HACETTEPE UNIVERSITY, INSTITUTE OF POPULATION STUDIES

TECHNICAL DEMOGRAPHY PROGRAM

THE DETERMINANTS OF MALNUTRITION OF CHILDREN UNDER FIVE YEARS IN TURKEY

NÜKET ÜNSAL

M.A Thesis submitted for the partial
fulfillment of the requirements for the
M.A. degree
in Technical Demography at Hacettepe University
Institute of Population Studies

Ankara, July 2006

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Supervisor

Dr. A. Sinan TÜRKYILMAZ

Ankara, July 2006

This is to certify that we have read and examined this thesis and in our opinion it fulfils the requirements in the scope and quality of a thesis for the degree of Master of Arts in Economical and Social Demography.

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SUMMARY

Malnutrition is characterized by an imbalance and/or deficiency of nutrients in the body. Such imbalances are produced most commonly by the relative deficiency of protein, carbohydrates and fat, as sources of energy and micronutrients, minerals and vitamins. Malnutrition is a silent emergency. But the crisis is real and its persistence as profound and frightening implications for children, society and the future of humankind. Malnutrition is not, as many think, a simple matter of whether a child can satisfy her appetite. A child who eats enough to satisfy immediate hunger can still be malnourished. And malnutrition is not just a silent emergency, it is largely an invisible one as well. Children are at greatest risk for undernutrition.

Malnutrition affects child's performance, health and survival, including physical growth, morbidity, mortality, cognitive development, physical work capacity and risks for several children onset chronic diseases. Malnourished children are much more likely to die as a result of a common childhood disease than those who are adequately nourished.

The purpose of the study is to explore the determinants of malnutrition among children (under 5 years old) in respect to children-related, mother-related and environment-related variables. Further, the impact degree of the determinants of all forms of malnutrition among children under 5 years old (with reference to 2003 TDHS) is evaluated. The final aim is to discuss about important determinants and suggest possible solutions to the problem of malnutrition.

It has been established that the malnutrition prevalence in the shape of stunting is high (12.2 %). Underweighting, one of the other forms of malnutrition, had a prevalence of 3.9 % and wasting had a prevalence of 0.7 %. It as been recorded that all

three groups' prevalence displayed a decrease in comparison to recent years, wasting prevalence having a higher rate of decrease. Much as these rates are low, the discrepancy between urban and rural and among regions appear to be extremely high. Stunting prevalence differs both among urban rural settings and geographical regions. While stunting is 8.9% in the urban areas, it is 19.4 % in rural areas. Also stunting is found to be 23 % in the Eastern region (highest value) and 6 % in the Western region (lowest value).

In order to search the determinants of malnutrition, primarily descriptive analyses and chi-square analyses are performed. Later, the impact degrees of these determinants are studied by carrying out logistic regression. The main determinants of the three forms of malnutrition according to analyses performed are given below.

Main determinants for stunting are:

-Age of children, sex of children, duration of breastfeeding, birth weight, place of delivery, region, household members, wealth index sex of household head.

Main determinants for wasting are:

- Age of children, sex of children, duration of breastfeeding, place of delivery.

Main determinants for underweight are:

- Age of children, sex of children, birth order, duration of breastfeeding, birth weight, place of delivery, mother's age, mother's BMI, wealth index.

Key Words: Malnutrition, Children, Height for Age, Weight for Height, Weight for Age, Turkey

ÖZET

Malnütrisyon, besinlerin vücutta eksik ya da dengesiz bulunması ile kendini gösteren bir hastalıktır. Böyle dengesizlikler, çoğunlukla, vücutta protein, karbonhidrat, yağ, mineral ve vitaminlerin eksikliği ile kendini gösterirler. Malnütrisyon, çoğunlukla sessiz gelişen ama acil müdahale gerektiren bir hastalıktır. Ama çocuklar, toplum ve gelecek nesiller üzerinde kalıcı etkiler bırakırlar. Malnütrisyon, çoğunun düşündüğü gibi, bir çocuğun açlığını giderebilmesi kadar basit bir sorun değildir Yeterli beslenen bir çocuk da malnütrisyonun etkisinde olabilir. Çocuklar yetersiz beslenme açısından en büyük risk grubunu oluşturmaktadırlar.

Malnütrisyon, çocuğun, performansı, sağlığı, hayatta kalabilmesi, fiziksel gelişimi, ölüm riski, davranışsal gelişim, iş kapasitesi ve pek çok kronik hastalık sürecini de etkileyen bir olgudur. Malnütrisyonlu çocuklar, yeterli beslenen çocuklara gore, çok daha yüksek düzeyde, çocuk hastalıklarına yakalanarak ölmektedirler.

Bu çalışmanın amacı beş yaş altı çocuklarda görülen malnütrisyonun belirleyicilerini, çocuğa, anneye ve çevreye ilişkin değişkenler bazında incelemektir. Sonra, bu belirleyicilerin etki derecelerini malnutrisyonun her üç formu açısından değerlendirmektir. Son olarak da, önemli belirleyiciler hakkında tartışarak, bu problem konusunda olası çözüm önerileri sunmaktır.

Beş yaş altı çocuklarda bodurluk şeklindeki malnutrisyon prevalansının (yüzde 12.2) yüksek olduğu görülmüştür. Malnutrisyonun diğer formlarından biri olan düşükkiloluluk prevalansı yüzde 3.9, zayıflık prevalansı ise yüzde 0.7 şeklindedir. Her üç grubun prevalansında da son yıllara göre düşüş gerçekleştiği gözlenmekte olup, zayıflık prevalansında bu düşüş oranı daha yüksek orandadır. Her ne kadar bu oranlar düşük olsa da kır-kent ve bölgeler arası farklılıkların çok fazla olduğu gözlenmektedir.

Bodurluk prevalansı hem kır-kent yerleşim alanlarında hem de coğrafik bölgelerde değişiklikler göstermektedir. Kentte bodurluk oranı % 8.9 iken kırda bu oran %19.4'e çıkmaktadır. Ayrıca bodurluk görülme oranı Doğu bölgesinde %23 (en yüksek değer) iken Batı bölgesinde %6'lardadır (en düşük değer).

Malnutrisyonun belirleyicilerini araştırmak için tezde, öncelikle tanımlayıcı analizler ve ki kare analizi yapılmaktadır. Daha sonra logistik regresyon analizi yapılarak bu belirleyicilerin etki derecelerine bakılmaktadır. Yapılan analizler sonucunda elde edilen malnütrisyonun her üç formunun belirleyicileri aşağıda belirtilmiştir.

Bodurluğun başlıca belirleyicileri;

-Çocuğun yaşı, çocuğun cinsiyeti, anne sütü alım süresi, doğum ağırlığı, doğumun yapıldığı yer, bölge, hanehalkındaki kişi sayısı, refah indeksi, hanehalkı reisinin cinsiyeti.

Zayıflığın başlıca belirleyicileri;

-Çocuğun yaşı, çocuğun cinsiyeti, anne sütü alım süresi, ilk süt alım zamanı, doğumun yapıldığı yer.

Düşükkilololuluğun başlıca belirleyicileri;

-Çocuğun yaşı, çocuğun cinsiyeti, doğum sırası, anne sütü alım süresi, doğum ağırlığı, doğumun yapıldığı yer, annenin yaşı, annenin beden kitle indeksi, refah indeksi.

Anahtar kelimeler: Malnutrisyon, Çocuklar, Yaşa göre Boy, Boya göre Ağırlık, Yaşa göre Ağırlık, Türkiye.

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WHO	World Health Organization
UNICEF	United Nations Children's Fund
FAO	Food and Agriculture Organization
BMI	Body Mass Index
SPO	State Planning Organization
ACC/SCN	Administrative Committe on Coordination and Sub Committe on Nutrition
HUIPS	Hacettepe University Institute of Population Studies
TDHS	Turkey Demographic Health Survey
IFPRI	International Food Policy Research Institute

CHAPTER I

INTRODUCTION

Nutrition is a basic human need. Nutrition plays a major role in maintaining health and malnutrition appears to generate vulnerability to a wide variety of diseases and general ill health. But for a great number of children all over the world this basic need can not be met. This situation makes children unable to achieve their full genetic developmental potential.

Malnutrition is a silent and persistent emergency which has profound and frightening effects for children, so for the society in which they live and the future of the generations. Malnutrition is a silent but also largely an invisible emergency. Most of the children suffering from malnutrition betray no out ward signs of problems to an ordinal observer.

Undernutrition is also called protein energy malnutrition (PEM), which in fact may occur at any stage in life, beginning from intrauterine life. Most often, however, it is a symptom of developmental impairment that results from causes primarily operating during intrauterine life and the first three years (Martorell, 1999).

Malnutrition is ‘the syndrome that results from the interaction between poor diets and disease’. It leads to most of the anthropometric deficits observed among children in all countries developed or less developed countries. The children who are malnourished and remain malnourished are under the risk of morbidity and mortality. Malnutrition contributes to delays in motor and mental development and decreased work capacity. A large percentage of the world’s children grow and develop while experiencing malnutrition. Malnutrition is the principal cause of the

effects of infection and contributes to more than half of all deaths of children under five years old.

The immediate causes of malnutrition are poor diet and disease resulting from the food insecurity, inadequate maternal and child care and poor health services and environment. The basic causes are also social structures and institutions political systems.

Malnutrition is characterized by an imbalance and/or deficiency of nutrients in the body. Such imbalances are produced most commonly by the relative deficiency of protein, carbonhydrates and fat, as sources of energy and micronutrients, minerals and vitamins. These deficiencies are followed by pathophysiological changes that are first reflected in functional impairments and later by biochemical and physical damage. Malnutrition decreases physical growth, mental development, learning capacity and the productivity of an individual and the nation (Martorell, 1999).

The major reasons of malnutrition can be divided into three groups as below. In Turkey, like other developing countries, the reasons are similar.

a.Lack of food security at the household level

b.Lack of health care facilities and unhygienic environment and

c.Lack of caring practices including undesirable nutritional behavior (Awwal, 2005).

Food security exists when all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active healthy life. Food security for a household means access by all members at all times to enough food for an active healthy life. Food security includes at a minimum; the ready availability of nutritionally adequate and safe foods and an assured ability to acquire acceptable foods in socially acceptable ways (FAO, 2002).

Malnutrition usually occurs within groups of high risk individuals, such as young children recently weaned from the breast. Prevention schemes should target the high risk groups with practical, indigenous interventions. This cooperative effort among nutritionist, agriculturists, government agencies, social service organizations and the community should consider the type of food consumed the availability of such food and the social practices of food preparation and eating.

Many children suffer from multiple types of malnutrition, so numbers tend to overlap. But it is reliably estimated that globally 226 million children are stunted - shorter than they should be for their age, and shorter than could be accounted for by any genetic variation.

The assessment of children's nutritional status is essential to verify the state of health of the pediatric population and to monitor the improvement in the quality of life of the population at large. The nutritional assessment has decisive influence on the risks of morbidity and mortality, as well as over child growth and development. The inference about the general living conditions of the population stems from the multicausal origin of malnutrition and from the close relationship established between infant feeding and the level of commitment to basic requirements such as nutrition, sanitation, health care and education (Davis and Blake, 1998).

The problems of health and malnutrition are widely prevalent in all the developing countries of the world. Malnutrition has significantly increased the sufferings of the people of the developing countries. Even in 2005, about %35 of the global population have been suffering from malnutrition of various degrees, the vast majority of them are from the developing countries. The disease profile and malnutrition jointly contribute %18 of the total daily manpower loss of these

countries. Health and nutrition plays the key role in the development process of a country in particular and the world in general (Awwal, 2005).

Malnutrition causing a great deal of human suffering is a violation of a child's rights. People who survived a malnourished childhood are less physically and intellectually productive and suffer from more chronic illness and disability. The costs to society are enormous. So eradicating malnutrition remains a tremendous public policy challenge (Smith and Haddad, 2000).

Child malnutrition is not confined to the developing world. In some industrialized countries, widening income disparities, coupled with reductions in social protection, is provoking malnutrition for low income people so for their children. This has effects on the nutritional well-being of children.

The factors associated with height and weights are different in each country but include energy availability, health expenditure, immunization, female literacy and education, and access to safe water. Other previous studies proved relations between the prevalence of underweight and several national factors such as economic production, infant mortality rate, energy intake per capita, female education, governmental social support, child population, food sources of energy, distribution of income, access to safe water, female literacy rate and region (Edward, 1999).

Each type of malnutrition is the result of a complex interplay of factors involving such diverse elements as household access to food, child and maternal care, safe water and sanitation and access to basic health services (UNICEF, 1998).

The most important nutritional problem in the world is the Protein Energy Malnutrition (PEM); it is also the deficiency which, in general, supplementary

feeding is intended to correct. For this reason, age, weight and height are the three measurements should be chosen to evaluate the nutritional status of the vulnerable groups.

These three measurements are further combined to form three indicators of nutritional status:

- Height for age

-Weight for height

-Weight for age

The three indicators for monitoring the nutritional status are:

1. Stunting: Number of children whose height for age z-score is less than –2 standard deviations (SD) below the median on the NCHS/CDC/WHO international reference population (H-A).

2. Wasting: Number of children whose weight for height z-score is less than -2 standard deviations (SD) below the median on the NCHS/CDC/WHO international reference population (W-H).

3. Underweight: Number of children whose height for age z-score is less than -2 standard deviations (SD) below the median on the NCHS/CDCWHO international reference population (W-A).

These indicators are compared with those obtained from an international reference population. The recommended data for this purpose are those collected by the United States National Center for Health Statistics (WHO, 1983). Each of the three indicators –stunting, wasting and underweight- can be used to compare regional prevalence of child malnutrition.

Protein energy malnutrition is a major health problem in Turkey and it affects the growth and development of young children. Infant malnutrition appears to be a really public health problem and children at weaning age are more affected.

According to the Turkey Demographic Health Surveys, 8,3 percent of children under age 5 were underweight in 1998 and 3,9 percent in 2003 (TDHS-2003). Although the rate of malnutrition decreasing, regional and urban- rural differences still significance.

The TDHS-2003 report contains the anthropometric data collection of the children under five years old whose mothers were interviewed. This study covers 3668 weighted children under five years old. Also the TDHS-2003 report reflects the children's nutritional situation. However the phenomenon is multifaced. This study explained and discussed the determinants of malnutrition of children aged under 5.

The purpose of the study is to explore the determinants of malnutrition among children (under 5 years old) in respect to children-related, mother-related and environment-related variables. Further, the impact degree of the determinants of all forms of malnutrition among children under 5 years old (with reference to 2003 TDHS) is evaluated. The final aim is to discuss about important determinants and suggest possible solutions to the problem of malnutrition.

This study contains five chapters. Chapter One is the introduction of the study. Chapter Two is the literature review that gives the theoretical framework of the study and assesses current literature on the determinants of malnutrition of children under five years old. Chapter Three includes data sources and statistical techniques of analysis used in this thesis. Chapter Four contains results of descriptive analyses, the ratio of children affected by malnutrition and how these figures differ according to variables related to children, mother and environment. This chapter also contains the determinants of malnutrition, their impact degrees, and relations between these determinants. The results of multivariate analyses are given. Chapter Five is the Conclusion Part.

CHAPTER II

LITERATURE REVIEW

II.1. Theoretical Framework

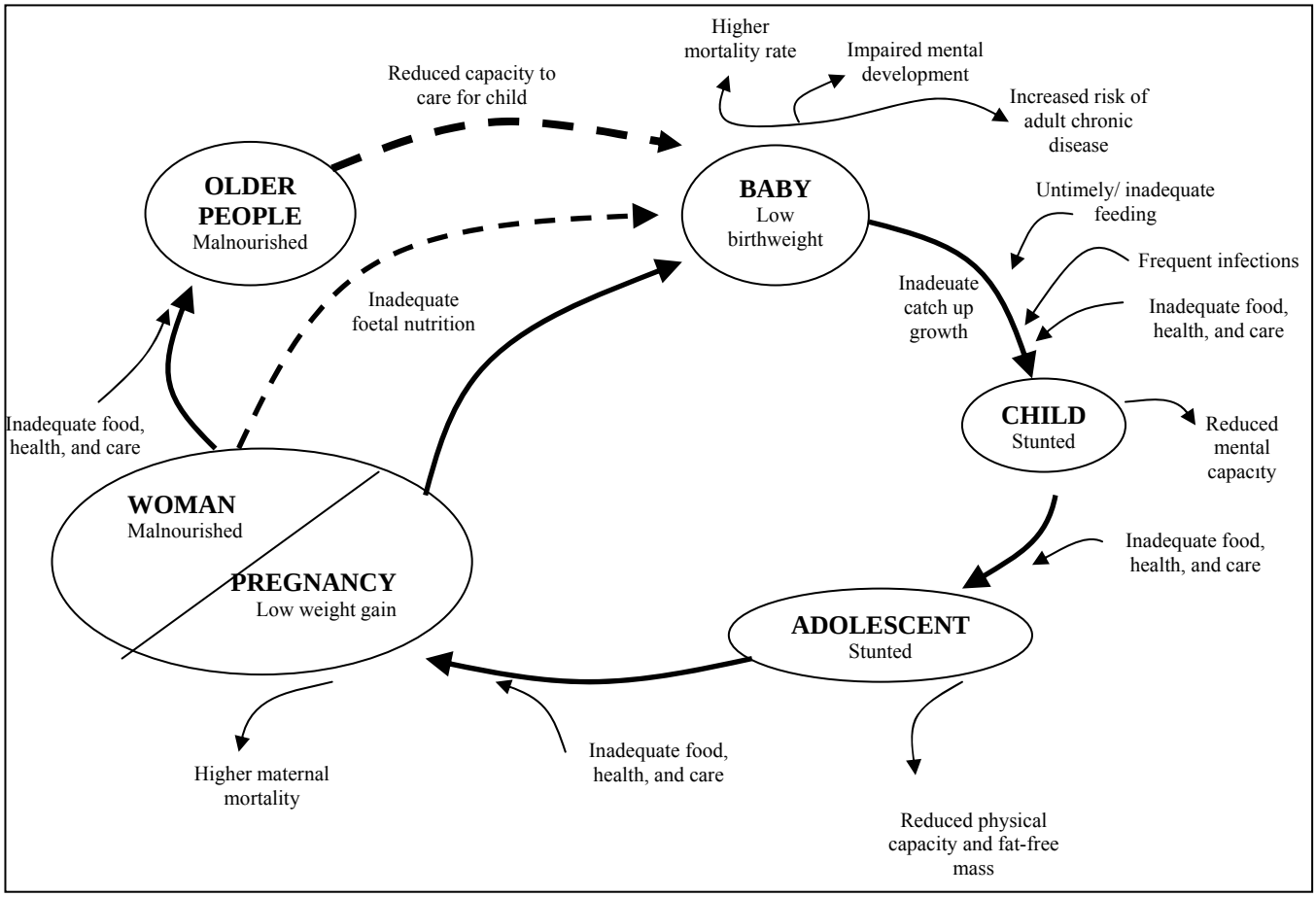
Health is a condition of physical, mental and social well being and implies the absence of disease. The state of people's health is the product of their genetic endowment, their age, nutrition, other aspects of lifestyle (such as physical activity and smoking habits) and many other aspects of their social environmental factors (such as housing conditions, sanitation and hygiene) and many other aspects of their social and cultural environment, such as stress, working conditions and family support (Pekcan, 2006).

Nutrition is recognized as one of the major health determinants. Poor nutrition makes an important contribution to the burden of disease. Increasing evidence indicates that risks of chronic disease begin in fetal life and extend to older ages. Chronic disease in adults thus reflects accumulated lifetime exposure to damaging physical and social environments, starting with the environment provided before birth. This approach would start with optimum maternal nutrition and proceed to optimum infant feeding patterns, such as breastfeeding exclusively for 6 months and timely introduction of safe and appropriate complementary foods (Pekcan, 2006).

Nutrition is very important for a child's development as the long term effects during early childhood, brain development, cognitive development and growth, development of the body, metabolisms, hormones and genes are on the rise. Problems of cognitive and psychological development can be identified in the areas of intellectual development, community lifestyle, immunity, major illnesses, working capacity and old age. Consequently, nutrition is not only the

measurement of calories, dieting and the gaining of weight. During childhood, the causes and resolutions of nutritional disorder arise as important issues (Semerci, 2006).

Figure II.1. Nutrition Throughout Life Cycle



Source: ACC/SCN and IFPRI, 4 th Report on The World Nutrition Situation, 2000.

Nutrition challenges continue throughout the life cycle, as depicted in Figure II.1. Poor nutrition often starts in utero and extends, particularly for girls and women, well into adolescence and adult life. It also spans generations. Undernutrition that occurs during childhood, adolescence, and pregnancy has an additive negative impact on the birth weight of infants. Low birthweight (LBW)

infants, who have suffered in trauterine growth retardation (IUGR) as foetuses, are born under nourished and are at a far higher risk of death in the neonatal period or later in fancy. If they survive, they are unlikely to significantly catch up on this lost growth later and are more likely to experience a variety of develop mental deficits. A LBW infant is thus more likely to be underweight or stunted in early ages.

The consequences of undernourished birth extend into adulthood. Epidemiologi cal evidences from both developing and industrialized countries now suggest a link be tween foe tal un dernutrition and increased risk of vari ous adult chronic diseases—the "foetal origins" of disease hypothesis.

Undernutrition can be found in every society and indeed in all parts of the world. Children are the greatest risk group. As seen in developing countries, undernutrition can be endemic and can affect up to half of the population (Manary and Solomons, 2004).

II.1.1. Definition of Malnutrition

Malnutrition is a silent emergency. But the crisis is real, and its persistence can have profound and frightening implications for children, society and indeed the future of humankind. Malnutrition is not, as widely conceived, a simple matter of whether a child can satisfy her appetite. A child who eats enough to satisfy immediate hunger can still be malnourished. Furthermore, malnutrition is not just a silent emergency, it is largely an invisible one as well. Three quarters of the children who die worldwide of causes related to malnutrition are what

nutritionists describe as mildly to moderately malnourished and show no explict signs to a casual observer (Edward and Frongillo, 1999).

Malnutrition is characterized by an imbalance and/or deficiency of nutrients in the body. Such imbalances are produced most commonly by the relative deficiency of protein, carbonhydrates and fat, as sources of energy and micronutrients, minerals and vitamins (Bulatao and Lee, 2001).

Who is undernourished and the causes undernutrition depend on how the term is defind. In its essence, it can be seen as an undernourishing process in which the normal needs for one or several nutrients are not being met, or the nutrients are being lost at a greater rate than they are being acquired (Manary and Solomon, 2004).

Although undernutrition is generally treated in the domain of deficiency of macronutrients (energy, protein), the same factors that compromise macronutrient status also interfere with adequate nutrition with respect to minerals and vitamins.

II.1.2. Causes of Malnutrition

An understanding of the complex and subtle causes of malnutrition is important to appreciate the scale and depth of the problem, the progress achieved until now further potential progresses. Malnutrition is obviously not a simple problem with a unique solution. Multiple and interrelated determinants are involved in its couases, and a similar intricate series of approaches, are required o deal with the problem.

II.1.2. 1. Immediate causes

Immediate causes of malnutrition are poor diet and disease. Poor diet and disease result from underlying causes of food insecurity, inadequate maternal and child care, poor health services and environmental pollution. Indeed The basic causes are social structures and institutions, political systems and ideologies, welfare distribution and potential resources. The factors associated with height, weight and weight adjusted for height were somewhat different among nations but included energy availability, health expenditure, immunization, female literacy and education, and access to safe water. Other previous studies demonstrated relations between the prevalence of underweight and several national factors such as economic production, infant mortality rate, energy intake per capita, female education, governmental social support, child population, food sources of energy, distribution of income, access to safe water, female literacy rate and region.

The interplay between the two most significant immediate causes of malnutrition - inadequate dietary intake and illness- tends to create a vicious circle: A malnourished child, whose resistance to illness is compromised, falls ill, and malnourishment worsens. Thus children who enter this malnutrition-infection cycle can quickly fall into a potentially fatal spiral.

Malnutrition lowers the body's ability to resist infection by undermining the functioning of the main immune-response mechanisms. This leads to longer, more severe and more frequent episodes of illness.

Infections cause loss of appetite, malabsorption and metabolic and behavioural changes. These, in turn, increase the body's requirements for nutrients, which further affects young children's eating patterns and how they are cared for.

II.1.2.2.Underlying Causes

Three clusters of underlying causes lead to inadequate dietary intake and in fectious disease: inadequte access to food in a household; insufficient health services and an unhealthful environment; and inadequate care for children and women.

Household food security is defined as “sustainable access to safe food of sufficient quality and quantity including energy, protein and micronutrients “ to ensure adequate intake and a healthy life for all members of the family

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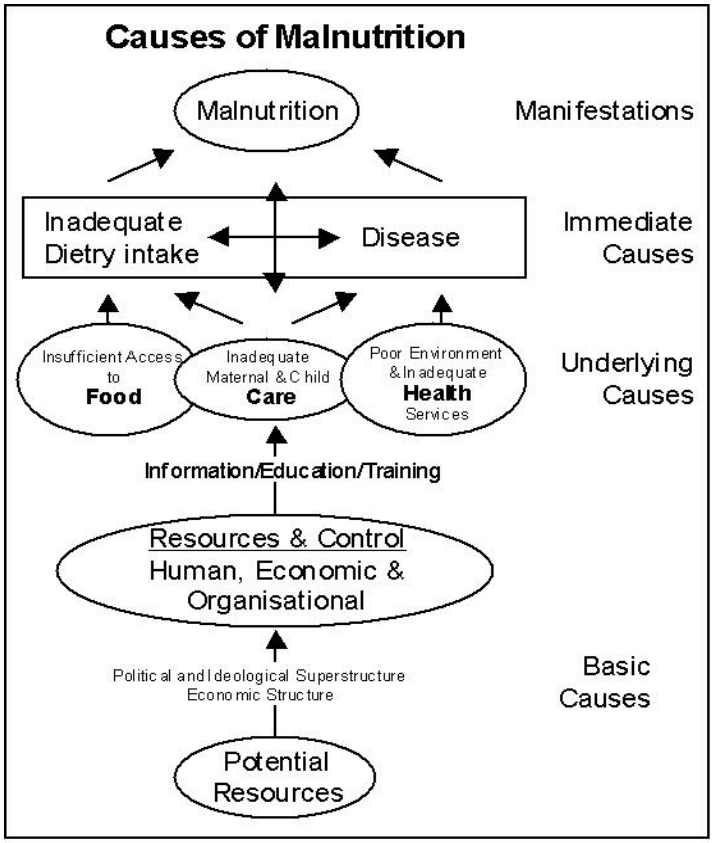
Figure II.2. Causes of Child Malnutrition



Source: ACC/SCN and IFPRI, 4 th Report on The World Nutrition Situation, 2000.

II.1.3. Clinical Malnutrition Syndromes

Child malnutrition is defined to be a pathological state resulting from inadequate nutrition, including undernutrition (protein energy malnutrition) due to insufficient intake of energy and other nutrients; deficiency diseases due to insufficient intake of one or more specific nutrients such as vitamins or minerals (Ali et al., 2005).

Protein-energy malnutrition (PEM) is by far the most lethal form of malnutrition. Children are the most visible victims. Malnutrition, “the silent emergency,” is seen in at least half of the 10.9 million child deaths each year. Indeed these young lives are prematurely and needlessly lost.

First recognized in the twentieth century, PEM’s full impact has been realized only in recent decades. Infants and young children are most susceptible to PEM’s characteristic growth impairment because of their high energy and protein needs and their vulnerability to infection (Edward and Frongillo, 1999).

In malnutrition, the deficiencies of nutrients are followed by pathophysiological changes that are first reflected in functional impairments and later by biochemical and physical damage. Severe, clinical malnutrition is known as “kwashiorkor or marasmus”.

Kwashiorkor usually affects children between 1 to 3 years of age. A child affected with kwashiorkor usually gives the impression of misery, is apathetic to external stimuli and is irritable. The child will show anthropometric indicators of growth failure, including low body weight, reduced length in relation to age, and some muscle wastings.

On the other hand, the clinical history of a child with marasmus will reveal a chronic and severe restriction of both energy and protein. This may be due to the factors outside of the control of the family, such as poverty or famine inadequate child-rearing practices, such as starvation prescribed as 'treatment' for diarrhoea, a separation of the child from his breastfeeding mother, overdilution of bottle feedings physical conditions that affect the child's growth and development, such as prematurity, mental defects, malabsorption syndromes or repeated and/or chronic infections, such as diarrhoea or tuberculosis. Marasmus usually presents at a younger age than kwashiorkor, often in a child under 1 year of age.

Malnutrition is not, as many think, a simple matter of whether a child can satisfy her appetite. A child who eats enough to satisfy immediate hunger can still be malnourished.

The four malnutrition problems that affect young children are protein-energy malnutrition, iron deficiency anemia, vitamin A deficiency, and iodine deficiency disorders (these are also given in 1998 Fifth National Nutrition Survey conducted by the Food and Nutrition Research Institute, Department of Science and Technology). The brief explanations of these terms follow:

- Protein -Energy Malnutrition (PEM) - A lack of energy and protein which results in growth retardation.
- Iron Deficiency Anemia (IDA) - A deficiency in iron wherein hemoglobin concentration is below the normal level which results in short attention span, reduced ability to learn and irritability.
- Vitamin A Deficiency (VAD) - Lack of vitamin A that may result to xeropthalmia (dryness of the eye), nightblindness (inability to see in dim light) eyes sensitive to bright light, rough dry skin and membranes of nose and throat, low body resistance to disease, poor growth, and blindness in severe cases.

- Iodine Deficiency Disorder (IDD) - Lack of iodine in the body which results in goiter, mental retardation, deaf-mutism, difficulty in standing or walking normally, and stunting of the limbs (Bulatao and Lee, 2001).

II.1.4. Child Development and Malnutrition

Growth assessment is the single measurement that best defines the health and nutritional status of children, because disturbances in health and nutrition, regardless of their etiology, invariably affect child growth. Health and nutrition problems during childhood are the result of a wide range of factors, most of which- particularly in underprivileged populations- relate to unsatisfactory food intake or severe and repeated infections, or a combination of the two. These conditions, in turn, are closely linked to the general standard of living and whether a population is able to meet its basic needs such as food, housing, and health care. Growth assessment thus serves as a means for evaluating the health and nutritional status of children, just as it also provides an indirect measurement of the quality of life of an entire population (De Onis et al., 1992).

It is now fully appreciated that early infant feeding may influence growth, development and the incidence of gastrointestinal, respiratory and allergic diseases in early childhood as well as metabolism and health in later childhood and adulthood (Barclay, 2006).

