4.1 Inclusion criteria

Residents of the district for, more than six months and Age 7 to 14 years

4.4.2 Exclusion criteria

Those who are sick and absent during data collection time, school children with chest, lower and upper extremity deformity

4.5 Sample size determination and sampling technique

4.5.1 Sample size determination

The sample size required for this study was calculated by using Epi info software version 7.1.2.0 using double population prevalence of stunting among children with feeding and without feeding program and considering the following variables and assumptions:- the power of 80%, CI 95%, 5%margin of error, 5% non-response rate and 1:1 allocation of children from schools with feeding to non-feeding and end up with the final sample size of 514 (table 1).

Table 1:-Sample size calculation for this study in Zala district in 2020

Variables	P1	P2	CI, and power	NRR	Total sample	Reference
Stunting prevalence	27%(non-feeding group)	16.2%(feeding group)	95%,80%	5%	514	(56,54)
Habit of missing meal schedule	64.3%	35.7%	95%,80%	5%	114	(20)
Stunting	Prevalence =42 %		95% CI	5 %	393	

So by taking the largest sample size, the final sample size for this study was 514 rural primary school children and 257 from each group.

4.5.2 Sampling technique

First, all the primary schools in the district were stratified into two strata (primary school with SFP and NSFP) based on the school feeding program implementation status. Then a total of ten schools (Three schools from schools with SFP and seven schools from NSFP schools) were selected using a simple random sampling method. Then probability proportionate to size (PPS) allocation was used to allocate the calculated sample size to selected schools in each stratum. Again the allocated sample for each school was proportionally allocated for each grade level based on the number of students. Finally, the study participants were selected using a simple random sampling method using school rosters as a sampling frame (figure 2).

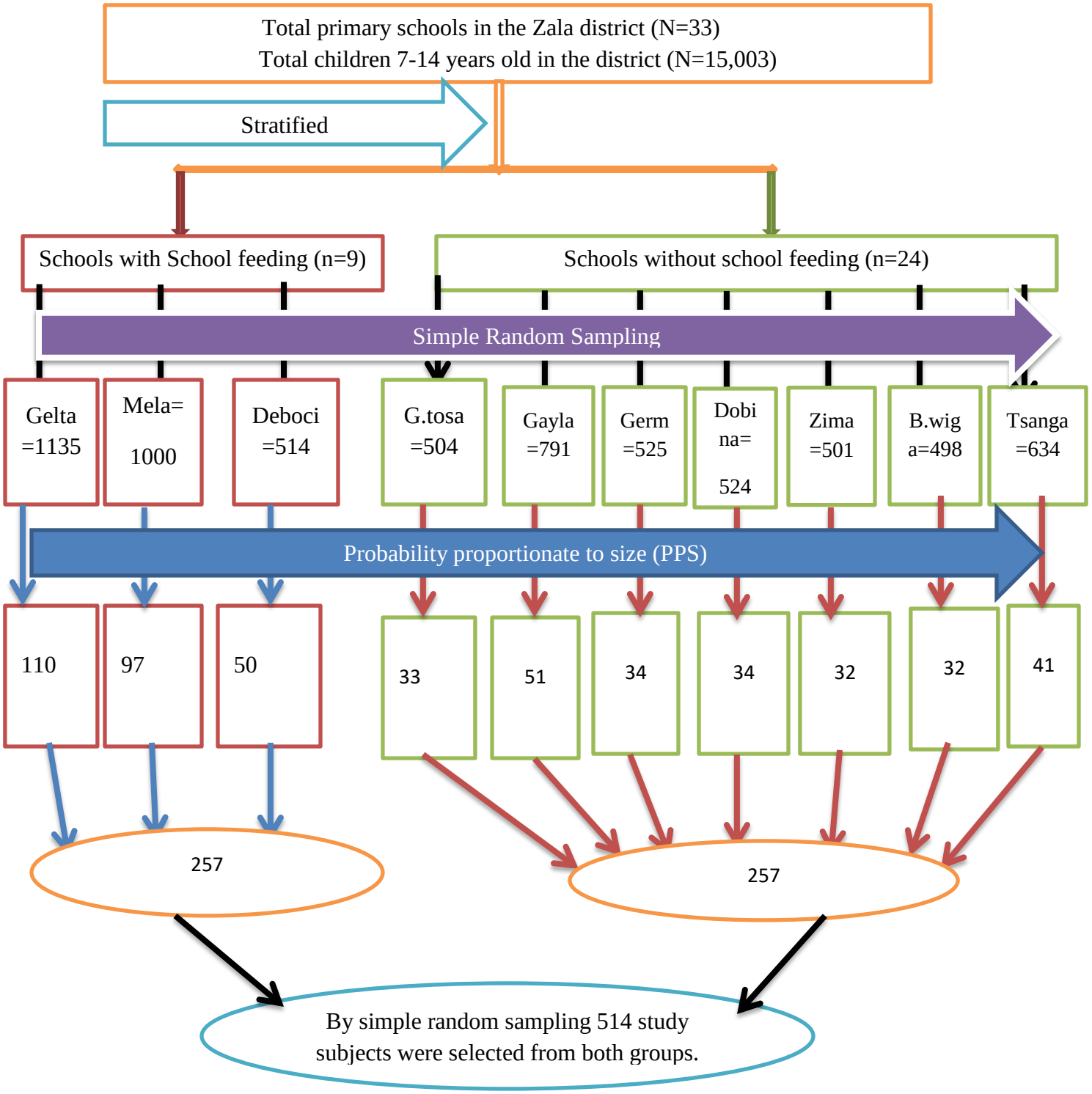

Figure 2: Schematic representation of the sampling procedure

4.6 Study variables

4.6.1 Dependent variable

Undernutrition (stunting, thinness, underweight)

4.6.2 Independent variables

Socio-Demographic Factors:- Age, Sex, Religion, Household wealth index, Ethnicity, Grade level, Family size, Paternal educational status, maternal educational status, Occupation of the father, Occupation of the mother, Childbirth order

Illness/infections: - History of Tuberculosis, Intestinal parasite, Diarrhea, Malaria

Dietary factors: - Missed meal schedule, meal frequency per day

Water and sanitation factors:-Waste disposal system, Latrine availability at home, Source of drinking water, Hand washing habit before a meal, Hand washing habit after toilet use, presence of hand washing facility, fruit washing habit before eating

4.6.3 Data collection tools and techniques

Face to face interview pre-tested structured questionnaire adapted from EDHS, and other published pieces of literature were employed to collect data on socio-demographic characteristics, morbidity factors, dietary factors, water, and sanitation factors.

4.6.4 Anthropometric measurements

The measurement of height was taken using a stadiometer with an attached measuring tape and a horizontal headboard that could be brought into contact with the uppermost point on the top. The children's height was measured barefoot or in thin socks. With weight distributed evenly on both feet, heels together, and the head positioned against the wall of the stadiometer, so that the line of vision is perpendicular to the body (Frankfurt position). The arms hanging freely to the sides, and the head, shoulder blade, buttocks, and heels are in contact with the wall of the stadiometer. The children were asked to inhale deeply and to maintain a fully erect position. The moveable headboard was brought on to the topmost point on the head with sufficient pressure to compress the hairs. The height was measured in meters and recorded to the nearest 0.1 cm.

Weight measurement was taken using a well-calibrated portable digital scale (Seca, Germany) to weigh the children. The weighing scale was standardized with the help of known 1 kg object

weight and calibrated to zero reading before taking the weight of the child. This calibration was done after each child's measurements. The weighing scale was placed on a flat surface and the weight was measured with little clothing and bare feet. And recorded to the nearest 0.1 kg .

Data collection techniques:-The data were collected from ten primary schools. This study was used a direct method of nutritional assessment among which anthropometric method and Interview methods were used.

4.6.5 Data collectors

In the data collection process, fifteen trained diploma nurses and five BSc health officers who were speaking the local language have participated as data collectors and supervisors respectively.

