

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES



ASSESSMENT OF NUTRITIONAL STATUS AND ITS DETERMINANTS

AMONG UNDER-FIVE CHILDREN
BUTAJIRA, SOUTHERN ETHIOPIA

A thesis submitted in partial fulfilment for
the degree of Masters of Public Health
in the Addis Ababa University

By: Ayana Yeneabat, MD

MAY, 1995

Assessment of Nutritional Status
and
Its Determinants Among Under-five Children
in
Butajira, South Ethiopia

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Advisors: Dr. Derege Kebede
Dr. Mesfin Kassaye

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Table of Contents	Page
Acknowledgements -----	i
Table of Contents -----	ii
List of Tables -----	iii
List of Figures -----	iv
Abbreviations -----	v
Summary -----	vi
Introduction -----	1
Literature Review -----	4-13
Prevalence	4
Factors	5
Impacts	7
Nutritional studies in Ethiopia	9
Methods of Nutritional Assessment	10
Justifications for Nutritional Assessment	12
Objectives	13
Subjects and Methods -----	14
Results -----	18
Descriptive Results	18
Determinants of Nutritional Status	29
Discussion -----	38
Conclusion -----	46
Recommendations -----	47
References -----	48
Appendices -----	58

List of Tables	Page
Table 1 Selected characteristics of study population, care-takers and households -----	21
Table 2 Distribution of Nutritional status by age group -----	24
Table 3 Relationship between nutritional status (W/A) and child characteristics, Butajira, Southern Ethiopia, 1994/95 -----	35
Table 4 Relationship between nutritional status (H/A) and child characteristics. Butajira, Southern Ethiopia, 1994/95 -----	36
Table 5 Relationship between nutritional status (W/H) and selected variables. Butajira, Southern Ethiopia, 1994/95 -----	37

List of Figures	Page
Figure 1. Age distribution of study children -----	20
Figure 2. Ethnic distribution of study children ----	22
Figure 3. Distribution of Malnutrition by Sex groups-	25
Figure 4. Distribution of mean WAZ score values by age group -----	26
Figure 5. Distribution of mean HAZ score values by age group -----	27
Figure 6. Distribution of mean WHZ score values by age group -----	28
Figure 7. Sampling frame -----	58
Figure 8. Geographic map of study area -----	64

List of abbreviations

ARI	Acute Respiratory Infection
BRHP	Butajira Rural Health Project
CBR	Crude Birth Rates
CDR	Crude Death Rates
CMR	Crude Mortality Rates
CI	Confidence Intervals
CSA	Central Statistics Authority
cms.	Centimetres
ENI	Ethiopian Nutrition Institute
FAO	Food and Agriculture Organization
FP	Family Planning
GNP	Gross National Product
gms.	Grams
H/A	Height-for-age
Ht.	Height
IMR	Infant Mortality Rates
kgs.	Kilograms
Maln.	Malnutrition (Malnourished)
MCH	Maternal and Child Health
MUAC	Mid-Upper-Arm Circumference
NCHS	National Centre for Health Statistics
OR	Odds Ratio(s)
PEM	Protein-energy malnutrition
PPS	Probability Proportional to Size
RDI	Required Daily Intake
SD	Standard Deviation(s)
USA	United States of America
VHws	Village Health Workers
W/A	Weight-for-Age
W/H	Weight-for-Height
WHO	World Health Organization

Summary

Malnutrition, in particular child malnutrition is a serious problem in the developing world. However its magnitude and factors are seldom well defined. Hence, a cross-sectional study with internal comparisons was conducted in Meskan ena Mareko Woreda, Butajira, between October 1994 and January 1995. The study aimed at assessing nutritional status and its determinants among under-five children. The study population was identified from under-fives of 10 villages sampled PPS. Data on variables of child, care-taker and household characteristics; child morbidity and care were gathered through an interview. Anthropometric measurements were used to determine child's weight, height and MUAC.

Results showed that 25.1% were underweight, 43.3% stunted and 4.0% wasted. Children < 6 months old were least affected with underweight and stunting. Those 12-23 and 24-59 months old were affected most with underweight and stunting, respectively. Age, birth order, spacing and breast feeding were significantly associated with nutritional status. Similarly, altitude, income, food sufficiency were strongly associated to nutritional status (OR:1.41, 95% CI:1.18-1.67, OR:0.63, 95% CI:0.53-0.75, OR:2.45, 95% CI:2.04-2.94, respectively). Also education of mothers' and fathers', were significantly associated with nutritional status. Child illnesses, were strongly (OR:4.38, 95% CI:3.71-5.16), while type of care during illness were weakly associated.

From the study it is concluded that malnutrition is highly prevalent and infections, poverty and lack of formal education are at the roots of it. Improvement of socioeconomic factors, in particular food availability and knowledge are necessary. With these, integration of child health services with other sectors of socioeconomic development is also indispensable.

Introduction

Children and mothers of developing countries are affected by synergic problems of infection, malnutrition and unregulated fertility (1). Additionally, the health care in the developing world, notably in Africa, is faced with scarcity of resources, inefficient management and increasing cost of medical services. This is further worsened by high prevalence of communicable diseases, increasing poverty, frequent famine and war which have forced the continent to carry the full brunt of underdevelopment (1,2,3). Frequent structural adjustments which usually fall short of meeting public needs have also contributed to the slow socioeconomic take-off (4,5). Rapid population growth that does not match to socioeconomic growth and food production has also posed a threat to the staggering developmental activities (6).

The food and nutrition problem of Africa may be divided into two major categories: An acute shortage leading to mild or severe famine, and long standing moderate shortages, with poor utilization and misuse of available foods leading to chronic malnutrition. And the most outstanding form of malnutrition appears as PEM (7).

Amongst the population, children suffer the most from effects of malnutrition, ARI, and diarrhoea, which often coexist, so much so that about a quarter to a third of the babies born do not reach five years of age (8).

Ethiopia is one of the least developed countries with 64% of its population living below absolute poverty line (9). Infant mortality rate (111/ 1000 live births), under-five mortality rate (226/ 1000 live births), maternal mortality rate (20/1000), and a rapid growth rate (3.1% per year) are one of the highest in the world. Life expectancy is 47 years for males and 57 years for females. GNP is estimated \$ 120, one of the least in the world (9,10,11,12). The population of the country for 1994 is estimated around 55 million, children constitute 46.5%, with a M:F ratio of 102:100. CBR is 51/1000, CDR 18/1000 and population doubling time is 21 years (13,14).

Although a country of long history where medicine have been practised for many years, its people still suffer from common, curable and preventable illnesses (12,13,15). Health problems including communicable diseases and malnutrition are high, particularly among the rural poor and children (12,16). The situation is getting no better due to the deteriorating socioeconomic conditions which are worsened by an increasing cost, war and famine that take place frequently (17,18). Hence, today most of the people in the country share common problems of diseases and other related problems. These are further faced with and complicated by low and uneven distribution and under-utilization of the health resources (17).

Amongst the general population mothers and children are affected most by multiple problems, which include nutritional problems, and social injustices that exist among communities (19). Their nutritional status is crucial not only for they are majority, but also for effects of malnutrition are severe among them. This is so, particularly, in early childhood where most growth flatterings takes place leading to permanent defect in later life (20)✓

✕Studies among under-fives in Butajira, have shown that the leading causes of mortality and perceived causes of morbidity include ARI, measles, diarrhoea and malaria (21,22). Mortality rates are high with IMR of 114.2/ 1000 live births, under-five mortality of 210/1000 under-fives, and CMR of 36/ 1000 population per year (22). Living conditions are low and 88% are rural while 11% of the population are urban. Health service utilization is very low due to distance, cost and low awareness (22,23). The area is one of the four densely populated districts in Ethiopia, 239 inhabitants/sqkm. The population has a M:F ratio of 94:100 in town and 88:100 in rural areas. Mothers and children constitute the majority (22).

Thus, this study will assess the nutritional status of these vulnerable groups, the under-fives, and the factors associated with it in a southern Ethiopian community of Meskan ena Mareko, Butajira, wereda.

Literature Review

Malnutrition has been defined by Gomez as a pathological condition of varying degrees and diverse clinical manifestations, resulting from the deficient assimilation (and intake, too) of the components of the nutrient complex (24). Similarly, it is a state of under-nutrition or malnutrition caused by deficient intake of calories and/or proteins relative to body requirements manifested by physical, psychological and biochemical abnormalities (25,26).

Prevalence

A global review on nutritional surveys shows that the first studies in nutritional status and food intake in developing countries were conducted before the Second World War. However, only in the 1950's and 1960's, did the first large and comprehensive surveys appear in the developing world (27).

Nutritional problems, including malnutrition and undernutrition, have been the major health and welfare problems facing developing countries for the last fifty years (28). To date, they remain to be the main sources of suffering, disability and death, particularly among children and mothers in most developing countries (3,19,29,30). According to a report by UNICEF, this "*silent emergency*", malnutrition, with other diseases, causes 40,000 child deaths every day with another

150 million children living with ill-health and poor growth (31). One-fourth of all child deaths in the world and a 3rd of child deaths in Africa are attributed to malnutrition (3,29). About 25% of the world's under-five children are described malnourished (19). This proportion is high in most developing countries where malnutrition is among the leading health problems (3,19,29,32).

Factors

Children are subject to continuous change as they pass through life, growing mentally, physically, and emotionally. They have special nutritional needs in early childhood and are fully dependent on their mothers to provide for these needs (33). Initially they are nurtured entirely by their mothers, but gradually become independent of their mothers. Children are dependent on adequate supply of nutrients to be capable of operating at their potential. At this time, they are particularly susceptible to infection with pathogens from their home environment and to those that cause the specific infectious disease of childhood (33). This is true particularly for most of Africa, although in areas where mothers still breast-feed adequately, child growth is initially up to the standards given by WHO. This good performance, however, is maintained up to the age of 4-6 months, followed by growth retardation due to poor weaning foods and feeding practices (34).

Studies in Ethiopia showed that weight increment pattern is similar as those in developed countries up to the age of 6 months, after which there is relative deterioration. The pattern for height and MUAC is similar except for deterioration being gradual with increasing age, reaching about 90% of the standard H/A at two years and 80% of the standard for MUAC at one year (35,36). Another study among healthy privileged Ethiopian children showed that trends of increase were similar to that of healthy, well-nourished children in Sweden (37). A South African study showed that growth pattern was similar to the USA reference population, but nutrition and ethnic factors could account for later differences (38). Thus, growth pattern of children and size of adults in a community reflects the effects of diet, infection, psychosocial and genetic factors and indirectly, agricultural and economic influences (28,39).