The period between weaning and the fifth year of life is the most vulnerable segment in life cycle. Rapid growth, loss of passive immunity and development of an immune system against infections neccessitate specific nutritional requirements

during this period and thus the nutritional status should be carefuuly monitored in this age range. That is why the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) regard the surveillance of children's nutritional status as extremely important, especially, in developing countries, highlighting the importance of early identification of children at nutritional risk or at risk for malnutrition and the implementation of measures that allow for the full recovery of children's nutritional and health status (Cogil, 2003).

Malnourished children, unlike the well-nourished, not only have lifetime disabilities and weakened immune systems, but they also lack the capacity for adequate learning capacities unlike the well-nourished ones (UNICEF, 1998). Globally, children who are poorly nourished suffer up to 160 days of illness each year. Malnutrition magnifies the effect of every disease (Canily, 1999).

Lacking mental as well as physical potential, malnourished children who live past childhood face diminished futures. They will become adults with lower physical and intellectual abilities, lower levels of productivity and higher levels of chronic illness and disability, often in societies with little economic capacity for even minimal therapeutic and rehabilitative measures (UNICEF, 1998).

Illness is frequently a consequence of malnutrition and malnutrition is also commonly the result of illness. Malaria, a major cause of child deaths in large parts of the world, also takes a major toll on child growth and development. In some parts of Africa, where malaria is common, about one third of child malnutrition is caused by malaria. The disease also has dangerous nutritional consequences for pregnant women. In addition, pregnant women are more susceptible to malaria, and children born to mothers with malaria run a greater chance of being born under weight and anaemic (UNICEF, 1998).

Pelletier and Frongillo stated that malnutrition affects human performance, health and survival, including physical growth, morbidity, mortality, cognitive development, reproduction, physical work capacity and risks for several adult onset chronic diseases. Their study results reveal that changes in weight for age have statistically significant effects on changes in child mortality, independent of socioeconomic and policy changes. The trend in mortality begins earlier and levels off at higher mortality rates in populations with a higher prevalance of malnutrition (Pelletier and Frongillo, 2003).

In young children, malnutrition dulls motivation and curiosity and reduces play and exploratory activities. These effects, in turn, impair mental and cognitive development by reducing the children's interaction with their environments, and with care-takers. (UNICEF, 1998).

The nature of the relationship between malnutrition and infection is indeed due to the fact that their interaction within the body is synergistic; that is, the effect of presence of both of them at once is greater than the sum of effects of malnutrition plus the effects of infection (Urvina, 2001).

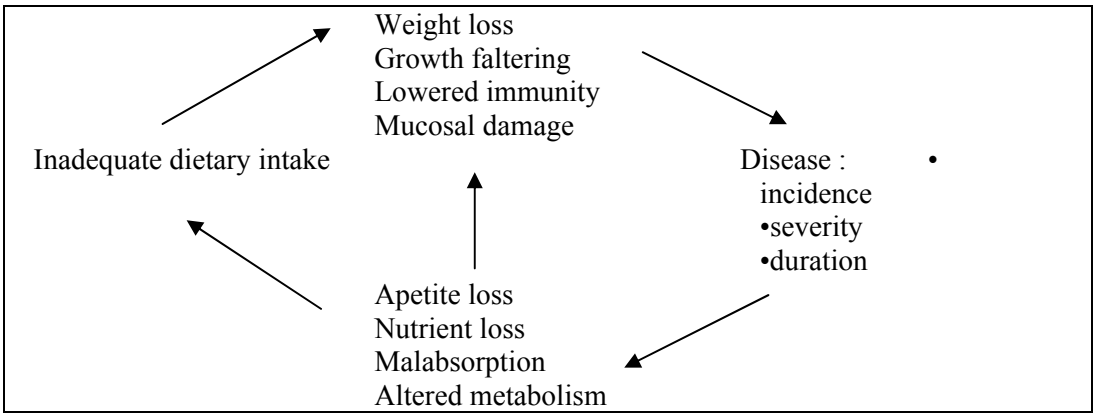
One of the most important adverse effects of malnutrition is that the body becomes unable to defend itself. People with kwashiorkhor are unable to produce antibodies after being given various vaccines, including typhoid and diphtheria. The formation of the white blood cells, essential in fighting infection, is reduced in severe PEM, and the ability of white blood cells to engulf and consume bacteria is decreased (Urvina , 2001).

II.1.5. Morbidity, Mortality And Malnutrition

Malnourished children are much more likely to die as a result of a common childhood disease than those who are adequately nourished. And research indicates a link between malnutrition in early life - including the period of foetal growth - and the development later in life of chronic conditions like coronary heart disease, diabetes and high blood pressure, giving the countries in which malnutrition is already a major problem new cause for concern (UNICEF, 1998).

The interrelationship between infection and body wasting is now well accepted. It has been clearly shown that the malnourished child is more susceptible to infection. Infection is one of the major factors contributing to the increased morbidity and mortality associated with protein-energy malnutrition. In 1973, Puffer and Serrano showed that nutritional deficiency was an associated cause in %61 of the deaths from infectious diseases as compared with only %33 of deaths from other causes. The major infectious diseases with the greatest morbidity and mortality were diarrhea and measles (Suskind et al., 2001).

Figure II.3. The Synergistic Cycle of Infection and Malnutrition



Source: Manary and Solomons, 2004.

Inadequate dietary intake and infection is a vicious cycle that accounts for much of the high morbidity and mortality in developing countries. When children don't eat enough, their immune system defences are lowered, resulting in greater incidence, severity and duration of disease. Disease speeds nutrient loss and suppresses appetite - so sick children tend not to eat as they should - and the cycle continues.

The interaction of infection and nutrition is an important paradigm for understanding the etiology of malnutrition. The interaction between infection and nutrition within an individual has been described as synergistic; during infection, nutrition status declines, and as nutritional status declines the individual is less resistant to infection. The immune response is less effective and less vigorous when the individual is undernourished. This synergism is illustrated in a diagram promoted by the United Nations Children's Fund (UNICEF) (Figure II.3).

Insufficient frequency or duration of breastfeeding is a risk factor for both macronutrient and micronutrient deficiencies in early life. Widespread infant undernutrition has been seen when urban mothers chose to use infant formula instead of breastfeeding. They could not afford to purchase enough formula to provide adequate energy intake for their infants, and undernutrition resulted.

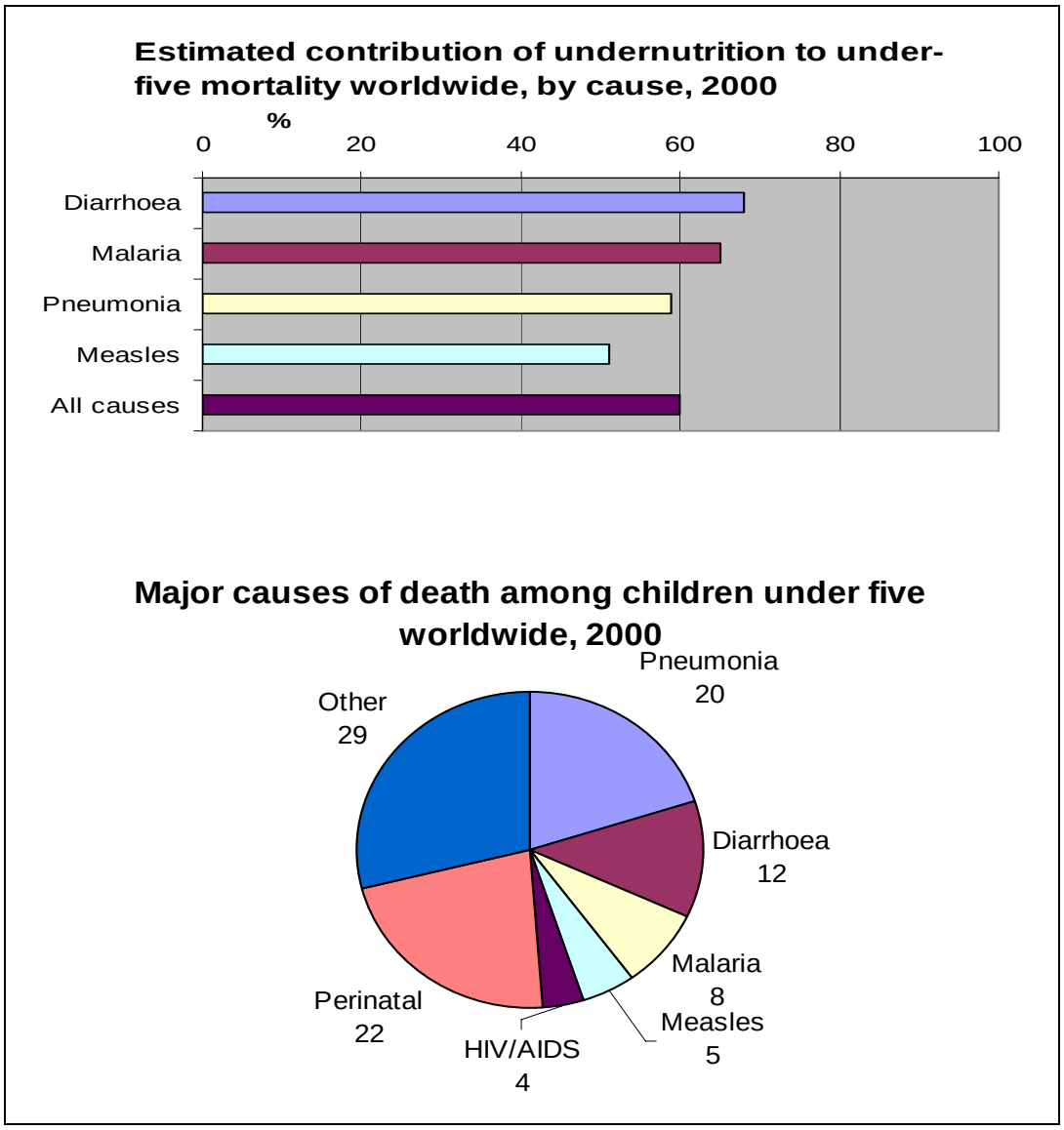
If a child is even mildly underweight, the mortality risk is increased. FAO estimates that malnutrition was associated with over half of all child deaths that occurred in developing countries in 2000 (Figure II.4).

Dr. Latham points out that deaths and diseases in developing countries primarily result from malnutrition. The so-called "big four" types are: "protein-

energy malnutrition (PEM)", with 500 million people affected and 10 million dying every year, "vitamin A deficiency", causing xerophthalmia and blindness, which affect 6 million people a year and kill 750,000, "endemic goiter", caused by iodine deficiency and affecting 150 million people a year and "nutritional anemia", affecting 350 million people a year (Urvina, 2001).

Over 8 million of the 13 million under-five deaths in the world each year can be put down to diarrhoea, pneumonia, malaria, and vaccine-preventable diseases. But this simple way of classifying hides the fact that death is not usually an event with one cause but a process with many causes. In particular, it is the conspiracy between malnutrition and infection which pulls many children into the downward spiral of poor growth and early death (Valh, 2004).

Figure II.4. Estimated Contribution of Undernutrition to under five Mortality Worldwide, by Cause, 2000



Source: FAO, The State of Food Insecurity in the World, 2002.

II.2. Literature Review

II.2.1. Malnutrition in the World

According to the Fifth Nutrition Situation of United Nations SCN Report, malnutrition is being reduced steadily in much of the world and that several

countries in Sub-Saharan Africa have been able to reduce malnutrition rates under difficult circumstances. However the decreasing rate of malnutrition in Sub-Saharan Africa is slowing and for Sub-Saharan Africa, at a regional level, nearly all the nutrition indicators are changing with a negative trend.

In most regions, nutrition rates are slowly improving, but in Eastern Africa, malnutrition rates and absolute numbers are increasing –from 22 million malnourished children under five in 2000, to a projected 24 million in 2005 (Bulatao and Lee, 2001).

A study in Guatemala found that some 67 million children are estimated to be wasted, which means they are below the weight they should be for their height - the result of reduced dietary intake, illness, or both (UNICEF, 1998).

About 183 million children weigh less than they should for their age. In one study, children who were severely underweight were found to be two to eight times more likely to die within the following year as children of normal weight for their age (UNICEF, 1998).

In most regions of the developing world, malnutrition rates have been falling over the last two decades, but at markedly different paces. The exception is sub-Saharan Africa, where malnutrition rates began increasing in most countries during the early 1990s, following the regional economic decline that began in the late 1980s. As government budgets shrank, basic social services and health services were dangerously affected. Per capita incomes also declined, affecting people's food purchasing power (UNICEF, 1998).

In United States, researchers estimate that over 13 million children - more than one in every four under 12 years of - have difficulty in getting the food they need, a problem that is often at its worst during the last week of the month when

families' social benefits or wages run out. Over 20 per cent of children in the United States live in poverty, more than double the rate of most other industrialized countries (UNICEF, 1998).

In United Kingdom, children and adults in poor families face health risks linked to diet, according to a recent study that cited high rates of anaemia in children and adults, and of premature and low-weight births, dental diseases, diabetes, obesity and hypertension (UNICEF, 1998).

Table II.1. Descriptive Statistics for National and Sub-National Longitudinal Data Sets, Africa

Variable	Sub-Saharan	Central/South America	Asia/North Africa	All Countries
National Data Sets				
Child mortality	18.6 (9.1)	4.6 (5.5)	6.5 (7.1)	8.6 (9.2)
Change in mortality	-2.1 (8.6)	-4.6 (6.1)	-5.2 (8.0)	-4.0 (7.7)
Under 5 mortality	163.0 (64.9)	64.1 (47.5)	83.2 (56.0)	95.5 (68.0)
Change in under 5 mortality	-18.7 (39.3)	-45.5 (43.3)	-37.6 (40.5)	-33.7(41.8)
Child underweight-malnutrition (pct<-2 Z scores)	27.8 (9.3)	10.7 (7.7)	33.0 (18.8)	22.4 (16.0)
Change in child malnutrition	1.2 (8.4)	-5.5 (4.7)	-7.2 (6.8)	-3.8 (7.7)
Sub-National Data Set				
Child mortality	21.9 (13.9)	6.4 (4.2)	7.2 (4.7)	15.1 (13.1)
Change in mortality	-3.0 (5.0)	-3.7 (3.0)	-2.8 (2.2)	-3.1 (3.9)
Under 5 mortality	163.8 (67.7)	80.6 (37.9)	96.9(37.9)	129.8 (67.7)
Change in under 5 mortality	-13.0 (21.8)	-29.7 (24.0)	-25.6 (12.5)	-20.0 (21.3)
Child malnutrition (pct<-2 Z sores)	27.7 (9.9)	15.4 (10.6)	19.4 (18.5)	22.8 (13.2)
Change in child malnutrition	+2.3 (5.5)	-2.3 (6.1)	-2.4(3.5)	-1.2(5.6)

Source: Pelletier and Frongillo, 2003.

In Table II.1., national and sub-national data on child mortality and nutrition interaction in Africa are given.

Table II.2. Percentage of Stunting, Wasting and Underweight of Children Under Five Selected DHS Countries, 1990-2004

	Year	Stunting %	Wasting %	Underweight %
Armenia	2000	13.0	2.0	2.6
Bangladesh	2004	54.6	17.7	56.3
Benin	2001	30.7	7.5	22.9
Bolivia	2003	26.4	1.2	7.4
Brazil	1996	10.5	2.3	5.7
Burkina Faso	2003	38.6	18.7	37.6
Cameroon	2004	31.7	5.1	18.5
Chana	2003	29.4	7.1	21.8
Colombia	2005	11.5	1.3	6.9
Chad	2004	40.9	13.5	36.7
Egypt	2000	18.7	2.5	4.0
Ethiopia	2000	51.2	10.7	47.1
Guatemala	1999	46.4	2.5	24.2
Haiti	2000	21.9	4.6	16.8
India	1999	45.5	15.5	47.0
Jordon	2002	13.2	2.5	7.4
Kenya	2003	30.6	5.6	19.8
Madagascar	2004	47.3	13.0	41.4
Malawi	2000	49.0	5.5	25.4
Mauritania	2001	34.5	12.8	31.8
Morocco	2004	18.2	9.3	10.2
Mozombique	2003	40.7	4.0	23.8
Namibia	2000	22.6	8.9	23.1

Table II.2. Percentage of Stunting, Wasting and Underweight of Children Under Five Selected DHS Countries, 1990-2004 (Continued)

	Year	Stunting %	Wasting %	Underweight %
Nepal	2001	50.5	9.7	48.4
Niger	1992	39.5	15.0	42.6
Nigeria	2003	38.5	9.3	28.7
Pakistan	1991	49.6	9.2	40.2
Paraguay	1990	13.3	0.3	3.7
Peru	2000	25.4	0.9	7.1
Rwanda	2000	42.4	6.8	24.5
Senegal	1993	24.7	8.4	22.2
Tanzania	2004	37.1	3.1	21.6
Turkey	2003	12.2	0.7	3.9
Uganda	2001	38.6	4.0	22.5
Yemen	1997	51.7	12.9	46.1
Zambia	2002	46.8	5.0	28.2
Zimbabwe	1999	26.5	6.4	13.0

Source: Demographic Health Surveys, 1990- 2004.

As shown in Table II.2., the worldwide distribution of protein-energy malnutrition, based on Demographic Health Surveys data gathered between 1990 and 2004 in developing countries in Africa, Asia, Latin America, and Oceania. The findings confirm that more than a third of the world's children are affected. For all the indicators (wasting, stunting, and underweight) the most favorable situation- low or moderate prevalences- occurs in Latin America; in Asia most countries have high or very high prevalences; and in Africa a combination; of both these circumstances is found. A total 80% of the children affected live in Asia (mainly in southern Asia) 15% in Africa, and 5% in Latin America. Approximately, 43% of children (230 million) in developing countries are stunted. Efforts to accelerate significantly economic development will be unsuccessful

until optimal child growth and development are ensured for the majority (UNICEF, 2006).

Table II.3. Estimated Prevalence of Stunting Children in the World 1995-2005

	1995	2000	2005
Africa	36.1	35.2	34.5
Eastern	44.4	44.4	44.4
Northern	24.4	21.7	19.1
Western	33.8	32.9	32.0
Asia	*35.4*	*30.1*	*25.7*
South Central	45.2	39.7	34.5
South-East	36.8	32.1	27.7
Latin America and the Caribbean	*15.9*	*13.7*	*11.8*
Caribbean	9.6	7.4	5.7
Central America	23.0	20.4	18.0
South America	13.3	11.3	9.6
All developing countries	*33.5*	*29.6*	*26.5*

Notes: Stunting is defined as low height-for-age at < –2 standard deviations of the median value of the NCHS/WHO international growth reference.
Source: ACC /SCN, 5 th Report on The World Nutrition Situation, 2004.

Table II.5. shows the distribution of developing countries according to the prevalence of underweight children (weight-for-age below -2 SD from the reference median value). Prevalences are grouped in four categories (less than 10%, 10-19%, 20-29%, and 30% and over), corresponding approximately to the quartile distribution observed in the 79 countries surveyed. These categories of underweight prevalences are referred to as (relatively) low, moderate, high, and very high.

Most developing countries in Latin America have low or moderate prevalences of underweight children, while most countries in Asia have high or very high prevalences. In Africa, however, both moderate and high prevalences are found, one of every three children is underweight, and in several countries of

the continent, the nutritional status of children is worsening given in Table II.5. Also, half of South Asia's children are malnourished.

Table II.4. Estimated Prevalence of Wasting Children in the World 1995-2005

	1995	2000	2005
Africa	7.7	8.3	9.5
Eastern	6.6	7.6	8.7
Northern	4.7	6.2	8.0
Western	10.5	10.3	10.2
Asia	*9.7*	*9.2*	*8.9*
South Central	14.7	14.0	13.3
South-East	9.2	8.9	8.7
Latin America and the Caribbean	*15.*	*1.6*	*1.5*
Caribbean	1.6	2.5	2.4
Central America	2.5	1.7	1.6
South America	1.4	1.4	1.4
All developing countries	*8.3*	*8.2*	*8.3*

Notes: Stunting is defined as low weight-for-height at < –2 standard deviations of the median value of the NCHS/WHO international growth reference.
Source: ACC /SCN, 5 th Report on The World Nutrition Situation, 2004.

Table II.5. Estimated Prevalence of Underweight Children in The World 1995-2005

	1995	2000	2005
Africa	*23.9*	*24.2*	*24.5*
Eastern	27.9	29.2	30.6
Northern	10.9	9.7	8.6
Western	27.5	27.1	26.8
Asia	*31.5*	*27.9*	*24.8*
South Central	45.2	40.8	36.5
South-East	31.2	27.4	23.9
Latin America and the Caribbean	*8.3*	*6.1*	*5.0*
Caribbean	7.3	6.1	4.7
Central America	7.8	9.2	7.9
South America	5.7	4.6	3.7
All developing countries	*27.3*	*24.8*	*22.7*

Notes: Underweight is defined as low weight-for-age at < –2 standard deviations of the median value of the NCHS/WHO international growth reference.
Source: ACC /SCN, 5 th Report on The World Nutrition Situation, 2004.

The most critically vulnerable groups are developing foetuses, children up to the age of three and women before and during pregnancy and while they are breastfeeding. Among children, malnutrition is especially prone to strike those who lack nutritionally adequate diets, are not protected from frequent illness and do not receive adequate care (UNICEF, 1998).

II.2. 2. Malnutrition in Turkey

The first goal of Millenium Development Goal is to eradicate the extreme poverty and hunger, the target 2 is to halve the proportion of people who suffer from hunger between 1990 and 2015. Two indicators are considered to monitor poverty in the study: the proportion of the population living less than one dollar a day, and the proportion of the population living below the food and non-food poverty line. Turkey is not in a precarious position with regard to these indicators. The proportion of the population subsisting on less than 1 dollar (PPP) per day was 1.1 % in 1994, 0.20 % in 2002 and 0.01 % in 2003. On the other hand, the proportion of food poverty was 1.35 % for 2002 and 1.29 % for 2003. This indicates that Turkey does not have a huge amount of extreme poverty; however, a considerable portion of the population is living close to the food and non-food poverty line (SPO, 2005).

In Millenium Development Goals Report, target 2 is; halve, the proportion of people who suffer from poverty and hunger, between 1990 and 2015. Under this target, one of the indicator is decrease of prevalance of underweight children under five years of age to 4.2 % till 2015 (SPO, 2005).

Reducing malnutrition is a cornerstone of poverty reduction. General malnutrition and specific micronutrient deficiencies contribute to infant, child and maternal morbidity; decreased learning capacity; lower productivity and higher mortality (Bulatao and Lee, 2001).

UNICEF is working with partners to achieve the 2010 goal of reducing malnutrition among children under five years old by at least one third, with special attention to children under two. In addition, the activities to address proper feeding also contributes to the 2010 goal of reducing child mortality by two-thirds (UNICEF, 2005).

The TDHS-93 provided data on dimensions of malnutrition for 3152 children aged under 5 years of age. For Tunçbilek, Ünalan and Coşkun, stunting was found to be the dominant form of malnutrition (21%) from TDHS-93. Altogether 10% of children were underweight and 3% were wasted. Among the most important conditioning factors were too early introduction of supplementary food, mother's educational level, mother' work area, person who takes care of children while mother is at work, birth rank of children, birth spacing, number of children in an individual family, family size and mother's welfare and hygiene indices (Tunçbilek, Çoşkun and Ünalan, 1996).

Decrease has been recorded in stunting, wasting and underweight status of the children. This indicates that there has been considerable improvement in child nutrition over the past decade. When results of TDHS-1993, TDHS-1998 and TDHS-2003 are compared, the child percentages below -2 SD have a decrease of 35 % in height for age index, one of 77 % in height for weight index and one of 59 % in weight for age. In the index values, the decrease in the child percentages below -2 SD, in comparison to 1993-1998 periods, is faster in 1998-2003 periods. While the weight for age index value only showed a decrease of 13 % in 1993-

1998, the decrease in 1998-2003 periods is around 58 % (Tezcan, Yavuz and Köse, 2005).

Table II.6. Nutritional Status in Children Under Five, TDHS 1993, 1998 and 2003

Nutritional Status	1993	1998	2003
Stunting	18.9	16.0	12.2
Wasting	3.0	1.9	0.7
Underweight	9.5	8.3	3.9

Source: Tezcan, Yavuz and Köse, 2005.

Table II.7. shows height for age (stunted) status of children less than 5 years of age by background characteristics, TDHS 1993, 1998 and 2003.

In the age groups of children, the decrease in the stunted child percentage occurred most in children younger than 6 months and those older than 36 months. Particularly, the stunted child percentage of children (older than 36 months) decreased by 50 % during 1993-2003 period.

When scrutinized in terms of children's sex, it appears that the decrease in stunted child percentage occurred at a higher rate among boys than girls. According to data from TDHS 1993, while the child percentage below -2 SD among boys and girls was almost the same, according to TDHS 2003 the discrepancy grew bigger. TDHS 2003 suggest that those below -2 SD among boys were 10.9 %, the rate was 13.6 % among girls.

Table II.7: Percentage of Stunting Children by Background Characteristics, TDHS 93, 98 and 2003

	TDHS 1993		TDHS 1998		TDHS 2003	
Background Characteristics	**Below -2SD**	**Nb of Child**	**Below -2SD**	**Nb of Child**	**Below -2SD**	**Nb of Child**
Child's age (in months)						
< 6 months	3,7	313	2	285	2,1	334
6-11 months	7,4	348	4,6	298	7,1	350
12-23 months	15,8	638	16,7	547	12,4	702
24-35 months	19,9	570	17,4	481	12,2	755
36-47 months	25,3	643	20,1	496	15,3	750
48-59 months	28,6	622	23,7	570	15,3	777
Child sex						
Male	19,1	1617	16	1415	10,9	1890
Female	18,7	1517	16	1261	13,6	1778
Birth order						
1	13	1020	13,5	929	7,2	1225
2-3	18,4	1316	14,2	1172	10,3	1614
4-5	24,3	407	17,5	329	21,1	468
6+	30,5	391	32,2	247	26,0	361
Birth interval						
First birth	13,1	1020	13,4	938	7,2	1239
Under 24 months	30	1316	24,9	426	21,0	1614
24-47 months	24,8	407	18,3	687	16,0	468
48+ months	10,1	391	11,3	625	8,9	361
Residence						
Urban	14,8	1892	12,6	1696	9,0	2414
Rural	25,2	1242	22	981	18,4	1254
Region						
West	10,2	852	9,9	763	5,5	1186
South	14,8	486	13,5	407	10,4	499
Central	18,8	703	11,6	643	9,5	727
North	12,9	303	12,8	211	13,0	218
East	33,3	790	30	652	22,5	1038
Mother's Education						
No education/ Prim.incom.	30,3	1115	31	710	25,3	975
First level primary/ İncom.second level	14,9	1583	11,8	1652	8,5	2169
Second level and higher	4,4	436	4	315	2,9	523
Total	18,9	3134	16	2677	12,2	3668

Source: Tezcan, Yavuz and Köse, 2005.

There is a direct relationship between a child's being stunted related to his age and his birth order. That is to say, the malnutrition percentage among children who are born later increases considerably compared to the percentage of those who were born earlier. In all three periods, every one child in three whose birth order is higher than 6 and every one child in a birth order of four and five are shorter than it should be according to their age. When results of TDHS-1993, TDHS-1998 and TDHS-2003 are compared, particularly the rate among children born first, second and third is 45 %, whereas the rate is 13-15% among those who were born later. The period passed between births is another important factor. The probability that children will be stunted is higher among the children who were born less frequently than two years in comparison to those who were born more than every two years.

It has been established that stunting among children living in cities has largely disappeared at a higher rate in the last ten years than those living in rural areas (a decrease of 39 % in urban areas, and 27% in rural areas).

As for the situation in the regions, there have been remarkable decreases in the stunting child percentages in the regions apart from the north. When all three TDHS data are examined, it appears that the stunting rate has not fallen below 13 % in the north. However; in the western and central Anatolia regions the stunted child rate decreased by 50 %.

When mother education is taken into account, the discrepancies in the stunted child percentages are worth considering. At TDHS 1993, 1998 and 2003, malnutrition seems not to pose a threat to children whose mothers' education was higher than secondary school or more. On the contrary, around one third of the children whose mothers did not have any education at TDHS 1993 and 1998, one

fourth at TDHS 2003 are shorter than their ages' average. When the change in mothers' education over the 10 years is considered, the greatest decrease in stunting child percentage occurred by 43 % in the children of mothers who had average level education. When the percentage of the stunted children whose mothers have the least education is compared to that of the mothers with the highest education level, at TDHS 1993 the discrepancy as big as 6.9 times grew to 7.7 times at TDHS 1998 and 8.7 times at TDHS 2003.

Table II.8. shows weight for height (wasted) status of children under 5 years of age by background characteristics, TDHS 1993, 1998 and 2003.

The wasting identified in children has decreased by 80 % over the last ten years, falling from 3% to 0.7 %. The wasting percentage among girls has been recorded to be less than that among boys in all three periods. In line with the birth order the decrease recorded in the wasted child percentage appears to occur among the children who were born the 6 th into a family and who were born at intervals longer than 24 months. In terms of urban or rural dwelling, no discrepancies have been recorded.

In regional terms, the highest wasted child rate was 5.9 % at TDHS 1993, 2.9 % at TDHS 1998 and 0.8 % at TDHS 2003 in Eastern Anatolia. It appears that the wasted child rate decreased by 86 %, reaching 0.8 %.

When mother education level is considered, the wasted child percentage fell at a higher rate among the children whose mothers had less education, whereas, the wasted child percentage was still high among the children whose mothers finished only primary school or had no education at all.