4.7 Data quality control

Pre-testing of the questionnaire was made to ensure the quality of data. The pre-test was performed on 5% (25) of sample size students in one of the unselected school before actual data collection. After pre-tested, clarifications and corrections were done on the questionnaire accordingly. And the English version questionnaire was translated into Amharic by the language expert and then back to English to maintain its consistency. During data collection, data collectors were taken two separate height and weight measurements for an individual and the average value was reported. Investigators and supervisors were checked the collected data every day for completeness and consistency throughout the data collection period.

A one-day-training was given to data collectors and supervisors on the tool, interviewing skills, and the use of weight scale, to minimize inter- and intra-observer errors. Technical error of measurement (TEM) was computed during training. For this, a principal investigator took two weight and height measurements of ten children and let the data collectors take the measurements of all ten children twice. Then, the data was entered and computed by ENA SMART software and was confirmed acceptable.

4.8 Operational Definition

Nutritional status; -according to this study nutritional status includes (stunting, thinness, and underweight). Stunting: Children whose height-for-age was < -2SDS (65). Thinness: Children whose BMI-for-age was < -2SDS (65). Underweight: children whose weight- for- age was <-2SDS (65). Beneficiaries of the program: All students registered in schools with feeding

programs. (66). Non-beneficiary: students from school not undertaking feeding programs(66). According to this study child's missed meal, the schedule means those who missed at list one meal schedule meaning breakfast, lunch, or dinner per day. Household Wealth is the value of all-natural, physical, and financial assets owned by a household(67). According to this study household with wealth index >0.01 were considered as rich, those with wealth index <0 was classified as poor and those households with wealth index of 0.01 was classified as medium.

Waste disposal system: according to this study waste disposing includes both solid and liquid household wastes. Source of drinking water: this includes pipe, protected spring, unprotected spring water sources.

4.9 Data analysis and presentation

The questioner was checked for completeness and then data was entered into EPi-data software version 3.0 and exported to Statistical Package for Social Sciences (SPSS) version 22 software for statistical analysis, then data was cleaned, outliers and missing values, and entirely recoded then ready for analysis. To analyze the anthropometric measurements WHO Anthro-plus version 1.0.4 software was used, and Children whose Height for Age z-score (HAZ), Weight for Age z-score (WAZ), and BMI for Age z-score (BAZ) blow-2SD scores were considered as undernourished. Then frequency tables and graphs were used to display the socio-demographic characteristics and the main findings of the responses given by the participants.

Both bivariate and multivariable logistics regression model analysis was undergone and Variables with p-value < 0.25 on bivariate analysis were entered into the multivariable model, to identify the factors that independently affect the nutritional status of the school children. Results were statistically significant when the p-value was < 0.05. The adjusted odds ratio together with the corresponding 95% confidence intervals was computed to see the strength of the association between the outcome and independent variables. The Hosmer–Lemeshow test for model fitness was performed and the multicollinearity effect was also checked using the variance inflation factor (VIF).

The wealth index was determined using the Principal Component Analysis and accordingly wealth index was ranked as tertiles in poor, medium, and rich (68).

Ethical consideration

An ethical clearance letter was obtained from the Institutional Review Board of Jimma University. Before data collection, a letter of support was obtained from the Nutrition and dietetics department and submitted to the selected school directors. Since study subjects were children below the age of 15 years written consent with assent form was given to the selected students take to home and signed by their family and bring back the next day and for those whose family signed the form was considered the study participants.

Also, the confidentiality of information was assured and the privacy of the study population was respected and kept as well. Moreover, to ensure confidentiality the name of respondents were not written in the data collection tool. Respondents and their parents were informed that they can refuse or discontinue participation at any time. Finally for those detected as malnourished are linked to health facilities to take treatment accordingly.

4.10 Dissemination plan

The result of this study will be disseminated to Jimma university institute of health, department of nutrition and dietetics, Zala district education and health office, and respective bodies, Moreover the result will be sent for publication in reputable Journals.

CHAPTER FIVE

5. RESULTS

5.1 Socio-demographic characteristics

In this study, a total of 514 school-age children participated with a response rate of 100%. Among the total participates 257(50%) children were from schools with the school feeding program and while the rest were from schools without a school feeding program. The mean age (±SD) of the children from the school feeding program was 10.7±2.36 whereas those from none school feeding programs were 10.6±2.36, respectively. Most of the children 210 (81.7%) from the school feeding group and the majority of children 226(87.9%) from the non-school feeding group were Gofa by ethnicity. More than three fourth 199 (77%) in both groups were protestant religious followers. Regarding household wealth status about 67(26.5%), 93(36.2%), and 96(37.4%) households among feeding groups and about 97(37.8%), 98(38.1%), and 62(24.1%) households among non-feeding groups were had rich, medium, and poor household wealth status respectively. (Table 2)

Table 2:- Socio-economic and demographic characteristics of the respondents in Zala district, 2020. (N=514)

Variable	**category**	**SFB(n=257)**		**NSFB(n=257)**	
		frequency	**Percent**	**frequency**	**percent**
Age	7-10	119	46.3	124	48.2
	11-14	138	53.7	133	51.8
Sex	male	127	49.4	125	48.6
	female	130	50.6	132	51.4
Birth order	<=2	84	32.7	83	32.3
	>2	173	67.3	174	67.7
	Mother	37	14.4	44	17.1
Living with	Father	59	23	42	16.3
	Both	125	48.6	95	37
	Sister$ brother	36	14	76	29.6
Mothers	Farmer	41	16	45	17.5
occupation	Gove employee	31	12	29	11.3
	Merchant	39	15	37	14.4
	House wife	146	57	146	56.8
	Muslim	15	5.8	15	5.8
Religion	Orthodox	32	12.5	36	14.0
	catholic	12	4.7	8	3.1
	Protestant	198	77	198	77
	Farmer	158	61.5	122	47.5
Fathers	Gove employee	31	12.1	42	16.3

occupation	Merchant	35	13.6	45	17.5
	Daily laborer	33	12.8	48	18.7
	Gammo	27	10.5	18	7.1
Ethnicity	Goffa	210	81.7	226	87.9
	Oromo	15	5.8	6	2.3
	Amhara	4	1.6	6	2.3
	Tigre	1	0.4	1	0.4
	No formal education	93	36.2	97	37.7
Maternal education status	Primary	68	26.5	100	38.9
	Secondary	80	31.2	37	14.4
	College and above	16	6.2	23	8.9
	No formal education	96	37.4	101	39.3
Paternal education	Primary	91	35.4	101	39.3
	Secondary	53	20.6	29	11.3
	College and above	17	6.6	26	10.1
Family size	1-3	85	33.1	75	29.2
	4-5	82	31.9	85	33.1
	>=6	90	35	97	37.7
Farmland	Yes	142	55.3	130	50.6
	No	115	44.7	127	49.4
Household Wealth tertiles	Rich	68	26.5	97	37.8
	Medium	93	36.2	98	38.1
	Poor	96	37.4	62	24.1
Grade level	1-4	196	76.3	178	69.3
	5-8	61	23.7	79	30.7

5.2. Water hygiene and Sanitation Characteristics

The findings of this study showed that most children 170(66.1%) from the school feeding program and more than half 150(58.4%) of children from schools without feeding program had latrine in their compound respectively. Regarding the hand washing facility, almost half 130(50.6%) of the household of children from school with the feeding program and 119(46.3%) children from schools without feeding program had a hand washing facility nearby the toilet respectively. Concerning waste disposal system 57(22.2%) children households and 43(16.7%) children households had disposing in an open field among feeding and non- feeding groups respectively. One third 85(33.1%) of respondents from schools with the school feeding program and 62(24.1%) of respondents from schools without feeding program had used unprotected water source for drinking purpose, 84(32.7%) and 97(37.7%) respondents had used pipe water, and

were as about 88(34.2%) and 98(38.1%) respondents got their water from protected spring in both feeding and non-feeding groups respectively (Table 3).

Table 3:- Water and sanitation characteristics of the school children in Zala district, southern Ethiopia, 2020(N=514).