In Sub-Saharan Africa, food production has suffered a progressive decline. This has led to "*nutritional poverty*" where more than 80% of the income of individuals and families in some places is spent to satisfy calorie needs from local staple (20). Dietary intake of African children, particularly rural preadolescents, is less than the WHO/FAO RDI (40). Dietary shortage and infection contribute to PEM, underlying a 3rd of all child deaths, and causes 40% of all under-tuos to be stunted (3,7,9).

Studies have showed that malnutrition is associated with many factors. It is highly associated with family income, mothers' knowledge, households' sanitation and water supply, prevalence of infection and power and politics of governments, and remains among the main causes of child morbidity and mortality (5,32,41-45).

Impacts

Malnutrition is one of the most important factors affecting the quality of life of individuals and communities. It is an impediment to national, regional and even global socioeconomic development (30). WHO estimated that in 1990 over a billion people were energy deficient globally while a lot more suffer from different micronutrient deficiencies. It is documented that 13.4% of the global burden of disease, 2.2% from Sub-Saharan Africa, is attributable to PEM (29).

The leading causes of child death, namely gastroenteritis, measles and ARI are highly associated with and complicated by malnutrition (46). These diseases, with malaria, are one of the top-five causes of child morbidity and mortality in the Third World (32,46,47). Coupled with dehydration due to diarrhoea, malnutrition is the leading child killer in the world (19).

The effects of malnutrition are multiple and its impact on physical development of children immense. However, its effect on mental development remained

questionable, mainly due to lack sound studies to substantiate this association (48). However, further studies done, in many parts of the world, in the field proved that malnutrition in infancy and childhood affects organic brain growth and mental development (49-51). A study in Kenya showed that even mild to moderate malnutrition has deleterious effects on the physical, cognitive, and motor development of children, resulting in retarded development and behavioral disturbances that persist into adult life (52).

Thus, nutritional status in early life is important for laying down the foundation of healthy adulthood through its effect on growth and development, and subsequently on quality of life, productivity and economic development in later adult life (32,20).

Reviews show that malnutrition which is caused by multiple factors and complicates childhood diseases and is a serious issue in developing countries. Even then, its effects are overshadowed by illnesses and mortality rates resulting from infectious diseases (46). And often times, underweight and lethargic children look normal to parents who do not know how healthy children behave. To make things worse many people, even health workers, give little consideration to this "*silent emergency*" (10). This worsens effects of PEM on children as preventive and intervention measures are not taken early.

Nutritional Assessment Studies in Ethiopia

In Ethiopia available anthropometric data are not comparable due to differences in methodologies. However, they can give a general picture of the nutritional status of the population, particularly in regard to PEM (53).

Studies among victims of war and famine in the Ogaden and Hararghae and two national health surveys done in 1958 and 1985 showed that malnutrition is associated with various factors and prevalence of underweight in some places could be as high as 43.5% to 73% among children. Growth retardation was seen among a 3rd of urban children. Twice as many growth retarded children exist in rural areas (53-56). A national review of 1985 showed that 33.0% were underweight, the ranging from 27% in Addis Ababa and Hararghae to 46% in Wollo (57). An unpublished survey at Zeway in 1992 showed that 24.7% were underweight, 9.5% were stunted and 1.0% wasted (58). Studies showed that the prevalence is high, but more so in arid areas, during famine and war times (18,54,56).

More than 84% of the Ethiopian population live in rural areas and living standards are deplorably low (9,15,59). The First Round Nutrition Survey of 1980, carried out in randomly selected areas, showed that the average calorie intake was 76% of RDA, the intake ranging from 57%, in Tigray, to 96% in Gojjam, with considerable variations among rural and urban set-ups (53). Recently,

these figures have dropped to 71% of RDI (9). The decline in food production and subsequently the RDI, will further complicate the magnitude and severity of nutritional problems in general and child malnutrition in particular. This will be more so among the underfive children.

Methods of Nutritional Assessment

Nutritional assessments can be done using four major methods: clinical, anthropometry, biochemical and a dietary history (26). The latter two are difficult in assessing large numbers of children because of practical reasons including lack of facilities, personnel and the expenses involved in carrying out these methods. Besides, beyond practical considerations, they have difficulties in their ability to detect specific malnutrition problems among different population groups, lacking sensitivity and specificity. But, clinical and anthropometry methods, particularly the latter, are applicable in developing countries where resources to use other methods are very limited (26,60).

Anthropometric survey is one of the most sensitive indicators of sudden changes in health status. It's also practical, comparable and more reliable than other methods employed (60-62). Although anthropometric measures by themselves do not necessarily indicate malfunction if quality of life is not impaired, they are widely employed to assess health status (60-63).

An anthropometric-linked survey has advantages over "anthropometric only" studies for it assesses nutritional status in relation to the factors involved. This is important to plan, implement and evaluate feasible and sustainable nutrition intervention (7,30,61).

Anthropometric national and regional norms would be ideal as a standard for comparisons of data, but are not available for most countries, due to the heavy cost and difficult task involved to produce them (30). Besides, studies done in different countries have shown that the growth pattern of normal children is similar and deviations from these may be due more to environmental factors, namely nutrition and infection, than genetic factors. Thus, international standards can be used as references in nutritional assessment (30,37,38,63,64).

Justifications for Nutritional Assessment

Human nutrition is an area which allows the holistic study of individuals and communities. However, many of the problems remain poorly defined. Thus, appropriate methodologies to identify nutritional problems and determine the factors involved will help in defining the problem and designing intervention measures (26,33,65).

Nutritional changes revealed by surveillance are important for establishing early warning systems. Most surveillances are done on national and regional basis. However, most nutritional distresses and factors are

quite localized (65). Hence, in places where malnutrition is a problem community based studies are needed. To have a sound basis for planning and implementing nutrition programmes, the followings are indispensable (30):

1. Knowledge of the nature, magnitude, distribution and final effects of malnutrition (to identify targets and set priorities) ;
2. Knowledge of the main causative factors and environmental circumstances (to set strategies);
3. Analysis of resources and constraints (to plan measures);
4. Adequate information on the magnitude, causes and effects of nutritional problems (for policy).

Most surviellances are carried out among under-fives for:

1. They are the most vulnerable groups,
2. Their nutritional status is an indicator of the community's nutritional status,
3. Are at a critical period of growth and development where nutritional insults leave serious effects,
4. Intervention measures improve their out come,
5. Findings can be compared to other studies done.

Nutritional survey among children is indispensable at this moment as the world's children's nutritional problem remains disquieting (44). And no where other than the developing world would this be an urgent issue.

Objectives

General:- To assess nutritional status and its determinants among under-five children in Meskan-ena-Mareko, Butajira, Woreda using linked anthropometry survey technique.

Specific:-

- To determine the prevalence of malnutrition using anthropometric measurements of weight-for-age, height-for-age, weight-for-age and mid-upper arm circumference.

- To identify the risk factors for malnutrition, specifically sociodemographic, behavioral characteristics and childhood illnesses.

Subjects and Methods

Study design: this is a community-based cross-sectional survey with internal comparison.

Study area: Meskan and Mareko Woreda, formerly known as Butajira district, one of the 7 districts of Guragae Zone, located 130 Kms. south of Addis Abeba is the study area. The population is around 227,595. There are one health centre, two health stations and four health posts. Health service coverage is 46% and services are under-utilized. The staple diets are Enset (*Enset ventricosum*) in the high land and maize in the low land (22,23).

The *source population* is the Woreda under-five children and the study population includes all children in the nine peasants and one urban dwellers associations. Children constitute about 15.6% (4,680) of the estimated 30,000 population of the study sites (22).

Sampling and Criteria: Under-fives residing in the 10 villages selected with probability proportional to size (PPS) for an on-going study by the BRHP (22), were included using set criteria and a sampling frame (Annex 1). All children living in the area and not taking part in any nutritional rehabilitation programme were included. Children whose care-takers were not around during the study period and children with illnesses which make attendance difficult were excluded from the study.

Variables: Independent; characteristics of households, care-takers and children; proximate determinants of child morbidity and care and dependent variables of anthropometry were taken (Annex 2). Anthropometry; weight, height and MUAC of children with out gross physical defects were taken.

Field methods: training was given for recruits who were high school graduates. Supervisors were assigned to assist. Questionnaire, mostly closed ended, were pre-tested and standardized (only 16% were open ended). Age was estimated by using list of local holidays and events. Income was asked in kind and quantity of produce for the farmers and changed into monthly cash using local price estimates. Those with known or estimated cash income were inquired from respondents. Anthropometry was done using standard methods (66). Weights taken using a Salter-type spring dial 25 Kgs hanging scale, calibrated twice daily, and with minimal clothing, were rounded-off to the nearest 100 gms. Standing height, with out shoes, for all ≥ 2 years and recumbent length, crown-heel, for < 2 years old, taken using calibrated standard wooden boards were rounded-off to the nearest 1 cm. MUAC, on the left arm, taken with a tape meter at mid-point between the acromial and olecranon process without compressing the skin of the arm which was hanging loosely were rounded-off to the nearest 0.5 cm.

Verbal consent were obtained from the community leaders and respondents. Those who were unwilling for cultural or other reasons were given the right to decide. Children with medical problems were given treatment by the research team. Referrals for further help were made. Health advices were given to attendants.

Quality was maintained by intensive training, on the spot evaluation, data editing and with computer feedback. Respondents who were not available for three consecutive visits were labelled "missing". But data filled in the first three visits and with missing information were completed with further visits.

Data entry, cleaning and analysis were done using EPI info version 5 and SAS packages. Before analysis, extreme Z-score values (<-6 and $>+6$ for H/age and W/age and <-6 and $>+4$ for W/H) which could be either due to errors in data entry and/or incorrect age and measurements were avoided (67).

Frequencies, rates and ratios were calculated for all variables. Anthropometric standards of NCHS, endorsed by WHO for international use were used (66). Bivariate and multivariate and analysis for trend were calculated, where necessary. Then, OR values and CI of 95% level were taken to determine significance of associations.