Table II.8. Percentage of Wasting Children by Background Characteristics, TDHS 93, 98 and 2003

	TDHS 1993		TDHS 1998		TDHS 2003	
Background Characteristics	**Below -2SD**	**Nb of Child**	**Below -2SD**	**Nb of Child**	**Below -2SD**	**Nb of Child**
Child's age (in months)						
< 6 months	1,9	313	2,1	285	1,2	334
6-11 months	2,9	348	3,7	298	0,9	350
12-23 months	5	638	2,9	547	0,7	702
24-35 months	3	570	1,4	481	1,1	755
36-47 months	2	643	1,4	496	0,3	750
48-59 months	2,4	622	0,7	570	0,2	777
Child sex						
Male	3,3	1617	2,1	1415	1	1890
Female	2,6	1517	1,7	1261	0,4	1778
Birth order						
1	2,1	1020	1,8	929	0,5	1225
2-3	2,1	1316	2	1172	0,7	1614
4-5	4,9	407	2,4	329	1,7	468
6+	6	391	1,2	247	0,4	361
Birth interval						
First birth	2,1	1020	1,9	938	0,5	1239
Under 24 months	3,2	1316	2,6	426	1,4	1614
24-47 months	4,1	407	1,6	687	0,7	468
48+ months	2,5	391	1,6	625	0,5	361
Residence						
Urban	2,9	1892	1,7	1696	0,7	2414
Rural	3	1242	2,3	981	0,8	1254
Region						
West	2,6	852	1,5	763	0,7	1186
South	1,4	486	2,2	407	0,4	499
Central	1,8	703	1,3	643	0,8	727
North	1,4	303	1,6	211	0,7	218
East	5,9	790	2,9	652	0,8	1038
Mother's Education						
No education/ Prim.incom.	4,5	1115	2,4	710	1	975
First level primary/ İncom.second level	2,3	1583	1,7	1652	0,6	2169
Second level and higher	1,5	436	1,8	315	0,6	523
Total	3	3134	1,9	2677	0,7	3668

Source: Tezcan, Yavuz and Köse, 2005.

Table II.9. shows weight for age (underweight) status of children under 5 years of age by background characteristics, TDHS 1993, 1998 and 2003.

The underweight rate for the under-five children was 9.5 % at TDHS 1993 and 8.3 % at TDHS 1998 whereas it was 3.9 % at TDHS 2003 which indicates that it has decreased by 60 % over the last 10 years.

If the underweight for age rate in the last ten years is examined, it will be seen that it increased at TDHS 1993 (0.7 %) and TDHS 2003 (0.9 %) in comparison to TDHS 1993 (0.7 %) in babies younger than 6 months.

In all three periods the underweight condition in children does not differ substantially in girls or boys. From TDHS 1993 until TDHS 2003, there has been a decrease of 66 % in male babies and 52 % in female ones.

As shown in Table II.9, in all three periods the ratio of underweight children in rural to those in urban has been recorded higher. In the change in the last ten years the percentage of the underweight children in cities has decreased at a higher rate than that of the children in the rural.

When the underweight rate for regions is considered, the underweight rate of the children in Eastern Anatolia is eminently higher than those living in other parts of the country. In terms of the decrease in the underweight percentage in the last 10 years, not much difference has been recorded.

Table II.9. Percentage of Underweight Children by Background Characteristics, TDHS 93, 98 and 2003

	TDHS 1993		TDHS 1998		TDHS 2003	
Background Characteristics	**Below -2SD**	**Nb of Child**	**Below -2SD**	**Nb of Child**	**Below -2SD**	**Nb of Child**
Child's age (in months)						
< 6 months	0,7	313	1,7	285	0,9	334
6-11 months	9,2	348	7	298	2,9	350
12-23 months	9,7	638	10,5	547	2,9	702
24-35 months	12	570	8,2	481	5,1	755
36-47 months	10,3	643	9,7	496	5,1	750
48-59 months	10,9	622	9	570	4,1	777
Child sex						
Male	9,3	1617	8,4	1415	3,2	1890
Female	9,8	1517	8,1	1261	4,7	1778
Birth order						
1	7,3	1020	7,5	929	2,1	1225
2-3	8	1316	7	1172	3,3	1614
4-5	13	407	10,2	329	8,2	468
6+	16,7	391	14,8	247	7,1	361
Birth interval						
First birth	7,3	1020	7,6	938	2,1	1239
Under 24 months	16,2	1316	12,3	426	7,0	1614
24-47 months	10,8	407	8,8	687	5,2	468
48+ months	5,5	391	5,9	625	2,8	361
Residence						
Urban	7,9	1892	6,2	1696	2,8	2414
Rural	12	1242	11,9	981	5,9	1254
Region						
West	4,8	852	3,8	763	1,9	1186
South	6,8	486	8,9	407	2,8	499
Central	7	703	5,4	643	2,9	727
North	6,4	303	4,8	211	2,2	218
East	19,7	790	17,1	652	7,7	1038
Mother's Education						
No education/ Prim.incom.	16,2	1115	17,2	710	8,3	975
First level primary/ İncom.second level	6,7	1583	5,6	1652	2,7	2169
Second level and higher	2,5	436	2,4	315	1,0	523
Total	9,5	3134	8,3	2677	3,9	3668

Source: Tezcan, Yavuz and Köse, 2005.

II.7. Determinants of Malnutrition

Şensoy et al. (1991) were carried out on 912 children in the 0-48 month age group and their parents in Çubuk. The aim was to determine the prevalence of malnutrition in the children and the factors affecting it. It was found that %11 of the children had malnutrition, 10% mild and 1% severe. Although severe malnutrition was seen among babies aged 0-12 months (1.4%), none was found in children older than 25 months. 5%of the boys and 17.2% of the girls were malnourished. Malnutrition was less common when the economic level of the family and the education of the parents was higher and when the interval between children was longer and the children were wanted by the family.

Açkurt and Wetherilt (1991) made a study to determine the effect of socioeconomic status on growth and development in Marmara, Central Anatolian and East Anatolian regions of Turkey. Socioeconomic conditions were found to be positively (as the socioeconomic status improve, nutritional indicators also improve) and significantly associated with all nutritional status indicators studied.

Garipağaoğlu and Günöz (1993) conducted a survey on 832 children aged between 3-6 years old who were in official and private kindergartens in the different socio-economical and cultural statues in Istanbul. Protein (99.5%) and energy (44.9%) intakes of children were adequate. However there were significant differences between the kindergartens according to the socioeconomic statues. The relative weight of children (wt/ht) was related to the energy intakes.

Sümer, Koçoğlu and Varol studied the stature of 5-7 years old children in Sivas Ulaş Health District with respect to their parents stature and their nutrition status during early childhood. 30.9% of the children were found stunted according to ‘height for age’ standards. 6.5% of the children were found below –2SD of the ‘weight for height’ standards. The stature of the parents of the stunted children was found shorter than the normals. The children who were exposed to

malnutrition either in weight or height during 0-2 years of age, were also found shorter than the children who did not experience malnutrition during those ages. These findings show that both genetic factors and nutrition affect the physical development of children. Since the mean height of mothers was rather short, existence of a chronic under nutrition problem in the district might be alleged (Sümer, Koçoğlu and Varol, 1994).

Mandıracıoğlu (1994) carried out a study on 197 children aged 0-24 months in Kızılay Health Centre, Bornova. Malnutrition grades of children have been established by various anthropometric measures. The general malnutrition rate has been found a to be 25% according to the Gomez classification. It has been shown that, malnutrition rate is statistically related with gender and the presence of living children aged 0-24 months.

Ricci and Becker indicate that the principle risk factors for stunting and wasting in infants below 6 months of age were either maternal behaviors or child biological characteristics under maternal control, eg, breastfeeding status and birth weight. After 6 months of age, household socioeconomic characteristics together with behavioral and biological variables emerged as important determinants of malnutrition, eg, father's education and presence of a television and/or radio. Household socioeconomic status influenced the risk of earlier stunting compared to that in urban areas (Ricci and Becker, 1996).

Bordon and Fernandez (1996) find out significant risk factors. They were: masculine sex, mother height being below 1.50 cm, intergenesic interval below 33 months referred to the immediate elder born, negligent mother, numerous family, crowded family, inadequate extreme disposition and having one undernourished brother or sister.

Jeyaseelan and Lakshman (1997) investigated impacts of hygiene, housing and socio-demographic variables on acute malnutrition in children aged 5-7, living in urban and rural areas. The logistic regression analysis showed that the older age, male sex, mother's poor education, lower family income, higher birth order of the child, use of dung or fire wood as fuel and defecation within the premises were significantly associated with malnutrition.

Nebigil et al. (1997) were carried out a survey in a low socioeconomic and high socioeconomic region of Ankara, to measure the weights and heights of school children. Both boys and girls from the high socioeconomic group had superior body measurements compared to those of the low socioeconomic group. The difference between the mean weight for age values of two groups was statistically significant, whereas no statistically significant difference was found on the basis height for age values among all age groups. They made a comparison both with National Centre for Health Statistics and World Health Organization (NCHS-WHO) standards and Turkish standards. Their results showed that the mean height and weight values of boys and girls were higher than the 50th centile height and weight values of NCHS-WHO standards.

Rikimaru et. al. (1998) found out that, severely malnourished children were more likely to have a young mothers and low weight at birth. The severely malnourished group showed the tendencies of less feeding frequency, less access to breastfeeding and less support by both parents. Moreover, the parents of the severely malnourished children had lower educational levels and lower income jobs, compared with those of the normal children Multivariable analysis resulted that, the weight-for-age, birth weight and mother's educational level were highly associated with one another. They conclude that, low birth weight is one of the important risk factors for the prevalence of underweight and severe malnutrition

and that the lack of a mother's education is also a risk factor for the prevalence of severe malnutrition in the urban Ghana.

In South Benin City, Aqueh et al. (1999) studied infant malnutrition and associated maternal factors. Mother's instruction level had a tendency to be associated positively and significantly with children z-score weight/height. Also the effect of socioeconomic level on children's nutritional status was significant.

Tharakan and Suchindran studied determinants of malnutrition based on data from a national cross-sectional study. There is 29.6% stunting, 14.9% underweight, and 7.1% wasting among children. The determinants of malnutrition cover biological, social, cultural, economic and morbidity factors: age, birth weight, breastfeeding duration, gender of family head, residence, house type, toilet facility, education of mother and father, child caretaker; intake levels of milk and dairy products, staple foods and cereals and beverages; and incidence of cough and diarrhea (Tharakan and Suchindran, 1999).

Ntab et al. (2001) made a study in Rural Senegal. The aim of the study was to test for associations of child feeding index with height-for-age and linear growth in African children. The feeding index was not associated with either height-for-age or with linear growth. Frequent fruit consumption was found to be positively associated with both, respectively, in adjusted, whereas food consumption from an animal source was not. In conclusion, the composite feeding index was independent of height and linear growth in these rural African children, due in part to reverse causality between breastfeeding duration and stunting.

Alvarado et al. (2002) conducted a longitudinal study among an Afro-Colombian population to investigate the influence of feeding practices and child morbidity on linear growth during infancy. Breastfeeding, defined as receiving breast milk at any time within a 2-3 month interval, was positively related to length gain, after adjusting for social conditions and food consumption. Among mothers with low levels of education, breastfeeding had a positive effect on weight gain; among non-breastfed infants, complementary food diversity generated a positive effect on weight. Their study confirms that breastfeeding after 6 months of life is important for nutrition and health, likely by mitigating the negative effects of poor social conditions and diarrhea on infant growth.

Boroah made analyses of determinants of risks of severe stunting and severe underweight. The importance of this study derives from the fact that the prevalence of under-nourishment in India is, even relative to other poor countries, shockingly high. The study focuses on the role of maternal literacy in reducing the risk of child malnourishment. It concludes that when the mother is literate, real benefits flow to children in terms of reduced risk; the same benefits, however, do not flow when the father, but not the mother, is literate. Literate mothers make more effective use of health-care institutions, like hospitals. Consequently, the benefits to children from expanding the supply of such institutions are greater when these institutions interact with mothers who are literate (Boroah, 2002).

Marins and Almeida, made a study for diagnosing the nutritional status and nutritional social economic determinants in children aged 0-59 months in the city of Niteroi, Rio de Janeiro State, Brazil. They found the stunting and underweight levels were found to be above those of the NCHS reference. Low birth weight prevalence in the city was 9% also above common levels in more developed countries. Undernutrition risks were, in general, higher for the younger age range. The variables family income, maternal schooling, water connection and birth weight could be characterized as important undernutrition risk factors, being most

noticeable the effects of family income and birth weight both for the ‘0-12 months’ and for the ‘above 13 months’ age ranges (Marins and Almeida, 2002).

Mendez and Adair investigated the relationship between stunting in the first 2 years of life and later cognitive development. The multivariate analysis show that, severe stunting at age 2 years remained significantly associated with later deficits in cognitive ability. The timing of stunting was also related to test performance (Mendez and Adair, 2003).

Chen, Chowdhury and Huffman found that, severely malnourished children, according to all indices, experienced substantially higher mortality risk. Normal, mild and moderately malnourished children all experienced the same risk. All indices were found to discriminate mortality risk (Chen, Chowdhury and Huffman, 2004).

Julian et al. investigate that, infectious diseases are the major causes of death and morbidity in underdeveloped countries, particularly in children. Increasing evidence suggests that malnutrition- both protein, energy and essential micronutrient type- is the underlying reason for increased susceptibility to infections. On the other hand, certain infectious diseases also cause malnutrition, which results in a vicious cycle (Julian et al., 2004).

In Van Province, Turkey, Aslan et al. conducted a study to determine the malnutrition status of children under five years of age. 3 % of the children were not breastfed. 80 % of babies younger than 6 months' of age had complementary food in the first three months after birth. The percentage of feeding with complementary food after 3 months was 20 %. Malnutrition status of the children

was assessed by the measurements of "height for age", "weight for height" and "weight for age". The prevalence of stunting was 23.4%. The prevalence of wasting was also measured and found to be 4.8 %. Finally, 9.4% of the children were accepted as underweight. The results of these three measurements were parallel to the ones calculated in 1998-Turkish Population and Health Survey for eastern parts and urban regions of the country. Further studies to promote nutritional status of the children are needed (Aslan et al., 2004).

In Kenya, Friedman et al. made a study to evaluate the relationship between malaria and PEM. The results of multivariate analysis are that, stunted children had more malaria parasitemia, high density parasitemia, clinical malaria and severe malaria (Friedman et al., 2005).

A study was carried out in Brazil to evaluate the association between low birth weight and nutritional status at the end of the first year of life. It is found that Low birth weight is an important risk factor of nutritional risk at the end of the first year of life. It is important to adopt strategies for its reduction and prevention. The results are, low birth weight and living in a household with no latrine were significantly associated with nutritional risk at the end of the first year of life. Children born weighing 1,500g to 2,499g had 29 times higher chances of being at nutritional risk at 12 months of life than those whose birth weights were above 3,500g. Children living in households without a flush toilet had three times the chance of nutritional risk at 12 months of life in relation to those that had a latrine with a septic tank at home (Motta et al., 2005).

In Bolivia, Shapiro et al. examined the impact of maternally reported pregnancy intention, differentiating unwanted and mistimed pregnancies, on the prevalence of early childhood stunting. Additionally, they examined the influence

of paternal pregnancy intention status. Approximately 29% of the maternally unwanted children were stunted as compared to 19% among intended and 19% among mistimed children. Infants with both parents reporting them as unwanted had an increased risk of being stunted as compared with children both of whose parents intended the pregnancy (Shapiro et al., 2005).

The determinants and specifically the relative contribution of prenatal and postnatal factors to growth and nutritional status of Indonesian infants were investigated by Schmidt et al. The multiple regression models explained %19-41 of the variation in infants' growth and nutritional status. Neonatal weight and length were the strongest positive predictors of weight-for-age and height-for-age Z –scores but not with length increase or height-for-age Z-scores. Intake of complementary foods was positively associated with increases in weight and length and nutritional status of infants. In conclusion, in this rural population in West Java, neonatal weight and especially length, reflecting the prenatal environment, are the most important predictors of infant nutritional status (Schmidt et al., 2005).

Meyers et al. examined the relationship between receiving housing subsidies and nutritional and health status among young children in low-income families, especially those that are food insecure. In a large convenience sentinel sample, the children of low-income renter families who receive public housing subsidies are less likely to have anthropometric indications of undernutrition than those of comparable families not receiving housing subsidies, especially if the family is not only low income but also food insecure (Meyers et al., 2005).

De Onis et al. describe the methodology developed by the World Health Organization (WHO) to derive global and regional trends of child stunting and

underweight, and reports trends in prevalence and numbers affected for 1990–2005. During 1990–2000 global stunting and underweight prevalences declined from 34% to 27% and 27% to 22%, respectively. Large declines were achieved in Eastern and South-eastern Asia, while South-central Asia continued to suffer very high levels of malnutrition. Substantial improvements were also made in Latin America and the Caribbean, whereas in Africa numbers of stunted and underweight children increased from 40 to 45, and 25 to 31 million, respectively (De Onis et al., 2005).

Ali et al. found the link between mothers' literacy and malnutrition among children under three years of age in rural area of district Malir, Karachi. Maximum malnutrition regarding stunting was seen in children whose mothers were illiterate and maximum underweight was seen in children whose mothers had education up to primary level and maximum wasting was seen in children whose mothers were graduates of some formal school (Ali et al., 2005).

CHAPTER III

METHODOLOGY

III.1. Data Sources

The data source of this study is the most recent demographic health survey, which is the 2003 Turkey Demographic and Health Survey (TDHS-2003).

The TDHS-2003 is the latest in a series of national-level population and health surveys that have been conducted by the Hacettepe University Institute of Population Studies (HUIPS), in the last four decades. The primary objective of the TDHS-2003 is to provide data on socio economic characteristics of households and women, fertility, mortality, marriage patterns, family planning, maternal and child health, nutritional status of women and children and reproductive health. The survey obtained detailed information on these issues from a sample of ever-married women in the reproductive ages (15-49). The TDHS-2003 was designed to produce information in the field of demography and health that to a large extent can not be obtained from other sources (HUIPS, 2004).

The TDHS-2003 was implemented by HUIPS, in collaboration with the General Directorate of Mother and Child Health and Family Planning of the Ministry of Health. The fieldwork of the TDHS-2003 was conducted between December 2003 and May 2004. The TDHS-2003 was supported for the first time as a project in the frame of the European Union 'Turkey Reproductive Health Program', implemented by the General Directorate of Mother and Child Health and Family Planning of the Ministry of Health two main types of questionnaires were used in the TDHS-2003: the Household Questionnaire and the Individual Questionnaire for ever married women of reproductive ages. The contents of the questionnaires were based on the International MEASURE/DHS+ survey project model questionnaires and on the questionnaires that had been employed in

previous Turkish population and health surveys. The sample design and the sample size of the TDHS-2003 make it possible to perform analyses for Turkey as a whole, for urban and rural areas and for the five demographic regions of the country (West, South, Central, North and East). The TDHS-2003 sample is of sufficiently size to allow for analysis on some of the survey topics at the level of the 12 geographical regions (NUTS 1) which were adopted at the second half of the year 2002 within the context of Turkey's move to join the European Union. In all, 13,049 households were selected for the TDHS-2003. 11,659 households were considered occupied and thus available for interview. Of the 11,659 occupied households, 93 percent (10,836 households) were successfully interviewed. In the interviewed 10,836 households, 8,447 women were identified as eligible for the individual interview, they were ever-married, in reproductive ages (15-49) and present in the household on the night before the interview. Interviews were successfully completed with 8,075 of these women (95.6 %). 4028 unweighted children's data, under five years of age are available for studying nutritional status but 8% of the children were not applied any measurement (Türkyılmaz, Hancıoğlu and Koç, 2004).

III.2. Anthropometric Evaluation and Monitoring Indicators

The monitoring of children's nutritional status is a fundamental tool for the evaluation of their health conditions and a unique opportunity for obtaining objective measures for the health assessment of a population. Especially in the first years of life, the evaluation of growth is considered to be a measure which best defines health and nutritional condition. Even small changes in nutritional and health status, either due to nutritional deficiencies or to recurrent infection, have clear impacts on child growth.

Changes in body dimensions reflect the overall health and welfare of

individuals and populations. Anthropometry is used to assess and predict performance, health and survival of individuals and reflect the economic and social well being of populations. Anthropometry is a widely used, inexpensive and non-invasive measure of the general nutritional status of an individual or a population group. Recent studies have demonstrated the applications of anthropometry to include the prediction of who will benefit from interventions, identifying social and economic inequity and evaluating responses to interventions. Due to its simplicity and low cost, anthropometric evaluations give, further, a simple and reliable estimation of undernutrition prevalence. Thus, anthropometry is an almost mandatory tool in any research on health and nutritional status is of great importance for the understanding of the social well being in a population (Marins and Almeida, 2002).

III.2.1. The Building Blocks of Anthropometry: Indices

The four building blocks or measures used to undertake anthropometric assessment are:

1. Age
2. Sex
3. Height
4. Weight

Each of these variables provides one piece of information about a person. When they are used together they can provide important information about a person's nutritional status. The actual measurement of age, weight and height of children requires specific equipment and techniques which are described later. When two of these variables are used together they are called an index. These indices are commonly used in assessing the nutritional status of children.

- Height for age
- Weight for height
- Weight for age

These three indexes can be used together or separately depending on the purpose of assessment.

A deficit in one of these often is regarded as evidence of malnutrition, but these indices alone do not establish the specific processes that lead a particular child or a group of children to be malnourished, but they often are used to represent the degree of general deprivation to which children are exposed (Cogill, 2003).

They are many other anthropometric measures including mid-upper arm circumference (MUAC), sitting height to standing height ratio (Cormic Index), and many skinfold measures (Cogill, 2003).

III.2.2. Indices About the Nutritional Status of Children

The advantages and disadvantages of the three indices and the information they can provide is summarized below:

III.2.2.1. Height for age (Stunting)

Deficits in height for age are referred to as stunting. Low height for age, stemming from a slowing in the growth of the fetus and the child and resulting in a failure to achieve expected height as compared to a healthy, well nourished child of the same age, is a sign of stunting (Edward and Frongillo, 1999). Stunting is an indicator of past growth failure. It is associated with a number of long term factors including chronic insufficient protein and energy intake, frequent infection, sustained inappropriate feeding practices and poverty. Data on prevalence of stunting in a community may be used in problem analysis in designing interventions. Information on stunting for individual children is useful clinically as an aid to diagnosis.

III.2.2.2. Weight for height (Wasting)

Wasting is the result of a weight falling significantly below the weight expected of a child of the same length or height. Wasting indicates current or acute malnutrition resulting from failure to gain weight or actual weight loss. Causes include inadequate food intake, incorrect feeding practices, disease and infection or more frequently, a combination of these factors. Wasting in individual children and population groups can change rapidly and slows marked seasonal patterns associated with changes in food availability or disease prevalence to which it is very sensitive. Because of its response to short term influences, wasting is not used to evaluate.

III.2.2.3. Weight for age (Underweight)

Underweight, based on weight for age, is a composite measure of stunting and wasting and is recommended as the indicator to assess changes in the magnitude of malnutrition over time. This index identifies the condition of being underweight, for a specific age. The advantage of this index is that it reflects both past (chronic) and/or present (acute) undernutrition.

III.2.2.4. Mid Upper Arm Circumference (MUAC)

Mid upper arm circumference is relatively easy to measure and a good predictor of immediate death risk. It is used for rapid screening of acute malnutrition from the 6-59 month age range (MUAC overestimates rates of malnutrition in the 6-12 month age group) (Cogill, 2003).

III.3. Weighing And Measuring Equipment

Equipment is required to do anthropometric assessment. The most

commonly used equipments are scales and measuring boards. Electronic weighing scales and locally adapted height measuring boards are recommended. In 2003 Turkish Demographic Health Survey, similar equipments were used.

III.4. Measurement Methods

Accurate anthropometric measurement is a skill requiring specific training. Standardizing methods helps ensure that the measurements will be correct and makes comparisons possible.

III.4.1. Age

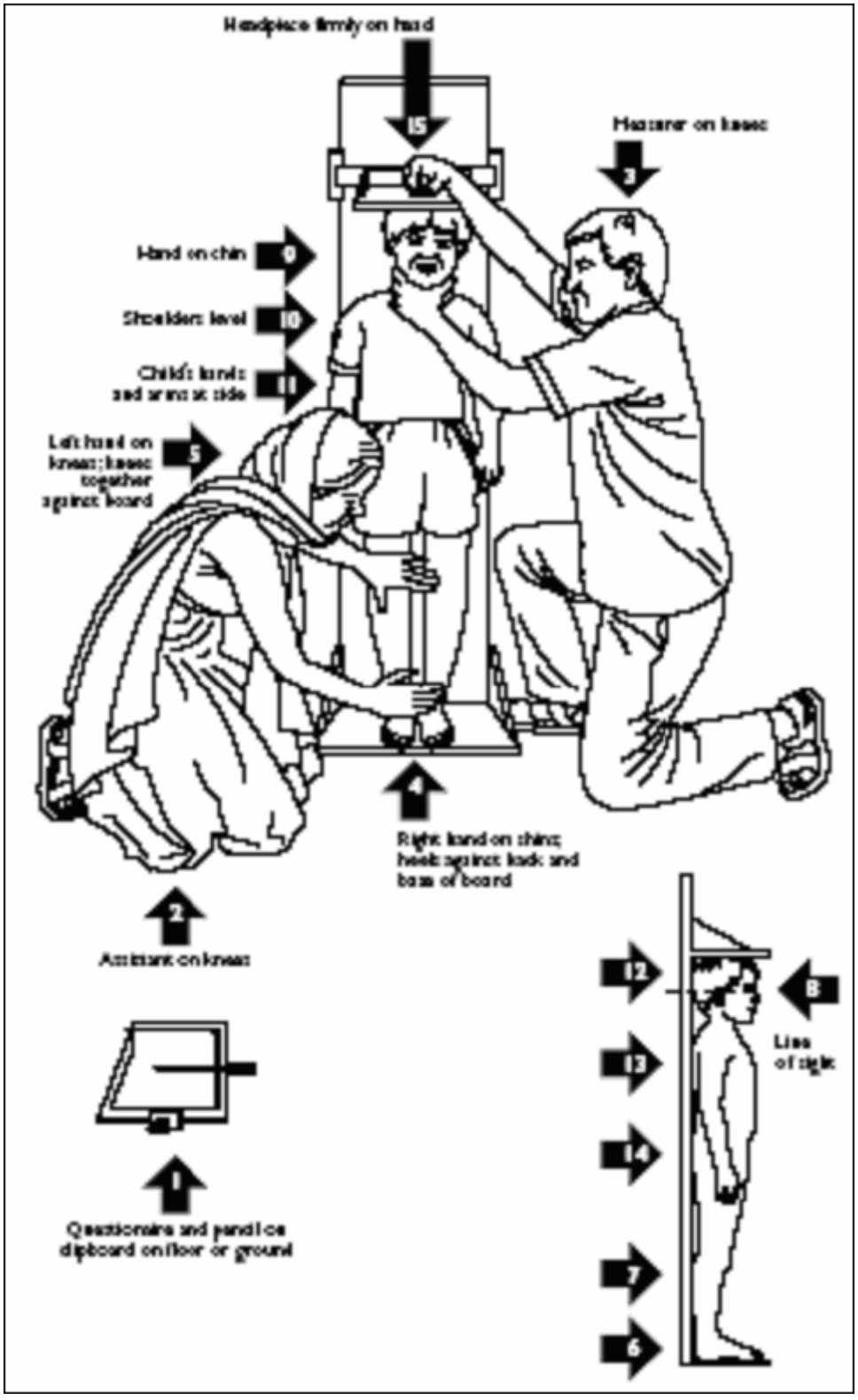
The child's accurate age is required, deciding on whether the child is measured standing or reclining for height, for converting height and weight into standard indices. Cross checking is necessary even if the mother knows the birth date or age of the child as errors in recall is common.

Where there is general registration of births and where ages are generally known, the recording of age is a straightforward procedure, with age measured to the nearest month or year as needed.

III.4.2. Height and Weight

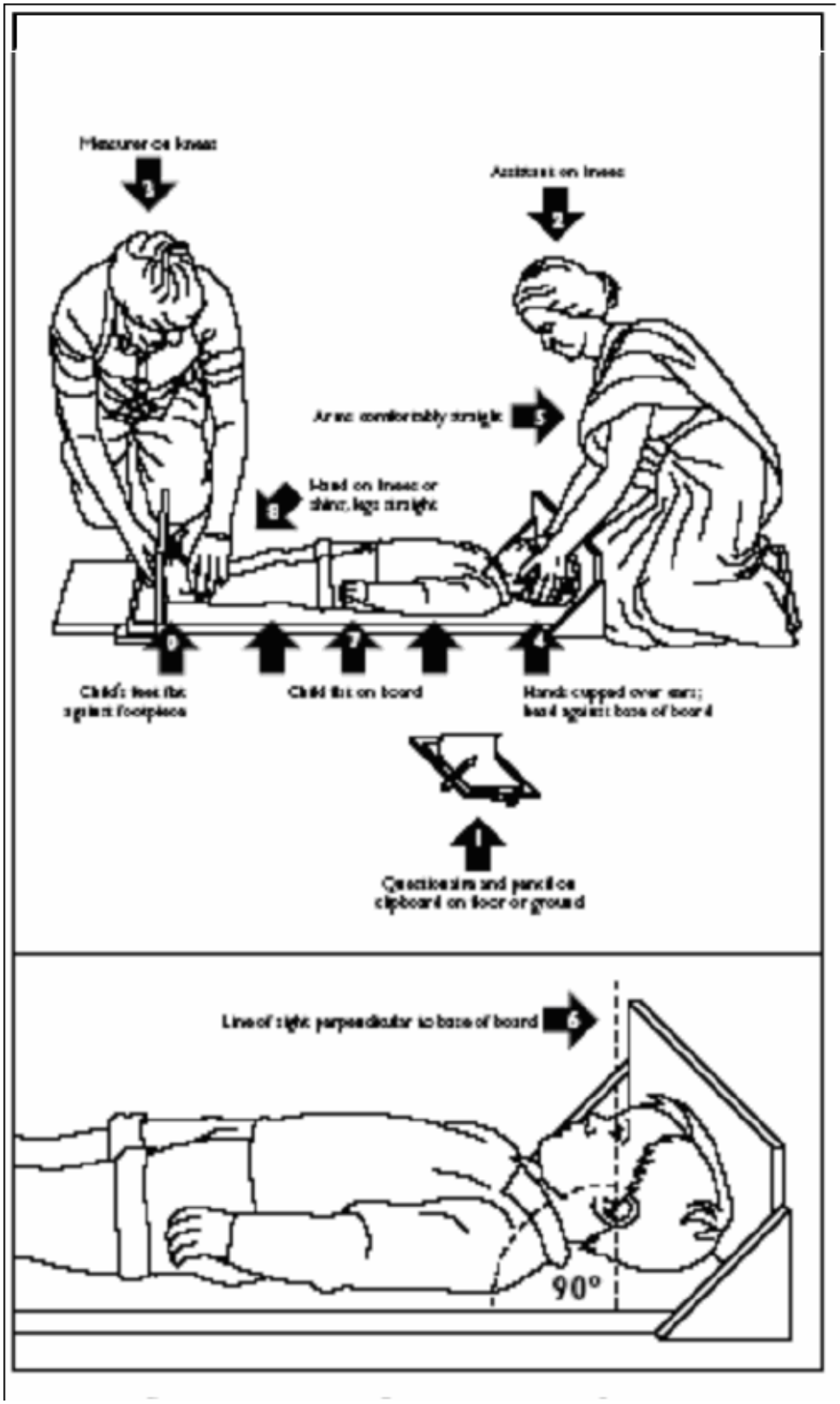
Height was measured in all children up to 2 years of age, whereas standing height was measured in children older than 2 years using wooden height measuring boards (Shorr Productions, USA) to the nearest 0.5 cm shown in figure III.1. and III.2. Measurements were done with the child in full extension, with feet bare and head positioned so that the child's gaze is directed at right angles to its body alignment. An electronic SECA scale was used for taking the body weight of children shown in figure III.3. Its accuracy was checked periodically with weights of known mass.