Variable	**category**	**SF**B(**n=257)**		**NSF**B**(n=257**)	
		Frequency	**percent**	**frequency**	**Percent**
Latrine availability	Yes	170	66.1	150	58.4
	No	87	33.9	107	41.6
Waste disposal method	Pit	120	46.7	147	57.2
	Burring	80	31.1	67	26.1
	Open field	57	22.2	43	16.7
Source of drinking water	Pipe	84	32.7	97	37.7
	Protected spring	88	34.2	98	38.1
	Un protected spring	85	33.1	62	24.1
Do used method for water Rx	Yes	117	45.5	132	51.4
	No	140	54.5	125	48.6
The method used for water Rx	Boiling	103	67.8	120	69.8
	Adding chlorine	47	30.9	43	25.0
	Clothe	2	1.3	9	5.2
Hand washing facility	Yes	130	50.6	119	46.3
	No	127	49.4	138	53.7
The habit of hand washing before a meal	Yes	131	51	119	46.3
	No	126	49	138	53.7
Wash fruit before eating	Yes	153	59.5	132	51.4
	No	104	40.5	125	48.6
Wash hand after toilet use	Yes	152	59.1	125	48.6
	No	105	40.9	132	51.4

5.3. Morbidity related characteristics

Regarding illness 122 (47.5%) of children from the school feeding group and 130(50.6%) children from the non-school feeding, group had been dewormed in the last six months before the data collection respectively. Children from a school feeding program 27(10.5%) and non-school feeding, 42(16.3%) had a family history of TB in their life. About 70 (68.2%) and 72(63.7%) children from the feeding and the non-feeding group had experienced diarrhea in the last two weeks before the data collection time respectively. About 21(20.6%) and 30(26.6%) children from feeding and non-feeding had developed malaria in the last two weeks, and also about 11(10.8%) and 11(9.7%) had developed intestinal parasite infection among feeding and non-feeding groups respectively. (Table 4).

Table 4:-Morbidity related characteristics of school children in Zala district, southern Ethiopia, 2020(N=514).

Variable	category	**SF**B(n=257)		**NSF**B(n=257)	
		Frequency	**percent**	**Frequency**	**percent**
illness in the last 2wks	Yes	102	39.7	113	44
	No	155	60.3	144	56
Type of illness	Diarrhea	70	68.6	72	63.7
	Malaria	21	20.6	30	26.5
	Intestinal parasite	11	10.8	11	9.7
Family History of TB	Yes	27	10.5	42	16.3
	No	230	89.5	215	83.7
Dewormed	Yes	122	47.5	130	50.6
	No	135	52.5	127	49.4

5.4. Dietary intake related characteristics of the respondents

Greater than half of the participants 149(58%) in schools with the school feeding program and 122 (47.5%) in schools without school feeding program children had missed at least one of their

meal schedules. The majority of respondents 133(88.7%) from the feeding group and 56(45.9%) respondents from the non-feeding had missed their breakfast in the last two weeks before the data collection time (table 5).

Table 5:-Dietary intake related characteristics of the respondents from schools with and without feeding program of Zalla district, southern Ethiopia, 2020.

variable	category	**SF**B(n=257)		**NSF**B(n=257)	
		Frequency	**%**	**frequency**	**%**
Meal frequency	>=3	148	57.6	118	45.9
	<3	109	42.4	139	54.1
Do you Missed meal schedule	Yes	149	58	122	47.5
	No	108	42	135	52.5
Missed schedule	Breakfast	133	88.7	56	45.9
	Lunch	14	10	38	31.1
	Dinner	2	1.3	28	23

5.6 Nutritional status of school children in Zala district

5.6.1. Undernutrition among school-age children in Zala district in 2020

The overall prevalence of stunting was 26.1% **(**7.8% severely and 18.2% moderately stunted). Concerning the prevalence of thinness, there were 14.2%, **(**7.2% severely, 7.0% moderately wasted). Concerning underweight about 16.5% were underweight (2.1% severely, 14.4% moderately underweight). (figure 5).

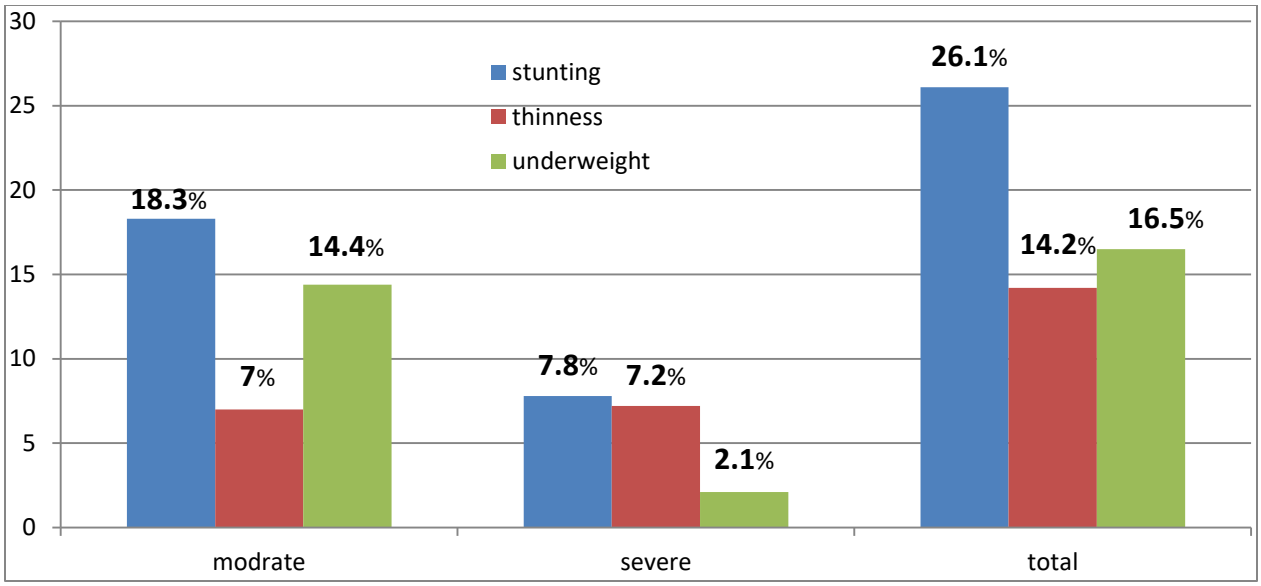

Figure 3 Overall prevalence of undernutrition in school children in Zala district in 2020

5.6.2. Prevalence of undernutrition in children's with and without feeding program

The magnitude of stunting among children with the school feeding program was 21.1 %(5.1% severely, 16% moderately stunted,). Whereas 10.9% of children were thinned (3.9% severely, 7 % moderately) thinned. Among the children of school feeding beneficiary's about 12.6% were underweight (0.8% severely, 11.8% moderately).

Among the total respondents from schools without a feeding program, the magnitude of stunting was 31.1% (10.5% severely, 20.6% moderately stunted). Regarding thinness, about 17.5% of children were thinned (10.5% severely, 7.0% moderately wasted). Among the children from non–feeding 20.2% were underweight (3.2% severely, 17% moderately). There was a statically significant difference in stunting [COR=1.69(1.14-2.53)/P<0.009)]. And thinness [COR=1.74(1.05-2.88)/P<0.033)] among school children in feeding and non- feeding groups. (Figure 4).