The following *operational definitions* were used:

- ARI- more than occasional cough and fever in a non-chronic cougher.
- Characteristics- sociodemographic, ecological, economic, dietary and health of the study population, households, care-takers and practices.
- Diarrhoea- is the passage of three or more loose stools with in 24 hours at least once in the last 2 weeks.
- Highland- altitude of ≥ 2000 meters above sea level.
- Lowland- altitude of below 2000 meters above sea level.
- Malaria- any fever with/with out chills, with out cough, ear or skin infection and percieved as malaria.
- Malnutrition- is defined as protein-energy malnutrition.
- Morbidity- include ARI, diarrhoea, malaria, measles, eye and skin illnesses, in 2 weeks before the survey.
- Peasants' associations- lowest rural administrative unit.
- Standard references- Z-score values used by NCHS and the MUAC of 12.5 cms (6-11 months) and 13.5 cm (12-59 months) (26).
- Stunting- $<90\%$ H/A and $>80\%$ W/A or a HAZ score <-2 (26).
- Urban Dwellers' association- lowest urban administrative unit.
- Underweight- having $<80\%$ W/A or WAZ-score <-2 (26).
- Unsafe water- any water other than from pumped source.
- Wasting- having $<80\%$ W/H or a WHZ score <-2 (26).
- Z-score- is simply " Standard Deviation score" (26).

Results

A total of 5,259 (93.6%), houses found in the project area were visited. First visit responses were made in 97% of all the responses. Under-five children were found from 2,703 (51.4%) households visited. From these 3,824 children were involved in the study, making the response rate about 82% of the estimated under-five population. Out of all the responses, 97.5% were made by parents of these children. And 95 % of the responses were made by mothers. Anthropometry was performed in 3,734 children (80.1 % of all estimated to live in the area and 98.5% of all the studied).

Out of the 3,824 children, 53.1% were aged 24-59 months (Figure 1). The proportion of females and males were almost the same (46.9%, 53.1%, respectively) . Most, 85.3% were rural children while those living in the highlands constituted 60.9%.

As shown in Table 1, those born as $\geq 4^{\text{th}}$ child to families constituted more than half of all the children. Majority, (85.3%) were born with spacing of ≥ 2 years and nearly half, (47.2%) were breast fed for 1-2 years. Adoption was none-existent and 90.3% were living with their couple parents. Meskan tribes were the majority (48.9%). Siltis, Marekos, Sodos, Dobis and others constituted the rest (Figure 2). Also, 37.4% of these children had illnesses in two weeks preceding the survey.

Of the total children, 86.4% were living in families headed by fathers, 82.6% were living in tukuls, the source of water for 87.8% was unsafe while for 87.1% latrine was not available for use. Most, (78.9%), were living in households with five and more family members and 57.3% were living in households with two or more under-fives. Children living in households with food shortage and an estimated monthly family income of < 100 Birr constituted the majority, 61.2% and 77.3%, respectively.

In 97.5% of the children, care-takers were their parents. In the majority of them their care-takers had no formal education. Most mothers (58%) were aged 30 years or more, 38.8% were 20-29 years while teen age mothers were very rare (3.1%). Most children (91.3%), were from peasant families and 91.1% of the children had mothers who were house wives. The dominant religion was Islam (76.4%). Practices in food distribution among family members favoured females and children (49.5% and 39.9%, respectively).

220

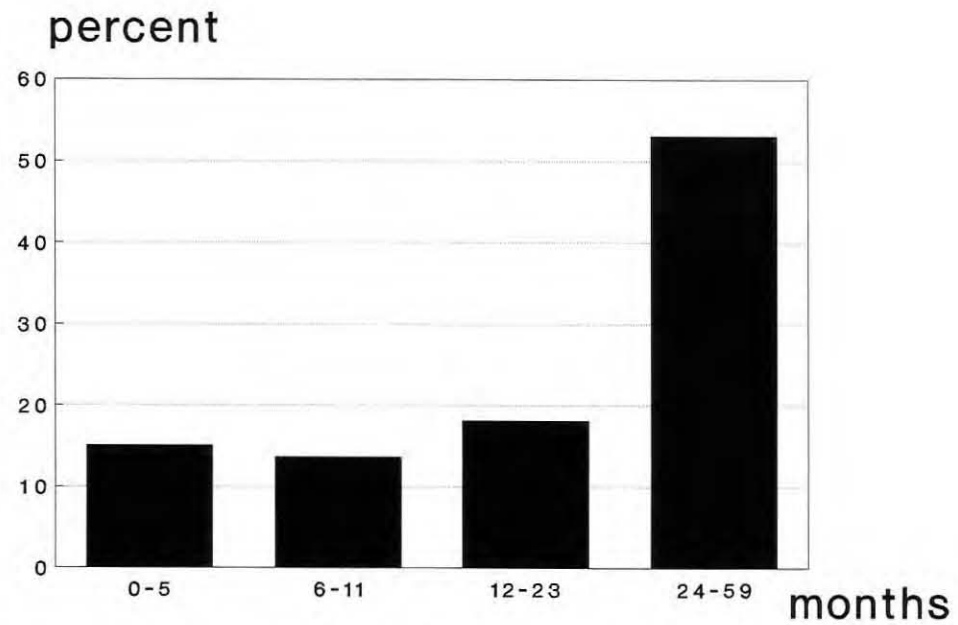


Figure 1 Age distribution of study children, south Ethiopia, 1994/95.

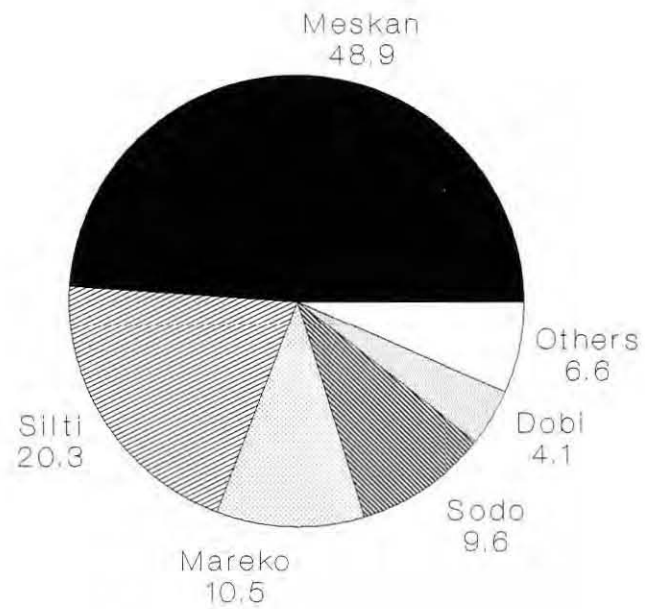
Table 1 Selected characteristics of study population, care-takers and households. Butajira, southern Ethiopia. 1994/95.

Variables	No.	%
Birth Order		
1	437	11.4
2	554	14.5
3	624	16.3
4+	2209	57.8
Birth Interval		
An only child	244	6.4
<2	318	8.3
2+	3262	85.3
Illness in 2 weeks		
Yes	1419	37.4
No	2401	62.8
Don't recall	4	0.1
Duration of Breast Feeding		
Feeding *	919	24.0
< 1 **	221	5.8
1-2	1805	47.2
2+	879	23.0
Food Production Sufficiency (n=3,391)***		
No shortages	1,315	38.8
Shortages	2,076	61.2
Family Income (Birr/month)		
<100	2,038	77.3
101-200	1,474	14.5
201+	312	8.2
Water source		
Unsafe	3,358	87.8
Safe	466	12.2
Mother's Occupation		
House-wives	3469	91.1
Gainful work	340	8.9
Mother's Education		
No formal schooling	3453	90.6
Formal Schooling	356	9.4
Father's Education		
No formal schooling	2709	63.3
Formal Schooling	990	26.8

* Age < 1 year and still breast feeding.

** Age 1/+ year and breast-fed only for < 1 year.

*** Subtotals discrepancy for only alive fathers and mothers (for occupation and education) and farmers (for food production) were included.



**Figure 2 Ethnic distribution of study children (%),
Butajira, southern Ethiopia, 1994/95.**

Nutritional Status description

Children with underweight for age (< -2 SD) were 932 (25.1%). Distribution by sex showed that both groups were equally affected. Children 11-23 months of age were affected most (33.1%), while those under 6 months of age were affected least (6.1%). Those with normal weight-for-age constituted 74.9% (Table 2 and Figure 3).

As shown in Table 2 and Figure 3, stunting was found among 1,573 (43.3%) children with a sex distribution of 44.6% in males and 41.9% in females. Children aged 24-59 months were affected most (53.4%), while those aged under 6 months were affected least (13.1%) with stunting. Those with normal height-for-age were 2,060 (56.7%).

Among the studied children 147 (4.0%) had small W/H (wasted) with insignificant distribution difference among males and females. Children in the age group 11-23 months had the highest (9.0%), while those aged 24-59 months had the lowest (1.7%) prevalence. Among the children, 3,559 (96.0%) had normal weight-for-height.

The MUAC measurements showed that 1,206 (37.2%) children aged 6 months and above had measurements below 80% of the standard for their age groups. Children aged 12-23 months were affected the most (56%) with females affected more than males (40.9% vs 33.8%), as shown in Table 2 and Figure 3.

Table 2 Distribution of Nutritional status by age group,*
Butajira, southern Ethiopia. 1994/95.

Age	WAZ**		HAZ***		WHZ ^o		MUAC ^{oo}	
	Total	<-2 SD	Total	<-2 SD	Total	<-2	Total	<80%
0-5	545	33 (6.1)	541	71 (13.1)	548	18 (3.3)	NOT APPLICABLE	
6-11	514	147 (28.6)	506	159 (31.4)	509	35 (6.9)	522	143 (27.4)
12-23	683	178 (33.1)	672	320 (47.6)	680	61 (9.0)	691	387 (56.0)
24-59	1972	571 (26.7)	1914	1023 (53.4)	1969	33 (1.7)	2032	676 (33.3)
Total	3174	932 (25.1)	3633	1573 (43.3)	3706	147 (4.0)	3245	1206 (37.2)

* Using NCHS Standards.