Figure III.1. Height for Children 24 Months and Older



Source: Cogill, 2003.

Figure III.2. Length for Children 24 Months and Younger



Source: Cogill, 2003.

Figure III.3. Child Weight Using UNICEF UNISCALE

Source: Cogill, 2003.

II.5. Comparison of Anthropometric Data to Reference Standards

Comparing the measurements of children to reference standards is an easy and important procedure.

III.5.1. NCHS/WHO Reference Standards

The reference standards most commonly used to standardize measurements

were developed by the US National Center for Health Statistics (NCHS) and are recommended for international use by the World Health Organization. The reference population chosen by NCHS was a statistically valid random population of healthy infants and children. Available evidence suggests that until the age of approximately 10 years, children from well nourished and healthy families throughout the world grow at approximately the same rate and attain the same height and weight as children from industrialized countries. The NCHS/WHO reference standards are available for children up to 18 years old but are most accurate when limited to use with children up to the age 10 years.

III.5.2. Comparisons to the Reference Standard

References are used to standardize a child's measurement by comparing the child's measurement with the median or average measure for children at the same age and sex.

Taking age and sex into consideration, differences in measurements can be expressed a number of ways:

- Standard deviation units, or Z scores
- Percentage of the median
- Percentiles

To standardize reporting, USAID recommends that Cooperating Sponsors calculate percentages of children below cut-offs as well as other statistics using Z scores. If Z scores cannot be used, percentage of the median should be used.

III.5.3. Standard Deviation Units or Z Scores

Z scores are more commonly used by the international nutrition community because they offer two major advantages. First, using Z scores allow us to identify a fixed point in the distributions of different indices and across different ages. For all indices for all ages, 2.28% of the reference populations lie below a cut off –2 Z

scores. The percent of the median does not have this characteristic. For example, because weight and height have different distributions (variances), -2 Z scores on the weight for age distribution is about 80% of the median, and –2 Z scores on the height for age distribution is about 90% of the median. Further, the proportion of the population identified by a particular percentage of the median varies at different ages on the same index.

The second major advantage of using Z scores is that useful summary statistics can be calculated from them. The approach allows the mean and standard deviation to be calculated for the Z scores for a group of children. The Z score application is considered the simplest way of describing the reference population and making comparisons to it.

The Z score or standard deviation (SD) is defined as the difference between the value for an individual and the median value of the reference population for the same age or height, divided by the standard deviation of the reference population. This can be written in equation form as:

$$Z \text{ score (or SD score)} = \frac{\text{(observed value)} - \text{(median reference value)}}{\text{Standart deviation of reference population}}$$

III.5.4. Percentage of the Median and Percentiles

The percentage of the median is defined as the ratio of a measured or observed value in the individual to the median value of the reference data for the same age or height for the specific sex, expressed as a percentage. This can be written in equation form as:

$$\text{Percent of median} = \frac{\text{(observed value)}}{\text{Median value of reference population x 100}}$$

The median is the value at exactly the mid-point between the largest and smallest.

The percentile is the rank position of an individual on a given reference distribution, stated in terms of what percentage of the group the individual equals or exceeds. The distribution of Z scores follows a normal distribution. The commonly used cut-offs of –3,-2, and –1 Z scores are, respectively, the 0.13th, 2.28th, and 15.8th percentiles. Anthropometric data (measurement of body size) have often been used as measures of children's nutritional physical state outcomes.

III.6. Methods of Analysis

Two statistical analyses used in this thesis are; descriptive and multivariate statistical analyses. If a child underwent malnutrition in a geographical area and if the family or the child, later, moved to the area where the research was made, the latter area is taken as the major source of malnutrition. Similarly, the children in the experiments are assumed to live in the same house as their mothers.

III.6.1. Survey Variables

Height-for-age, weight-for-height and weight-for-age indices were use to evaluate nutritional status of children. These indices are the survey variables and coded as bivariate variables while performing logistic regression as below.

Stunting is defined as 1 if the height for age is under -2 standard deviations of the median value of the NCHS/WHO international growth reference vice versa defined as 0.

Wasting is defined as 1 if the weight for height is under -2 standard deviations of the median value of the NCHS/WHO international growth reference vice versa defined as 0.

Underweight is defined as 1 if the weight for age is under -2 standard deviations of the median value of the NCHS/WHO international growth reference vice versa defined as 0.

III.6.2. Independent Variables

The independent variables used in descriptive and/or multivariate analyses are presented in the following respectively.

III.6.2.1. Independent Variables Related With Children

1. Age of children (in months)

Child's age is recoded from the 'Age in months' variable. 7 groups are for child's age (in months) constructed for this recoded variable as;

1. 0-5
2. 6-9
3. 10-11
4. 12-23
5. 24-35
6. 36-47
7. 48-59

2. Sex of children

The original variable ‘Sex of child’ is used without any recoding.

1. Male
2. Female

3. Birth Order

Birth order is recoded from the ‘Birth order’ variable. Birth order strongly associated with the planning status of birth. Group codes for birth order are;

1. 1
2. 2-3
3. 4-5
4. 6+

4. Duration of Breastfeeding

For optimal growth, it is recommended that infants should be exclusively breastfed for the six months of life. Breastfeeding in the early months of life is correlated strongly with increased child survival and reduced risk of morbidity, particularly from diarrhea diseases. Breastfeeding is recoded from the ‘Months of breastfeeding’ variable. Group codes for breastfeeding are;

0. Never breastfed
1. Less than 6 months
2. 6-11 months
3. 12-24 months
4. 24+ months

5. Wanting Status of Pregnancy

Wanting status of pregnancy **is** recoded from the ‘Time wanted pregnancy’ variable. This variable refers the time of the births that were wanted or not by the family. Group codes for wanting status of pregnancy are;

1. Then
2. Later
3. No more

6. Birth weight

Birth weight is the baby's weight at birth. It is recoded from the 'Birth weight (kilos - 3 dec.)' variable. Group codes for birth weight are;

1. Not weighed at birth
2. Don't Know
3. Less than 2500
4. 2500-3999
5. 4000+

7. Initial Breastfeeding

UNICEF and WHO recommend that children be exclusively breastfed initial breastfeeding immediately after birth and continue to be exclusively breastfed even if the regular breast milk has not yet come down. Early breastfeeding increases the chances of breastfeeding success and generally lengthens the duration of breastfeeding. Early initiation of breastfeeding also encourages bonding between the mother and newborn, and it helps to maintain the baby's body temperature. Initial breastfeeding is recoded from the 'When child put to breast' variable. Group codes for initial breastfeeding are;

1. Immediately
2. One day
3. After one day

Variables **8-16** shown below is recoded like this;

1. No

2. Yes

If the women gave supplementary feeding to children after first 3 days following birth, the category is yes and otherwise it is no.

8. Children were given milk other than breast milk for first 3 days

9. Children were given plain water for first 3 days

10. Children were given sugar/glucose water for first 3 days

11. Children were given sugar/salt/water solution for first 3 days

12. Children were given fruit juice first 3 days

13. Children were given infant formula first 3 days

14. Children were given tea/infusions first 3 days

15. Children were given honey first 3 days

16. Children were given juice of cooked meal first 3 days

17. Nipple (Drink From Bottle With Nipple)

The practice of feeding children with a bottle with a nipple at every age and receive some food this way. Bottle feeding practices may result in increased morbidity because of unsafe water and preparation facilities.

1. No
2. Yes

18. Vaccination

Vaccination is recoded from ‘Ever had vaccination’ variable. Group codes for vaccination are;

1. No
2. Yes

19. Antenatal care

Antenatal care from a medically trained provider is important to monitor the pregnancy and reduce the risks for the mother and child during pregnancy and at delivery. To be most effective, there should be regular antenatal care throughout pregnancy. Antenatal care can be more effective in avoiding adverse pregnancy outcomes when it is sought early in the pregnancy and continues through to delivery. Antenatal visit is recoded from the 'Antenatal visits for pregnancy' variable. If the mothers do not taken any care during the pregnancy is called none visits. Group codes for antenatal care are;

1. No visits (no care)
2. 1-60 visits

20. Iron supplementation

Iron supplementation is recoded from 'During pregnancy, given or bought iron tablets/syrup' variable. If the women are taken iron supplementation during pregnancy is called yes otherwise no.

1. No
2. Yes

21. Vitamin supplementation

Vitamin supplementation is recoded from 'During antenatal care, given vitamins' variable. If the women are taken vitamin supplementation during pregnancy is called yes otherwise no.

1. No
2. Yes

22. Folic acid supplementation

Folic acid supplementation is recoded from 'During antenatal care, given folic acid' variable. If the women are taken folic supplementation during pregnancy the category is Yes and otherwise it is No.

1. No
2. Yes

23. Has Fever

The original variable ‘Has fever’ is used without any recoding.

1. No
2. Yes

24. Place of Delivery

The place of the birth occurrence is important both for mothers and children. Hygienic conditions during delivery and proper medical attention reduce the health risks to mothers and children. Group codes for place of delivery are;

1. Home
2. Health center
3. Other

25. Has Health Card

The original variable ‘Has card’ is used without any recoding.

1. No
2. Yes

III.6.2.2. Independent Variables Related With Mother

26. Mother’s Educational Status

Mother’s education is recoded from the ‘Educational categories’ variable. 4 categories are constructed for this variable as;

- Uneducated consists of the category ‘no education and incomplete primary’
- First level primary consists of the category ‘Complete primary and

incomplete secondary'

- Second level primary consists of the category 'Complete secondary and high school'

1. No education/Primary incomplete
2. First level primary
3. Second level secondary and higher

27. Mother's Age

The original variable 'Age 5 year groups' is used without any recoding.

1. 15-19
2. 20-24
3. 25-29
4. 30-34
5. 35-39
6. 40-44
7. 45-49

28. Mother's Smoking Status

Cigarette smoking is harmful to human health. Its use adversely affects women's health status and may affect children's health. During pregnancy its use increases the risk of having a small or low birth weight baby may increase the susceptibility to acute respiratory illnesses among children. Mother's smoking status is recoded from the variable of 'Ever smoked' variable. Group codes for mother's smoking status are;

1. Never smoke/tried once or twice
2. Smoke rarely
3. Smoke regularly
4. Smoked in the past

29. Mother Tongue

Mother tongue variable is recoded from 'Mother tongue of women' variable.

1. Turkish
2. Kurdish
3. Other

30. Mother's Body Mass Index

Mother's body mass index is recoded from the variable 'Body mass index for respondent'. Body mass index is used to measure thinness or obesity. It is defined as weight in kilograms divided by height in meters squared (kg/m²). A cutoff point of 18.5 is used to define thinness or undernutrition. A BMI of 25 or above usually indicates overweight and 30 or above indicates obesity.

1. Less than18,5 (Thin)
2. 18,5-24,9 (Normal)
3. 25-29,9 (Overweight)
4. 30+ (Obese)

31. Mother's Employment Status

Mother's employment status of mother is computed from the "Worked in last 12 months" and "Employment all year/seasonal" variable.

1. Not employed
2. All year
3. Seasonal

32. Children under 5

Children under 5 variable is recoded from the 'Number of children 5 and under' variable. This variable shows the number of the children aged under 5 of mother. Group codes for children under 5 are;

1. 0
2. 1
3. 2
4. 3+

III.6.2.3. Independent Variables Related With Environment

33. Type of Place of Residence

The original variable ‘Type of place of residence’ is used without any recoding.

1. Urban
2. Rural

34. Region

The original variable ‘Region’ is used without any recoding.

1. West
2. South
3. Central
4. North
5. East

35. Region 12

The original variable ‘Region 12’ is used without any recoding.

1. İstanbul
2. West Marmara
3. Aegean
4. East Marmara
5. West Anatolia
6. Mediterranean
7. Central Anatolia
8. West Black Sea
9. East Black Sea
10. Northeast Anatolia
11. Central East Anatolia
12. Southeast Anatolia

36. Household Members

Number of household members is recoded from the 'Number of household members' variable. This variable shows the size of the family if it is large or small. Group codes for number of household members

1. 1-3
2. 4
3. 5
4. 6
5. 7+

37. Wealth Index

The original variable 'Wealth index' is used without any recoding.

1. Poorest
2. Poorer
3. Middle
4. Richer
5. Richest

38. Water Safety

Safe water is recoded from the 'Source of drinking water' variable. The source of drinking water is the characteristics of that affect the health status of the household members particularly of children. It is an important determinant potentially fatal diarrhea disease, such as typhoid, cholera and dysentery. Households with no access to clean drinking water are categorized as unsafe water and the others are titled as safe water.

1. Unsafe water
2. Safe water

39. Sanitation

Sanitation is recoded from "Type of toilet" variable. The lack of availability

of sanitary facilities posses a serious health problem. Households with flush toilet are categorized as sanitary and with open/close pit are categorized as non-sanitary.

1. No (Non-sanitary)
2. Yes (Sanitary)

40. Sex of Household Head

Sex of household head is recoded from "Sex of household head" variable. Group codes for sex of household head are;

1. Male
2. Female

III.6.3. Descriptive Analysis

The descriptive procedure displays univariate summary statistics for several variables. Cross tables and row percentage tabulation are used in making the preliminary analysis of the associations between malnutrition and the children, mother, environment related variables by using Statistical Package for Social Sciences (SPSS).

In this thesis, also chi-square tables are used to give the levels of significance between three indices of malnutrition and the other variables. For the significance, the p values are evaluated. If the value is less than 0.05 then the value is marked with * or if the value is less than 0.01 then the value is marked with **.

III.6.4. Regression Diagnosis

Assessing the influence of outliers and assessing the collinearity is essentially diagnostic tools. In analyzing data, it is important to be familiar with their basic characteristics. Such familiarity helps avoid many errors. For example

it is essential to know the following:

1. The type of subject or experimental unit
2. The procedure for data collecting
3. The unit of measurement for each variable
4. A plausible range of values and a typical value for each variable

Because of these reasons as mentioned above, the outlier detection was performed for all variables and these cases were cleared from the data. During the recode of the variables, the outlier type of data is called as missing.

There are certain features of a regression analysis that can result in numerical problems that in turn yield inaccurate estimates of regression coefficients, variability and P values. These problems can be grouped into one of two types: collinearity and scaling. Collinearity involves the relationship of the independent variables to one another (Kleinbaum, 1998).

Collinearity is a problem that arises when independent variables are correlated with one another. Collinearity involves the relationship of the independent variables (predictors) to one another. Perfect collinearity means that at least one independent variable is a perfect linear combination of the others. When perfect colinearity exists, it is impossible to obtain a unique estimate of the regression coefficients; any of an infinite number of possible combinations of linear or logistic regression coefficients will work equally well (Menard, 1995).

The collinearity table of the variables is given in Appendix A.

III.6.5. Logistic Regression

The statistical method that is appropriate for the design of multivariate statistical analyses is logistic regression since we consider three indices as binary

variables. There are three dichotomous survey variables. These are categorized as;

For the first survey variable, the children are categorized as;

1- The children who are stunting at the time of the survey are coded with 1

2- The children who are not stunting at the time of the survey are coded with 0.

For the second survey variable, the children were categorized as;

1- The children who are wasting at the time of the survey are coded with 1

2- The children who are not wasting at the time of the survey are coded with 0.

For the third survey variable, the children were categorized as;

1- The children who are underweight at the time of the survey are coded with 1

2- The children who are not underweight at the time of the survey are coded with 0.

The independent variables were categorized under three main levels as; children related variables, mother related variables and environment related variables. So, there were three stages of estimation. In the first model only children related variables were introduced into logistic regression. The second model included also the mother related variables as well as children related variables. Finally, with the introduction of the contextual level variables, the third model combined all the three level of variables.

Survey variables are binary. They have 0/1 values. Besides the dichotomous survey variables, also majority of the independent variables included in the model are categorical. Because of their binary nature, the logistic regression is used for the analyses.

Logistic analysis is a statistical tool for evaluating the relationship of one or more determinant variables X1, X2.....Xk to a single, continuous dependent variable Y. It is most often used when the determinant variables cannot be controlled, as when they are collected in a sample survey. Nevertheless, it is equally applicable to more controlled experimental situations (Kleinbaum, 1998).

Logistic regression procedure is based on the direct estimation of the probability of an event occurring. In logistic regression, the parameters of the model are estimated by using the maximum likelihood method. That is, the coefficients that make the observed results most likely are selected, since the logistic regression model is non linear. Logistic regression is used to determine whether other measurements are related to the presence of some characteristic-for example, whether certain blood measures are predictive of having a disease.

Logistic regression is useful for situations in which you want to be able to predict the presence or absence of a characteristic or outcome based on values of a set of predictor variables. It is similar to a linear regression model but is suited to models where the dependent variable is dichotomous. Logistic regression coefficients can be used to estimate odds ratios for each of the determinant variables in the model. Logistic regression is applicable to a broader range of research situations than discriminant analysis (SPSS Regression Models 11.0, 2001).

Logistic regression is relatively free of restrictions and with the capacity to analyze mixture of all types of predictors (continuous, discrete and dichotomous) the variety and complexity of data sets that can be analyzed is almost unlimited. The outcome variable does have to be discrete but a continuous variable can be converted to a discrete but a continuous variable can be converted to a discrete one there is special reason for it (Tabachnick and Fidell, 1996).

In multiple linear regression, the interpretation of regression coefficients is straightforward. It shows the amount of change in the survey variable for a one unit change in the determinant variable. To understand the interpretation of the logistic coefficients, we need to consider a rearrangement of the equation in logistic model.

The logistic regression procedure has several selection methods. The "enter" option was used in this study. The underlying reason for this to see the relation of all independent variables within the model either it is significant or insignificant.

CHAPTER IV

FINDINGS

Two statistical analyses used in this thesis are; descriptive and multivariate statistical analyses.

IV.1. Descriptive Analyses

In descriptive analysis cross tables and row percentage tabulation are used in making the preliminary analysis of the associations between malnutrition and the children, mother, environment related variables also chi-square tables are used to give the levels of significance between three form of malnutrition and the other variables.

IV.1.1. Children Related Variables of Stunting

Table IV.1. shows the percentage of children under five years classified as malnourished according to height for age index varies with the selected child's characteristics.

The overall frequency of malnutrition (stunting) by height or age criteria is found to be 12.2 %. Age is one of the most important factors and plays a crucial role in stunting form of malnutrition. The percentage distribution of children by age group is illustrated in Table IV.1. As could be seen in the table, while children in 36-59 months age group have the highest proportion (15.4 %), children in 0-5 months age group have the lowest occurrence proportion.

Table IV.1. The Percentage Distribution of Stunting According Variables Related With Children

Variables	Categories	Stunting %	n	Chi-square	p
Age of Children (in months)				55.301	0.000*
	0-5	2,1	334		
	6-11	7,1	350		
	12-23	12,4	702		
	24-35	12,2	755		
	36-47	15,3	751		
	48-59	15,3	776		
Sex of Children				6.249	0.012*
	Male	10,9	1890		
	Female	13,6	1778		
Birth Order				133.930	0.000*
	1	7,2	1225		
	2-3	10,3	1613		
	4-5	21,1	468		
	6+	26,0	362		
Duration of Breastfeeding				44.530	0.000*
	Never breastfed	7,5	67		
	Less than 6 months	8,9	1422		
	6-12	13,8	903		
	12-24	13,4	1102		
	24+	25,0	164		
Wanting Status of Pregnancy				27.702	0.000*
	Then	10,6	2447		
	Later	11,8	466		
	No more	17,7	755		
Birth weight				249.930	0.000*
	Not weighed at birth	25,3	910		
	Don't Know	19,3	150		
	Less than 2500	16,4	391		
	2500-3999	5,9	1876		
	4000+	4,1	341		
Initial Breastfeeding				36.807	0.000*
	Immediately	9,8	1946		
	One day	13,2	1076		
	After one day	19,2	556		
Children were given milk other than breast milk for first 3 days				2.100	0.147
	No	12,1	3406		
	Yes	15,6	192		
Children were given plain water for first 3 days				0.041	0.840
	No	12,3	3444		
	Yes	11,8	153		

Table IV.1. The Percentage Distribution of Stunting According Variables Related With Children (Continued)

Variables	Categories	Stunting %	n	Chi-square	p
Children were given sugar/glucose water for first 3 days				28.928	0.000*
	No	10,8	2823		
	Yes	17,9	775		
Children were given sugar/salt/water solution for first 3 days				0.140	0.708
	No	12,3	3596		
	Yes	0,0	1		
Children were given fruit juice first 3 days				1.123	0.289
	No	12,3	3590		
	Yes	0,0	8		
Children were given infant formula first 3 days				4.833	0.028*
	No	12,7	3166		
	Yes	9,0	432		
Children were given tea/infusions first 3 days				2.889	0.089
	No	12,2	3582		
	Yes	26,7	15		
Children were given honey for 3 days				0.445	0.505
	No	12,3	3583		
	Yes	6,7	15		
Children were given juice of cooked meal for 3 days				0.140	0.708
	No	12,3	3596		
	Yes	0,0	1		
Nipple				28.757	0.000*
	No	14,3	2379		
	Yes	8,3	1284		
Vaccination				0.322	0.570
	No	17,2	174		
	Yes	15,6	2133		
Antenatal care				172.041	0.000*
	No care	25,3	839		
	1-60 visits	8,3	2794		
Iron Supplementation				148.200	0.000*
	No	20,2	1447		
	Yes	6,8	2215		
Vitamin Supplementation				110.073	0.000*
	No	19,4	1390		
	Yes	7,7	2274		

Table IV.1. The Percentage Distribution of Stunting According Variables Related With Children (Continued)

Variables	Categories	Stunting %	n	Chi-square	p
Folic acid Supplementation				27.609	0.000*
	No	13,4	2971		
	Yes	6,1	671		
Total		12,2	3668		

Being stunted shows a little difference by child's sex. The rate of being stunted among male children is 10.9 % and it is 13.6 % for female ones. Birth order is an important factor affecting the height for age index in the survey. Increasing birth order is associated with an increase in the percentage of stunting. Breastfeeding is a major determinant on children growing. While stunting is observed as 7.5 % among the children who are not breastfed, it is 25 % among the children who are breastfed more than 24 months.

Wanting status of pregnancy is also an important variable on stunting. The proportion of being stunted among the unwanted children is 17.7 % whereas it is 10.6 % among wanted children. Birth weight is a good indicator of child's being stunting. The rate of being stunted among children who have not been weighed during birth is 25.3 %, it is 16.4 % among the children who are below 2500 grams, and 4.1 % among the children who are above 4000 grams. Initial breastfeeding is a very important variable on stunting. The rate of being stunted is observed among the children who have taken initial breastfeeding immediately as 9.8 % whereas it is found as 19.2 % among the children who have taken it after a day.

The rate of stunting among children who have been given milk instead of breast milk in the first three days is 15.6 %, it is observed as 12.1 % among the ones to whom milk has not been given instead of breast milk. The rate of stunting 12.3 % among children who have not been given plain water in first three days, on

the contrary, it is 11.8 % among the ones who have been given. The rate of stunting is 17.9 % among children who have been given sugar/glucose by contrast it is 10.8 % among the ones who have not been given sugar/glucose. Stunting among children who have been given sugar / salt / water in the first three days of infancy is observed as 12.39 %, while it is observed as 0.0 % among children who have not been given sugar / salt / water.

Stunting is observed as 12.3 % among children who have been given fruit juice in first three days, however it is observed as 0 % among the ones who have not been given fruit juice in this period. While stunting is observed as 12.7 % among children who have not been given infant formula in first three days, it is observed as 9 % among the ones who have been given infant formula in this period. Stunting among children who have been given tea infusions in first three days is observed as 26.7 % and it is observed as 12.2 % among the ones who have not been given tea infusions. Stunting among children who have not been given honey in first three days is observed as 6.7 % and it is observed as 12.3 % among the ones who have been given honey. Rate of stunting among children who have not been given juice of cooked meal in the first three days of the infancy is observed as 12.3 % while it is 0.0 % among the ones who have been given juice of cooked meal.

The stunting rate of children who do not drink milk with nipple is observed as 14.3 %, this rate is 8.3 % among the children who drink milk with nipple. The rate of stunting among the children who have never been vaccinated is 17.2 % and it is 15.6 % among the children who have been vaccinated. The rate of stunting among the children of the mothers who have not taken antenatal care is 25.3 %, it is 8.3 % among the children of the mothers who have taken antenatal care.

The rate of stunting among the children of mothers who have not taken iron is 20.2 %, while it is only 6.8 % among the children whose mothers have taken

iron. Also the usage of vitamins is effecting the prevalence of stunting. While 7.7 % of children of mothers who have taken vitamins have stunted, this rate increases to 19.4 % for children whose mothers have not taken vitamins. A similar relation exists for the usage of folic acid in that the rate of stunting among the children of mothers who have not taken folic acid is 13.4 %; while it is only 9.9 % among the children of mothers who have taken folic acid.

IV.1.2. Mother Related Variables of Stunting

Table IV.2. shows the percentage of children under five years classified as malnourished according to height for the age index varies with the selected mother's characteristics.

There are striking differences in the percentage of children classified as stunted according to mother's educational status. Stunting is not a problem among children of mothers with high school or higher educational level (2.9 %). In contrast, one third of children whose mothers lack formal education are classified as stunted (25.3 %) (Figure IV.1.).

Figure IV.1. Percentage of Stunting Children Under 5 by Mother's Educational Level

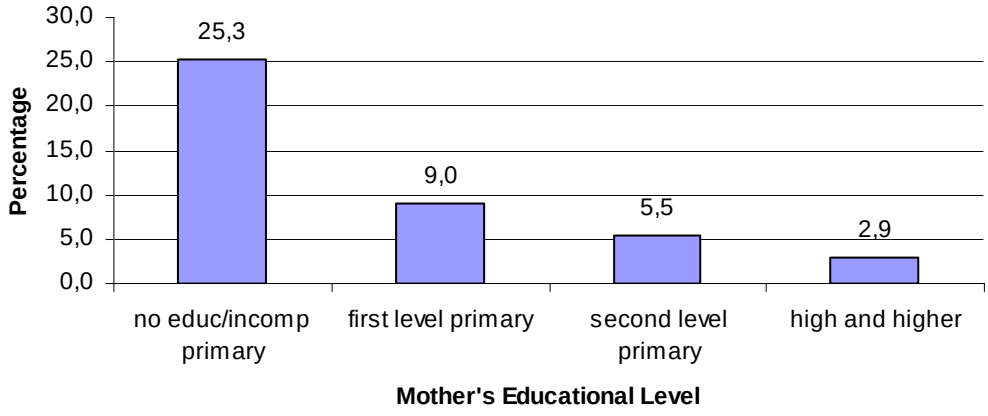


Table IV.2. The Percentage Distribution of Stunting According to Variables Related With Mother

Variables	Categories	Stunting %	n	Chi-square	p
Mother's Educational Status				229.701	0.000*
	No educ/incomp primary	25,3	975		
	First level primary	9,0	1895		
	Second level primary	5,5	274		
	High and higher	2,9	523		
Mother's Age				22.789	0.001*
	15-19	11,1	126		
	20-24	11,1	924		
	25-29	11,1	1247		
	30-34	11,8	845		
	35-39	15,8	374		
	40-44	23,6	127		
	45-49	14,8	27		
Mother's Smoking Status				12.907	0.005*
	Never smoke/tried once or twice	13,4	2478		
	Rarely smoke	9,9	345		
	Regularly smoke	10,9	587		
	Smoked in the past	6,7	253		
Mother Tongue				162.469	0.000*
	Turkish	7,8	2583		
	Kurdish	23,5	942		
	Other	17,5	143		
Mother's Body Mass Index				5.811	0.121
	Less than 18,5	14,8	54		
	18,5-24,9	13,6	1540		
	25-29,9	10,9	1291		
	30+	11,3	776		
Mother's Employment Status				21.977	0.000*
	Not employed	10.4	2414		
	All year	16.0	574		
	Seasonal	15.5	678		
Children Under 5				106.439	0.000*
	0	7,0	100		
	1	8,0	1754		
	2	13,3	1259		
	3+	23,9	556		
Total		12,2	3668		

When the child's state of being stunting is analyzed according to mother's age, it is found that the rate of stunting among children of mothers in 40-44 years age group is in the highest level with a percentage of 23.6.

The rate of stunting among the children whose mothers do not smoke is 13.4 %, it is 9.9 % among the children whose mothers sometimes smoke and 10.9 % among the children whose mothers regularly smoke.

The rate of stunting observed among the children whose mother tongue is Turkish is 7.8 % and 23.5 % among children whose mother tongue is Kurdish. The rate of being stunted is found as 14.8 % among the children whose mother's body mass index is below 18.5 whereas this rate is 10.9 % among the children whose mother's body index is between 25 and 29.9.

As the number of children under 5 increases within households, the rate of stunting increases, too. The rate of stunting observed in households with a single child under 5 year old is 7.0 %, this rate increases to 23.9 % in the households with more under 5 year old children.

There are striking differences in the percentage of children classified as stunted according to mother's educational status. Children whose mothers are not educated face with greater stunting (25 %). On the other hand, in families in which mothers are educated minimal stunting rate is observed (2.9 %).

The rate of being stunted is 16.0 % among the children whose mothers have studied all year and seasonal, this rate is observed as 10.4 % among the children whose mothers are not employed.