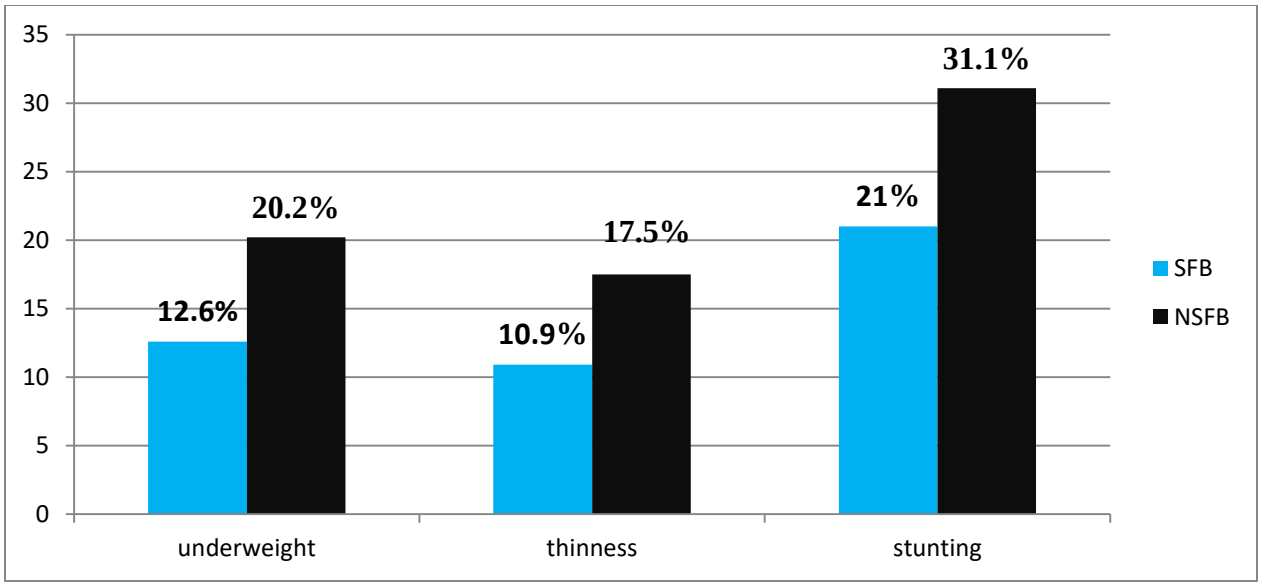

Figure 4. The Prevalence of undernutrition among school children with and without school feeding program in Zala district 2020.

5.7. Factors associated with stunting in school children in the Zala district in 2020.

The following independent variables were candidates for the final model in the bivariate logistic regression analysis:-missing meal schedule, meal frequency per day, sex of the children, living with a whom, maternal occupation, father's occupation, latrine availability, family size, source of drinking water, deworming, and family history of TB. In the multivariable logistic regression analysis, meal frequency, missed meal schedule, latrine availability, fathers occupation, and deworming were found to be significantly associated factors of stunting among children with and without feeding program. Stunting was 2.37 times more likely to occur in children who had missed their meal schedule than those who did not[AOR=2.37, 95% CI (1.46-3.87)].

Children from households without latrine were 4.73 times more likely to be stunted as compared to those children from households with latrine [AOR=4.73, 95%CI(2.88-7.73)]. Children who had a meal frequency <3 times per day were 2.03 times more likely stunted as compared to those children who had meal frequency ≥3 times per day [AOR=2.03,95%CI (1.20-3.26)]. The odds of Stunting was 2.53 times higher in children who had not dewormed in the last six month as compared to those who had dewormed [AOR=2.53,95%CI (1.32-4.83)]. Children whose father was a daily laborer were 2.65 times more likely to be stunted as compared to those children whose father was a farmer [AOR=2.65,95%CI(1.40-5.04)] (table 6). The model was well fitted with the Hosmer and Lemeshow goodness of test =0.147.

Table 6. Multivariable logistic regression for stunting among school-age children 7–14 years old in Zala district, Southern Ethiopia, in 2020(N=514).

Characteristics		Stunting		COR(95%CI)	AOR(95%CI)	P-value
		Yes (%)	No (%)			
Meal frequency per day	< 3	85(34.3)	163(65.7)	2.31(1.54-3.47)	2.03(1.20-3.26)	0.004**
	≥ 3	49(18.5)	217(81.5)	1	1	
Is there missed meal schedule	Yes	85(31.3)	187(68.7)	1.80(1.20-2.69)	2.37(1.46-3.87)	0.001**
	No	49(20.3)	193(79.7)	1	1	
Dewormed in the last six month	No	86(32.8)	176(67.2)	2.07(1.38-3.12)	2.53(1.32-4.83)	0.005**
	Yes	48(19)	204(81)	1	1	
Latrine	No	90(46.4)	104(53.6)	5.43(3.55-8.31)	4.73(2.88-7.73)	0.001**
	Yes	44(13.7)	276(86.3)	1	1	
Fathers occupation	GOVE	29(39.7)	44(60.3)	3.84(2.16-6.82)	2.49(1.26-4.93)	
	Merchant	26(32.5)	54(67.5)	2.81(1.58-4.97)	2.73(1.38-5.37)	0.002**
	Daily laborer	38(47)	43(53)	5.15(2.97-8.91)	2.65(1.40-5.04)	
	Farmer	41(14.6)	239(85.4)	1	1	

Highly significant** p< 0.001, significant*p<0.05

5.8 Factors associated with thinness in school children in the Zala district in 2020.

The following independent variables were candidates for the final model in the bivariate logistic regression analysis:-missing meal schedule, availability of latrine, meal frequency per day,

father's occupation, deworming, family history of TB, the habit of hand washing after using the toilet, availability of hand washing facility.

In the multivariable logistic regression analysis, availability of hand washing facility, and Latrine availability was found to be significantly associated factors of thinness among children with and without feeding program. Children in households without a latrine in the compound were 6.01 times more likely to be thinned as compared to those children in households with a latrine in their compound [AOR=6.01, 95%CI (2.13-16.9)]. The odds of thinness was 9.01 times more likely to occur in children whose family had no hand washing facility nearby toilet as compared to those children who had a hand washing facility nearby toilet [AOR=9.01,95%CI (2.79-28.9)] (table 7).The model was well fitted with the Hosmer and Lemeshow goodness of test =0.764.

Table 7. Multivariable logistic regression for thinness among school-age children 7–14 years old in Zala district, Southern Ethiopia, in 2020 (N=514).

Characteristics		Thinness		COR(95%CI)	AOR(95%CI)	P-value
		Yes (%)	No (%)			
availability of handwashing facility	No	50(19)	215(81)	2.28(1.35-3.87)	9.01(2.79-28.9)	0.004**
	Yes	23(9.3)	226(90.7)	1	1	
Latrine availability	No	41(21)	153(79)	2.41 (1.46-3.98)	6.01(2.13-16.9)	0.019*
	Yes	32(10)	288(90)	1	1	

Highly significant** p< 0.001, significant*p<0.05

5.9 Factors associated with Underweight in school children in Zala district in 2020.

The following independent variables were candidates for the final model in the bivariate logistic regression analysis:- sex of the child, living with whom, latrine availability, source of drinking water, deworming, illness in the last two weeks, fruit washing practice before eating, hand washing habit before meal eating and availability of hand washing facility.

In the multivariable logistic regression analysis, source of drinking water and living with whom were found to be significantly associated factors of underweight among school children with and without school feeding program. Children living with their father alone were 5.65 times more

likely underweighted as compared to those children living with their mother alone[AOR=5.65,95%CI (1.57-20.32)]. In another way, children living with both father and mother were 85% protected from being underweight as compared to children living with their mother alone[AOR=0.15,95%CI (0.02-1.48)]. Underweight was 7.15 times more likely to occur in children living with their sisters or brothers alone as compared to children living with their mothers. The Source of drinking water is another factor significantly associated with underweight. Therefore Children whose source of drinking water were from protected spring were 2.34 times more likely to be underweight as compared to children whose source of drinking water was from pipe[AOR=2.34,95%CI(0.91-6.02)]. Children whose source of drinking water was from an un-protected spring were 3.37 times more likely to be underweight as compared to children whose source of drinking water was from pipe [AOR=3.37,95%CI(1.29-8.78)] (table 8). The model was well fitted with the Hosmer and Lemeshow goodness of test =0.254.