^o WHZ- Weight/height Z-score

** WAZ- Weight/age Z-score

^{oo} MUAC- Mid-upper arm circumference

*** HAZ- Height/age Z-score

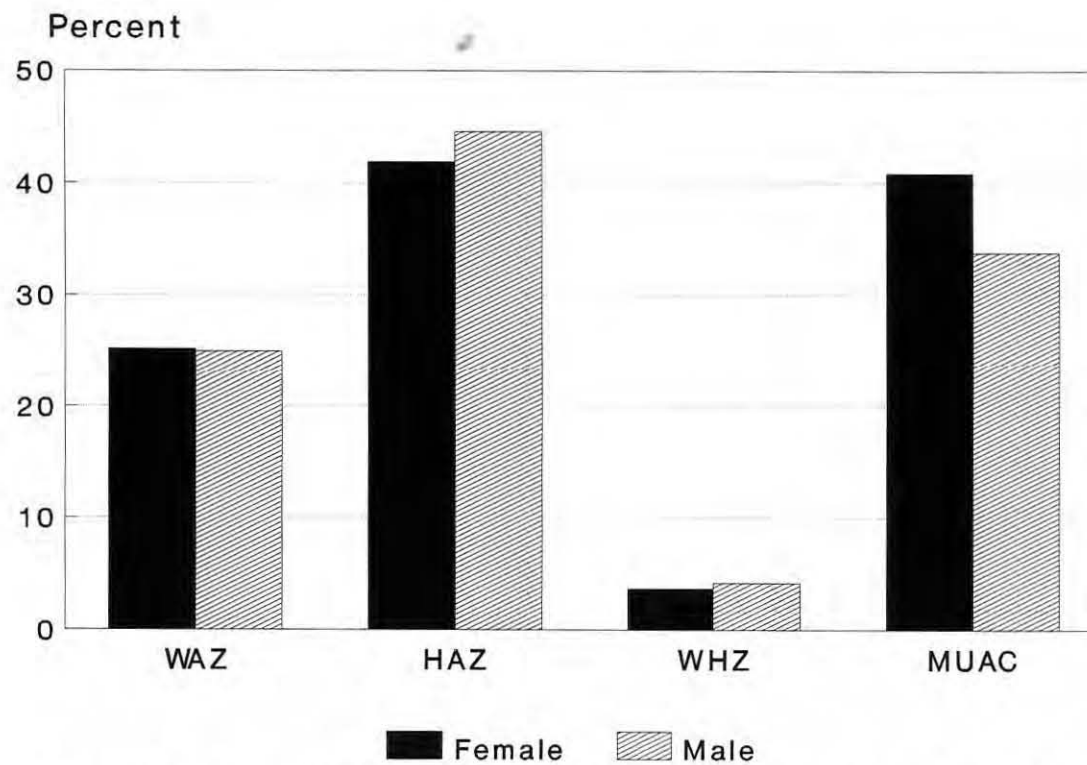


Figure 3 Distribution of malnutrition by sex groups, Butajira, south Ethiopia, 1994/95.

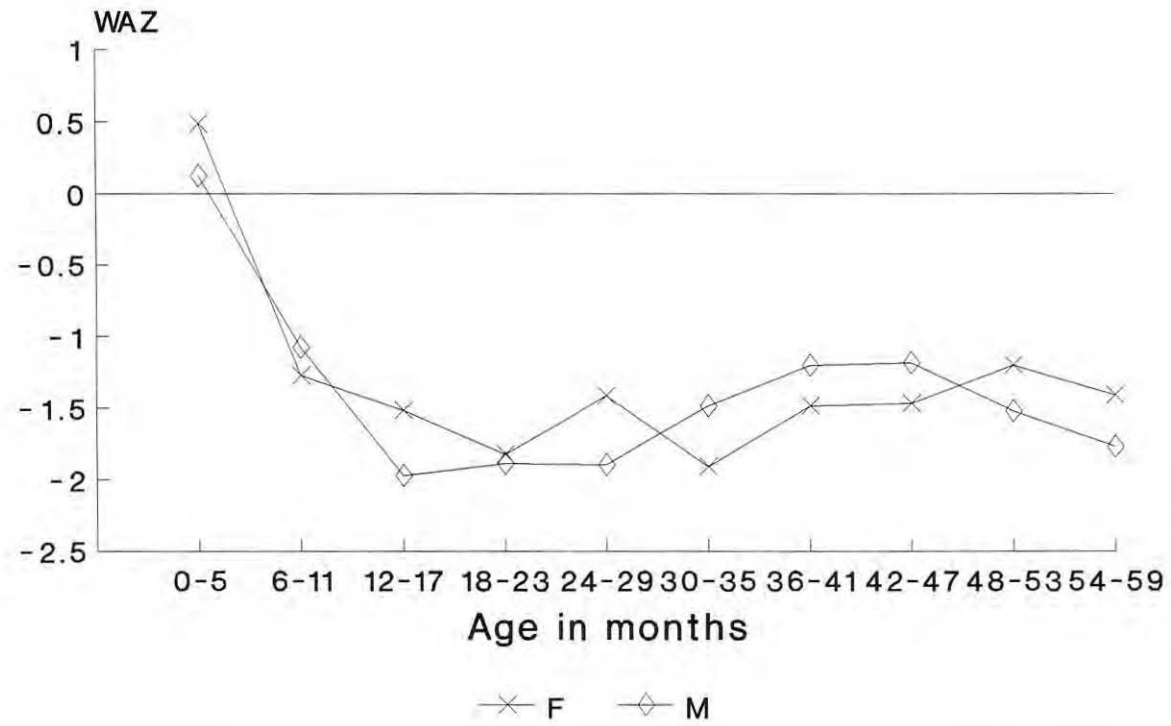


Figure 4 Distribution of mean WAZ score values by age group, Butajira, southern Ethiopia, 1994/95.

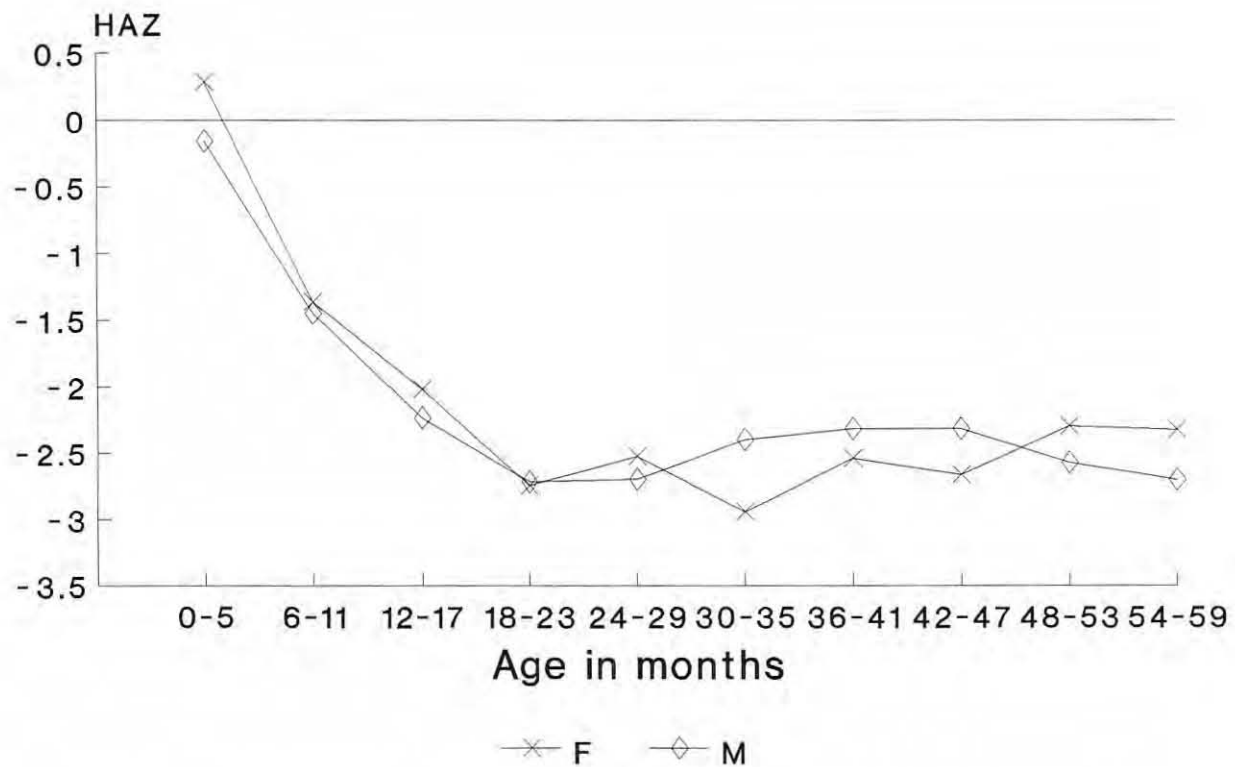


Figure 5 Distribution of mean HAZ score values by age group, Butajira, southern Ethiopia, 1994/95.

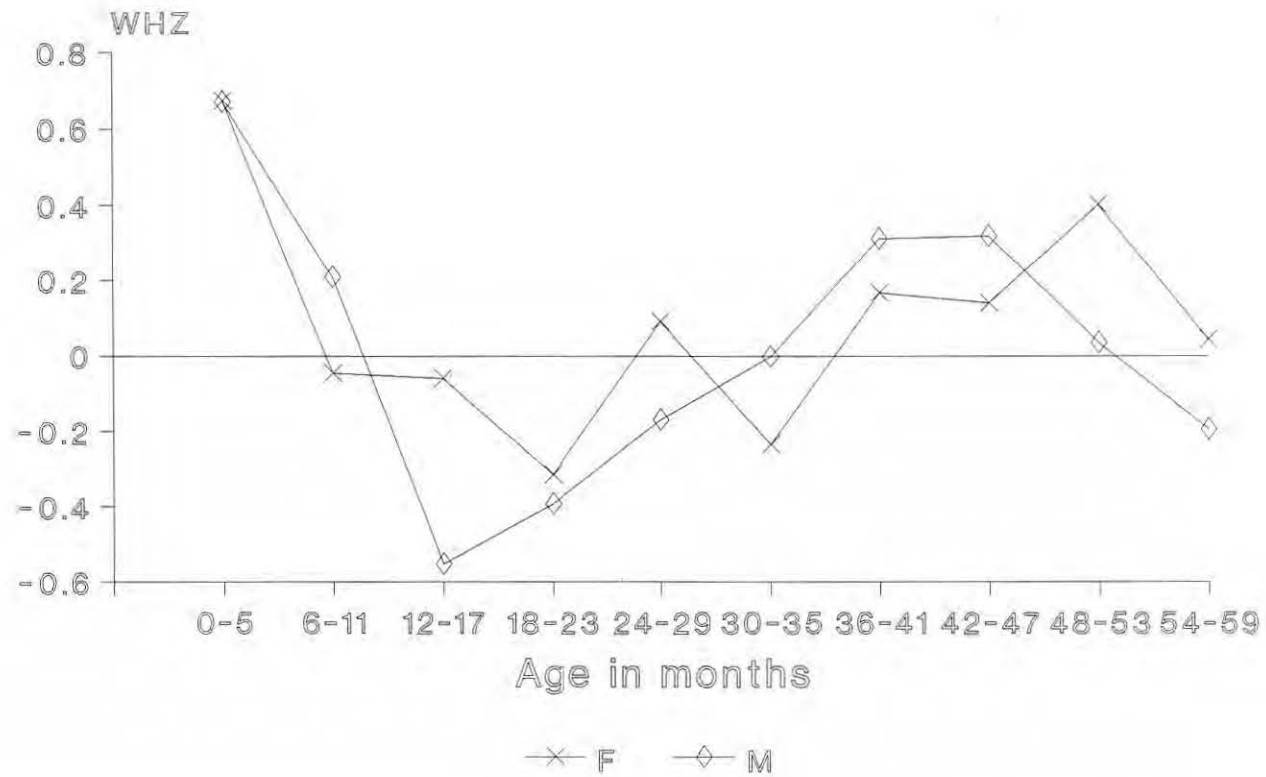


Figure 6 Distribution of mean WHZ score values by age group, Butajira, southern Ethiopia, 1994/95.