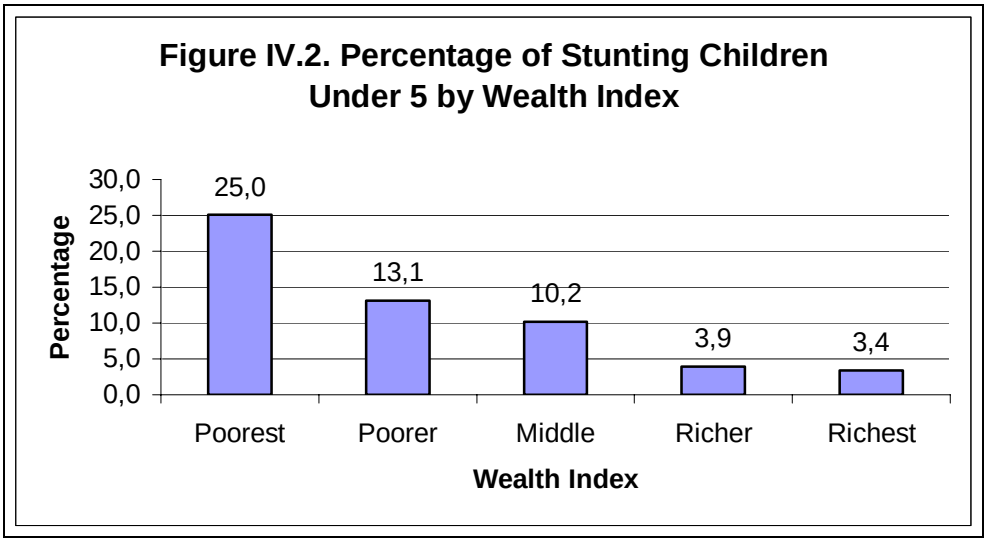
IV.1.3. Environment Related Variables of Stunting

Table IV.3. shows the percentage of children under the age of five classified as malnourished according to the height for age index varies with the selected environment characteristics.

Type of place of residence is also an important factor on stunting. Stunting is more common in rural residences (18.4 %) than in urban residences (8.9 %). There are also regional differences in stunting. Region is a major factor affecting height for age. The highest level of stunting is seen in the East region with a percentage of 23.0 while the lowest levels have been found in the West region with a percentage of 6 and in Central regions with a percentage of 10.0. There are significant regional differences. The Central East Anatolia and South East Anatolia region exhibits the highest percentage (26.6 % and 22.1 %) for being stunting among the children under five. Relatively minor percentages are observed for children in East Marmara region. It is also noteworthy that stunting is observed as 16.9 % among the children who are living in East Black Sea and 10.4 % in Mediterranean and 6.0 % in Istanbul and Aegean.

It can be said that as the number of individuals living in a household increases, children under 5 years old have been badly affected from this. The highest levels of stunting have been seen in the households with 7 and more members with a percentage of 21.7 % whereas the lowest levels have been seen in the households with 1-3 members with a percentage of 4.5.

The highest levels of stunting are seen in the poorest wealth index with a percentage of 25.0 whereas the lowest levels have been found in the richest one with the percentage of 3.4 (Figure IV.2.).



The rate of stunting observed in the households using unsafe water is 26.6 %, it is 9.5 % in the households using safe water.

The rate of stunting observed in non-sanitary households is 17.8 % whereas this rate is 11.6 % in sanitary households. The rate of stunting observed in the households where the head of the household is male is 8.6 % whereas this rate is observed as 12.4 % in the households where the head of the house is female.

Table IV.3. The Percentage Distribution of Stunting According to Variables Related With Environment

Variables	Categories	Stunting %	n	Chi-square	p
Type of Place of Residence				69.209	0.000*
	Rural	18,4	1254		
	Urban	9,0	2414		
Region				158.432	0.000*
	West	5,5	1186		
	South	10,4	499		
	Central	9,5	727		
	North	13,0	218		
	East	22,5	1038		
Region (12)				172.116	0.000*
	İstanbul	6,1	572		
	West Marmara	7,3	113		
	Aegean	6,6	346		
	East Marmara	3,4	284		
	West Anatolia	9,8	311		
	Mediterranean	10,4	499		
	Central Anatolia	9,6	204		
	West Black Sea	9,1	182		
	East Black Sea	16,9	118		
	Northeast Anatolia	16,8	166		
	Central East Anatolia	26,6	280		
	Southeast Anatolia	22,1	592		
Household Size				170.246	0.000*
	1-3	4,5	507		
	4	5,6	803		
	5	8,5	647		
	6	12,7	512		
	7+	21,7	1199		
Wealth Index				228.115	0.000*
	Poorest	25,0	907		
	Poorer	13,1	789		
	Middle	10,2	697		
	Richer	3,9	735		
	Richest	3,4	540		
Water Safety				131.295	0.000*
	Unsafe	26,6	576		
	Safe	9,5	3093		
Sanitation				11.216	0.001*
	No	17,8	349		
	Yes	11,6	3319		
Sex of Household Head				2.561	0.110
	Male	8,6	198		
	Female	12,4	3472		
Total		12,2	3668		

Association was found with the stunting and the below variables:

-age of children (in months) (χ^2=55.301, $p < 0.01$)

-sex of children (χ^2=6.249, $p < 0.05$)

-birth order (χ^2=133,930, $p < 0.01$)

-duration of breastfeeding (χ^2=44,530, $p < 0.01$)

-wanting status of pregnancy (χ^2 =27,702, $p < 0.01$)

-birth weight (χ^2=249.930, $p< 0.01$)

-initial breastfeeding (χ^2=36.807, $p < 0.01$)

-children were given sugar/glucose water for first 3 days (χ^2=28,928, $p < 0,001$)

-children were given infant formula for first 3 days (χ^2=4,833, $p < 0.05$)

-drinking milk with a nipple (χ^2=28,757, $p < 0.01$)

-antenatal care (χ^2=172.041, $p < 0.01$)

-mother's taking iron (χ^2= 148.200, $p < 0.01$)

-mother's taking vitamins (χ^2= 110.073, $p < 0.01$)

-mother's taking folic acid (χ^2= 27.609, $p < 0.01$)

-mother's educational level (χ^2= 229.701, $p < 0.01$)

-mother's age (χ^2= 22.789, $p < 0.01$)

-mother's smoking cigarette (χ^2= 12.907, $p < 0.05$)

-mother tongue (χ^2= 162.469, $p < 0.01$)

-mother's employment status (χ^2= 21.977, $p < 0.01$)

-the number of children under 5 (χ^2= 106.439, $p < 0.01$)

-type of place of residence (χ^2= 69.209, $p < 0.01$)

-region (χ^2= 158.432, $p < 0.01$)

-number of household size (χ^2= 170.246, $p < 0.01$)

-wealth index (χ^2= 228.115, $p < 0.01$)

-water safety (χ^2= 131.295, $p < 0.01$)

-sanitation (χ^2=11.216, $p < 0.01$)

No association was found with the stunting and the below variables:

-children were given milk other than breast milk for first 3 days (χ^2=2.100, p=0.147)

-children were given plain water for first 3 days (χ^2=0.041, p=0.840)

-children were given sugar/salt/water solution for first 3 days (χ^2=0.140, p=0.708)

-children were given fruit juice for first 3 days (χ^2=1.123, p=0.289)

-children were given tea infusions for first 3 days (χ^2=2.889, p=0.089)

-children were given honey for first 3 days (χ^2=0.445, p= 0.505)

-children were given cooked meal for first 3 days (χ^2=0.140, p=0.708)

-vaccination (χ^2=0.322, p=0.570)

-mother's body mass index (χ^2=5.811, p=0.121)

-sex of household head (χ^2=2.561, p=0.110)

IV.2.1. Children Related Variables of Wasting

Table IV.4. shows the percentage of children under five years classified as malnourished according to the weight for height index varies with the selected child's characteristics.

The overall frequency of malnutrition (wasting) by weight for height criteria is 0.7 %. Age plays a crucial role in wasting form of malnutrition. The percentage distribution of children by age group is illustrated in Table IV.4. As seen in Table IV.4, while children in 0-5 months have the highest proportion (1.2 %), children in 36-47 months age group have the lowest occurrence proportion.

Being wasted is found as 1.0 % among male children and it is 0.4 % among female children. Birth order is an important factor affecting wasting. The rate of being wasting is very high (1.7 %) among the forth or fifth-born children, this rate has decreased to 0.4 % after the sixth child.

Table IV.4. The Percentage Distribution of Wasting According to Variables Related With Children

Variables	Categories	Wasting %	n	Chi-square	p
Age of Children (in months)				6.005	0.306
	0-5	1,2	334		
	6-11	1,1	350		
	12-23	0,7	702		
	24-35	0,9	755		
	36-47	0,3	750		
	48-59	0,4	777		
Sex of Children				4.869	0.027*
	Male	1,0	1890		
	Female	0,4	1778		
Birth Order				8.440	0.038*
	1	0,5	1225		
	2-3	0,7	1614		
	4-5	1,7	468		
	6+	0,4	361		
Duration of Breastfeeding				10.967	0.027*
	Never breastfed	3,0	67		
	Less than 6 months	0,4	1421		
	6-12	0,8	904		
	12-24	1,1	1103		
	24+	0,0	165		

Table IV.4. The Percentage Distribution of Wasting According to Variables Related With Children (Continued)

Variables	Categories	Wasting %	n	Chi-square	p
Wanting Status of Pregnancy				3.170	0.205
	Then	0,6	2447		
	Later	0,6	466		
	No more	1,2	756		
Birth weight				4.288	0.368
	Not weighed at birth	1,2	910		
	Don't Know	0,7	151		
	Less than 2500	0,8	392		
	2500-3999	0,6	1877		
	4000+	0,3	340		
Initial Breastfeeding				7.762	0.021*
	Immediately	0,6	1946		
	One day	0,3	1075		
	After one day	1,4	556		
Children were given milk other than breast milk for first 3 days				1.362	0.243
	No	0,7	3406		
	Yes	0,0	192		
Children were given plain water for first 3 days				0.000	0.983
	No	0,7	3445		
	Yes	0,7	153		
Children were given sugar/glucose water for first 3 days				0.339	0.560
	No	0,7	2823		
	Yes	0,5	775		
Children were given sugar/salt/water solution for first 3 days				0.007	0.935
	No	0,7	3596		
	Yes	0,0	1		
Children were given fruit juice for first 3 days				0.054	0.817
	No	0,7	3590		
	Yes	0,0	8		
Children were given infant formula first 3 days				0.309	0.579
	No	0,7	3166		
	Yes	0,5	432		
Children were given tea/infusions first 3 days				0.101	0.750
	No	0,7	3583		
	Yes	0,0	15		

Table IV.4. The Percentage Distribution of Wasting According to Variables Related With Children (Continued)

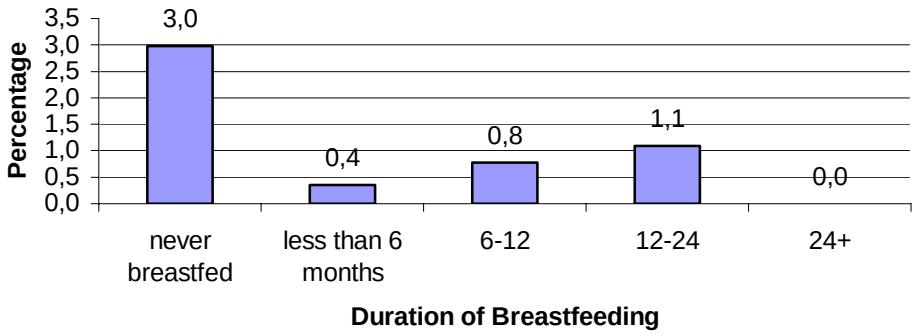
Variables	Categories	Wasting %	n	Chi-square	p
Children were given honey first 3 days				0.094	0.759
	No	0,7	3583		
	Yes	0,0	14		
Children were given juice of cooked meal first 3 days				0.007	0.935
	No	0,7	3597		
	Yes	0,0	1		
Nipple				0.103	0.748
	No	0,7	2379		
	Yes	0,6	1284		
Vaccination				8.811	0.003*
	No	2,9	174		
	Yes	0,7	2132		
Antenatal Care				1.949	0.163
	No care	1,1	840		
	1-60 visits	0,6	2794		
Iron Supplementation				2.858	0.091
	No	1,0	1447		
	Yes	0,5	2214		
Vitamin Supplementation				1.611	0.204
	No	0,9	1391		
	Yes	0,6	2273		
Folic acid Supplementation				2.007	0.157
	No	0,8	2971		
	Yes	0,3	671		
Total		0,7	3668		

Wanting status of pregnancies is an important variable on wasting, too. The rate of being wasting among the unwanted children is 1.2 % whereas it is 0.6 % among wanted children.

Birth weight is a good indicator of child's wasting. The rate of wasting among children who have not been weighed during birth is 1.2 %, it is 0.8 % among the children who are below 2500 grams, and 0.3 % among the children who are above 4000 grams.

Breastfeeding is a major determinant on child's growth. Wasting is observed as 3.0% among the children who have not been breastfed and 0 % among the children breastfed more than 24 months (Figure IV.3.).

Figure IV.3. Percentage of Wasting Children Under 5 By Duration of Breastfeeding



Initial breastfeeding is a very important variable on wasting. The rate of wasting is observed among the children who have taken initial breastfeeding immediately as 0.6 % whereas it is found as 1.4 % among the children who have taken it after a day.

The rate of wasting among children who have been given milk instead of breast milk in the first three days is 0.0 %, it is observed as 0.7 % among the ones to whom milk has not been given. The rate of wasting 0.7 % among children who have not been given plain water in first three days, it is 0.7 % among the ones who have been given. The rate of wasting is 0.5 % among children who have been given sugar/glucose, it is 0.7 % among the ones who have not been given sugar/glucose.

Wasting among children who have been given sugar / salt / water in the first

three days of infancy is observed as 0.0 %, while it is observed as 0.7 % among children who have not been given sugar / salt / water. While wasting is observed as 0.0 % among children who have been given fruit juice in first three days, it is observed as 0.7 % among the ones who have not given fruit juice in this period. While wasting is observed as 0.7 % among children who have not been given infant formula in first three days, it is observed as 0.5 % among the ones who have been given infant formula in this period.

Wasting among children who have been given tea infusions in first three days is observed as 0.0 % and it is observed as 0.7 % among the ones who have not been given. Wasting among children who have not been given honey in first three days is observed as 0.7 % and it is observed as 0.0 % among the ones who have been given honey. Rate of being wasting among children who have not been given juice of cooked meal in the first three days of the infancy is observed as 0.7 % while it is 0.0 % among the ones who have been given.

The rate of wasting among children who do not drink milk with nipple is observed as 0.7 %, this rate is 0.6 % among the children who drink milk with nipple. The rate of wasting among the children who have never been vaccinated is 2.9 %, it is 0.7 % among the children who have been vaccinated.

The rate of wasting among the children of the mothers who have not taken antenatal care is 1.1 %, it is 0.6 % among the children of the mothers who have taken antenatal care. The rate of wasting among the children of the mothers who have not taken iron is 1.0 %, it is 0.5 % among the children of the mothers who have taken iron. The rate of wasting among the children of the mothers who have not taken vitamins is 0.9 %, it is 0.6 % among the children of the mothers who have taken vitamins. The rate of wasting among the children of the mothers who have not taken folic acid is 0.8 %, it is 0.3 % among the children of the mothers who have taken folic acid.

IV.2.2. Mother Related Variables of Wasting

Table IV.5. shows the percentage of children under five years classified as malnourished according to weight for the height index varies with the selected mother's characteristics.

When the child's state of being wasting is analyzed according to the mother's age, it is found that the rate of being wasting among children of mothers in 25-29 years age group is in the highest level with a percentage of 1.1.

There are striking differences in the percentage of children classified as wasted according to mother's educational status. Wasting is not a problem among children of mothers with high school or higher educational level (2.9 %). In contrast, one third of children whose mothers lack formal education are classified as wasted (25.3 %).

The rate of wasting among the children whose mothers do not smoke is 0.7 %, it is 1.2 % among the children whose mothers sometimes smoke and 0.3 % among the children whose mothers regularly smoke.

The rate of wasting observed among the children whose mother tongue is Turkish 0.7 % and 0.8 % among the children whose mother tongue is Kurdish.

The rate of being wasting is found as 0.0 % among the children whose mother's body mass index is below 18.5 whereas this rate is 0.9 % among the children whose mother's body index is between 25 and 29.9.

Table IV.5. The Percentage Distribution of Wasting According to Variables Related With Mother

Variables	Categories	Wasting %	n	Chi-square	p
Mother's Educational Level				1.967	0.579
	No educ/incomp primary	1,0	975		
	First level primary	0,6	1895		
	Second level primary	0,6	274		
	High and higher	0,6	523		
Mother's Age				4.746	0.577
	15-19	0,8	126		
	20-24	0,6	924		
	25-29	1,1	1247		
	30-34	0,4	845		
	35-39	0,5	374		
	40-44	0,8	128		
	45-49	0,0	27		
Mother's Smoking Status				2.158	0.540
	Never smoke/tried once or twice	0,7	2479		
	Rarely smoke	1,2	345		
	Regularly smoke	0,3	587		
	Smoked in the past	0,8	253		
Mother Tongue				0.358	0.836
	Turkish	0,7	2583		
	Kurdish	0,8	942		
	Other	0,7	143		
Mother's Body mass Index				3.397	0.334
	Less than 18,5	0,0	54		
	18,5-24,9	0,8	1540		
	25-29,9	0,9	1292		
	30+	0,3	776		
Mother's Employment Status				0.897	0.638
	Not employed	0.8	2414		
	All year	0.7	574		
	Seasonal	0.4	679		
Children under 5				5.881	0.118
	0	0,0	100		
	1	0,5	1754		
	2	0,7	1259		
	3+	1,5	556		
Total		0,7	3668		

As the number of the children under 5 year old living in a household increases, the rate of being wasting observed increases, as well. The rate of being wasted observed in households with a single child under 5 years old is 0.5 %, this rate increases to 1.5 % in the households with three and more under 5 year old children.

The rate of being wasting is 0.8 % among the children whose mothers are not employed, this rate is observed as 0.4 % among the children whose mothers are seasonal employed.

IV.2.3. Environment Related Variables of Wasting

Table IV.6. shows the percentage of children under the age of five classified as malnourished according to the weight for height index varies with the selected mother's characteristics.

Wasting is more common in rural areas (0.8 %) than in urban areas (0.7 %). There are also regional differences. The highest levels of wasting have been seen in the Central and Eastern regions with a percentage of 0.8 while the lowest levels have been found in the Southern regions with a percentage of 0.4.

Wasting is more common in rural areas (0.8 %) than in urban areas (0.7 %). There are also regional differences. The highest levels of wasting have been seen in the Central and Eastern regions with a percentage of 0.8 while the lowest levels have been found in the Southern regions with a percentage of 0.4. Regional estimates of wasting vary from low of 0.3 % in the Central East Anatolia and East Black Sea to a high of 1.6 % and 1.3 % East Marmara and Northeast Anatolia.

Table IV.6. The Percentage Distribution of Wasting According to Variables Related With Environment

Variables	Categories	Wasting %	n	Chi-square	p
Type of Place of Residence				0.037	0.848
	Rural	0,8	1254		
	Urban	0,7	2414		
Region				1.084	0.897
	West	0,7	1186		
	South	0,4	499		
	Central	0,8	727		
	North	0,7	218		
	East	0,8	1038		
Region (12)				8.239	0.692
	Istanbul	0,7	572		
	West Marmara	0,7	114		
	Aegean	0,8	347		
	East Marmara	1,6	284		
	West Anatolia	0,4	310		
	Mediterranean	0,4	499		
	Central Anatolia	0,4	205		
	West Black Sea	0,6	182		
	East Black Sea	0.3	118		
	Northeast Anatolia	1,3	166		
	Central East Anatolia	0,3	280		
	Southeast Anatolia	0,8	592		
Household Size				3.808	0.433
	1-3	0,2	507		
	4	0,6	803		
	5	1,0	647		
	6	1,2	512		
	7+	0,8	1199		
Wealth index				10.759	0.029*
	Poorest	1,3	907		
	Poorer	0,3	789		
	Middle	1,1	697		
	Richer	0,4	735		
	Richest	0,4	540		
Water Safety				0.247	0.619
	Unsafe water	0,9	576		
	Safe water	0,7	3093		
Sanitation				1.037	0.309
	No	1,1	350		
	Yes	0,7	3319		
Sex of Household Head				0.093	0.761
	Male	0,5	197		
	Female	0,7	3472		
Total		0,7	3668		

It can be said that as the number of individuals living in a household increases, children under 5 years old have been poorly affected from this situation. The highest levels of wasting have been seen in the households with 6 members with a percentage of 1.2 % whereas the lowest levels have been seen in the households with 1-3 members with a percentage of 0.2.

The rate of wasting observed in unhygienic households is 1.1 % whereas this rate is 0.7 % in sanitary counterparts. The rate of wasting observed in the households where the head of the household is male is 0.5 % whereas this rate is observed as 0.7 % in the households where the head of the house is female.

Association was found with the wasting and the below variables:

-sex of children (χ^2= 4.869, $p < 0.05$)

-birth order (χ^2=8.440, $p < 0.05$)

-duration of breastfeeding (χ^2= 10.967, $p < 0.05$)

-initial breastfeeding (χ^2=7.762, $p < 0.05$)

-vaccination (χ^2=8,811, $p < 0.05$)

-wealth index (χ^2= 10.759, $p < 0.01$)

No association was found with the wasting and the below variables:

-age of children (in months) (χ^2=6.005, p= 0.306)

-wanting status of pregnancy (χ^2 =3.170, p= 0.205)

-birth weight (χ^2=4.288, p= 0.368)

- children were given milk instead of breast milk for first 3 days (χ^2=1.362, p =0.243)

- children were given plain water for first 3 days (χ^2=0.00, p < 0.983)

-children were given sugar/glucose water for first 3 days (χ^2=0.339, p= 0.560)

-children were given sugar/salt/water solution for first 3 days (χ^2=0,007, p =0.935)

-children were given fruit juice for first 3 days (χ^2=0.054, p= 0.817)

-children were given infant formula for first 3 days (χ^2=0.309, p= 0.579)

-children were given tea infusions for first 3 days (χ^2=0.101, p=0.750)

-children were given honey for first 3 days (χ^2=0.094, p =0.759)

-children were given cooked meal for first 3 days (χ^2=0.007, p =0.935)

-drinking milk with a nipple (χ^2=0.103, p =0.748)

-antenatal care (χ^2=1.949, p = 0.163)

-mother's taking iron (χ^2=2.858, p= 0.091)

-mother's taking vitamins (χ^2=1.611, p= 0.204)

- mother's taking folic acid (χ^2=2.007, p= 0.157)

-mother's educational level (χ^2=1.967, p= 0.579)

-mother's age (χ^2=4.746, p= 0.577)

-mother's smoking cigarette (χ^2=2.158, p=0.540)

-mother tongue (χ^2=0.358, p = 0.836)

-mother's body mass index (χ^2=3.397, p= 0.334)

-mother's employment status (χ^2=0.897, p =0.638)

-number of children under 5 (χ^2=5.881, p =0.118)

-type of place of residence (χ^2=0.037, p=0.848)

-region (χ^2=1.084, p=0.897)

-number of household size (χ^2= 3.808, p= 0.433)

-water safety (χ^2= 0.247, p= 0.619)

-sanitation (χ^2=1.037, p= 0.309)

-sex of household head (χ^2=0.093, p=0.761)

IV.3.1. Children Related Variables of Underweight

Table IV.7. shows the percentage of children under five years classified as malnourished according to the weight for age index varies with the selected child's characteristics.

The overall frequency of malnutrition (underweight) by weight for height criteria is 3.9 %. Age is one of the most important factors and plays a crucial role in underweight form of malnutrition. The percentage distribution of children by age group is illustrated in Table IV.7. As seen in Table IV.7, while children in 24-47 months age group have the highest proportion (5.2 %), children in 0-5 months age group have the lowest occurrence proportion (0.9 %).

Being underweight show a little difference by sex of child. It is found as 4.7 % among male children while it is observed as 3.2 % among female children. Birth order is an important factor affecting weight for age index in the survey. Increasing birth order is associated with an increase in the percentage of underweight.

Breastfeeding is a major determinant on child's growth. While being underweight observed as 3.0 % among the children who have never been breastfed, this rate is observed as 1.1 % among the children taking breast milk 12-24 months.

Wanting status of pregnancy is an important variable on being underweight, too. The rate of being underweight among the unwanted children is 1.2 % whereas it is 0.6 % among the wanted children. Birth weight is a good indicator of child's being underweight. The rate of being underweight among children who have not been weighed during birth is 7.8 %, it is 6.4 % among the children who are below 2500 grams and 0.9 % among the children who are above 4000 grams.

While rate of being underweight among children who have been given milk instead of breast milk in the first three days is 3.9 %, it is observed as 3.1 % among the ones to whom milk has not been given. While rate of being underweight is 3.9 % among children who have not been given plain water in first three days, it is 2.6 % among the ones who have been given plain water. While rate of being underweight is 5.4 % among children who have been given sugar/glucose, it is 3.4 % among the ones who have not been given sugar/glucose.

The state of being underweight among children who have not been given sugar / salt / water in the first three days of infancy is observed as 3.8 %, while it is observed as 0.0 % among children who have been given sugar / salt / water. While being underweight is observed as 3.8 % among children who have not been given fruit juice in first three days, it is observed as 0.0 % among the ones who have given fruit juice in this period. Being underweight is observed as 3.9 % among children who have not been given infant formula in first three days, it is observed as 3.2 % among the ones who have been given infant formula in this period. Rate of being underweight among children who have been given tea infusions in first three days is observed as 6.7 % and it is observed as 3.8 % among the ones who have not been given.

Table IV.7. The Percentage Distribution of Underweight According to Variables Related With Children

Variables	Categories	Underweight %	n	Chi-square	p
Age of Children (in months)				17.320	0.004*
	0-5	0,9	335		
	6-11	2,9	350		
	12-23	2,8	702		
	24-35	5,2	755		
	36-47	5,1	750		
	48-59	4,1	777		
Sex of Children				5.439	0.020*
	Female	3,2	1890		
	Male	4,7	1779		
Birth Order				44.670	0.000*
	1	2,1	1226		
	2-3	3,3	1614		
	4-5	8,1	468		
	6+	7,2	362		
Breastfeeding				20.123	0.000*
	Never breastfed	3,0	67		
	Less than 6 months	0,4	1421		
	6-12	0,8	904		
	12-24	1,1	1103		
	24+	0,0	165		
Wanting Status of Pregnancy				9.024	0.011*
	Then	0,6	2447		
	Later	0,6	466		
	No more	1,2	756		
Birth weight				74.210	0.000*
	Not weighed at birth	7,8	910		
	Don't Know	6,0	150		
	Less than 2500	6,4	392		
	2500-3999	1,9	1877		
	4000+	0,9	340		
Initial Breastfeeding				15.747	0.000*
	Immediately	3,3	1947		
	One day	3,3	1075		
	More than one day	6,8	556		
Children were given milk other than breast milk for first 3 days				0.278	0.598
	No	3,9	3405		
	Yes	3,1	192		
Children were given plain water for first 3 days				0.647	0.421
	No	3,9	3444		
	Yes	2,6	153		

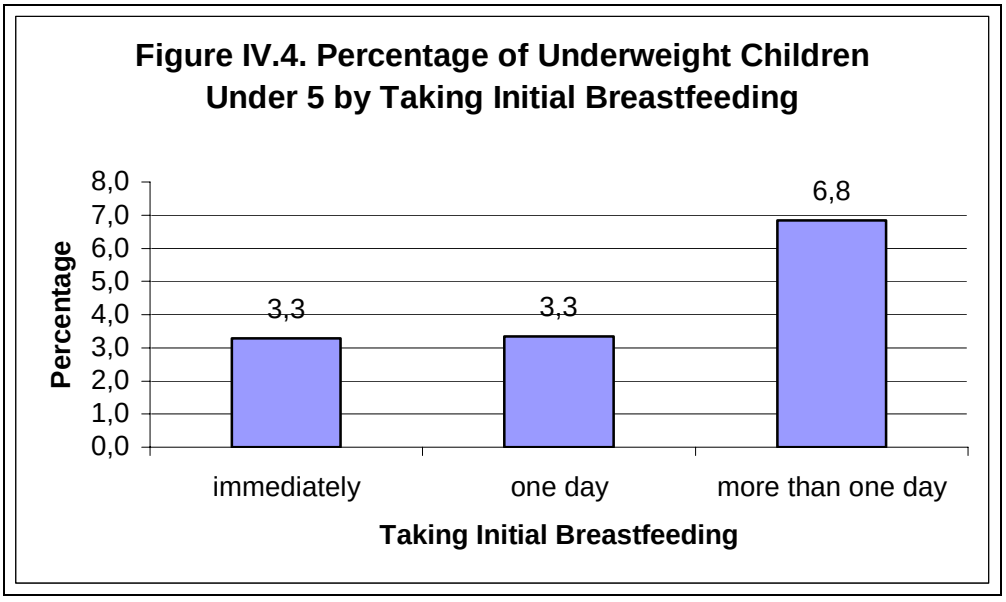
Table IV.7. The Percentage Distribution of Underweight According to Variables Related With Children (Continued)

Variables	Categories	Underweight %	n	Chi-square	p
Children were given sugar/glucose water for first 3 days				6.756	0.009*
	No	3,4	2823		
	Yes	5,4	774		
Children were given sugar/salt/water solution for first 3 days				0.040	0.842
	No	3,8	3596		
	Yes	0,0	1		
Children were given fruit juice first 3 days				0.320	0.572
	No	3,8	3590		
	Yes	0,0	8		
Children were given infant formula first 3 days				0.471	0.493
	No	3,9	3166		
	Yes	3,2	432		
Children were given tea/infusions first 3 days				0.327	0.567
	No	3,8	3582		
	Yes	6,7	15		
Children were given honey first 3 days				0.561	0.454
	No	3,9	3583		
	Yes	0,0	14		
Children were given juice of cooked meal first 3 days				0.040	0.842
	No	3,8	3597		
	Yes	0,0	1		
Nipple				6.107	0.013
	No	4,5	2379		
	Yes	2,8	1284		
Vaccination				0.410	0.522
	No	4,0	173		
	Yes	5,2	2133		
Antenatal Care				51.112	0.000*
	No care	8,1	839		
	1-60 visits	2,6	2793		
Iron Supplementation				52.858	0.000*
	No	6,6	1446		
	Yes	1,9	2215		
Vitamin Supplementation				40.519	0.000*
	No	6,5	1391		
	Yes	2,3	2273		

Table IV.7. The Percentage Distribution of Underweight According to Variables Related With Children (Continued)

Variables	Categories	Underweight %	n	Chi-square	p
Follic acid Supplementation				11.895	0.001*
	No	4,3	2970		
	Yes	1,5	670		
Total		3,9	3668		

Initial breastfeeding is also a very important variable on being underweight. The rate of being underweight is observed among the children who have taken initial breastfeeding immediately as 3.3 % whereas it is found as 6.8 % among the children who have taken it after a day (Figure IV.4.).



Rate of being underweight among children who have not been given honey in first three days is observed as 3.9 % and it is observed as 0.0 % among the ones who have been given. Rate of being underweight among children who have not been given juice of cooked meal in the first three days of the infancy is observed as 3.8 % while it is 0.0 % among the ones who have been given.