Table 8 . Multivariable logistic regression for underweight among school-age children 7–14 years old in Zala district, Southern Ethiopia, in 2020 (N=514)**.**

Characteristics		Underweight		COR(95%CI)	AOR(95%CI)	P-value
		Yes (%)	No (%)			
Source of drinking water	Protected spring	16(8.6)	170(91.4)	2.34(0.94-5.83)	2.34(0.91-6.02)	0.044
	Un-protected spring	17(11.6)	130(88.4)	3.25(1.31-8.07)	3.37(1.29-8.78)	
	pipe	7(4)	174(96)	1	1	
Living with whom	Father	16(15.8)	85(84.2)	4.89(1.37-17.44)	5.65(1.57-20.32)	0.001
	Both	1(0.5)	219(99.5)	0.12(0.01-1.16)	0.15(0.02-1.48)	
	Sister or brother	20(18)	92(82)	5.65(1.62-19.74)	7.15(2.01-25.49)	
	Mother	3(3.7)	78(96.3)	1	1	

Highly significant** p< 0.001, significant*p<0.05

CHAPTER SIX

6. DISCUSSION

In the current study the overall prevalence of undernutrition in terms of stunting, wasting, and underweight among the school children was 26.1%, 14.2%, and 16.5% respectively. The prevalence of stunting, wasting, and underweight among children with school feeding programs was 21 %, 10.9% 12.6% respectively. This prevalence was significantly lower when compared to the prevalence of stunting (p=0.009), wasting (P=0.033), and underweight among children without a school feeding program which was 31.1%, 17.5%, and 20.2% respectively.

6.1. Stunting

The prevalence of stunting among children of school feeding was 21% and among children of non- school feeding was 31.1%. The public significance of the problem was high in non- feeding group and medium in the feeding group. The finding of stunting from the present study in children of non-feeding was found to be higher than the finding from a study conducted in Nairobi Kenya which was 22%.(69) This difference may be due to the sampling design meaning the Kenyan study was an interventional study (67 school children were involved in Nairobi Kenyan study). Finding from the present study was also higher when compared to a study in Addis Ababa among non-feeding children where the prevalence was 16.5%(70). This difference may be attributed due to the study area, living style.

The prevalence of stunting among non- feeding children in the present study was lower than a comparative study done in Ghana (44.7%)(71), Kenya (53.1%),(72), and Meket woreda (48.3%)(45).The difference in Ghana study may be attributed due to differences in age group among study participants. The difference with the Kenyan study may be due to differences in the community participated meaning in Kenya the community was food insecure were as in the present study not. The difference among the study done in Meket woreda was attributed due to a long time fasting in the northern part of Ethiopia that related to religion. Findings from the present study among the non-feeding children were higher than the study done in Ghana where the prevalence was 17.2%(73).This difference may be attributed due to the long period of feeding program implementation in school children in Ghana and the economic status of the two countries.

Finding from the present study was higher when compared to a study conducted in school feeding children in Ghana 16.2% (44).This difference may be attributed due to sample size, child-caring practice, feeding frequency at school.

The prevalence of stunting was 21% among children from the school feeding program beneficiary and 31.1% among children from none school feeding program beneficiaries. This showed that there was a significant difference in the nutritional status of children among the groups. Another study done in Addis Ababa showed that the finding was lower than the current study were the prevalence of stunting among children of school feeding was 23.6% (62).This difference may be attributed due to the difference in the study area, living style of the community, child feeding habit.

Also, the prevalence of stunting among the feeding group was lower than a study done in Ghana 63%) (71)Kenya (30%)(72), and Meket(58%). (45). The difference in Ghana study may be attributed due to differences in age group among study participants. The difference with the Kenyan study may be due to differences in the community participated meaning in Kenya the community was food unsecured whereas in the present study not. The difference among the study done in Meket woreda was attributed due to long time fasting in the northern part of Ethiopia that related to religion

In the current study one of the factors associated with stunting was meal frequency, so children who did not get the daily recommended amount of energy may result in undernutrition. This was supported by a study done in Hohoe Municipality, Ghana were children who consumed only two meals per day were more likely stunted(34). Another study conducted in Bangladesh showed that children who had meal frequency 1-2 times were also associated with increased odds of stunting which was similar to the current study (35). Another study conducted in Addis Ababa stated that low meal frequency (≤3 times) per day was significantly associated with stunting which was similar to the current study (62). Children who had a meal frequency <3 times per day were 2.03 times more likely stunted as compared to those children who had meal frequency ≥3 times per day.

The latrine was another factor significantly associated with stunting because hygiene and sanitation issue was one of the underlying cause for malnutrition this supported with a study done in Dangila north Ethiopia states unavailability of a latrine, were an independent predictor of stunting(51). Children living in households without a latrine in the compound were 4.73 times

more likely to be stunted as compared to those children in households with a latrine in their compound. Missed meal schedule was a significant factor of stunting in the study subjects. Missed meal schedule leads to a shortage of energy calorie to the cells and ends up with malnutrition. This was supported by a study conducted in Aribaminch states that children who missed their meal schedule were 57% more stunted as compared to those who did not miss the schedule (20).This also supports the present study which showed that Stunting was 2.37 times more likely to occur in children who had missed their meal schedule than those who did not. Father's occupation is another predictor variable, so according to this study child whose father was a daily laborer was 2.65 times more likely stunted as compared to those children whose father was a farmer. This association was supported by a study conducted in Gobu Seyo District, East Wollega zone states that children whose father was a daily laborer were 4.22 times more likely stunted as compared to those children whose father was a farmer, this is may be due the reason that lower household economic status may lead to household food insecurity which leads to undernutrition (46).

Deworming is another factor significantly associated with stunting in school children. Parasitic infection particularly helminthes leads to undernutrition due to competition for essential nutrients as well as endogenous nutrient losses, so to minimize this problem deworming was a good intervention. (74). Children who had not dewormed in the last six months were 2.53 times more likely to be stunted as compared to those children who had dewormed. This study was supported by a study conducted in India which states that those children who were dewormed where had improved nutritional states as compared to those who did not deworm (75)

6.2. Thinness

In the present study, the prevalence of thinness among the feeding group was 10.9% whereas among the non-feeding group were 17.5% and there was a statistical difference among the groups in terms of thinness (P=0.033).

The prevalence of thinness in the present study was higher than a comparative cross-sectional study in school feeding children done in Denkyembour district, eastern region, Ghana showed that the prevalence of thinness among children in schools with FP was 9.3% (44). This discrepancy may be occurred due to child health& nutrition polices, child feeding practice, the difference between the two countries' school feeding program implementation modalities.

Finding from this study was higher than a study conducted among children of school feeding in Addis Ababa were the prevalence of thinness among the feeding group was found to be 7.1%(62). This difference may be attributed due to the difference in the study area, economic status, living style, health-seeking behavior of the community. The finding also was higher than the study conducted in Kenya where the prevalence of thinness among the feeding group was 5%(72). This difference may be attributed due to the difference in the number of participants in the study meaning Kenyan study participants were small numbers than the present study. The finding where lower than the study conducted in Ghana and Meket woreda where the prevalence of thinness among the feeding group was 21.5%(71), and 27.8%.(45). This difference may be attributed due to age range difference in Ghana were 10-19 years old children were incorporated, whereas in the case of Meket woreda in the northern part of Ethiopia the difference may be attributed due to a long period of fasting.

The prevalence of thinness among the non- feeding group was 17.5% in the present study. This was lower than the study conducted in Ghana and Meket woreda where the prevalence was 18.5%(71), and 37.6%(45) respectively. This difference may be due to age difference and having a large sample size in Ghana study. And concerning Mekite woreda, the difference may be attributed due to the long period of fasting in the northern part of Ethiopia. On the other hand, the prevalence among children without a feeding program was higher than the study done in Kenya(11%)(69) and Addis Ababa(10%)(70). This difference may be attributed due to the long time implementation of the school feeding program in Kenya. Regarding Addis Ababa's study difference in the study area, living style, children caring habit, economic status, and healthcare-seeking behavior of the community as compared to the present studied community .