Determinants of Nutritional Status

Weight-for-age (underweight), as shown in Table 3, was strongly associated to age of children, (the lowest OR:5.64, 95% CI:3.86-8.28). This association was retained when controlled for other variables. Birth order of ≥ 4 was also associated significantly, (OR:1.58, 95% CI:1.21-2.06). Birth interval, breast feeding and altitude showed significant association. Those born < 2 years apart were significantly more underweight (OR:1.58, 95% CI:1.21-2.06), than only children of families and those born >2 years apart. When adjusted, age, birth interval and altitude remained significantly associated with W/A. Birth interval had significant crude trend (P=0.01) with increasing interval. However, this trend was not retained when adjusted (P=0.10). Age and birth order had no significant trend with W/A (P=0.07; 0.63, respectively).

Food production sufficiency (OR:2.45, 95% CI:2.04-2.94), and income (OR:0.61, 95% CI:0.52-0.72 and OR:0.41, 95% CI:0.29-0.57) had significant association with W/A. Association of income to W/A was retained significant when controlled for others (OR:0.63, 95% CI:0.53-0.75). Number of under-fives in a household was associated negatively with W/A of children (OR:0.82, 95% CI:0.71-0.96). Children of Mareko ethnicity had the least prevalence of being underweight. Associations of family size, household head and water source were insignificant.

Education of mothers and fathers had significant association with W/A of children, (OR:1.31, 95% CI:1.00-1.74 and OR:1.32, 95% CI:1.10-1.58, respectively). However, when adjusted only fathers' education remained significant, (OR:1.19, 95% CI:1.00-1.41). Children of families favouring food distribution for children had the lowest prevalence of underweight. Those whose care-takers practised no favouring of single group were significantly affected more, (OR:1.27, 95% CI:1.06-1.51). Maternal age of 30+ years had considerable but non-significant association with W/A (1.63, 95% CI:0.99-2.70). Children cared by singles were affected more as compared to those cared by couples, but the association to W/A was non-significant (Crude OR:1.18, 95% CI:0.89-1.57). Mothers' occupation had non-significant association to W/A of children (Crude OR:1.19, 95% CI:0.89-1.50). When adjusted, these associations were unchanged.

* Illness in 2 weeks before the study had significant association with W/A of children (OR:3.99, 95% CI:3.41-4.38). When adjusted, this was retained, (OR:4.38, 95% CI: 3.71-5.16). Association of measles, diarrhoea and malaria were high to W/A, (OR:9.98, 95% CI:4.13-24.62; OR:5.76, 95% CI:4.72-7.20; OR: 5.44, 95% CI:3.97-7.46, respectively). Those who received health care were less affected while those for whom "nothing" was done were significantly underweight, (OR:1.25, 95% CI:1.09-1.44).

Height-for-age (stunting), as shown in Table 4, had significantly associated with age, (OR: 3.03, 95% CI:2.19-4.20), OR:6.02, 95% CI:4.45-8.15 and OR:7.60, 95% CI:5.78-10.0, respectively, with increasing age group. When adjusted, this association was retained and there was a significant trend of increasing stunting with an increase in age (P=0.003). Birth interval and breast feeding also had significant associations. As compared to those having siblings, "only-children" of families were least affected. Although non-significant, females were also less stunted (OR:0.90, 95% CI:0.78-1.03).

Height-for-age (stunting) had significant association to income and water source (OR:1.20, 95% CI:1.04-1.38) and OR:1.47, 95% CI:1.19-1.83, respectively). However, this associations were not retained when adjusted for other variables (Table 4). Food production sufficiency and household size, like the rest household variables, associations to H/A were non-significant (OR:1.13, 95% CI:0.98-1.38 and OR:1.01, 95% CI:0.86-1.19, respectively).

Stunting had a significant association to education and occupation of fathers (OR:1.20, 95%:1.03-1.40 and OR:1.29, 95% CI:1.01-1.64, respectively). However, this association was not retained when controlled for other variables (OR:0.89, 95% CI:0.22-1.57 and OR:0.91, 95% CI:0.89-1.58, respectively).

Children of farmers were significantly more affected than those of traders. (OR:1.29, 95% CI:1.01-1.64). Children of mothers with no formal education were more affected, but the difference with the others was non-significant, (OR:1.20, 95% CI:0.94-1.57). This association was retained significant when adjusted (OR:0.85, 95% CI:0.21-0.89). Other variables had weak and non-significant associations with stunting.

Illness had weak and non-significant association, (Crude OR:1.20, 95% CI=0.89-1.76, and adjusted OR:1.14, 95% CI:0.87-1.78), to H/A. Associations of types of illnesses in 2 weeks period to H/A were insignificant.

Weight-for-height (wasting), as shown in Table 5, had the strongest association to age of children. Those 7-12 months and 12-23 months were affected most while children 24-59 months were affected least, (OR:2.17, 95% CI:1.18-4.13, OR:2.90, 95% CI:1.65-5.16 and OR:0.50, 95% CI:0.27-0.94), respectively). When adjusted, this significant association was retained. However, it failed to show linear trend ($P=0.45$). Breast feeding of 1-2 years had significant positive association with W/H of children (OR:0.66, 95% CI:0.44-0.99). However, this was not retained when adjusted. A significant trend of decreasing malnutrition was seen with increasing duration of breast feeding ($P=0.02$). As shown in Table 5 others had insignificant associations.

The associations of W/H to income (OR:0.34, 95% CI:0.21-0.50 and OR:0.33, 95% CI:0.12-0.74); and water source (OR:0.13, 95% CI:0.12-0.74) were significant. However, these associations were not retained when controlled for other variables (OR:0.99, 95% CI:0.49-1.99; OR:0.57, 95% CI:0.27-1.19 and OR:0.97, 95% CI:0.74-1.51, for income and water source, respectively). Similarly, food sufficiency of households had significant association with W/H of children on crude analysis, (OR:2.29, 95% CI:1.46-3.62). Other household variables, had insignificant associations.

Weight-for-height had no significant association with care-takers' characteristics. But, prevalence differences were higher among children of single parents and mothers who spend most of their time out of homes (having gainful work), (OR:1.62, 95% CI:0.91-1.84) and OR:1.66, 95% CI:0.99-2.75, respectively). Considerable, but non-significant association was found to education of fathers (Crude OR:1.17, 95% CI:0.71-1.90 and Adjusted OR:1.25, 95% CI:0.89-1.75).

Morbidity had significant association with W/H of children, with being wasted, (OR:7.34, 95% CI=4.78-11.3). When controlled, this association was retained significant (OR:6.38, 95% CI:4.21-9.70).

Diarrhoea, measles and ARI had very strong associations to W/H, (OR:11.6, 95% CI:7.35-18.3; OR:10.7, 95% CI:1.95-38.8 and OR: 10.0, 95% CI:5.87-17.0), respectively). Similarly, other illness had significant associations to W/H of children, (OR:6.01, 95% CI:3.64-9.96). Types of care provided showed non-significant associations.

As mentioned in the appropriate sections, controlling for other variables which could have confounded the results was done.

The results of multivariate analysis showed that significant associations of child age, household income, child morbidity, birth interval, altitude and fathers' education were retained significant (adjusted OR were significant at 95% CI).

In conclusion, among different variables significantly associated to underweight (W/A), stunting (H/A) and wasting (W/H) with bivariate analysis, some had retained their significance after controlling for confounders. Analysis for trend showed significance for birth interval with crude analysis ($P=0.01$), and for income even when adjusted ($P(\text{crude})=0.03$, $P(\text{adjusted})=0.02$).

Table 3 Relationship between nutritional status (W/A) and selected variables. Butajira, southern Ethiopia, 1994/95.

Variable	Weight/age		Odds Ratio (95% CI)	
	Total	Maln. (%)	Crude	Adjusted
=====				
Sex of child				
Male	1971	492 (25.0)	1.00*	1.00*
Female	1743	440 (25.2)	1.02 (0.87-1.18)	1.01 (0.85-1.15)
Age of child (months)				
0-5	545	33 (6.1)	1.00*	1.00*
6-11	514	147 (28.6)	6.21 (4.09-9.47)	6.33 (4.18-9.58)
12-23	683	226 (33.1)	7.65 (5.14-11.5)	8.06 (4.99-13.0)
24-59	1972	526 (26.7)	5.64 (3.86-8.28)	7.05 (4.36-11.4)
Birth interval (years)				
Only	214	47 (19.5)	1.00*	1.00*
<2	308	93 (30.2)	1.79 (1.17-2.72)	2.12 (1.35-3.33)
≥2	3165	792 (25.0)	1.38 (0.98-1.94)	1.39 (0.96-2.02)
Birth order				
1	431	82 (19.0)	1.00*	1.00*
2	537	129 (24.0)	1.35 (0.97-1.86)	1.08 (0.84-1.32)
3	604	142 (23.5)	1.32 (0.95-1.80)	1.08 (0.85-1.31)
≥4	2142	579 (28.7)	1.58 (1.21-2.06)	1.12 (0.89-1.39)
Breast feeding (years)				
Infant	901	158 (17.5)	1.00*	1.00*
<1	211	48 (22.8)	1.38 (0.95-2.02)	1.31 (0.88-1.93)
1-2	1756	475 (27.0)	1.74 (1.42-2.14)	1.07 (0.75-1.53)
>2	846	251 (29.7)	1.98 (1.57-2.50)	1.24 (0.81-1.91)
Residence/altitude/				
Lowland	1456	317 (21.8)	1.00*	1.00*
High "	2258	615 (27.2)	1.34 (1.15-1.58)	1.41 (1.18-1.67)
Morbidity in 2 weeks				
No	2315	350 (15.1)	1.00*	1.00*
Yes	1395	580 (41.6)	3.99 (3.41-4.68)	4.38 (3.71-5.16)
Household income (Birr/month)				
<100	1872	590 (30.0)	1.00*	1.00*
101-200	1437	297 (27.7)	0.61 (0.52-0.72)	0.63 (0.53-0.75)
201+	305	45 (14.8)	0.41 (0.29-0.57)	0.33 (0.10-1.02)

* Referent category

Table 4 Relationship between nutritional status (H/A) and selected variables. Butajira, southern Ethiopia, 1994/95.