The rate of underweight among children who do not drink milk with nipple is observed as 4.5 %, this rate is 2.8 % among the children who drink milk with nipple. The rate of being underweight among the children who have never been vaccinated is 4.0 %, it is 5.2 % among the children who have been vaccinated. The rate of being underweight among the children of the mothers who have not taken antenatal care is 8.1 %, it is 2.6 % among the children of the mothers who have taken antenatal care.

The rate of being underweight among the children of the mothers who have not taken iron is 6.6 %, it is 1.9 % among the children of the mothers who have taken iron. The rate of being underweight among the children of the mothers who have not taken vitamins is 6.5 %, it is 2.3 % among the children of the mothers who have taken vitamins. The rate of being underweight among the children of the mothers who have not taken folic acid is 4.3 %, it is 1.5 % among the children of the mothers who have taken folic acid.

IV.3.2. Mother Related Variables of Underweight

Table IV.8. shows how the percentage of children under five years classified as malnourished according to weight for the age index varies with the selected household characteristics.

There are striking differences in the percentage of children classified as underweight according to mother's educational status. Being underweight is not a problem among children of mothers with high school or higher educational level

(1.0 %). In contrast, one third of children whose mothers lack formal education are classified as underweight (8.3 %).

Table IV.8. The Percentage Distribution of Underweight According to Variables Related With Mother

Variables	Categories	Underweight %	n	Chi-square	p
Mother's Education				72.529	0.000*
	No educ/incomp primary	8,3	976		
	First level primary	2,7	1895		
	Second level primary	1,8	275		
	High and higher	1,0	524		
Mother's Age				11.045	0.087
	15-19	6,3	126		
	20-24	2,7	924		
	25-29	4,1	1247		
	30-34	3,4	845		
	35-39	5,6	374		
	40-44	6,3	127		
	45-49	3,7	27		
Mother's Smoking Status				0.618	0.892
	Never smoke/tried once or twice	4,0	2478		
	Rarely smoke	3,2	345		
	Regularly smoke	3,7	587		
	Smoked in the past	3,6	252		
Mother Tongue				58.627	0.000*
	Turkish	2,3	2583		
	Kurdish	7,9	942		
	Other	6,3	144		
Mother's Body Mass Index				7.882	0.049*
	Less than 18,5	7,5	53		
	18,5-24,9	4,7	1539		
	25-29,9	3,3	1291		
	30+	2,8	775		
Mother's Employment Status				4.848	0.089
	Not employed	3.4	2414		
	All year	5.2	574		
	Seasonal	4.4	678		
Children Under 5				43.023	0.000*
	0	1,0	100		
	1	2,5	1754		
	2	4,1	1259		
	3+	8,5	556		
Total		3,9	3668		

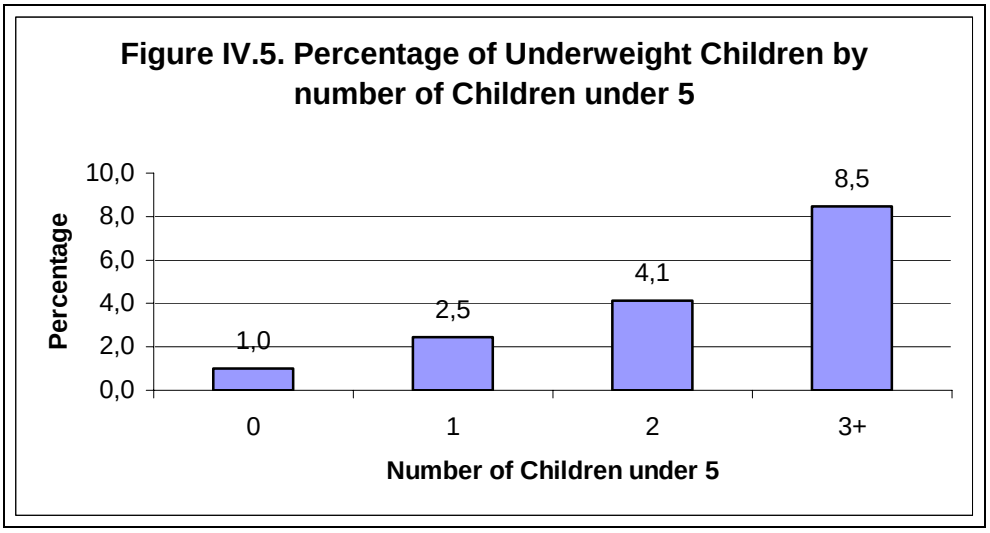
When the child's situation of being underweight is analyzed according to the mother's age, it is found that the rate of being underweight among children of mothers in 15-19 and 40-44 years age group is in the highest level with a percentage of 6.3.

The rate of underweight for children whose mothers do not smoke is 4.0 %, it is 3.2 % among the children whose mothers sometimes smoke and 3.6 % among the children whose mothers regularly smoke.

The rate of being underweight for children whose mother tongue is Turkish 2.3 % and 7.9 % among the children whose mother tongue is Kurdish.

The rate of being underweight is found to be 7.5 % among the children whose mothers' body mass index is below 18.5 whereas this rate is 2.8 % for the ones whose mothers' body index is above 30. As the result of body mass index increases, the rate of being underweight observed decreases.

As the number of the children under 5 year old living in a household increases, the rate of being underweight observed increases, as well. The rate of being underweight observed in households with a single child under 5 years old is 1 %, this rate increases to 8.5 % in the households with three and more under 5 year old children (Figure IV.5.).



The rate of being underweight is 5.2 % among the children whose mothers have employed all year, this rate is observed as 3.4 % among the children whose mothers not employed.

IV.3.3. Environment Related Variables of Underweight

Table IV.9. shows the percentage of children under the age of five classified as malnourished according to the weight for age index varies with the selected environment characteristics.

Being underweight is more common in rural areas (5.9 %) than in urban areas (2.8 %). There are also regional differences. The highest levels of underweight have been seen in the Eastern regions with a percentage of 7.7 while the lowest levels have been found in the Western regions with a percentage of 1.9. As could be seen in the table, although underweight children in Central East Anatolia have the highest proportion (9.6 %), underweight children in Aegean and Istanbul have the lowest occurrence proportion (1.2 % and 1.3 %).

Table IV.9. The Percentage Distribution of Underweight According to Variables Related With Environment

Variables	Categories	Underweight %	n	Chi-square	p
Type of Place of Residence				21.095	0.000*
	Rural	5,9	1254		
	Urban	2,8	2414		
Region				57.346	0.000*
	West	1,9	1186		
	South	2,8	499		
	Central	2,9	727		
	North	2,2	219		
	East	7,7	1039		
Region (12)				66.029	0.000*
	Istanbul	1,3	572		
	West Marmara	6,3	113		
	Aegean	1,2	346		
	East Marmara	3,0	284		
	West Anatolia	2,7	310		
	Mediterranean	2,8	498		
	Central Anatolia	2,4	205		
	West Black Sea	3,0	182		
	East Black Sea	2,3	119		
	Northeast Anatolia	6,7	166		
	Central East Anatolia	9,6	280		
	Southeast Anatolia	7,1	592		
Household Size				35.713	0.000*
	1-3	0,8	507		
	4	2,7	804		
	5	3,4	646		
	6	3,9	513		
	7+	6,3	1200		
Wealth Index				71.611	0.000*
	Poorest	7,8	907		
	Poorer	5,2	788		
	Middle	2,5	697		
	Richer	0,9	735		
	Richest	1,3	542		
Water Safety				54.730	0.000*
	Unsafe water	9,4	576		
	Safe water	2,9	3093		
Sanitation				15.048	0.000*
	No	7,7	350		
	Yes	3,5	3319		
Sex of Household Head				0.020	0.887
	Male	4,1	197		
	Female	3,9	3471		
Total		3,9	3668		

It can be said that as the number of individuals living in a household increases, children under 5 years old have been roughly affected from this situation. The highest levels of underweight have been seen in the households with more than 7 members with a percentage of 6.3 whereas the lowest levels have been seen in the households with 1-3 members with a percentage of 0.8.

The highest levels of being underweight are seen in the poorest wealth index groups with a percentage of 7.8 whereas the lowest levels have been found in the richest ones with the percentage of 1.3.

The rate of being underweight among children living in the households using unsafe water is 9.4 %, it is 2.9 % in the households using safe water. The rate of being underweight observed in non-hygienic households is 7.7 % whereas this rate is 3.5 % in sanitary households.

The rate of being underweight among children living in the households where the head of the household is male is 4.1 % whereas this rate is observed as 3.9 % in the households where a woman is leading household.

Association was found with the underweight and the below variables:

-age of children (in months) (χ^2= 17.320, $p < 0.05$)

-sex of children (χ^2=5.439, $p < 0.05$)

-birth order (χ^2= 44.670, $p<0.01$)

-duration of breastfeeding (χ^2=20.123, $p < 0.01$)

-wanting status of pregnancy (χ^2=9.024, $p < 0.05$)

-birth weight (χ^2=74.210, $p< 0.01$)

-initial breastfeeding (χ^2=15.747, $p < 0.01$)

-children were given sugar/glucose water for first 3 days (χ^2=6.756, $p < 0$,

005)

-antenatal care (χ^2=51.112, p < 0.01)

-mother's taking iron (χ^2=52.858, p < 0.01)

-mother's taking vitamins (χ^2=40.519, p < 0.01)

-mother's taking folic acid (χ^2=11.895, p < 0.01)

-mother's educational level (χ^2=75.529, p < 0.01)

-mother tongue (χ^2=58.627, p < 0.01)

-mother's body mass index (χ^2=7.882, p < 0.05)

-the number of children under 5 (χ^2=43.023, p < 0.01)

-type of place of residence (χ^2= 21.095, p < 0.01)

-region (χ^2= 57.346, p < 0.01)

-number of household size (χ^2=35.713, p < 0.01)

-wealth index (χ^2=71.611, p < 0.01)

-water safety (χ^2=54.730, p < 0.01)

-sanitation (χ^2=15.048, p < 0.01)

No association was found with the underweight and the below variables:

-children were given milk instead breast milk for first 3 days (χ^2=0.278, p =0.598)

-children were given plain water for first 3 days (χ^2=0.647, p =0.421)

-children were given sugar/salt/water solution for first 3 days (χ^2=0.040, p = 0.842)

-children were given fruit juice for first 3 days (χ^2=0.320, p = 0.572)

-children were given infant formula for first 3 days (χ^2=0.471, p =0.493)

-children were given tea infusion for first 3 days (χ^2=0.327, p =0.567)

-children were given honey for first 3 days (χ^2=0.561, p =0.454)

-children were given cooked meal for first 3 days (χ^2=0,040, p =0.842)

-drinking milk with a nipple (χ^2=6.107, p =0.013)

-vaccination (χ^2=0.410, p =0.522)

-mother's age (χ^2=11.045, p =0.087)

-mother's smoking cigarette (χ^2=0.618, p= 0.892)

-mother's employment status (χ^2=4.848, p =0.089)

-sex of household (χ^2=0.020, p = 0.887)

IV.2. MULTIVARIATE ANALYSES

In this section, results of the multivariate analyses are presented. As mentioned in the methodology part, the technique employed for the multivariate analyses is logistic regression technique. We constructed a logistic regression model to show the effects of the variables on three forms of malnutrition; stunting, wasting and underweight.

Three models are used for logistic regression. As pointed out in previous chapter, model 1 consists of children related variables, model 2 consists of children and mother related variables and model 3 consists of children, mother and environment related variables. At first, model 1 was introduced into logistic regression, then model 2 was added, and all the three models were in the logistic regression at the final stage.

IV.2.1. Results of Logistic Regression Analyses for Stunting Children

This chapter contains the results of the logistic regression analyses for stunting form of malnutrition.

Table IV.2.1. presents the logistic regression models analyzing the effects of children, mother and environment related variables on the stunting form of malnutrition.

The chi-square value of the model 1 is 399.356 and p= 0.000 < 0.05. Therefore this model is significant. The – 2 Log likelihood= 2182 and Nagelkerke R-square is 0.207 so it can be concluded that this model explains 0.207 of the variation for the survey variable (stunting). In addition, the value of concordant is 88% with cut point=0.5. So, this model predicts 88% of the predicted values. This proves that the fitted model was appropriate and efficient (The table presentation at this model is given in Appendices B).

Chi-square value of the model 2 is 453.586 and p= 0.000 < 0.05. Therefore this model is also significant. The – 2 Log likelihood= 2128 and Nagelkerke R-square is 0.233 so it can be concluded that this model explains 0.233 of the variation for the survey variable (stunting). In addition, the value of concordant is 88% and the cut point is 0.5. So, this model predicts 88% of the predict values. This shows that the model becomes more efficient after adding the mother-related variables. (The table presentation at this model is given in Appendices B).

Chi-square value of the model 3 is 522.150 and p= 0.000 < 0.05. Therefore this model is significant. The – 2 Log likelihood= 2060 and Nagelkerke R-square is 0.266 so it can be concluded that this model explains 0.266 of the variation for

the survey variable (stunting). In addition, the value of concordant is 88.1% and the cut point is 0.5. So, this model predicts 88.1% of the predict values. This shows that the model becomes more efficient after adding environment-related variables.

Age of the children is shown to be strong and significant predictor, with the odds of being stunting increasing as the age of the children increases. Children 0-5 months of age are less likely to being stunting than the children 48-59 months of age.

Breastfeeding is an important predictor on being stunting. It has a strong and significant effect on children under 5. Children breastfeeding 24+ months are 2 times more likely to being stunting than those breastfeeding less than 6 months.

Birth weight is also important and significant predictor. Children with less than 2500 g birth weight are 4.6 times more likely to being stunting than children with 4000+ g birth weights.

The place of delivery is important and significant effect on being stunting. Children born in a health center are 0.6 times less likely to being stunting than the children born at home. In terms of geographical region, children living in Eastern parts are 1.87 more likely to being stunted than those living in West.

Another major result of the analyses is the number of household size. The probability of being stunting increases as the number of household member rises. The odds of being stunted are 1.6 times higher for the children living in households with 7+ members compared to children living in households with 1-3 members.

Table IV.2.1. Results of Logistic Regression Analyses For Stunting Children Model III

	B	S.E.	Sig.	Exp(B)	
Age of Children (in months)			0,000		**
0-5				1.000	
6-11	1,22925	0,47879	0,010	3,42	
12-23	2,16117	0,44331	0,000	8,68	**
24-35	1,98058	0,4434	0,000	7,25	**
36-47	2,38054	0,44144	0,000	10,81	**
48-59	2,33541	0,44297	0,000	10,33	**
Sex of Children					
Male				1.000	
Female	-0,1555	0,11548	0,178	0,86	
Birth Order			0,297		
1				1.000	
2-3	0,3308	0,18588	0,075	1,39	
4-5	0,31944	0,25351	0,207	1,38	
6+	0,1806	0,30072	0,548	1,20	
Duration of Breastfeeding			0,022		*
Never breastfed/less than 6 months				1.000	
6-12	0,14742	0,15683	0,347	1,16	
12-24	0,03601	0,15542	0,816	1,04	
24+	0,71673	0,24585	0,003	2,05	**
Wanting Status of Pregnancy			0,590		
Then				1.000	
Later	0,17259	0,18271	0,344	1,19	
No more	-0,0294	0,15648	0,851	0,97	
Birth weight			0,000		**
Less than 2500	1,52642	0,34814	0,000	4,60	**
Don't know	1,32183	0,39044	0,000	3,75	**
Not weighed	0,8748	0,35858	0,014	2,40	*
2500-3999	0,858	0,33038	0,009	2,36	**
4000+				1.000	
Initial Breastfeeding			0,384		
Immediately				1.000	
Within one day	0,13827	0,13654	0,311	1,15	
After one day	0,21478	0,16944	0,205	1,24	

Table IV.2.1. Results of Logistic Regression Analyses For Stunting Children Model III (Continued)

	B	S.E.	Sig.	Exp(B)
Children were given milk other than breast milk for first 3 days				
Yes				1.000
No	0,24555	0,23462	0,295	1,28
Children were given plain water for first 3 days				
Yes				1.000
No	-0,3268	0,30651	0,286	0,72
Children were given sugar/glucose water for first 3 days				
Yes				1.000
No	-0,2536	0,14573	0,081	0,78
Children were given sugar/salt/water solution for first 3 days				
Yes				1.000
No	-20,043	33996	0,999	0,00
Children were given fruit juice first 3 days				
Yes				1.000
No	-18,083	14148,9	0,999	0,00
Children were given infant formula first 3 days				
Yes				1.000
No	0,26448	0,21403	0,216	1,30
Children were given tea/infusions first 3 days				
Yes				1.000
No	0,15854	0,70468	0,822	1,17
Children were given honey first 3 days				
Yes				1.000
No	-2,0941	1,38622	0,130	0,12
Children were given juice of cooked meal first 3 days				
Yes				1.000
No	-20,682	43929	0,999	0,00
Antenatal Care				
1-60 visits				1.000
No	-0,0828	0,16969	0,625	0,92
Iron Supplementation				
Yes				1.000
No	-0,1153	0,19954	0,563	0,89

Table IV.2.1. Results of Logistic Regression Analyses For Stunting Children Model III (Continued)

	B	S.E.	Sig.	Exp(B)	
Vitamin Supplementation					
Yes				1.000	
No	0,06314	0,19796	0,749	1,07	
Follic acid Supplementation					
Yes				1.000	
No	-0,0385	0,20337	0,850	0,96	
Nipple					
Yes				1.000	
No	0,15693	0,14981	0,294	1,17	
Has Fever					
Yes				1.000	
No	0,10117	0,11889	0,394	1,11	
Place of Delivery			0,026		*
Home				1.000	
Health Centre	-0,5048	0,18713	0,007	0,60	**
Other	-19,715	12830,2	0,998	0,00	
Has Health Card					
Yes				1.000	
No	-0,0447	0,13473	0,740	0,96	
Mother's Educational Status			0,096		
No education/incomp.primary	0,67616	0,34985	0,053	1,97	
First level	0,39079	0,31208	0,210	1,48	
Second level and higher	1.000	1.000	1.000	1.000	
Children Under 5			0,969		
0				1.000	
1	0,07651	0,44172	0,862	1,08	
2	0,1051	0,43964	0,811	1,11	
3+	0,15807	0,45119	0,726	1,17	
Mother's Age			0,315		
15-19				1.000	
20-24	-0,0761	0,36148	0,833	0,93	
25-29	-0,2288	0,3735	0,540	0,80	
30-34	-0,3191	0,39322	0,417	0,73	
35-39	-0,2018	0,42082	0,631	0,82	
40-44	0,14574	0,46657	0,754	1,16	
45-49	-1,4342	0,81987	0,080	0,24	

Table IV.2.1. Results of Logistic Regression Analyses For Stunting Children Model III (Continued)

	B	S.E.	Sig.	Exp(B)		
Mother's Smoking Status			0,250			
Never smoke				1.000		
Rarely smoke	0,17739	0,21493	0,409	1,19		
Regularly smoke	0,12753	0,17314	0,461	1,14		
Smoked in the past	-0,4617	0,28861	0,109	0,63		
Mother Tongue			0,632			
Turkish				1.000		
Kurdish	0,08563	0,18997	0,652	1,09		
Other	0,2797	0,29281	0,339	1,32		
Mother's Body Mass Index			0,439			
Less than 18.5				1.000		
18.5-24.9	-0,1073	0,45866	0,815	0,90		
25-29.9	-0,2825	0,46295	0,541	0,75		
30+	-0,3282	0,47261	0,487	0,72		
Mother's Employment Status			0,517			
Not employed				1.000		
All year	0,18184	0,16139	0,259	1,20		
Seasonal	0,01935	0,15256	0,899	1,02		
Type of Place of Residence						
Urban				1.000		
Rural	0,01016	0,1492	0,945	1,01		
Region			0,024		*	
West				1.000		
South	0,37006	0,21893	0,091	1,45		
Central	0,49615	0,20299	0,014	1,64	*	
North	0,59845	0,28258	0,034	1,82	*	
East	0,62593	0,20914	0,002	1,87		**
Household Size			0,000			**
1-3				1.000		
4	-0,3434	0,30912	0,266	0,71		
5	-0,1046	0,30983	0,735	0,90		
6	0,1441	0,31108	0,643	1,15		
7+	0,51513	0,29898	0,084	1,67		

Table IV.2.1. Results of Logistic Regression Analyses For Stunting Children Model III (Continued)

	B	S.E.	Sig.	Exp(B)	
Wealth Index			0,000		**
Poorest	1,06847	0,3081	0,000	2,91	**
Poorer	0,71288	0,30303	0,018	2,04	*
Middle	0,61929	0,30119	0,039	1,86	*
Richer	-0,132	0,32674	0,686	0,88	
Richest				1.000	
Water Safety					
Safe				1.000	
Unsafe	-0,0965	0,1691	0,568	0,91	
Sanitation					
Yes				1.000	
No	0,00336	0,18449	0,985	1,00	
Sex of Household Head					
Male				1.000	
Female	0,6146	0,29013	0,034	1,85	*
Constant	-9,3887	4276,75	0,998	0,00	

Differences are significant at: * $p < 0.05$; ** $p < 0.01$; otherwise differences are not significant.

The linear score function is:

BXt= -9.388718 + 1.22 Age of children (6-11) + 2.16 Age of children (12-23) + 1.9 Age of children (24-35) + 2.38 Age of children (36-47) + 2.33 Age of children (48-59) + 0.71 Duration of breastfeeding (24+ months) + 1.52 Birth weight (Less than 2500) + 1.32 Birth weight (Don't know) + 0.87 Birth weight (Not weighed) + 0.85 Birth weight (2500-3999) - 0.50 Place of delivery (Health center) + 0.49 Region (Central) + 0.59 Region (North) + 0.62 Region (East) – 0.34 Number of household size + 1.06 Wealth ındex (Poorest) + 0.71 Wealth ındex (Poorer) + 0.61 Wealth ındex (Middle) – 0.13 Wealth ındex (Richer) + 0 61 Sex of household head (Female).

Wealth index has a negative impact over being stunting. As could be expected, while the wealth index increases the probability of being stunting decreases. The odds of being stunting are 2.9 times higher for children with poorest wealth index compared to the children with richest wealth index.

Sex of household head also significant on being stunting. The probability of being stunting is 1.8 times higher by the children in female household head compared to those in male household head.

Effects of children and mother related variables still persist after the environment variables are introduced into the regression equation.

In summary, constant variable is significant in all models and in the last model used it is predicted with 81 percent accuracy.

Stunting status: Estimates of the coefficients (together with their standard errors and significance level) for stunting status are given in Table V.1. The effective factors for stunting are: age of children, duration of breastfeeding, birth weight, place of delivery, region, household size, wealth index and sex of household head.

IV.2.2. Results of Logistic Regression Analyses for Wasting Children

Table IV.2.2. presents the logistic regression models to analyze the effects of children, mother and environment related variables on the wasting form of malnutrition.

Chi-square value of the model 1 is 75.799 and p= 0.000 < 0.05. Therefore this model is significant. The – 2 Log likelihood= 211.957 and Nagelkerke R-square is 0.271 so it can be concluded that this model explains 0.271 of the variation for the survey variable (wasting). In addition, the values of concordant is 99 % and cut point is 0.5. So, this model predicts 99 % of the predict values. This shows a greater efficiency of the fitted model. (The table presentation at this model is given in Appendix B).

Chi-square value of the model 2 is 92.744 and p= 0.003 < 0.05. Therefore this model is significant. The – 2 Log likelihood= 195.013 and Nagelkerke R-square is 0.331 so it can be concluded that this model explains 0.331 of the variation for the survey variable (wasting). In addition, the values of concordant is 99.4 % with cut point=0.5. So, this model predicts 99.4 % of the predict values. This shows that the model becomes more efficient after adding the mother-related variables. (The table presentation at this model is given in Appendix B).

Chi-square value of the model 3 is 111.246 and p= 0.004 < 0.05. Therefore this model is significant. The – 2 Log likelihood= 176.511 and Nagelkerke R-square is 0.396 so it can be concluded that this model explains 0.396 of the variation for the survey variable (wasting). In addition, the values of concordant is 99.4 % with cut point=0.5. So, this model predicts 99.4 % of the predict values.

Table IV.2.2. Results of Logistic Regression Analyses For Wasting Children Model III

	B	S.E.	Sig.	Exp(B)		
Age of Children (in months)			0,103			
0-5				1.000		
6-11	-1,0144	1,2731	0,425	0,36		
12-23	-2,2357	1,27553	0,079	0,11		
24-35	-2,8597	1,31418	0,029	0,06	*	
36-47	-3,4874	1,38502	0,011	0,03	*	
48-59	-2,9657	1,33237	0,026	0,05	*	
Sex of Children						
Male				1.000		
Female	1,05986	0,53322	0,046	2,89	*	
Birth Order			0,483			
1				1.000		
2-3	0,62994	0,80119	0,431	1,88		
4-5	0,25512	1,06543	0,810	1,29		
6+	-1,0298	1,40958	0,465	0,36		
Duration of Breastfeeding			0,070			
Never breastfed/less than 6 months				1.000		
6-12	2,17602	1,08946	0,045	8,81	*	
12-24	2,9868	1,12689	0,008	19,82		**
24+	-14,295	2591,96	0,995	0,00		
Wanting Status of Pregnancy			0,954			
Then				1.000		
Later	-0,1636	0,81002	0,840	0,85		
No more	0,11795	0,68728	0,863	1,13		
Birth weight			0,928			
Less than 2500	0,91238	1,32911	0,492	2,49		
Don't know	0,69737	1,70163	0,681	2,01		
Not weighed	1,04878	1,37684	0,446	2,85		
2500-3999	0,40846	1,1901	0,731	1,50		
4000+				1.000		
Initial Breastfeeding			0,033		*	
Immediately				1.000		
Within one day	-0,6438	0,70411	0,360	0,53		
After one day	1,30905	0,66764	0,049	3,70	*	

Table IV.2.2. Results of Logistic Regression Analyses For Wasting Children Model III (continued)

	B	S.E.	Sig.	Exp(B)
Children were given milk other than breast milk for first 3 days				
Yes				1.000
No	-16,03	2271,24	0,994	0,00
Children were given plain water for first 3 days				
Yes				1.000
No	0,76227	1,16055	0,511	2,14
Children were given sugar/glucose water for first 3 days				
Yes				1.000
No	-0,5432	0,6784	0,423	0,58
Children were given sugar/salt/water solution for first 3 days				
Yes				1.000
No	-15,424	33306,1	0,999	0,00
Children were given fruit juice first 3 days				
Yes				1.000
No	-14,461	12460,7	0,999	0,00
Children were given infant formula first 3 days				
Yes				1.000
No	-0,7526	1,01503	0,458	0,47
Children were given tea/infusions first 3 days				
Yes				1.000
No	-17,787	7535,58	0,998	0,00
Children were given honey first 3 days				
Yes				1.000
No	-17,206	8402	0,998	0,00
Children were given juice of cooked meal first 3 days				
Yes				1.000
No	-14,133	46841,1	0,999	0,00
Antenatal Care				
1-60 visits				1.000
No	0,22052	0,7699	0,774	1,25
Iron Supplementation				
Yes				1.000
No	-0,9063	0,79733	0,255	0,40

Table IV.2.2. Results of Logistic Regression Analyses For Wasting Children Model III (continued)

	B	S.E.	Sig.	Exp(B)	
Vitamin Supplementation					
Yes				1.000	
No	0,27754	0,83849	0,740	1,32	
Follic acid Supplementation					
Yes				1.000	
No	-0,9018	0,9756	0,355	0,41	
Nipple					
Yes				1.000	
No	0,2838	0,60637	0,639	1,33	
Has Fever					
Yes				1.000	
No	-0,8867	0,56815	0,118	0,41	
Place of Delivery			0,001		**
Home				1.000	
Health Centre	0,20015	0,83713	0,811	1,22	
Other	5,62698	1,62655	0,000	277,82	**
Has Health Card					
Yes				1.000	
No	-0,6316	0,61954	0,308	0,53	
Mother's Educational Level			0,428		
No education/incomp.primary	-0,7302	1,24278	0,556	0,48	
First level	-1,1781	0,9931	0,235	0,31	
Second level and higher				1.000	
Children Under 5			0,525		
0				1.000	
1	16,1797	3381,66	0,996	10.51	
2	15,2204	3381,66	0,996	4.72	
3+	16,0213	3381,66	0,996	9.02	
Mother's Age			0,459		
15-19				1.000	
20-24	0,26253	1,452	0,856	1,30	
25-29	1,18769	1,47306	0,420	3,28	
30-34	-0,3788	1,61513	0,814	0,68	
35-39	1,05077	1,72452	0,542	2,86	
40-44	1,74079	1,92607	0,366	5,70	
45-49	-17,179	6382,37	0,997	0,00	

Table IV.2.2. Results of Logistic Regression Analyses For Wasting Children Model III (continued)

	B	S.E.	Sig.	Exp(B)
Mother's Smoking Status			0,930	
Never smoke				1.000
Rarely smoke	0,35672	0,85683	0,677	1,43
Regularly smoke	-0,3667	0,85071	0,666	0,69
Smoked in the past	0,09837	0,88995	0,912	1,10
Mother Tongue			0,941	
Turkish				1.000
Kurdish	-0,132	0,85401	0,877	0,88
Other	0,29599	1,28307	0,817	1,34
Mother's Body Mass Index			0,244	
Less than 18.5				1.000
18.5-24.9	16,702	4140,31	0,996	17.41
25-29.9	15,7836	4140,31	0,997	7.20
30+	15,2554	4140,31	0,997	4.14
Mother's Employment Status			0,148	
Not employed				1.000
All year	0,13727	0,6722	0,838	1,15
Seasonal	-2,372	1,25206	0,058	0,09
Type of Place of Residence				
Urban				1.000
Rural	0,30651	0,67579	0,650	1,36
Region			0,587	
West				1.000
South	0,00884	0,9914	0,992	1,01
Central	0,85121	0,78593	0,278	2,34
North	0,89337	1,27161	0,482	2,44
East	-0,5585	1,00344	0,577	0,57
Household Size			0,492	
1-3				1.000
4	1,36145	1,65292	0,410	3,90
5	2,3418	1,63518	0,152	10,40
6	2,28809	1,68254	0,173	9,86
7+	2,55315	1,62726	0,116	12,85

Table IV.2.2. Results of Logistic Regression Analyses For Wasting Children Model III (continued)

	B	S.E.	Sig.	Exp(B)
Wealth Index			0,202	
Poorest	0,99539	1,1475	0,385	2,71
Poorer	-0,3278	1,23976	0,791	0,72
Middle	0,76548	1,02403	0,454	2,15
Richer	-2,2127	1,63902	0,177	0,11
Richest				1.000
Water Safety				
Safe				1.000
Unsafe	0,67703	0,8356	0,417	1,97
Sanitation				
Yes				1.000
No	-1,1148	0,7121	0,117	0,33
Sex of Household Head				
Male				1.000
Female	0,08318	1,0641	0,937	1,09
Constant	-18,863	1742,79	0,991	0,00

Differences are significant at: * $p < 0.05$; ** $p < 0.01$; otherwise differences are not significant.