Regarding associated factors availability of hand washing facility and latrine, availability were significantly associated. In the current study children from households without latrine were 4.73 times more likely to be thinned as compared to those with households that had latrine in their compounds. This finding was supported by a study conducted in Mieso woreda states that those children from households without latrine were 2.05 times more likely to be thinned as compared to those with households that had latrine in their compounds. (76). The absence of a hand washing facility was one of the significant independent variables. Therefore in the present study thinness was 9.01 times more likely occurred in children from households without a hand washing facility as compared to those from households with hand washing facilities. This result

is supported by a study done in Addis Ababa were children from households without hand washing facilities were 2.08 times more thinned as compared to those from households with hand washing facilities. (77)

6.3. Underweight

In the current study, the prevalence of underweight among feeding and non-feeding school children was 12.6% and 20.2% respectively. This difference was not statistically significant (p=0.103). The prevalence was higher than a study conducted in Kenya(8.1%)(72) and Addis Ababa(5.6%)(70)among children with feeding program beneficiaries and non-feeding program beneficiaries Kenya (16.3%) and Addis Ababa (10.5%) respectively. This difference may be attributed due to the age difference of the study population in Kenya. Regarding the Addis Ababa's study Hygiene and sanitation difference, living style, study area were the contributing factors for the difference in prevalence . The prevalence of underweight in the current study was lower than the study done in Gonder town among school children states that the prevalence of underweight was 34.8%(54). This difference may be attributed due to the long period of fasting related to religion in the northern part of Ethiopia, study design meaning Gonder study was community-based so it had a chance of handling more cases.

Regarding the factors associated with underweight among the school children were:- source of drinking water and living with whom were significantly associated with underweight. Source of drinking water is crucial to minimize wash related causes of malnutrition. In the present study children who used unprotected spring water were 3.3 times more likely to be underweight as compared to those who use pipe water. This association was supported by a study conducted in Tanzania were children who used unprotected sources of water were 9.3 times more likely to be underweight as compared to those used protected sources. (78) . According to the present study children living with both parents were 85% protective for malnutrition as compared to those children living with a mother or father alone. This is supported by a study conducted in Nigeria states that children living with both parents were protective of underweight as compared to those living with separate parents (79).

Limitation of this study .

- The cross-sectional design used in the study was not appropriate to establish a causal relationship between the provision of school meals and undernutrition.

CHAPTER SEVEN

7. CONCLUSIONS AND RECOMMENDATIONS

7.1. Conclusion

The finding suggests that SFP has improved the nutritional status of school children. Even so, the prevalence of malnutrition in the area was high but there was a statistically significant difference occurred in the feeding and non-feeding groups due to the school feeding program implementation.

Concerning public health importance, the overall prevalence of thinness was in serious public health problems, whereas stunting and underweight were in medium public health problems. Meal frequency per day, missed meal schedule, Latrine availability, deworming and father's occupation were found to be significantly associated factors of stunting. The availability of hand washing facility and latrine were factors associated with thinness. Whereas the source of drinking water and living with whom were factors associated with underweight among school children in the area.

7.2. Recommendations

Based on the finding of the study, the following recommendations were made

Policymakers

- The school feeding programs are better if it incorporates animal source foods because most high-quality proteins and more bioavailable micronutrients are found in animal food products which can increase brain functioning and hence improve the children's educational performance.
- Better to incorporate the school feeding program as a pillar in primary schools in the food and nutrition policy of Ethiopia.

Regional health and education bureau

- Better to allocate the budget for the program routinely to expand the program to other areas in the region**.**
- Better to design health and nutrition education program interventions to improve child feeding practices.
- Supporting schools to construct a full package of WASH components at the school level to minimize communicable disease and other contributing factors for malnutrition.

Researchers

- Better to conduct a longitudinal study design that can assess the casual association of child nutritional status
- Further study about the quality of the meal provided to the children will be needed.

Health office

- Better to design health and nutrition-specific activities to improve the nutritional status of school children.
- Strengthening the school deworming program with the collaboration of education office
- Increasing the construction and practice of using both public and private toilets and hand washing facilities near the toilet.
- Teaching and providing water treatment chemicals with the collaboration of the water sector

Education office

- Better to construct pipes in school compounds to supply clean water service to schools with the collaboration of the water sector

For NGOs

- Supporting the local government by different utensils and supplies for the school feeding program and playing a great role in expanding the program to other primary schools to improve the nutritional status of school children

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urban Nigerian children. 2005;26(2):230–3.

Annex 1 Assent or Consent form

Title: Undernutrition and associated factors among rural primary school children in Zala district southern Ethiopia. A comparative study between schools with and without school feeding programs .

Principal investigator: Abrachew Datiko, working in Zala district health Office as maternal and child health and nutrition service coordinator and second-year human nutrition student working the research.**E-mail**:abrachewd@gmail.com, **cellphone**: 0916882876.

Institution: Jimma University, Institute Of Health, Faculty of Public Health, Department Of Nutrition and Dietetics

Procedures

If you agree to participate, I will collect data on the height and weight of your child for analysis.

Risks Nothing harmful will come from your child's participation.

Benefits There are no direct benefits to you or your child. However, the results will possibly help others. Based on the finding I will inform the authorized person and respective stakeholders to work on it

Cost There is no direct cost to you for participating

Compensation There will be no compensation to you for participating

Participant's right as I have said things that are not clear to you, you may ask me without any fear and I will give you an answer and explanation .you may feel free and ask questions. Your child participation in the study entirely volunteers and up to you to decide. There is no penalty if you don't agree to participate. You can say no without worry. The school and the feeding program providers as well as the health care center will continue to give food and care for your child as usual.

Parent's right You have the right to ask about anything that is not clear and I wish you could understand the whole process and you may ask me without any fear and I will give you an answer and explanation to you and please feel free and ask questions as parent/guardian. Your child participation in the study entirely volunteers and up to you to decide. There is no penalty if your child or you don't agree to participate. You can say no without worry. The school administration on or all stakeholders will assist your child or you as usual.

Confidentiality By excluding names and other identifying numbers from the questionnaire confidentiality of information will be assured. Any information about your child will be kept privet.

Persons to contact If you have any question, you can ask at any time, if you have additional questions about the study you may contact: Abrachew Datiko, working in Zala district health Office as maternal and child health and nutrition service coordinator and second-year human nutrition student working the research **E-mail**:abrachewd@gmail.com, **cellphone**: 0916882876

Would you allow your child to participate in the study? Yes ----------No ----------.Thank you

VOLUNTEER AGREEMENT

The above document describing the benefits, risks, and procedures for the research title Undernutrition and associated factors among rural primary school children in Zala district southern Ethiopia. A comparative study between schools with and without the school feeding program has been read and explained to me. I have been allowed to have any questions about the research answered to my satisfaction. I agree to participate as a volunteer.

_____ _____

Child's name Name of child's guardian/parent

_____ _____

Date Signature or mark of child's guardian/parent

If volunteers cannot read the form themselves, a witness must sign here:

I was present while the benefits, risks, and procedures were read to the volunteer. All questions were answered and the volunteer has agreed to take part in the research.

_____ _____

Date Name and signature of a witness

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual.

_____ _____

Date Name Signature of Person Who Obtained Consent

Thank you for your cooperation

Annex 2 . የፈቃደኝነት መግለጫ ቅፅ

ርዕስ፡ በዛላ ወረዳ በተመረጡ አንደኛ ደረጃ ት/ቤቶች የምገባ መርሀ ግብር ውስጥ ያሉናየሌሉ ተማሪዎችን የምግብና የሰውነት እድገት መጠን መለካትና ማወዳደር

የጥናቱ ተጠሪ ፡ አብራቸው ዳቲኮ

ይህ ጥናት በየት/ቤቶቹ ባለው የምገባ መርሃ ግብር ተጠቃሚ የሆኑና ያልሆኑ ተማሪዎች የእድገት መጠንን ይለካል እንዲሁም ያወዳድራል በተጨማሪም የተማሪዎቹን የተመጣጠነ ምግብ አወሳሰድ ሁኔታን ያጠናል፡፡

የስራ ቅደም ተከተል:-

በዚህ የምርምር ስራ ላይ ለመሳተፍ ፍቃደኛ ከሆናችሁ:-

1 ለምርምር ስራው አስፈላጊ የሆኑ ጥያቄዎችን እንጠይቃችሁአለን ፡፡

2. የተማሪዎቹን ቁመት ፣ክብደት እንለካለን ፡፡

3.ተማሪዎቹ በቀን ውስጥ የሚመገቡትን የምግብ አይነት እንጠይቃለ፡፡

የአደጋ መጠን:-

የአደጋ መጠኑ እጅግ ዝቅተኛ አና የተማሪዎቹን የእረፍት ጊዜ ብቻ መጠቀምን ያካትታል፡፡

ከምርምሩ የሚገኙ ጥቅሞች:-

ከምርምሩ ውጤት በመነሳት ለተመረጡ ተማሪዎች የምገባ አገልግሎት ከሚስጡ ድርጅቶች ጋር በማገናኘት ተጠቃሚ እንዲሆኑ ጥረት ይደረጋል ፡፡ እንዲሁም እየተሰጠ ባለው የምገባ አገልግሎት ላይ ያሉ ክፍተቶችን ለይቶ በማውጣት አገልግሎቱን የተሻለለ ማድረግ ከፍተኛ አስተዋፅዎ ያደርጋል ፡፡