Variables	Height/age		Crude	OR(95% CI)	
	Total	Maln.(%)		Adjusted	
=====					
Sex of child					
Male	1935	862(44.6)	1.00*	1.00*	
Female	1968	711(41.9)	0.90(0.78-1.03)	0.30(0.09-0.61)	
Age of child (months)					
0-5	541	71(13.1)	1.00*	1.00*	
6-11	506	159(31.4)	3.03(2.19-4.20)	3.02(2.20-4.14)	
12-23	672	320(47.6)	6.02(4.45-8.15)	5.94(4.07-8.66)	
24-59	1914	1023(53.4)	7.60(5.78-10.0)	7.51(5.15-10.94)	
Birth order					
1	423	192(45.4)	1.00*	1.00*	
2	527	225(42.7)	0.90(0.69-1.17)	0.86(0.43-1.70)	
3	593	253(42.7)	0.90(0.69-1.16)	0.85(0.41-1.75)	
4+	2090	903(43.2)	0.92(0.74-1.14)	0.85(0.41-1.75)	
Birth interval					
"Only"	239	80(33.5)	1.00*	1.00*	
<2yrs	304	134(44.1)	1.57(1.09-2.26)	0.42(0.21-0.86)	
≥2yrs	3090	1359(44.0)	1.56(1.17-2.08)	0.92(0.53-1.58)	
Breast feeding					
Infant	894	225(25.2)	1.00*	1.00*	
<1yr	210	52(24.8)	0.99(0.68-1.40)	0.94(0.59-1.49)	
1-2yr	1720	871(50.6)	3.05(2.45-3.66)	0.62(0.23-1.66)	
>2yrs	809	425(52.5)	3.29(2.27-4.06)	0.80(0.35-1.81)	
Residence (altitude)					
Lowland	1422	610(42.9)	1.00*	1.00*	
High "	2211	963(43.6)	1.03(0.90-1.18)	1.01(0.89-1.23)	
Water source					
Safe	435	153(35.2)	1.00*	1.00*	
Unsafe	3198	1420(44.4)	1.47(1.19-1.83)	1.04(0.91-1.09)	
Household income(Birr/month)					
<100	1924	805(41.8)	1.00*	1.00*	
101-200	1410	652(46.2)	1.20(1.06-1.38)	0.99(0.83-1.18)	
≥201	299	299(38.8)	0.88(0.83-1.18)	0.68(0.26-1.76)	

* Referent category

Table 5 Relationship between nutritional status (W/H) and selected variables. Butajira, southern Ethiopia, 1994/95

Variables	Weight/Height		OR(95% CI)	
	Total	Maln.(%)	Crude	Adjusted

Sex of child				
Male	1973	83(4.2)	1.00*	1.00*
Female	1733	64(3.7)	0.87(0.62-1.23)	1.16(0.82-1.64)
Age of child (months)				
0-5	548	18(3.3)	1.00*	1.00*
7-11	509	35(6.9)	2.17(1.18-4.13)	1.98(1.09-3.60)
12-23	680	61(9.0)	2.90(1.65-5.16)	2.95(1.41-6.18)
24-59	1969	33(1.7)	0.50(0.27-0.94)	0.52(0.23-1.17)
Birth order				
1	428	17(4.0)	1.00*	1.00*
2	532	14(2.6)	0.66(0.33-1.41)	0.62(0.34-1.14)
3	605	29(4.8)	1.22(0.64-2.35)	1.20(0.76-1.92)
≥4	2141	87(4.2)	1.02(0.59-1.81)	0.92(0.56-1.50)
Birth interval				
"Only"	238	12(5.0)	1.00*	1.00*
<2 yrs	310	11(3.6)	0.69(0.28-1.71)	1.06(0.57-2.14)
≥2 yrs	3158	124(3.9)	0.77(0.41-1.49)	1.10(0.43-2.60)
Breast feeding				
Infant	890	47(5.3)	1.00*	1.00*
<1 yr	210	9(4.3)	0.80(0.36-1.73)	0.98(0.45-2.11)
1-2 yrs	1750	62(3.5)	0.66(0.44-0.99)	0.63(0.38-1.07)
>2yrs	850	29(3.4)	0.63(0.38-1.04)	1.04(0.58-1.86)
Residence				
Lowland	1452	40(2.7)	1.00*	1.00*
High "	2254	107(4.8)	1.76(1.21-2.54)	1.52(0.84-1.89)
Morbidity in 2 weeks				
No	2316	29(1.3)	1.00*	1.00*
Yes	1386	118(8.5)	7.34(4.78-11.3)	6.38(4.21-9.70)

* Referent category.

Discussions

The prevalence of underweight (25.1%) and stunting (43.3%) were high, while that of wasting (4.0%) was relatively low. Among variables used age, altitude, income, food production sufficiency, education and water source were very important risk factors.

The findings of high prevalence could not be accounted for compliance as most, 93.6%, of the estimated houses in the area and all children present, 98.5% of children found in these homes, were included in the survey. To improve compliance, market days and local holidays were exempted from study days. Measurements were taken with standard methods and trained, supervised and different workers from data collectors. Equipments were checked and adjusted. Age could be under-estimated, but prominent local dates were used to reduce recall bias. Additionally, the prevalence found with MUAC and W/H parameters are relatively free from age influences.

Information bias is unlikely to be a reason for differences in associations. Most of the questionnaire were closed ended, simple and collected by trained interviewers who were supervised. Income could be under-estimated, however, different indices were used to cross-check income of households. Recalling child illnesses could be a source of bias, but this was just a 2 weeks illness and likely to be remembered by mothers.

Confounders were handled with internal comparisons and by controlling for other variables. Sampling bias is unlikely as all new houses in the area were included. Besides, all households were accessible. The distribution and socioeconomic status of houses "missed" and health status of children not included is believed to be no different from the others in the area. Although, very few new borns (17, < 0.5 % of total) were not included in anthropometry for cultural reasons, their influence on nutritional status prevalence is very minimal.

* The prevalence of underweight and stunting were in agreement with national studies, (50% and 28-53%, respectively). But the prevalence of wasting was higher than (7-13%), (53). A review in 1982 on national nutritional status studies, had showed that prevalence of wasting, stunting and under-weight were higher, (18.3%, 53.1%, 53.8%, respectively) (68). A study in 1989 among 6-60 months children in Illubabor region, Western Ethiopia, showed that prevalence of stunting (H/A) was less while wasting (W/H) was more there (adjusted for same age groups, stunting and wasting: 37.0% and 9.0% ; 48.6% and 4.1% for Illubabor and Butajira, respectively) (69). A study in 1989, at Pawi, North-Western Ethiopia, showed that the prevalence of wasting (W/H) was higher, (18.1%) (70). Methods used in these studies were similar to this study, however there is a time difference and

in some places famine was present. Besides, Pawi is a malarious area and most of the study population were victims of famine settled in the area. Like this study, the surveys were done in a harvest and post-harvest seasons, thus, prevalence are likely to increase in pre-harvest seasons as documented in other studies (44,71).

The prevalence of underweight using W/A and MUAC standard parameters were almost equal in all age groups except in 12-23 months age group. In this group, MUAC values showed considerably higher prevalence. The agreements of the two parameters in 6-11 months children are in consistent with other studies (72). This age group is not only critical in onset of PEM, it is also the period most responsive to nutritional intervention. Hence, the agreement of MUAC to W/A findings has an important implication in the use of MUAC measurements as a simple community nutritional assessment method by trained VHWS and lower level health staff (72).

The role of identified determinants was more marked among children above six months of age. The low W/A in under-six months children is more related to low birth weight than to nutritional and environmental factors (73). This is justifiable for a few months after birth nutritional intake, infection and socioeconomic factors predominate the pattern of growth making them more susceptible to malnutrition and its subsequent effects.

Factors associated with malnutrition are multiple and confounded by different variables (7,25,28,73,74). Its causes are complex that even in areas and families where food sufficiency is plenty, child malnutrition may be evident. (High income of households does not guarantee an improvement of nutritional status.) However, given fair distribution among family needs, better income strongly influences child health. Effect of income on child nutrition is as seen with other studies (32,41,55,69,75).

Completing elementary level education by mothers' had significant association to nutritional status of children irrespective of social class (75). However, this could not be substantiated in this study, mainly due to the few number of mothers who have completed elementary education. The more considerable association of fathers' education could be due to their role in decision making and through an effect on income and health seeking behaviour. A study in Butajira has showed that health seeking behaviour of families and child mortality were significantly associated to paternal education (23).

The association of water source to nutritional status was marked in chronic malnutrition (stunting), possibly through its effect on diarrhoea and helminthiasis. A study in Illubabor showed that unsafe water is significantly associated with malnutrition, but more so in chronic than acute malnutrition (69). However,

it was difficult to conclude this association in this study since the water source for most of the population was homogeneous (91.6% use unsafe sources), while in the earlier study 58% of the area population obtained water from safe sources. The association of presence and use of latrines to nutritional status could not be established in this study. This was for the majority (87.1%), had no latrines. And even among those who had latrines, its use by children was very limited (24.2%). This makes the study population almost homogenously exposed to the factor, and thus making comparisons difficult.

Child morbidity had the strongest association to W/A and W/H of children. But duration of illnesses than number of episodes are more important (74). As temporal relationship as to which occurred first may not be easily established, comparative cross-cultural longitudinal studies are needed to establish causality (76). This is for nutrition, infection and immunity play an intricate role to each other and establishment of temporal relationship between effect and cause could not be easily established cross sectional studies (76,77). However, the negative role of childhood infections in nutritional status of children is established to be significant (78). This is particularly so in areas like this study community, where predisposing factors to illnesses are high and health services are very low.

Previous studies in Butajira (21), showed that Siltis were more at risk of morbidity and mortality. This is not in agreement with the findings of this study. Socioeconomic, demographic and morbidity factors could account for inter-ethnic differences than ethnicity being a factor as such. This fact was documented in a study among the tribes of Borena, Southern Ethiopia (79).