The linear score function is:

BXt= - 18.86293 - 2.85 Age of children (24-35) - 3.48 Age of children (36-47) - 2.96 Age of children (48-59) + 1.05 Sex of children (female) + 2.17 Duration of breastfeeding (6-12 months) + 2.98 Duration of breastfeeding (12-24 months) + 1.30 Initial Breastfeeding (after one day) + 5.62 Place of delivery (other).

In wasting status of children, age is also shown to be a strong and significant predictor . Especially, the data on children of ages in 24-59 group show strongest

and significant association. Being wasting significantly decreases as the age of children increases.

With regard to sex of the children, female children are significantly 2.8 times more likely to being wasting compared to their male counterparts. As expected, the children who have taken initial breastfeeding after at least 1 day after birth, are 3.7 times more likely to being wasting than the children who have been breastfed immediately after birth. This is an expected result since initial breastfeeding has an antibiotic effect for the infant. Mothers should be informed about the importance of immediate breastfeeding.

Place of delivery is shown to be a significant predictor on being wasting. The children whose birth is in health center is 1.2 times more likely to being wasting. Because of the very low case number the other category of place of delivery predictor must be evaluated carefully.

Wasting status: Estimates of the coefficients (together with their standard errors and significance level) for wasting status are given in Table V.2. The effective factors for wasting are: age of children, sex of children, duration of breastfeeding, initial breastfeeding, place of delivery.

IV.2.3. Results of Logistic Regression Analyses for Underweight Children

Table IV.2.3. presents the logistic regression models to analyze the effects of children, mother and environment-related variables on the underweight form of malnutrition.

Chi-square value of the model 1 is 164.876 and p= 0.000 < 0.05. Therefore this model is significant. The – 2 Log likelihood= 963.459 and Nagelkerke R-square is 0.167 so it can be concluded that this model explains 0.167 of the variation for the survey variable (underweight). In addition, the values of concordant is 96 % and cut point is 0.5. So, this model predicts 96 % of the predict values. This shows that the fitted model has greater efficiency . (The table presentation at this model is given in Appendix B).

Chi-square value of the model 2 is 202.185 and p= 0.000 < 0.05. Therefore this model is significant. The – 2 Log likelihood= 926.150 and Nagelkerke R-square is 0.204 so it can be concluded that this model explains 0.204 of the variation for the survey variable (underweight). In addition, the values of concordant is 96 % and the cut point is 0.5. So, this model predicts 96 % of the predict values. This shows still a greater efficiency of the fitted model after adding the variables related with mother. (The table presentation at this model is given in Appendix B).

Chi-square value of the model 3 is 227.106 and p= 0.000 < 0.05. Therefore this model is significant. The – 2 Log likelihood= 901.229 and Nagelkerke R-square is 0.228 so it can be concluded that this model explains 0.228 of the variation for the survey variable (underweight). In addition, the values of concordant is 96 % and cut point is 0.5. So, this model predicts 96 % of the

predict values. This shows that the model becomes more efficient after adding environment- related variables.

In underweight status, also age is a significant predictor. The odds of being underweight increasing as the age of the children. Children age of 48-59 months are 7 times more likely to be underweight than the children age 0-5 months. Female children are 0.59 less likely to be underweight than male children.

Duration of breastfeeding is also very important and significant determinant with the odds of being underweight increasing as the duration of breastfeeding decreases. The children breastfed 24+ months are 2 times more likely to the children breastfed never breastfed/less than 6 months.

Birth weight is expected to affect the children health. In the context of birth weight, higher birth weight decreases the likelihood of being underweight. The odds of being underweight decrease if the children birth weight 4000g and above. The children with less than 2500g birth weight are 14 times more likely being underweight that those reference group.

In relation to the place of delivery, the children born in health centre are 0.9 times less likely than the children born at home. Also the children whose born the other delivery place are 19 times more likely than those reference category.

Mother's age also significant determinant of being underweight. The children whose mothers age is 20 and older are 0.2 times less likely than those mothers are 15-19 age group.

Table IV.2.3. Results of Logistic Regression Analyses for Underweight Children Model III

	B	S.E.	Sig.	Exp(B)		
Age of Children (in months)			0,0227		*	
0-5	1.000	1.000	1.000	1.000		
6-11	1,19952	0,74493	0,1073	3,32		
12-23	1,48868	0,70651	0,0351	4,43	*	
24-35	1,99265	0,6926	0,0040	7,33	*	**
36-47	2,04967	0,69495	0,0032	7,77	*	**
48-59	1,88174	0,7034	0,0075	6,56	*	**
Sex of Children						
Male	1.000	1.000	1.000	1.000		
Female	-0,5198	0,19595	0,0080	0,59	*	**
Birth Order			0,0567			
1	1.000	1.000	1.000	1.000		
2-3	0,44265	0,32052	0,1673	1,56		
4-5	0,91114	0,41343	0,0275	2,49	*	
6+	0,289	0,50596	0,5679	1,34		
Duration of Breastfeeding			0,1826			
Never breastfed/less than 6 months	1.000	1.000	1.000	1.000		
6-12	0,17254	0,26801	0,5197	1,19		
12-24	0,24521	0,26511	0,3550	1,28		
24+	0,81077	0,36908	0,0280	2,25	*	
Wanting Pregnancy Status			0,5136			
Then	1.000	1.000	1.000	1.000		
Later	-0,3321	0,35306	0,3469	0,72		
No more	-0,2064	0,24776	0,4048	0,81		
Birth weight			0,0275		*	
Less than 2500	2,65913	0,99219	0,0074	14,28	*	**
Don't know	2,32804	1,03326	0,0243	10,26	*	
Not weighed	1,92301	1,00162	0,0549	6,84		
2500-3999	2,0136	0,98365	0,0407	7,49	*	
4000+	1.000	1.000	1.000	1.000		
Initial Breastfeeding			0,1055			
Immediately	1.000	1.000	1.000	1.000		
Within one day	-0,1617	0,24038	0,5012	0,85		
After one day	0,4126	0,2659	0,1207	1,51		

Table IV.2.3. Results of Logistic Regression Analyses for Underweight Children Model III (Continued)

	B	S.E.	Sig.	Exp(B)
Children were given milk other than breast milk for first 3 day				
Yes	1.000	1.000	1.000	1.000
No	-0,3888	0,47211	0,4102	0,68
Children were given plain water for first 3 days				
Yes	1.000	1.000	1.000	1.000
No	-0,4238	0,56067	0,4498	0,65
Children were given sugar/glucose water for first 3 days				
Yes	1.000	1.000	1.000	1.000
No	-0,355	0,24156	0,1416	0,70
Children were given sugar/salt/water solution for first 3 days				
Yes	1.000	1.000	1.000	1.000
No	-18,855	33591	0,9996	0,00
Children were given fruit juice first 3 days				
Yes	1.000	1.000	1.000	1.000
No	-15,606	14241,6	0,9991	0,00
Children were given infant formula first 3 days				
Yes	1.000	1.000	1.000	1.000
No	0,33274	0,35404	0,3473	1,39
Children were given tea/infusions first 3 days				
Yes	1.000	1.000	1.000	1.000
No	0,54078	1,03948	0,6029	1,72
Children were given honey first 3 days				
Yes	1.000	1.000	1.000	1.000
No	-18,551	9902,49	0,9985	0,00
Children were given juice of cooked meal first 3 days				
Yes	1.000	1.000	1.000	1.000
No	-18,889	44950,3	0,9997	0,00
Antenatal Care				
1-60 visits	1.000	1.000	1.000	1.000
No care	-0,0122	0,27413	0,9644	0,99
Iron Supplementation				
Yes	1.000	1.000	1.000	1.000
No	-0,4342	0,34364	0,2064	0,65
Vitamin Supplementation				
Yes	1.000	1.000	1.000	1.000
No	0,2263	0,34199	0,5082	1,25

Table IV.2.3. Results of Logistic Regression Analyses for Underweight Children Model III (Continued)

	B	S.E.	Sig.	Exp(B)		
Follic acid Supplementation						
Yes	1.000	1.000	1.000	1.000		
No	-0,172	0,37822	0,6493	0,84		
Nipple						
Yes	1.000	1.000	1.000	1.000		
No	0,26994	0,25481	0,2894	1,31		
Has Fever						
Yes	1.000	1.000	1.000	1.000		
No	0,1979	0,19561	0,3117	1,22		
Place of Delivery			0,0011		*	**
Home	1.000	1.000	1.000	1.000		
Health Centre	-0,0892	0,30721	0,7715	0,91		
Other	2,96012	0,85197	0,0005	19,30	*	**
Has Health Card						
Yes	1.000	1.000	1.000	1.000		
No	-0,2873	0,21894	0,1895	0,75		
Mother's Educational Level			0,3398			
No education/incomp.primary	0,80092	0,63197	0,2050	2,23		
First level	0,47204	0,57314	0,4102	1,60		
Second level and higher	1.000	1.000	1.000	1.000		
Children Under 5			0,3920			
0	1.000	1.000	1.000	1.000		
1	0,63725	1,1254	0,5712	1,89		
2	0,78474	1,11912	0,4832	2,19		
3+	1,10259	1,12776	0,3282	3,01		
Mother's Age			0,1089			
15-19	1.000	1.000	1.000	1.000		
20-24	-1,358	0,49782	0,0064	0,26	*	**
25-29	-1,1277	0,51233	0,0277	0,32	*	
30-34	-1,3508	0,55395	0,0147	0,26	*	
35-39	-0,9219	0,59344	0,1203	0,40		
40-44	-0,8895	0,68871	0,1965	0,41		
45-49	-2,3734	1,43614	0,0984	0,09		

Table IV.2.3. Results of Logistic Regression Analyses for Underweight Children Model III (Continued)

	B	S.E.	Sig.	Exp(B)	
Mother's Smoking Status			0,6060		
Never smoke	1.000	1.000	1.000	1.000	
Rarely smoke	0,00111	0,38037	0,9977	1,00	
Regularly smoke	0,26159	0,27867	0,3479	1,30	
Smoked in the past	0,43248	0,39598	0,2748	1,54	
Mother Tongue			0,7280		
Turkish	1.000	1.000	1.000	1.000	
Kurdish	0,07295	0,31605	0,8175	1,08	
Other	0,36414	0,46534	0,4339	1,44	
Mother's Body Mass Index			0,0670		
Less than 18.5	1.000	1.000	1.000	1.000	
18.5-24.9	-1,0343	0,59208	0,0807	0,36	
25-29.9	-1,2139	0,60179	0,0437	0,30	*
30+	-1,54	0,62928	0,0144	0,21	*
Mother's Employment Status			0,7669		
Not employed	1.000	1.000	1.000	1.000	
All year	0,09865	0,25911	0,7034	1,10	
Seasonal	-0,1267	0,26168	0,6282	0,88	
Type of Place of Residence					
Urban	1.000	1.000	1.000	1.000	
Rural	-0,028	0,24818	0,9101	0,97	
Region			0,2581		
West	1.000	1.000	1.000	1.000	
South	0,07794	0,39688	0,8443	1,08	
Central	0,39225	0,35484	0,2690	1,48	
North	-0,0952	0,5638	0,8659	0,91	
East	0,68713	0,35991	0,0562	1,99	
Household Size			0,8846		
1-3	1.000	1.000	1.000	1.000	
4	0,6017	0,63543	0,3437	1,83	
5	0,57352	0,641	0,3709	1,77	
6	0,51875	0,65484	0,4283	1,68	
7+	0,64834	0,63852	0,3099	1,91	

Table IV.2.3. Results of Logistic Regression Analyses for Underweight Children Model III (Continued)

	B	S.E.	Sig.	Exp(B)	
Wealth Index			0,0254		*
Poorest	0,40836	0,50502	0,4187	1,50	
Poorer	0,46829	0,48838	0,3376	1,60	
Middle	-0,1031	0,51248	0,8405	0,90	
Richer	-1,0405	0,61508	0,0907	0,35	
Richest	1.000	1.000	1.000	1.000	
Water Safety					
Safe	1.000	1.000	1.000	1.000	
Unsafe	-0,1145	0,27511	0,6772	0,89	
Sanitation					
Yes	1.000	1.000	1.000	1.000	
No	-0,3744	0,27559	0,1743	0,69	
Sex of Household Head					
Male	1.000	1.000	1.000	1.000	
Female	-0,0321	0,42116	0,9393	0,97	
Constant	-2,1306	0,79248	0,0072	0,12	

Differences are significant at: * p <0.05; ** p <0.01; otherwise differences are not significant.

The linear score function is:

BXt= - 2.130619 + 1.48 Age of children (12-23) + 1.99 Age of children (24-35) + 2.04 Age of children (36-47) + 1.88 Age of children (48-59) - 0.51 Sex of children (female) + 0.81 Duration of breastfeeding (24+ months) + 2.65 Birth weight (less than 2500) + 2.32 Birth weight (don't know) + 2.01 Birth weight (2500-3999) + 2.96 Place of delivery (other) – 1.35 Mother age (20-24) –1.12 Mother age (25-29) – 1.35 Mother age (30-34) – 1.21 Body mass index (25-29.9) + 1.54 Body mass index (30+) + 0.40 Wealth ındex

The children whose mothers body mass index is 30 and above are 0.2 less likely to being underweight than those mothers body mass index is under 18.5. The odds

of being underweight is decreasing as the children whose mothers body mass index increases. This result too is not surprising. Inadequate and unbalanced nutrition of the mother directly effects the health of the children. Therefore, pregnant women should be informed about the importance of nutrition during pregnancy both for their own and for their child's health.

As expected, wealth index is a highly effective predictor of being underweight. The odds of being underweight increasing as the wealth index decreases. The children living in poorest wealth index households have a greater risk of being underweight than those living highest wealth index. It is probable, that as the household gets more affluent, indicators, such as the rate of antenatal visits, percentage of deliveries at health centers and alike do increase.

Underweight Status: Estimates of the coefficients (together with their standard errors and significance level) for underweight status are given in Table IV.2.3. The effective factors for underweight are: age of children, sex of children, birth order, duration of breastfeeding, birth weight, place of delivery, mother's age, mother's body mass index, wealth index.

CHAPTER V

CONCLUSION

Good nutrition is the cornerstone for survival, health and development of present and future generations. Well-nourished children perform better in school, grow into healthy adults and in turn give their children a better start in life. Well-nourished women face fewer risks during pregnancy and childbirth, and their children set off on developmental paths, both physically and mentally.

Malnutrition is characterized by an imbalance and/or deficiency of nutrients in the body. Such imbalances are produced most commonly by the relative deficiency of protein, carbonhydrates and fat, as sources of energy and micronutrients, minerals and vitamins. These deficiencies are followed by pathophysiological changes that are first reflected in functional impairments and later by biochemical and physical damage.

Undernutrition is implicated in more than half of all child deaths worldwide. Undernourished children have lowered resistance to infection; they are more likely to die from common childhood ailments like diarrhoeal diseases and respiratory infections, and for those who survive, frequent illness saps their nutritional status, locking them into a vicious cycle of recurring sickness and faltering growth. Their plight is largely invisible: three quarters of the children who die from causes related to malnutrition were only mildly or moderately undernourished, showing no outward sign of their vulnerability.

Many children suffer from multiple types of malnutrition, so numbers tend to overlap. But it is reliably estimated that globally 226 million children are stunted.

Protein energy malnutrition is a major health problem in Turkey and it affects growth and development of younger children. According to Turkey Demographic Health Surveys, 8,3 % of children under age 5 were underweight in 1998 and 3,9 %in 2003 (TDHS-2003). Although the rate of malnutrition is decreasing, regional and urban- rural differences are still significant.

Data on children's nutritional situation is presented in the TDHS–2003 report. However, the phenomenon is multidimensional and detailed analyses are not presented in that study. Because of that, this thesis is attempting to include both descriptive and multivariate analysis. The determinants of malnutrition and also the relations between the determinants and their impact degrees on malnutrition were discussed. So, this study may be viewed as complementing the TDHS-2003.

Our study aimed to examine the nutritional status of children, under five years of age, in Turkey. The information about the extent of child malnutrition, the malnutrition patterns, and determinants of malnutrition examined in detail. The TDHS-2003 report findings used. Determinants of three forms of malnutrition examined; stunting, wasting and underweight. There is 12.2 % stunting, 0.7 % wasting and 3.9 % underweight among children in Turkey. The results of descriptive analysis are valid for all malnutrition forms.

The association between being stunted and the variables as follows:

Age of children, sex of children, birth order, breastfeeding, wanting status of pregnancy, birth weight, initial breastfeeding, children were given infant formula for first 3 days, drink from bottle with nipple, vaccination, mother's education, mother's age, antenatal care, iron, vitamin and folic acid supplementation, mother's smoking status, type of place of residence, region, household size, wealth index, safe water and sanitation.

The association between being wasted and the variables as follows:

Sex of children, birth order, breastfeeding, initial breastfeeding, children were given milk other than breast milk for first 3 days, children were given infant formula first 3 days, vaccination and wealth index.

The association between being underweight and the variables as follows:

Age of children, sex of children, birth order, breastfeeding, wanting status of pregnancy, birth weight, initial breastfeeding, children were given sugar/glucose water for first 3 days, drink from bottle with nipple, vaccination, mother's education, antenatal visits, iron, vitamin and folic acid supplementation, mother tongue, mother's body mass index, type of place of residence, region, household members, wealth index, safe water and sanitation.

In our multivariate analysis, the variables related to children, mother and environment are studied as determinants of malnutrition. Individual variables and intervention strategies are also covered.

For stunting; age of children, duration of breastfeeding, birth weight, place of delivery, region, number of household members, wealth index, sex of household head the significant determinants.

For wasting; age of children, sex of children, duration of breastfeeding, initial breastfeeding, place of delivery the significant determinants.

For underweight; age of children, sex of children, duration of breastfeeding, birth weight, place of delivery, mother's age, mother's body mass index, wealth index the significant determinants.

Age of children: Children less than 6 months are less malnourished, but as children grow older there is a greater stunting and underweight. This negative relationship is further explained through the negative coefficient in the case of stunting and underweight and the positive coefficients. Stunting is an indicator of chronic malnutrition and is resulting from an inadequate intake of food for a long time. The rate of stunting is increasing with the age of children under 5, which shows that at these ages children are exposed to inadequate and unbalanced nutrition. On the other hand, as the children grow older wasting is decreasing. So the malnutrition form of stunting and underweight intervention should start in early childhood. Similar results are found in the study of Tharakan and Suchindran (1999).

Duration of breastfeeding: This is a a factor associated with all three types of malnutrition. Duration of breastfeeding has a major influence on a child's nutritional status. The prolonged breastfeeding is leading to significant stunting, wasting and underweight. Garipağaoğlu (1993) reported that after weaning, many infants showed improved growth. The negative relationship of nutritional status with prolonged breastfeeding is seen from the significant coefficients. Although breastfeeding is very common in Turkey, only 44 % of infants are exclusive breastfeeding within the two months. Both an early as well as late introduction of complementary feeding may have harmful effects for the infant. It concluded that prolonged breastfeeding leads to and enhances the chance of malnutrition among children. The child should be introduced to complementary foods at the right stage of its development. Further studies for an ideal weaning period are needed. Meanwhile, mothers in Turkey must be encouraged to add nutritious supplements

to their infant's after the sixth months. Similar results are also found by Ricci and Becker (1996), Alvarado et al.(2002) and Tharakan and Suchindran (1999).

The pattern of infant feeding has an important influence on the health of children. Feeding practices are the principal determinant of a young child's nutritional status, poor nutritional status has been shown to increase the risk of illness and death among children.

Optimal infant feeding is defined by WHO and UNICEF as follows: (WHO/ UNICEF 1990; WHO 1994):

-Initiation of breastfeeding within about 30 to 60 minutes of birth; frequent, on demand feeding (including night feeds)

-Exclusive breastfeeding (defined as breast milk only and no other foods or liquids until the infant is abut six months of age)

-Breastfeeding complemented with hygienically prepared, appropriate local foods at about six months of age

-Increased breastfeeding during illness and recovery continued breastfeeding well into the second year of life and beyond

Place of delivery: Children who are born in health centres have lesser stunting and underweight than those born at home. But regarding with wasting it is vice versa. The logistic model indicates that children from home births have a greater chance to being stunting and underweight.

Birth weight: Low birth weight is a factor associated with stunting and underweight. Similar results are also found by Motta et al.(2005), Marins and Almeida (2002) and Tharakan and Suchindran (1999). Birth weight is affected by the health and care of the mother. The intervention needed is special health care and special nutrition education for pregnant women.

Region: Regional variations are observed in stunting. In some rural locations where environmental, economic and other factors may expose children to a high risk of malnutrition and food insecurity. Children who are living in East and North region are more stunting than their counterparts. In some rural areas characterized by poor health conditions, declining agricultural productivity, widespread poverty and low income diversification, 25 % of children under five suffer from stunting. As a policy implication, it can be suggested that the region's women can be educated via relevant television programs.

Number of household members: Children from 7+ member households have more chance of stunting. When the number of members in a households increases the chances of getting adequate food for all household members may drop. Similar results are also found by Bordon and Fernandez (1996). Living in extended family, in crowded conditions with little money available for food, they tend to consume unbalanced diets that are high in calories but lacking other essential nutrients. So their nutritional status is generally poor. More spesific information is needed about the groups of children who are at high risk of food insecurity and the factors that create this risk. Much of the effort to date has focused on finding ways to identify spesific geographic areas where vulnerable and food insecure people are most likely to be found. Policies should be implemented to increase regional differences in food insecurity.

Wealth index: This is a significant factor for stunting and underweight. The prevalence of stunting and wasting among children increase as societies' wealth indices decrease. Also environmental health conditions in households with lower socio-economic status may be negative. Within these conditions children are more exposed to infectionious diseases. Acute malnutrition may directly lead to wasting. Similar results are also found by Jeyaseelan and Lakshman (1997). As an intervention measure, poverty should be alleviated and differences in wealth distribution should be minimized.

Sex of household head: Children from male headed households have less chance of malnutrition especially stunting than their counterparts in female headed households. This may be because of the economic vulnerability of female headed households as they may be single parent children. Social and governmental support for children of single mothers can be the way to intervene.

Initial breastfeeding: Children who took initial breastfeeding immediately have less chance of wasting than their counterparts who took one day later. Initial breastfeeding (colostrum), a premilk substance containing antibodies and white cells from the mother's blood, is produced during the first 2-3 days of lactation. Colostrum contains maternal immune factors and helps protect the newborn infant from infections. There is evidence that links having been breastfed as a child with stronger intellectual development and a reduced risk of cancer, obesity and several chronic diseases. The early initiation of breastfeeding is also beneficial for the mother since it stimulates breast milk production and reduces risk of ovarian cancer and pre-menopausal breast cancer. In that respect, all mothers should be encouraged for initial breastfeeding.

Sex of children: There is a greater probability of female children's being wasting than male ones. On the other hand, there is a greater probability of male children's being wasting than female ones.

Mother's age: Children whose mothers are aged 15- 19 years seem to have higher underweight probabilities compared to their counterparts with elder mothers. This is possibly due to the fact that younger mothers may not be aware of proper child care and nutrition. Similar results are also found by Rikimaru (1998).

Mother's body mass index: Children with mothers less than 18.5 BMIs have a greater probability of being underweight. This is not surprising since mothers with lower weights may give births to underweight babies. Inadequate and unbalanced nutrition of the mother directly effects the health of the children. Therefore, pregnant women should be informed about the importance of nutrition during pregnancy both for their own and for their child's health. It is recommended that pregnant women take antenatal care on a regular basis and participate in educational programs related to nutrition.

This study also contains information about insignificant variables. Some variables/factors, though generally mentioned in the literature, are found to have no significant effect three forms of malnutrition. These are mother's education status, safe water and sanitation.

In Turkey, the most important indicator of malnutrition for children aged under 5 years, is underweight. Because underweight shows both acute and chronical malnutrition. The weight for age index does not distinguish between chronic malnutrition (stunting) and acute malnutrition (wasting). A child can be underweight for age because of stunting, because of wasting or because of both stunting and wasting. Weight for age is a good overall indicator of a population's general health.

Although improvements in the nutrition of under five children have been observed in recent years stunting and underweight is still an important problem. Economic, demographic and environmental factors are leading to the mentioned problems. If risk factors are reduced improvements in the nutritional status of children can be expected. More research should be undertaken in this direction.

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APPENDIX A

Table A.1. Collinearity of Variables for Stunting

	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
	-39,7250	387,5359		-0,1025	0,9184		
Age in months	-6,1258	0,9210	-0,1241	-6,6512	0,0000	0,7928	1,2614
female	12,7290	28,5984	0,0074	0,4451	0,6563	0,9882	1,0119
Birth order nb	12,4167	11,4809	0,0309	1,0815	0,2795	0,3375	2,9632
rural	-45,2826	36,6969	-0,0251	-1,2340	0,2173	0,6662	1,5010
south	14,9312	47,3522	0,0060	0,3153	0,7525	0,7593	1,3171
central	33,5047	42,3964	0,0156	0,7903	0,4294	0,7080	1,4124
north	-35,9577	65,7438	-0,0099	-0,5469	0,5845	0,8470	1,1807
east	-0,4468	49,0054	-0,0002	-0,0091	0,9927	0,4110	2,4329
firstlev	103,1578	47,0246	0,0603	2,1937	0,0283	0,3655	2,7360
secondle	127,9657	71,4486	0,0396	1,7910	0,0734	0,5642	1,7726
highlev	84,3690	68,0994	0,0345	1,2389	0,2155	0,3565	2,8054
household size	12,1195	6,2450	0,0460	1,9407	0,0524	0,4907	2,0380
Nb of children 5	-12,0453	18,4397	-0,0145	-0,6532	0,5137	0,5585	1,7907
poorer	-52,9533	45,0416	-0,0254	-1,1757	0,2398	0,5891	1,6976
middle	-20,1227	49,6287	-0,0092	-0,4055	0,6852	0,5332	1,8754
richer	-9,8896	51,4683	-0,0046	-0,1922	0,8476	0,4763	2,0996
richest	-24,3899	60,2483	-0,0101	-0,4048	0,6856	0,4403	2,2713
Age 5-year grps	15,5455	16,9603	0,0215	0,9166	0,3594	0,5036	1,9856
notsafew	2,9740	49,6507	0,0013	0,0599	0,9522	0,6128	1,6318
nonsanit	-24,5013	50,9726	-0,0084	-0,4807	0,6308	0,9073	1,1022
breastfeeding	-5,3590	1,6230	-0,0593	-3,3019	0,0010	0,8559	1,1684
later	40,8473	44,0601	0,0160	0,9271	0,3539	0,9253	1,0807
nomore	-44,6197	42,8330	-0,0211	-1,0417	0,2976	0,6738	1,4842
Antenatal visits	-0,0909	1,5934	-0,0010	-0,0570	0,9545	0,8850	1,1299
Birth weight	0,0051	0,0064	0,0188	0,8040	0,4215	0,5038	1,9848
Initial breastfeeding	-0,1614	0,2100	-0,0142	-0,7685	0,4422	0,8127	1,2304
no	-101,0289	46,0026	-0,0578	-2,1962	0,0281	0,3989	2,5072
noo	100,5081	45,1586	0,0571	2,2257	0,0261	0,4193	2,3850
rarelysm	55,6456	50,2681	0,0191	1,1070	0,2684	0,9307	1,0745
regulrsm	15,2157	41,0975	0,0065	0,3702	0,7112	0,8926	1,1203
smopast	-49,8834	57,0497	-0,0149	-0,8744	0,3820	0,9510	1,0515
f3dmno	8,5067	64,3394	0,0023	0,1322	0,8948	0,9305	1,0746
f3dpwno	-35,5028	71,6122	-0,0085	-0,4958	0,6201	0,9472	1,0557
f3dorsno	20,3984	38,9351	0,0098	0,5239	0,6004	0,7807	1,2810
f3dfjno	36,1885	299,2055	0,0025	0,1209	0,9037	0,6485	1,5421
f3dıfno	-39,5563	46,7587	-0,0152	-0,8460	0,3976	0,8601	1,1626
f3dteano	155,6775	229,1758	0,0130	0,6793	0,4970	0,7521	1,3295
f3dhno	80,0196	222,3706	0,0069	0,3598	0,7190	0,7607	1,3145
f3dcmno	-161,6802	515,3295	-0,0074	-0,3137	0,7537	0,4904	2,0391

Table A.1. Collinearity of Variables for Stunting (Continued)

	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
motonkur	2,3148	50,2162	0,0012	0,0461	0,9632	0,4176	2,3949
motonoth	-66,5881	78,7084	-0,0151	-0,8460	0,3976	0,8616	1,1607
fflprima	-55,6580	32,9943	-0,0324	-1,6869	0,0917	0,7485	1,3359
fslprima	-20,0933	75,1450	-0,0048	-0,2674	0,7892	0,8473	1,1803
fhgschoo	-74,2828	76,1040	-0,0178	-0,9761	0,3291	0,8293	1,2059
BMI	0,0039	0,0312	0,0023	0,1262	0,8996	0,8493	1,1774
nippleno	95,2914	32,8009	0,0531	2,9051	0,0037	0,8259	1,2108