ክፍያ:- በዚህ የምርምር ስራ ላይ ለመሳተፍ ምንም አይነት ክፍያ አትጠየቁም፡፡

ማካካሻ፡- በዚህ የምርምር ስራ ላይ በመሳተፋችሁ የገንዘብም ሆነ ምንም አይነት ድጋፍ አይደረግላችሁም፡፡

የተሳታፊዎችመብት፡- ያልገባችሁ ነገር ካለ በነፃነት እና ያለምንም ማመንታት መጠየቅ ትችላላችሁ ፡፡ በዚህ የምርምር ስራ ላይ መሳተፍ ሙሉበሙሉ በእናንተ ፈቃደኝነት ላይ የተመሰረተ ነው፡፡

ሚስጥራዊነት፡- የምርምሩ ውጤቶች እና ማንኛውም መረጃ በሚስጥር ይያዛል፡፡

ተመራማሪው(እኔ) ብቻ መረጃዎቹን አገኛለሁ ፡፡ እንዲሁም ሪፖርቱ ሲፃፍ መረጃዎቹን ሌላ ሰው እንዳያገኛቸው በተለየስም (ኮድ) ይቀመጣሉ ፡፡ ማንኛውም አይነት ጥያቄ ካለዎት የሚከተለውን አድራሻ ይጠቀሙ

አብራቸው ዳቲኮ ;- ስልክ ቁጥር 0916882876

በዚህ የምርምር ስራ ላይ ለመሳተፍ ፈቃደኛ ከሆኑ እባክዎ በክፈት ቦታው ላይ ይፈርሙ፡፡

ስለ ምርምሩ በበቂ ሁኔታ ተገልፆልኛል እንዲሁም ጥያቄዎቹ በሚገባ ተመልሰዋል ስለዚህ በዚህ ምርምር ላይ ለመሳተፍ ተስማምቻለሁ፡፡

_____ _____ ----------

ፊርማ ስም ቀን

_____ _____ ----------

ስም የምርምሩተወካይፊርማ ቀን

ስለ ትብብርዎ እናመሰግናለን ፡፡

ANNEXES .3 English Version Questionnaire

Part I: Socio-demographic Characteristics

Participant code _____ school code---------- Date----------

Socio-demographic Characteristics			
Question		**Response**	**skip rule**
101.	Age of the child in complete years	----------years	
102.	Sex of the child	1. Male 2. Female	
103	Grade level	----------	
104	What is your birth order? (Which child are you in your family?)	1= ≤2 2= >2	
105	With whom you are living	1. Mother 2. Father 3. Brother or sister 99 Others (specify----------	
106	Occupation of your Mother/caretaker?	1. Farmer 2. Government Employee 3. Merchant 4. Housewife 99 Other(specify)_____	
107	Religion of parents	1. Muslim 2. Orthodox 3. Catholic 4. Protestant 99 Others (specify)_____	
108	Occupation of father	1=Farmer 2=Government Employee 3=Merchant 4=daily laborer 99Others (specify)…	
109	Ethnicity	1. Gamo 2. Gofa 3. Oromo 4. Amhara 5. Tigre 99 Others (specify)_____	

110	Maternal education	1. No formal education 2. Primary education 3. Secondary education 4. college and above	
111	Fathers education	1. No formal education 2. Primary education 3. Secondary education 4. College and above	
112	How many people including yourself, live in your household (Family size)?	1= 1-3 2= 4-5 3= ≥6	
113	Do your families have farmland?	1=yes 2=no	

Part 2. Household wealth index indicator variables

114	**Household items**	**1=yes**	**0=no**	
A	Does your family have functional Radio?	1	0	
B	Does your family have a functional Television?	1	0	
C	Does your family have an Electric stove?	1	0	
D	Does your family have a Bicycle?	1	0	
E	Does your family have a Motor cycle?	1	0	
F	Does your family have a Cart?	1	0	
G	Does your family have a Watch hand/wall?	1	0	
H	Does your family have a Mobile phone?	1	0	
I	Does your family have Plough?	1	0	
J	Does your family have a Sofa?	1	0	
K	Does your family have a Mattress?	1	0	
L	Does your family have a Chair?	1	0	
M	Does your family have a Generator?	1	0	
N	Does your family have milling?	1	0	
O	Does your family have Oxen?	1	0	
P	Does your family have Cows?	1	0	
Q	Does your family have Horse/mules?	1	0	
R	Does your family have Goats/Sheep?	1	0	
S	Does your family have Chickens?	1	0	

T	Does your family have a Donkey?	1	0	

Part 3.Water and sanitation-related questions

115	Do you have a latrine in the compound/ household?	1. Yes 2. No	
116	If yes what type of latrine do you have?	1=Pit 2=VIP 3=Flashed 4 =Other (specify……	
117	How do you dispose of the waste generated in the compound?	1. pit 2. burning 3. open field 4. garbage can	
118	What is the source of drinking water?	1. pipe water 2. protected well/ spring 3. unprotected well/ spring 4. river	
119	do you do anything to the water to make it safer to drink?	1=yes 2=no	
120	Methods used to treat the water to make it safe?	1=Boil 2=Add Chlorine 3= Strain through a cloth	
121	Is there a hand washing facility?	1=yes 2=no	
122	Do you have a habit of washing your hand before a meal?	1. yes 2. no	
123	Do you have a habit of washing your hand after using a toilet?	1. yes 2. no	
124	Do you wash Fruit before eating?	1=yes 2=no	

Part 4. Morbidity related questions

125	Have you experienced any illness/ infection in the last 2 weeks?	1. yes 2. No	
126	If yes what type of illness did you experienced?	1. Diarrhea 2. malaria 3. parasitic infection 4. Others (specify)_____	
127	Do you have dewormed in the last 6 months?	1=yes 2=no	
128	Do you have a family history of TB?	1=yes 2=no	

Part: 5. Diet-related questions

130	Are you school feeding program beneficiary	1=yes 2=no	
131	How many times do you eat in school per day?	1=one times 2=two times 3=three times	
132	How long do you use the program?	1=six month 2= one year 3=two years and above	
133	Meal frequency in a day?	1= ≥ 3 2= < 3	
134	Have you ever missed your meal schedule in the last two weeks?	1=yes 2 =no	
135	If yes which one you missed?	1=brake fast 2=lunch 3=dinner	

Part: 6. School performance-related questions

136	The absent number of days in the last semester?	1=<=5 2= >5	
137	Have you ever drop out or repeat Class?	1= Yes 2= No	
138	If yes how many times?	1=Drop---------- 2=Repeat----------	
139	Academic achievement of a student?	1=good 2=poor	

Part 7. Child anthropometric measurements .