Studies in Butajira have documented that children in lowlands were more affected with child morbidity and mortality (22,23). However, in this study children in the highlands were more affected with malnutrition as compared to those in the lowlands. This could be largely due to economic differences and the types of staple diets used in the two ecological zones. Children in the highlands eat high fiber, low calorie staple food, (*Enset ventricosum*), while for those in the lowlands cereals, with high calorie, are the staple diets. Studies have confirmed that children cannot break down high fiber diet easily, making the bio-availability low (80). Besides, among families in the lowlands, production of cereals and cash crops were more making their income higher. However, studies have shown that economic improvements by themselves may not bring much of a difference unless distribution of resources among family members and use among needs is not in favour of child health (43,55,81).

Breast feeding is shown to have non-significant association to nutritional status of children when controlled for other variables. Even then, children breast fed 1-2 years and infants were less affected. A study in Jimma, Western Ethiopia, showed that the mean duration of breast feeding was higher among well nourished children than among under nourished ones (82). However, like this study it could not show significant association between low duration of breast feeding and malnutrition. This could be due to the cross-sectional nature of both studies which also could be confounded by various factors. Even then, the protective nature of breast feeding until a given period of life is obvious.

Prevalence estimates of malnutrition in this study are in agreement with national estimates (53,57). These studies were done ten years ago; hence, it seems that time factor has played very little role in changing the magnitude of the problem. This implies that very little, if at all, has changed in the socioeconomic status of the community and the conditions of child health.

In general, the findings with regard to determinants of malnutrition are in agreement with other studies (33,39,53,69,71). But local factors vary among nations and communities. This study shows that some factors found strongly associated with child nutritional status in other studies were not equally as strong.

As discussed in the above sections, association of some risk factors to nutritional status found in other studies were not documented in this study. The possible explanation could be differences in the studied communities in the country who have diverse cultures, health beliefs and practices. Thus, the need to carry out similar studies in different areas is believed to give a better picture of the whole country.

This study, however, is not free from some limitations. Being a cross-sectional study, trends in seasonal variations could not be seen. Besides, variables used were limited. This under-estimates and over-looks the role of other possible risk factors for malnutrition.

Conclusions

In general, it may be concluded that about a quarter of the children in the studied community are under-weight and about half of them are stunted. Similarly, the factors involved in malnutrition are multi-faceted and inter-linked.

Socioeconomic factors, given the priorities, are relatively amenable to intervention. This calls for directing developmental activities to improve poverty, ignorance and disease.

Nutritional problems vary among different sectors of society and its factors are multiple. The effects of nutritional problems affect survival of individuals, development of families and communities and progress of nations and regions. Hence, efforts to improve nutritional status deserve to be seen as part of the over-all socioeconomic and political commitment of nations to improve survival of their people.

Studies have shown that socioeconomic problems, among them child malnutrition, do not simply amount to health deficit; but they are huge social deficits that cannot be tackled on sectoral basis. Hence, much remains to be done by different sectors of societies and development organizations to alleviate these problems, notably child malnutrition and mortality in the developing world (75).

Recommendations

Malnutrition is a cumulative result of availability of food, knowledge of utilization and intake and assimilation of diet.

As seen in the study, poverty and childhood infections are at the roots of child malnutrition. But we can not afford to wait for an economic growth to provide solution. Thus, in addition to concerted efforts to improve food production, various methods may be employed to improve the condition. Among others and based on the findings among the study community, the following are recommended:-

1. Nutrition education on nutrient needs of children, preparation and on consequences of malnutrition.
2. Improving digestibility, bio-availability and assimilation of high fiber starch staple diets using traditional practices of malting, pre-chewing and soaking.
3. Integrating MCH health services to other sectors of development in the community.
4. Prevention and management of common childhood infections by expanding and strengthening VHS.
5. Improvement of economic conditions and environmental factors.
6. Longitudinal studies to establish a sound basis for long-term intervention programmes.

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Part B.**I. Basic Information on Family and Care-takers**

101. Respondents Sex 1. Male 2. Female
102. Age of the child's mother (if alive).....
103. Age of the child's father (if alive).....
104. Marital status of parents of child
1. Married/ together 3. Single/ unmarried
2. Divorced 4. Spouse dead
105. Religion of parents/ care-takers
1. Christian 2. Islam 3. Others/specify...
106. Nationality of parents/care-takers (Ethnicity)
1. Sodo 2. Dobi 3. Maskan
4. Mareko 5. Silti 6. Others..
107. Mother's educational status
1. Formal education... Years completed....
2. Read and write 3. Neither read nor write
108. Mother's occupational status
1. House-wife 3. Government employee
2. Private gainful work 4. Others/ specify....
109. Father's educational status
1. Formal education.....Years completed....
2. Read and write 3. Neither read nor write
110. Father's occupation
1. Government employee 2. Farmer 3. Trader
4. Pensioned 5. No job 6. Others

111. Housing type 1. Tukul 2. Thatched
112. Does the family have latrine? 1. Yes 2. No
113. If yes, 1. Private 2. Shared with neighbours
114. Does the child use the latrine? 1. Yes 2. No
115. Where does the family get its water?
1. Rivers 3. Ponds
2. Wells 4. Spring 5. Others/Specify.
116. What is the approximate monthly income of the family? 1. <50 Birr 3. 101-200
2. 51-100 4. 201-500 5. >500
117. Do the family own cattle? 1. Yes Number. 2. No
118. Does the family produce cash crops? 1. Yes 2.No
119. If the family does produce cash crops, types?
1. Pepper 2. Chat 3. Others/ specify
120. Does the family produce food crops by farming?
1. Yes 2. No
121. If the family produces, what is the produce like?
1. Surplus for sale 3. Seasonal shortage
2. Just sufficient 4. Year-round "
122. Whom does the family favour food distribution?
1. Children 2. Adults 3. No bias
123. Who gets privilege in the family food distribution?
1. Females 2. Males 3. No difference
-

II. Information on child characteristics


201. What is the age of your child? months.
202. Sex of child? 1. Male 2. Female
203. Birth order of the child?
204. Whom does the child live with at present?
1. Both parents 2. Mother only
3. Father only 4. Others/ specify
205. Was this child ill in the past two weeks?
1. Yes 2. No 3. Do not remember
206. If the child was sick, do you know the type of illness?
1. Yes 2. No
207. If yes, was your child sick from the following illnesses?
- | | Yes | No |
|---------------------------|------|------|
| 1. Diarrhoea | | |
| 2. Respiratory infections | | |
| 3. Measles | | |
| 4. Malaria | | |
| 5. Others/ specify..... | | |
208. What was done to the child during this illness?
1. Taken to and assisted by health services
2. Assisted by traditional healers
3. Given home care only
4. Nothing was done to him (No special care).

209. How many years are there between this child and siblings?
1. < 2 years 2. 2 and above 3. An only child
210. How long has this child been breast fed?
1. < 1 Year 2. 1-2 years
3. 2+ 4. Infant/still feeding
-
-

III. Anthropometry

401. Child's weight in Kgs (to the nearest 0.5gm) ..
402. Child's MUAC (to the nearest 1 cm)..... cm.
403. Child's height (to the nearest 1 cm)....cm.
-
-

IV. Recommendations

501. Measures given
1. Drugs/type
2. Health advice
3. Referrals
- 

የላጆችን የእድገት ሁኔታን ለማጥናት

የቀረበ መጠይቅና ምርመራ ቅጽ

ግቢያ፦

የዚህ ጥናት ዓላማ በላጆች እድገትና ጤነነት ላይ ያተኮረ ነው። ጥናቱ በአ/አ/ የኒሮሲቲ የሀክምና ፋኩልቲ የሀብረ ተሰብ ጤና ሳይንስ ክፍል በኩል የሚካሄድ ነው። የተከበሩትህ ጠላጆች /አሳዳጊዎች/ የአካባቢው በማገልገያ ለዚህ ጥናት ለምታደርጉልን ተሰብሮ ምስጋናችን የላቀ ነው።

“ከአክብሮት ጋር”

ክፍል ሀ- አጠቃላይ መረጃ

001 የተባለ/የገባረ ግሀብር ጠላያ ቀጥር _____

002 የአካባቢው አዋጣጥ 1-ክፍተኛ 2. ዘቀተኛ

003 የቤት ቀጥር _____

004 የቤተሰብዎ በዚያ ቢገለጹልን? _____

ሀ. አየቂዎች _____ ለ. ልጆች /ከ15 ዓመት በታች _____

ጠ. ከ5 ዓመት በታች ያሉ _____ ጡ. ከ2 ዓመት በታች _____

005 የቤተሰብ አሳዳሪ /አባባሪ/ ግነው? 1. አባት 2. አናት 3. ሌላ _____

006.ሀ/ መጠይቅ የተደረገበት ቀን _____ የገብነት በዘት _____

ለ/ የገብነት ጤነት 1. የጥላ 2. ያልተገኘ ጡ. ፍጆራ ያልሆነ

4. አካባቢውን የለቀቀ

ጠ/ የያለ-መጠይቅ አቀራቢው ጠላያ ቀጥር _____ ፊርማ _____

ክፍል ለ- መሠረታዊ መረጃዎች

101- የጠላብ ስድ ጭታ 1 ጠገድ 2. ቤት

102- የላጁ አናት ፅድቅ ስገት ይህኖል? _____

103- የላጁ አባት ፅድቅ ስገት ይህኖል? _____

- 104- የወላጆች የገቢቻ ሁኔታ 1. በገራ የጫኛ የተገቡ
አገዳት ነው 2. የተፋተ
3. ያልተገቡ
4. በጭተ የተለያዩ

105- የወላጆች/አባላጊ ሀይማኖት?

1. ክርስቲያን
2. እስላም
3. ሌላ

- 106- የወላጆች በጤረሰብ/ጉዛብ? 1. ሰይ 4. ጻረቅ
2. ደቤ 5. በሰጠ
3. ጠቃኝ 6. ሌላ_____

107- የአናት የየ የተቃራኒ ሁኔታው አገዳት ነው?

1. ጠቃኝ ተቃራኒ ያለው የጠረጠረ ክፍለ_____
2. ጠቃኝ ተቃራኒ የሌለው

108- የአናት የየ የሥራ ሁኔታው?

1. የቤት አጠባባቢ/ክብር ጭቃ ሥራ የሌለው/
ጭቃ ክብር ጭቃ ሥራ ያለው

109- የአባት የየ የተቃራኒ ሁኔታው አገዳት ነው?

1. ጠቃኝ ተቃራኒ ያለው_____ የጠረጠረ ክፍለ
2. ጠቃኝ ተቃራኒ የሌለው

110- የአባት የየ የሥራ ሁኔታው?