Measurements		Measurement 1	Measurement 2	Average measurement	Skip rule
148	Height			In centimeter----------	
149	Weight			In kilograms _____	
150	Is there nutritional edema?			1. yes 2. no	
151	If yes indicate its grade			1. grade one 2. grade two 3. grade three	

ANNEXES.4የአማርኛመጠይቆች

ክፍል 1-የስነ-ሕዝብባህሪዎችእናአጠቃላይገጥታ

የተማርውመለያ _____የትምህርትቤቱመለያ----------ቀን--------

የስነሕዝብመጠይቅ			
መጠይቅ		**ምላሽ**	**ዝለል**
101.	**የልጁዕድሜበዓመት**	_____	
102.	**የልጁፆታ**	1. ወንድ 2. ሴት	
103	**የክፍልደረጃ**	----------	
104	**ስንተኛልጅነህ/ሽ**	1= ሁለትኛናበታች 2= ከሁለትበላይ	
105	**ከማንጋርትኖራለህ/ሽ**	1. ከ እናቱ 2. ከ አባቱ 3. ከ ወንድምእናእህት 99 ሌላካለይጠቀስ	
106	**የአሳዳጊወይምእናትሥራ**	1=አርሶአደር 2=መንግስትተቀጣሪ 3=ነጋደ 4,የቤት እመቤት 99 ሌላካለይጠቀስ_____	
107	**ሐይማኖት**	1=ሙስልም 2=ኦርቶዶክስ 3=ካቶልክ	

		4=ፕሮቴስታንት 99 ሌላካለይጠቀስ	
108	የአሳዳጊወይምአባትሥራ	1=አርሶአደር 2=መንግስትተቀጣሪ 3=ነጋደ 4=የጉልበትሠራተኛ 99 ሌላካለይጠቀስ_____	
109	ብሄር	1=ጋሞ 2=ጎፋ 3=ኦሮሞ 4=አማራ 5=ትግሬ 99 ሌላ ካለ ይጠቀስ___	
110	የእናትህ/ሽ ትምህርትደረጃ	1=መደበኛትምህርትአልተማሩም 2=አንደኛደረጃ 3=ሁለተኛደረጃ 4=ኮሌጅናከዛበላይ	
111	የአባትህ/ሽ ትምህርትደረጃ	1=መደበኛትምህርትአልተማሩም 2=አንደኛደረጃ 3=ሁለተኛደረጃ 4=ኮሌጅናከዛበላይ	
112	በቤታቹውስጥጠቅላላአንተንም /ቺምጨምሮስንትሰውይኖራል	1= ከ1 እስከ 3 2= ከ4 እስከ 5 3= 6 እናበላይ	
113	የእርሻመሬትአላችሁ	1=አውን 2=አይ	

2.የቤተሰብየሀብትደረጃንየሚያሳዩጥያቀዎች

114	የቤተሰብንብረት	1=አውን	0=አይ	
A	ራድዮ አላችሁ?	1	0	
B	ቴለቪሽን አላችሁ?	1	0	
C	የኤለክትርክ ሚጣድ አላችሁ?	1	0	
D	ሳይክል አላችሁ?	1	0	
E	ሞቴር ሳይክል አላችሁ?	1	0	
F	ጋሪ አላችሁ?	1	0	
G	የግድግዳ /የእጅሰዓት አላችሁ?	1	0	
H	ተንቀሳቃሽ ስልክ አላችሁ?	1	0	
I	ሞቨርናቀንበር አላችሁ?	1	0	
J	ሶፋ አላችሁ?	1	0	
K	ፍራሽ አላችሁ?	1	0	
L	ወንበር/ጠረጴዛ አላችሁ?	1	0	
M	ጀነረተር አላችሁ?	1	0	

N	የድንጋ ይወፍጮ አላችሁ?	1	0	
O	በሬ አላችሁ?	1	0	
P	ላም አላችሁ?	1	0	
Q	ፈረስ/በቅሎ አላችሁ?	1	0	
R	ፍየል/በግ አላችሁ?	1	0	
S	ዶሮ አላችሁ?	1	0	
T	አህያ አላችሁ?	1	0	

ክፍል 3. ውሀ፣ጽዳት እና ንፅህና ተያያዥ ጥያቄዎች

115	ሽንት ቤት አላችሁ?	1=አው 2=የለም	
116	ካሌ ምን ዓይነት ነው?	1=ጉድጓድ 2=የተሸሻሌ አየር ማስገቢያያለው 3=መቀመጫ ያለው 4 =ሌላ ካሌ ይጠቀስ.....	
117	ደረቅ ቆሻሻን እንደት ታስወግዳላችሁ ?	1=ጉድጓድ 2=በማቃጠል 3=መዳ ላይ በመበተን 4=ቆሻሻ መጣያን በመጠቀም	
118	የመጠጥ ውሀ ምንጭ የት ነው?	1=የቧንቧውሃ 2=የተጠበቀምንጭ 3=ያልተጠበቀምንጭ 4=የወንዝ	
119	የውሀውን ንጽህና ለመጠበቅ ዘደ ትጠቀማላችሁ ?	1=አውን 2=አይ	
120	የተኛውንዘዴትጠቀማላችሁ?	1=ማፍላት 2=ክሎሮንን መጨመር 3= በጨርቅማጥለል	
121	የእጅ መታጠቢያ አላችሁ?	1=አውን 2=የለም	
122	ምግብከመመገብበፍትእጅየመታጠብ ልምድአለህ/ሽ?	1. አውን 2. አይ	
123	ከሽንትቤትመልስእጅየመታጠብልም ድአለህ/ሽ?	1. አውን 2. አይ	

124	ፍራፍረን ከመመገብህ/ሽ በፍት የማጠብ ልምድ አለህ/ሽ ?	1. አውን 2. አይ	

ፍል 4. ከህመም ጋርየተዛመዱጥያቄዎች

125	ባለፉት ሁለት ሳምንታት ውስጥ ታመህ/ሽ ነበር	1. አውን 2. አይ	
126	ታመህ/ሽ ከሆነ ምን አይነት በሽታ	1. ተቅማጥ 2. ወባ 3. የሆድ ትላትል 4. ሌላካ ይጠቀስ_____	
127	በባለፉት ስድስት ወራት ውስጥ የሆድ ትላትል መድሃንት ወስደህ /ሽ ነበር	1=አውን 2=አይ	
128	ከዚህ በፊት የሳንባ ነቀርሳ በሽታ ህመም አለህ?	1=አውን 2=አይ	

ክፍል 5. ከአመጋገብ ጋር የተዛመዱ ጥያቄዎች

129	የትምህርት ቤት ምገባ ተጠቃም ነህ/ሽ?	1=አውን 2=አይ	
130	ተጠቃሚ ከሆንክ/ሽ በቀን ስንተ ትመገባላችሁ ት/ቤት ውስጥ?	1=አንድ ጊዜ 2=ሁለት ጊዜ 3=ሶስት ጊዜ	
131	ለምንያህልጊዜተጠቅመሃል/ሻል?	1=ስድስት ወር 2=ለአንድ ዓመት 3=ሁለት ዓመት ና በላይ	
132	በቀን ውስጥ ምግብ ስንቴ ትመገባለህ/ሽ?	1= ሶስትና በላይ 2= ከሶስት በታች	
133	በባለፉት ሁለት ሳምንታት ውስጥ ምግብ ሳትበላ ያለፈክበት ሰዓት አለ?	1=አውን 2 =የለም	
134	ካሌ የተኛውን ዘለልክ?	1=ቁርስ 2=ምሳ 3=እራት	

ክፍል6. የትምህርት ቤት አፈፃፀም ጋር የተያያዙ ጥያቄዎች

135	በባለፈው ስምስቱር የቀር ቀን ብዛት?	1=አምስትናበታች 2= ስድስትናበላይ	
136	አቃረጠ ወይም ወድቀ ታቃለህ/ሽ?	1=አውን 2= አይ	
137	አውን ከሆነ ስንት ጊዜ?	1=አቋረጥክ/ሽ---------- 2=ደገምክ/ሽ----------	
138	የሴምስቱር አማካይ ውጤት	1=ከፍተኛ>50 2=ዝቅተኛ<50	

ክፍል 7.የልጆች የሴውነት ልኬቶች

የሰውነት ልከት መረጃ					ዝለል
139	ቁሜት	1 ኛ ዙርልከት	2 ኛ ዙርልከት	አማካይልከትበሴ.ሜ	
140	ክብደት				
141	የሰውነትአብጠት	1,አለ 2,የለም			
142	እብጠት ካለ	1,አንደኛደረጃ 2. ሁለተኛደረጃ 3.ሶስተኛ ደረጃ			

DECLARATION

I, the undersigned, declare that this thesis is my original work, has not been presented for a degree in this or any other university, and that all sources of materials used for the thesis have been fully acknowledged.

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This thesis has been submitted for examination with my approval as University advisor

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