1. የጠቃኝ ሥራ ተፋ 4. ጠረጠረ
2. ገቢ 5. ሥራ የሌለው
3. ነገዳ 6. ሌላ_____

111- የሌሎች ጭቃ ስተን ጠቃኝ/ጭቃ :- ስን አይነት ነው?

1. የሥራ ስተ
2. የጭቃ ስተ

112. በተባበሩ ሽንት ቤት አለው? 1. አይደለም 2. የለም
113. ለምን ከህግ ይዘታዎቹ የሚገኙ ነው? 1. የገላ 2. የገራ
114. ሽንት ቤት ከሌሎች ልዩ/ያ/ አዘውትር ይጠየቃል? 1. አይደለም 2. የለም
115. በተባበሩ ሙሉ የሚገኙት ከየት ነው?
1. ከግዛ 3. ከኮራ 5. ከጋንባ
2. ከጉጋንባ 4. ከግንባ
116. የቤተሰብ ለማካደ የጦር ገቢ በገምት ምን ያህል ነው?
1. 50 በር በታች 3. 101-200በር 5. ከ500 በላይ
2. 51-100በር 4. 201-500በር
117. የቤተሰብ የገንዘብ ክፍት አለ? 1. አይደለም _____ በዚህ _____
2. የለም
118. በቤተሰብ ለገንዘብ የሚጠቀሙ ሰብሰቢ ይቆረታል?
1. አይደለም 2. የለም 3. አርባ የለም
119. ለገንዘብ የሚጠቀሙ ሰብሰቢ ከቆረታዎቹ አይነት ቢነገሩ?
1. በርበራ 2. ወጥ 3. ሌላ _____
120. በተባበሩ የምገባ ለህል በገባርና ያቆርታል?
1. አይደለም 2. የለም
121. ለምን ከሌሎች የምርት ቅጠት አገዳጅ ነው?
1. ለቤት በቀጥታ ለሽንት ይቆረታል
2. ለቤት በታች ነው
3. ወቅታዊ አገረት አለው
4. ምንም ዓይነት ገንዘብ የሌለው::
122. በቤተሰብ የምገባ ክፍል ጭንቀት ለቀጠረ /ቀደሚያ/ የሚገኘው ለማንኛው?
1. ለላይኛ 2. ለአዋጅ 3. ለቀጠረ የለም
123. በዚህ የምገባ ክፍል ላይ ቀደሚያው ለማንኛው ይሰጣል?
1. ለቤት 2. ለቤት 3. ለቀጠረ የለም

ክፍል ሐ- በሌሎች ጠያቂዎች ላይ ሲነገሩ ገብ

- 201 የሌሎች ጠያቂዎች ስም? _____ ጠር ::
- 202 የሌሎች ጠያቂ? 1. ወገድ 2. ሴት
- 203 ይህ ሌሎች ስም ላይ ሌሎች? _____
- 204 ሌሎች በሌሎች ገብ የሚኖረው ከሌሎች ጋር ነው?
 - 1. ከወላጆቹ ጋር
 - 2. ከሌሎች ጋር
 - 3. ከሌሎች ጋር
 - 4. ሌላ _____
- 205 ይህ ሌሎች /ያ/ ባለፈት ሁለት ባለቤታት ታዩ ይታያል?
 - 1. አዎ
 - 2. የአዎ
 - 3. አሳባታችሁ
- 206 ታዩ ከነሰረ የባለቤታት ስም ነው ይታያል?
 - 1. አዎ
 - 2. የአዎ
- 207 የሌሎች ጠያቂ ከሆነ ከሌሎች ጋር ስም ላይ ሲነገሩ ገብ

	አዎ	የአዎ
1. በ24 ሰዓት ውስጥ ከ3 ገብ በላይ ተጠቅሞ	_____	_____
2. ባለፈት /ገንዘብ/ የገርግ ሆኖ	_____	_____
3. የሌሎች ጠያቂ /አገልግሎት/	_____	_____
4. ወገ /ጠያቂ/ ማግኘት	_____	_____
5. ሌላ _____		
- 208 ሌሎች /ያ/ በታዩ ገብ ላይ ታዩ ገብ?
 - 1. ወይ ጠያቂ ባለቤቱ ተወሰደ
 - 2. በባህሪ ላይ /ሆኖ ገብ ጠያቂ/ ተረጎሞ
 - 3. በሌሎች ጠያቂ ላይ ተገባብሮ
 - 4. ሌሎች የሆኖ ገብ ላይ ተገባብሮ
- 209 በዚህ ሌሎች በታዩ /በተጠቃሚ ሌሎች ላይ/ ጠያቂ ላይ የሌሎች ጠያቂ ስም ላይ?
 - 1. ከ2 ዓመት የሆኑት
 - 2. ከ2 ዓመት ከዚያ በላይ
 - 3. ጠያቂዎች በገብ ላይ ነው
- 210 ይህ ሌሎች /ያ/ ሌሎች ላይ ገብ ላይ ጠያቂ?
 - 1. ከ1 ዓመት በታዩ ገብ
 - 2. ከ1-2 ዓመት በታዩ ገብ
 - 3. ከ2 ዓመት በላይ
 - 4. ጠያቂዎች ከ1 ዓመት በታዩ ገብ የሆኑት ነው

ክፍል ለ - ይበገ ለጅ/ያገ/ በገጠረዎረወሰ?

401- የሌጅ የሥራ ገራ ከሳይ ወፍረተ _____ ሲ.ግ.

402- የሌጅ ቤት /የግዥ/አገልግሎት/ _____

403- የሌጅ ከባድተ _____ ሲ.ግ.

ክፍል ሠ - ግጠኝነት

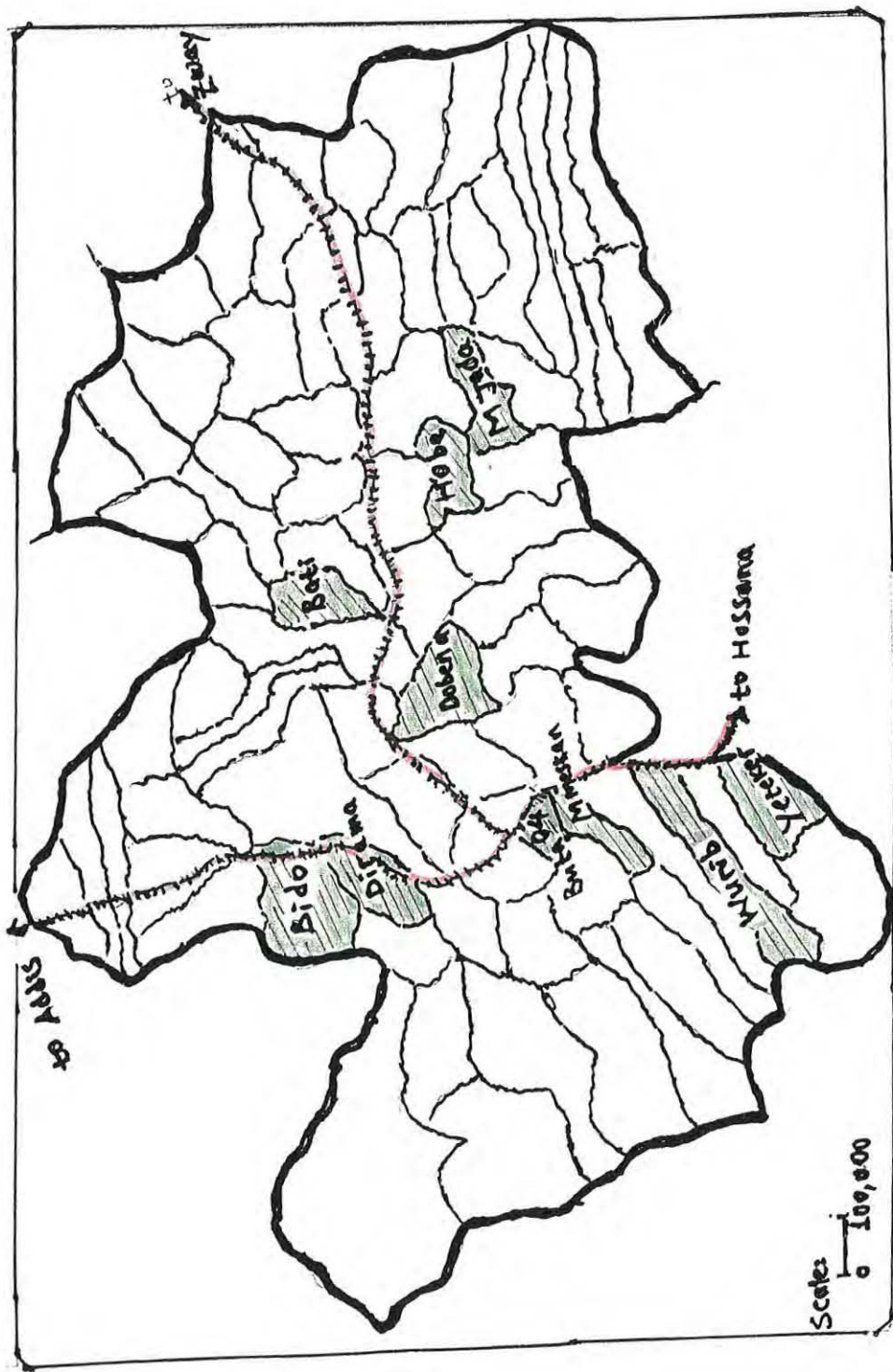
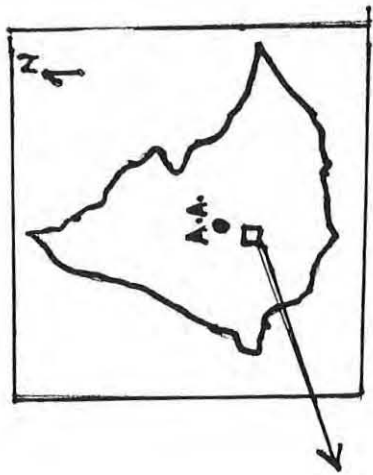
501- የተገረገለተ ርዳታ

1. ጠይቅ ኒት

2. ሥነር

3. ወይ ከፍተኛ ሀኪም

/ለፍጠራገፍለገ/



Legend:



Study Sites



All weather Roads



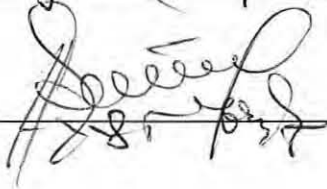
Kebele boundaries

Figure 8 Geographic map of Study Area (Butajira).

DECLARATION

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

Name : Dr. Ayana Yeneabat

Signature: 

Place : Addis Ababa, Ethiopia

Date of Submission : May, 1995