Table A.2. Collinearity of Variables for Wasting

	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
	-150,6275	382,5341		-0,3938	0,6938		
Age in months	-4,8713	0,9091	-0,1001	-5,3581	0,0000	0,7928	1,2614
female	4,2483	28,2274	0,0025	0,1505	0,8804	0,9882	1,0119
Birth order number	11,8681	11,3319	0,0300	1,0473	0,2950	0,3369	2,9681
rural	-36,7753	36,2243	-0,0207	-1,0152	0,3101	0,6660	1,5015
south	39,2862	46,7419	0,0160	0,8405	0,4007	0,7593	1,3171
central	29,7235	41,8501	0,0140	0,7102	0,4776	0,7080	1,4124
north	3,8006	64,8964	0,0011	0,0586	0,9533	0,8470	1,1807
east	27,2383	48,3743	0,0146	0,5631	0,5734	0,4109	2,4338
firstlev	89,1769	46,4184	0,0529	1,9212	0,0548	0,3654	2,7364
secondle	118,5005	70,5259	0,0372	1,6802	0,0930	0,5642	1,7725
highlev	72,6289	67,2194	0,0301	1,0805	0,2800	0,3565	2,8052
household size	14,5178	6,1644	0,0559	2,3551	0,0186	0,4904	2,0393
Nb of children 5	-6,9831	18,2022	-0,0085	-0,3836	0,7013	0,5583	1,7911
poorer	-65,5145	44,4599	-0,0319	-1,4736	0,1407	0,5891	1,6976
middle	-55,9599	48,9892	-0,0260	-1,1423	0,2534	0,5332	1,8754
richer	-51,4071	50,8050	-0,0244	-1,0118	0,3117	0,4763	2,0996
richest	-87,5121	59,4722	-0,0369	-1,4715	0,1413	0,4403	2,2713
Age 5-year grps	15,6434	16,7417	0,0219	0,9344	0,3502	0,5032	1,9873
notsafew	0,8788	49,0103	0,0004	0,0179	0,9857	0,6123	1,6331
nonsanit	-17,3354	50,2873	-0,0060	-0,3447	0,7303	0,9069	1,1026
breastfeeding	-4,5555	1,6020	-0,0511	-2,8436	0,0045	0,8557	1,1686
later	54,7051	43,4927	0,0218	1,2578	0,2085	0,9253	1,0808
nomore	-44,6795	42,2807	-0,0214	-1,0567	0,2907	0,6734	1,4851
Antenatal visits	-0,0658	1,5728	-0,0007	-0,0418	0,9667	0,8850	1,1299
Birth weight	0,0054	0,0063	0,0201	0,8557	0,3922	0,5037	1,9855
initial breastfeeding	-0,1046	0,2073	-0,0093	-0,5048	0,6138	0,8125	1,2308
no	-105,4754	45,4102	-0,0612	-2,3227	0,0203	0,3988	2,5078
noo	114,8246	44,5770	0,0662	2,5759	0,0100	0,4192	2,3856
rarelysm	52,2556	49,6203	0,0182	1,0531	0,2924	0,9307	1,0745
regulrsm	35,3424	40,5680	0,0153	0,8712	0,3837	0,8926	1,1203
smopast	-52,2737	56,3149	-0,0158	-0,9282	0,3533	0,9510	1,0515
f3dmno	-12,0283	63,5107	-0,0033	-0,1894	0,8498	0,9305	1,0746
f3dpwno	-30,3392	70,6889	-0,0073	-0,4292	0,6678	0,9473	1,0557
f3dorsno	35,2098	38,4322	0,0173	0,9162	0,3597	0,7803	1,2816
f3dfjno	82,3486	295,3519	0,0058	0,2788	0,7804	0,6485	1,5421
f3dıfno	-35,7266	46,1562	-0,0139	-0,7740	0,4390	0,8601	1,1626
f3dteano	140,3195	226,2241	0,0119	0,6203	0,5351	0,7521	1,3295
f3dhno	100,5259	219,5052	0,0087	0,4580	0,6470	0,7607	1,3145
f3dcmno	-113,3091	508,6926	-0,0053	-0,2227	0,8237	0,4904	2,0391

Table A.2. Collinearity of Variables for Wasting (Continued)

	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
motonkur	1,0420	49,5695	0,0005	0,0210	0,9832	0,4174	2,3960
motonoth	-56,6516	77,6944	-0,0131	-0,7292	0,4660	0,8616	1,1607
fflprima	-60,6798	32,5693	-0,0358	-1,8631	0,0625	0,7484	1,3361
fslprima	-26,0747	74,1773	-0,0064	-0,3515	0,7252	0,8473	1,1803
fhgschoo	-79,1618	75,1239	-0,0192	-1,0537	0,2921	0,8293	1,2059
BMI	0,0243	0,0308	0,0142	0,7885	0,4305	0,8491	1,1777
nippleno	84,3611	32,3785	0,0477	2,6055	0,0092	0,8258	1,2109

Table A.3. Collinearity of Variables for Underweight

	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
	-119,5406	384,5470		-0,3109	0,7559		
Age in months	-6,0048	0,9139	-0,1225	-6,5705	0,0000	0,7928	1,2614
female	10,7001	28,3778	0,0063	0,3771	0,7062	0,9882	1,0119
Birth order nb	12,7112	11,3923	0,0319	1,1158	0,2646	0,3375	2,9632
rural	-40,9990	36,4139	-0,0229	-1,1259	0,2603	0,6662	1,5010
south	25,7465	46,9870	0,0104	0,5479	0,5838	0,7593	1,3171
central	28,7971	42,0694	0,0135	0,6845	0,4937	0,7080	1,4124
north	-19,6263	65,2367	-0,0054	-0,3008	0,7635	0,8470	1,1807
east	9,3407	48,6275	0,0050	0,1921	0,8477	0,4110	2,4329
firstlev	98,4463	46,6619	0,0579	2,1098	0,0349	0,3655	2,7360
secondle	128,5946	70,8976	0,0401	1,8138	0,0698	0,5642	1,7726
highlev	87,4547	67,5742	0,0360	1,2942	0,1957	0,3565	2,8054
household size	12,6605	6,1969	0,0484	2,0430	0,0411	0,4907	2,0380
Nb of children 5	-9,1966	18,2975	-0,0112	-0,5026	0,6153	0,5585	1,7907
poorer	-54,1863	44,6942	-0,0262	-1,2124	0,2254	0,5891	1,6976
middle	-34,7766	49,2460	-0,0161	-0,7062	0,4801	0,5332	1,8754
richer	-21,2396	51,0713	-0,0100	-0,4159	0,6775	0,4763	2,0996
richest	-48,9362	59,7837	-0,0205	-0,8186	0,4131	0,4403	2,2713
Age 5-year grps	15,7651	16,8295	0,0219	0,9368	0,3489	0,5036	1,9856
notsafew	-2,0760	49,2678	-0,0009	-0,0421	0,9664	0,6128	1,6318
nonsanit	-21,4161	50,5795	-0,0074	-0,4234	0,6720	0,9073	1,1022
breastfeeding	-5,2972	1,6105	-0,0590	-3,2892	0,0010	0,8559	1,1684
later	48,2529	43,7203	0,0190	1,1037	0,2698	0,9253	1,0807
nomore	-47,6654	42,5026	-0,0227	-1,1215	0,2622	0,6738	1,4842
Antenatal visits	0,0399	1,5811	0,0004	0,0252	0,9799	0,8850	1,1299
Birth weight	0,0061	0,0063	0,0227	0,9723	0,3309	0,5038	1,9848
initial breastfeeding	-0,1505	0,2084	-0,0133	-0,7225	0,4701	0,8127	1,2304
no	-108,2635	45,6478	-0,0624	-2,3717	0,0178	0,3989	2,5072
noo	112,7573	44,8103	0,0645	2,5163	0,0119	0,4193	2,3850
rarelysm	56,5452	49,8804	0,0195	1,1336	0,2570	0,9307	1,0745
regulrsm	28,6948	40,7805	0,0124	0,7036	0,4817	0,8926	1,1203
smopast	-47,2969	56,6098	-0,0142	-0,8355	0,4035	0,9510	1,0515
f3dmno	0,8547	63,8432	0,0002	0,0134	0,9893	0,9305	1,0746
f3dpwno	-30,2541	71,0599	-0,0073	-0,4258	0,6703	0,9472	1,0557
f3dorsno	27,5316	38,6349	0,0134	0,7126	0,4761	0,7807	1,2810
f3dfjno	62,1847	296,8979	0,0043	0,2094	0,8341	0,6485	1,5421
f3dıfno	-35,5513	46,3981	-0,0137	-0,7662	0,4436	0,8601	1,1626
f3dteano	155,3405	227,4083	0,0131	0,6831	0,4946	0,7521	1,3295
f3dhno	87,6471	220,6556	0,0076	0,3972	0,6912	0,7607	1,3145
f3dcmno	-143,3878	511,3551	-0,0066	-0,2804	0,7792	0,4904	2,0391

Table A.3. Collinearity of Variables for Underweight (Continued)

	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
motonkur	-3,0707	49,8290	-0,0016	-0,0616	0,9509	0,4176	2,3949
motonoth	-63,1906	78,1014	-0,0145	-0,8091	0,4185	0,8616	1,1607
fflprima	-59,9995	32,7398	-0,0352	-1,8326	0,0669	0,7485	1,3359
fslprima	-21,4535	74,5655	-0,0052	-0,2877	0,7736	0,8473	1,1803
fhgschoo	-83,3887	75,5171	-0,0201	-1,1042	0,2696	0,8293	1,2059
BMI	0,0255	0,0310	0,0148	0,8242	0,4099	0,8493	1,1774
nippleno	93,8395	32,5480	0,0527	2,8831	0,0040	0,8259	1,2108

APPENDIX B

Table B.1. Results of Logistic Regression Analyses For Stunting Children Model I (Children Related Variables)

Variables	B	S.E.	Sig.	Exp(B)	
Age of children (in months)			0,120		
0-5				1.000	
6-11	-1,48646	1,219098	0,223	0,23	
12-23	-2,23634	1,211934	0,065	0,11	
24-35	-2,70278	1,244827	0,030	0,07	*
36-47	-3,36323	1,313392	0,010	0,03	*
48-59	-3,0379	1,275756	0,017	0,05	*
Sex of children					
Male				1.000	
Female	0,917741	0,483925	0,058	2,50	
Birth order			0,325		
1				1.000	
2-3	0,559376	0,6243	0,370	1,75	
4-5	0,497661	0,806647	0,537	1,64	
6+	-1,03009	1,114357	0,355	0,36	
Duration of breastfeeding			0,104		
Never breastfed/less than 6 months				1.000	
6-11	2,159449	1,072436	0,044	8,67	*
12-24	2,715321	1,093811	0,013	15,11	*
24+	-14,5873	2698,239	0,996	0,00	
Wanting status of pregnancy			0,821		
Then				1.000	
Later	-0,19565	0,72465	0,787	0,82	
No more	0,284291	0,583299	0,626	1,33	
Birthweight			0,868		
Less than 2500				1.000	
Don't know	0,922425	1,159934	0,426	2,52	
Not weighed	0,857185	1,502397	0,568	2,36	
2500-3999	0,923307	1,196377	0,440	2,52	
4000+	0,344687	1,04975	0,743	1,41	
Initial breastfeeding			0,023		*
Immediately				1.000	
Within one day	-0,5944	0,657189	0,366	0,55	
After one day	1,228166	0,589129	0,037	3,41	*
Children were given milk other than breast milk for first 3 days					
Yes				1.000	
No	-16,0647	2562,977	0,995	0,00	
Children were given plain water for first 3 days					
Yes				1.000	
No	0,262493	1,061255	0,805	1,30	

Table B.1. Results of Logistic Regression Analyses For Stunting Children Model I (Children Related Variables) (Continued)

Variables	B	S.E.	Sig.	Exp(B)	
Children were sugar/glucose water for first 3 days					
Yes				1.000	
No	-0,78291	0,611222	0,200	0,46	
Children were given sugar/salt/water solution for first 3 days					
Yes				1.000	
No	-16,7363	32121,22	1,000	0,00	
Children were given fruit juice first 3 days					
Yes				1.000	
No	-14,4888	13495,91	0,999	0,00	
Children were given infant formula first 3 days					
Yes				1.000	
No	-0,45934	0,907712	0,613	0,63	
Children were given tea/infusions for first 3 days					
Yes				1.000	
No	-16,9863	8601,364	0,998	0,00	
Children were given honey for first 3 days					
Yes				1.000	
No	-17,4645	9511,508	0,999	0,00	
Children were given juice of cooked meal for first 3 days					
Yes				1.000	
No	-15,2217	45259,7	1,000	0,00	
Antenatal visits					
1-60 visits				1.000	
No antenatal care	0,32434	0,656678	0,621	1,38	
Iron supplementation					
Yes				1.000	
No	-0,78383	0,720343	0,277	0,46	
Vitamin supplementation					
Yes				1.000	
No	0,010184	0,732756	0,989	1,01	
Follic acid supplementation					
Yes				1.000	
No	-0,55852	0,904177	0,537	0,57	
Nipple					
Yes				1.000	
No	0,225357	0,539043	0,676	1,25	
Has Fever					
Yes				1.000	
No	-0,97374	0,517501	0,060	0,38	
Place of delivery			0,000		**
Home					
Health Centre	-0,13081	0,748492	0,861	0,88	
Other	4,760803	1,2565	0,000	116,84	**

Table B.1. Results of Logistic Regression Analyses For Stunting Children Model I (Children Related Variables) (Continued)

Variables	B	S.E.	Sig.	Exp(B)
Has Health Card				
Yes				1.000
No	-0,68699	0,530072	0,195	0,50
Constant	-7,20385	674,5602	0,991	0,00

Table B.2. **Results of Logistic Regression Analyses For Stunting Children Model II (Children and Mother Related Variables)**

Variables	B	S.E.	Sig.	Exp(B)	
Age of children (in months)			0,150		
0-5				1.000	
6-11	-1,48522	1,266175	0,241	0,23	
12-23	-2,34079	1,238771	0,059	0,10	
24-35	-2,87433	1,279095	0,025	0,06	*
36-47	-3,33128	1,346388	0,013	0,04	*
48-59	-2,9368	1,29882	0,024	0,05	*
Sex of children					
Male				1.000	
Female	0,927385	0,500757	0,064	2,53	
Birth order			0,316		
1				1.000	
2-3	0,715386	0,731624	0,328	2,04	
4-5	0,490908	0,982232	0,617	1,63	
6+	-0,96945	1,366729	0,478	0,38	
Duration of breastfeeding			0,090		
Never breastfed/less than 6 months				1.000	
6-11	2,146519	1,092651	0,049	8,56	*
12-24	2,821248	1,110092	0,011	16,80	*
24+	-14,9176	2526,397	0,995	0,00	
Pregnancy wanted			0,888		
Then				1.000	
Later	-0,12649	0,771762	0,870	0,88	
No more	0,250443	0,620261	0,686	1,28	
Birthweight			0,852		
Less than 2500				1.000	
Don't know	1,121099	1,251318	0,370	3,07	
Not weighed	1,144275	1,597695	0,474	3,14	
2500-3999	0,908382	1,292913	0,482	2,48	
4000+	0,410943	1,114711	0,712	1,51	
Initial breastfeeding			0,042		*
Immediately				1.000	
Within one day	-0,61853	0,675089	0,360	0,54	
After one day	1,150163	0,629121	0,068	3,16	
Children were given milk other than breast milk for first 3 days					
Yes				1.000	
No	-15,7951	2443,124	0,995	0,00	
Children were given plain water for first 3 days					
Yes				1.000	
No	0,435948	1,074931	0,685	1,55	
Children were sugar/glucose water for first 3 days					
Yes				1.000	
No	-0,55771	0,640675	0,384	0,57	

Table B.2. **Results of Logistic Regression Analyses For Stunting Children Model II (Children and Mother Related Variables) (Continued)**

Variables	B	S.E.	Sig.	Exp(B)	
Children were given sugar/salt/water solution for first 3 days					
Yes				1.000	
No	-14,3154	33748,4	1,000	0,00	
Children were given fruit juice first 3 days					
Yes				1.000	
No	-15,3417	12857,51	0,999	0,00	
Children were given infant formula first 3 days					
Yes				1.000	
No	-0,81397	0,980096	0,406	0,44	
Children were given tea/infusions for first 3 days					
Yes				1.000	
No	-17,6691	7645,738	0,998	0,00	
Children were given honey for first 3 days					
Yes				1.000	
No	-17,3614	8787,178	0,998	0,00	
Children were given juice of cooked meal for first 3 days					
Yes				1.000	
No	-14,9107	47007,57	1,000	0,00	
Antenatal visits					
1-60 visits				1.000	
No antenatal care	0,255426	0,712512	0,720	1,29	
Iron supplementation					
Yes				1.000	
No	-0,80413	0,758413	0,289	0,45	
Vitamin supplementation					
Yes				1.000	
No	0,058911	0,787615	0,940	1,06	
Follic acid supplementation					
Yes				1.000	
No	-0,82494	0,935425	0,378	0,44	
Nipple					
Yes				1.000	
No	0,212692	0,570775	0,709	1,24	
Has Fever					
Yes				1.000	
No	-0,90025	0,544219	0,098	0,41	
Place of delivery			0,000		**
Home				1.000	
Health Centre	-0,13279	0,78799	0,866	0,88	
Other	5,54349	1,470492	0,000	255,57	**
Has Health Card					
Yes				1.000	
No	-0,69928	0,59856	0,243	0,50	

Table B.2. **Results of Logistic Regression Analyses For Stunting Children Model II (Children and Mother Related Variables) (Continued)**

Variables	B	S.E.	Sig.	Exp(B)
Mother's Educational Status			0,415	
No education/incomp.primary				1.000
First level	0,121847	1,010216	0,904	1,13
Second level and higher	-0,65221	0,802724	0,417	0,52
Children under 5			0,656	
0				1.000
1	15,63789	3597,666	0,997	6186586,41
2	15,11801	3597,666	0,997	3678463,50
3+	15,93247	3597,666	0,996	8305874,08
Mother's Age			0,801	
15-19				1.000
20-24	-0,0488	1,328385	0,971	0,95
25-29	0,554087	1,340046	0,679	1,74
30-34	-0,56489	1,488537	0,704	0,57
35-39	0,522283	1,587791	0,742	1,69
40-44	0,938209	1,795622	0,601	2,56
45-49	-16,5888	6608,532	0,998	0,00
Mother's Smoking Status			0,829	
Never smoke				1.000
Rarely smoke	0,593537	0,779527	0,446	1,81
Regularly smoke	-0,15321	0,79436	0,847	0,86
Smoked in the past	0,424045	0,831178	0,610	1,53
Mother Tongue			0,574	
Turkish				1.000
Kurdish	-0,74079	0,70997	0,297	0,48
Other	-0,56852	1,212964	0,639	0,57
Mother's Body Mass Index			0,382	
Less than 18.5				1.000
18.5-24.9	16,19824	4582,226	0,997	10834406,61
25-29.9	15,4151	4582,226	0,997	4951004,45
30+	15,1161	4582,226	0,997	3671462,93
Mother's Employment Status			0,243	
Not employed				1.000
All year	-0,04947	0,611305	0,936	0,95
Seasonal	-2,06828	1,233623	0,094	0,13
Constant	-17,7438	1847,011	0,992	0,00

Table B.3. Results of Logistic Regression Analyses For Wasting Children Model I

Variables	B	S.E.	Sig.	Exp(B)	
Age of children (in months)			0,120		
0-5				1.000	
6-11	-1,48646	1,219098	0,223	0,23	
12-23	-2,23634	1,211934	0,065	0,11	
24-35	-2,70278	1,244827	0,030	0,07	*
36-47	-3,36323	1,313392	0,010	0,03	*
48-59	-3,0379	1,275756	0,017	0,05	*
Sex of children					
Male				1.000	
Female	0,917741	0,483925	0,058	2,50	
Birth order			0,325		
1				1.000	
2-3	0,559376	0,6243	0,370	1,75	
4-5	0,497661	0,806647	0,537	1,64	
6+	-1,03009	1,114357	0,355	0,36	
Duration of breastfeeding			0,104		
Never breastfed/less than 6 months				1.000	
6-11	2,159449	1,072436	0,044	8,67	*
12-24	2,715321	1,093811	0,013	15,11	*
24+	-14,5873	2698,239	0,996	0,00	
Pregnancy wanted			0,821		
Then				1.000	
Later	-0,19565	0,72465	0,787	0,82	
No more	0,284291	0,583299	0,626	1,33	
Birthweight			0,868		
Less than 2500				1.000	
Don't know	0,922425	1,159934	0,426	2,52	
Not weighed	0,857185	1,502397	0,568	2,36	
2500-3999	0,923307	1,196377	0,440	2,52	
4000+	0,344687	1,04975	0,743	1,41	
Initial breastfeeding			0,023		*
Immediately				1.000	
Within one day	-0,5944	0,657189	0,366	0,55	
After one day	1,228166	0,589129	0,037	3,41	*
Children were given milk other than breast milk for first 3 days					
Yes				1.000	
No	-16,0647	2562,977	0,995	0,00	
Children were given plain water for first 3 days					
Yes				1.000	
No	0,262493	1,061255	0,805	1,30	
Children were sugar/glucose water for first 3 days					
Yes				1.000	
No	-0,78291	0,611222	0,200	0,46	

Table B.3. Results of Logistic Regression Analyses For Wasting Children Model I (Continued)

Variables	B	S.E.	Sig.	Exp(B)	
Children were given sugar/salt/water solution for first 3 days					
Yes				1.000	
No	-16,7363	32121,22	1,000	0,00	
Children were given fruit juice first 3 days					
Yes				1.000	
No	-14,4888	13495,91	0,999	0,00	
Children were given infant formula first 3 days					
Yes				1.000	
No	-0,45934	0,907712	0,613	0,63	
Children were given tea/infusions for first 3 days					
Yes				1.000	
No	-16,9863	8601,364	0,998	0,00	
Children were given honey for first 3 days					
Yes				1.000	
No	-17,4645	9511,508	0,999	0,00	
Children were given juice of cooked meal for first 3 days					
Yes				1.000	
No	-15,2217	45259,7	1,000	0,00	
Antenatal visits					
1-60 visits				1.000	
No antenatal care	0,32434	0,656678	0,621	1,38	
Iron supplementation					
Yes				1.000	
No	-0,78383	0,720343	0,277	0,46	
Vitamin supplementation					
Yes				1.000	
No	0,010184	0,732756	0,989	1,01	
Follic acid supplementation					
Yes				1.000	
No	-0,55852	0,904177	0,537	0,57	
Nipple					
Yes				1.000	
No	0,225357	0,539043	0,676	1,25	
Has Fever					
Yes				1.000	
No	-0,97374	0,517501	0,060	0,38	
Place of delivery			0,000		**
Home				1.000	
Health Centre	-0,13081	0,748492	0,861	0,88	
Other	4,760803	1,2565	0,000	116,84	**
Has Health Card					
Yes				1.000	
No	-0,68699	0,530072	0,195	0,50	
Constant	-7,20385	674,5602	0,991	0,00	

Table B.4.	**Results of Logistic Regression Analyses For Wasting Children Model II**				
Variables	**B**	**S.E.**	**Sig.**	**Exp(B)**	
Age of children (in months)			0,150		
0-5				1.000	
6-11	-1,48522	1,266175	0,241	0,23	
12-23	-2,34079	1,238771	0,059	0,10	
24-35	-2,87433	1,279095	0,025	0,06	*
36-47	-3,33128	1,346388	0,013	0,04	*
48-59	-2,9368	1,29882	0,024	0,05	*
Sex of children					
Male				1.000	
Female	0,927385	0,500757	0,064	2,53	
Birth order			0,316		
1				1.000	
2-3	0,715386	0,731624	0,328	2,04	
4-5	0,490908	0,982232	0,617	1,63	
6+	-0,96945	1,366729	0,478	0,38	
Duration of breastfeeding			0,090		
Never breastfed/less than 6 months				1.000	
6-11	2,146519	1,092651	0,049	8,56	*
12-24	2,821248	1,110092	0,011	16,80	*
24+	-14,9176	2526,397	0,995	0,00	
Wanting status of pregnancy			0,888		
Then				1.000	
Later	-0,12649	0,771762	0,870	0,88	
No more	0,250443	0,620261	0,686	1,28	
Birthweight			0,852		
Less than 2500				1.000	
Don't know	1,121099	1,251318	0,370	3,07	
Not weighed	1,144275	1,597695	0,474	3,14	
2500-3999	0,908382	1,292913	0,482	2,48	
4000+	0,410943	1,114711	0,712	1,51	
Initial breastfeeding			0,042		*
Immediately				1.000	
Within one day	-0,61853	0,675089	0,360	0,54	
After one day	1,150163	0,629121	0,068	3,16	
Children were given milk other than breast milk for first 3 days					
Yes				1.000	
No	-15,7951	2443,124	0,995	0,00	
Children were given plain water for first 3 days					
Yes				1.000	
No	0,435948	1,074931	0,685	1,55	
Children were sugar/glucose water for first 3 days					
Yes				1.000	
No	-0,55771	0,640675	0,384	0,57	
Children were given sugar/salt/water solution for first 3 days					
Yes				1.000	
No	-14,3154	33748,4	1,000	0,00	

Table B.4. Results of Logistic Regression Analyses For Wasting Children Model II (Continued)

Variables	B	S.E.	Sig.	Exp(B)	
Children were given fruit juice first 3 days					
Yes				1.000	
No	-15,3417	12857,51	0,999	0,00	
Children were given infant formula first 3 days					
Yes				1.000	
No	-0,81397	0,980096	0,406	0,44	
Children were given tea/infusions for first 3 days					
Yes				1.000	
No	-17,6691	7645,738	0,998	0,00	
Children were given honey for first 3 days					
Yes				1.000	
No	-17,3614	8787,178	0,998	0,00	
Children were given juice of cooked meal for first 3 days					
Yes				1.000	
No	-14,9107	47007,57	1,000	0,00	
Antenatal visits					
1-60 visits				1.000	
No antenatal care	0,255426	0,712512	0,720	1,29	
Iron supplementation					
Yes				1.000	
No	-0,80413	0,758413	0,289	0,45	
Vitamin supplementation					
Yes				1.000	
No	0,058911	0,787615	0,940	1,06	
Follic acid supplementation					
Yes				1.000	
No	-0,82494	0,935425	0,378	0,44	
Nipple					
Yes				1.000	
No	0,212692	0,570775	0,709	1,24	
Has Fever					
Yes				1.000	
No	-0,90025	0,544219	0,098	0,41	
Place of delivery			0,000		**
Home				1.000	
Health Centre	-0,13279	0,78799	0,866	0,88	
Other	5,54349	1,470492	0,000	255,57	**
Has Health Card					
Yes				1.000	
No	-0,69928	0,59856	0,243	0,50	
Mother's Educational Status			0,415		
No education/incomp.primary				1.000	
First level	0,121847	1,010216	0,904	1,13	
Second level and higher	-0,65221	0,802724	0,417	0,52	

Table B.4. **Results of Logistic Regression Analyses For Wasting Children Model II (Continued)**

Variables	B	S.E.	Sig.	Exp(B)
Children under 5			0,656	
0				1.000
1	15,63789	3597,666	0,997	6186586,41
2	15,11801	3597,666	0,997	3678463,50
3+	15,93247	3597,666	0,996	8305874,08
Mother's Age			0,801	
15-19				1.000
20-24	-0,0488	1,328385	0,971	0,95
25-29	0,554087	1,340046	0,679	1,74
30-34	-0,56489	1,488537	0,704	0,57
35-39	0,522283	1,587791	0,742	1,69
40-44	0,938209	1,795622	0,601	2,56
45-49	-16,5888	6608,532	0,998	0,00
Mother's Smoking Status			0,829	
Never smoke				1.000
Rarely smoke	0,593537	0,779527	0,446	1,81
Regularly smoke	-0,15321	0,79436	0,847	0,86
Smoked in the past	0,424045	0,831178	0,610	1,53
Mother Tongue			0,574	
Turkish				1.000
Kurdish	-0,74079	0,70997	0,297	0,48
Other	-0,56852	1,212964	0,639	0,57
Mother's Body Mass Index			0,382	
Less than 18.5				1.000
18.5-24.9	16,19824	4582,226	0,997	10834406,61
25-29.9	15,4151	4582,226	0,997	4951004,45
30+	15,1161	4582,226	0,997	3671462,93
Mother's Employment Status			0,243	
Not employed				1.000
All year	-0,04947	0,611305	0,936	0,95
Seasonal	-2,06828	1,233623	0,094	0,13
Constant	-17,7438	1847,011	0,992	0,00

Table B.5. Results of Logistic Regression Analyses For Underweight Children Model I

Variables	B	S.E.	Sig.	Exp(B)	
Age of children (in months)			0,094		
0-5				1.000	
6-11	1,189243	0,736711	0,106	3,28	
12-23	1,328327	0,69581	0,056	3,77	
24-35	1,715372	0,678322	0,011	5,56	**
36-47	1,749094	0,676919	0,010	5,75	**
48-59	1,517778	0,681933	0,026	4,56	**
Sex of children					
Male				1.000	
Female	-0,43855	0,189384	0,021	0,64	**
Birth order			0,025		**
1				1.000	
2-3	0,399847	0,27493	0,146	1,49	
4-5	0,952249	0,323126	0,003	2,59	**
6+	0,514778	0,366956	0,161	1,67	
Duration of breastfeeding			0,228		
Never breastfed/less than 6 months				1.000	
6-11	0,184709	0,257365	0,473	1,20	
12-24	0,120443	0,249995	0,630	1,13	
24+	0,707352	0,348226	0,042	2,03	**
Wanting status of pregnancy			0,365		
Then				1.000	
Later	-0,40551	0,340748	0,234	0,67	
No more	-0,2293	0,237426	0,334	0,80	
Birthweight			0,001		**
Less than 2500				1.000	
Don't know	2,718542	0,979779	0,006	15,16	**
Not weighed	2,620043	1,019861	0,010	13,74	**
2500-3999	2,478854	0,98893	0,012	11,93	**
4000+	1,739681	0,97008	0,073	5,70	
Initial breastfeeding			0,078		
Immediately				1.000	
Within one day	-0,10175	0,228845	0,657	0,90	
After one day	0,469255	0,255231	0,066	1,60	
Children were given milk other than breast milk for first 3 days					
Yes				1.000	
No	-0,5403	0,460108	0,240	0,58	
Children were given plain water for first 3 days					
Yes				1.000	
No	-0,37163	0,550447	0,500	0,69	
Children were sugar/glucose water for first 3 days					
Yes				1.000	
No	-0,16382	0,228969	0,474	0,85	

Table B.5. Results of Logistic Regression Analyses For Underweight Children Model I

Variables	B	S.E.	Sig.	Exp(B)	
Children were given sugar/salt/water solution for first 3 days					
Yes				1.000	
No	-18,8327	33744,41	1,000	0,00	
Children were given fruit juice first 3 days					
Yes				1.000	
No	-16,5727	14053,88	0,999	0,00	
Children were given infant formula first 3 days					
Yes				1.000	
No	0,107876	0,343058	0,753	1,11	
Children were given tea/infusions for first 3 days					
Yes				1.000	
No	0,731789	1,021332	0,474	2,08	
Children were given honey for first 3 days					
Yes				1.000	
No	-18,6092	10046,27	0,999	0,00	
Children were given juice of cooked meal for first 3 days					
Yes				1.000	
No	-18,045	45568,08	1,000	0,00	
Antenatal visits					
1-60 visits				1.000	
No antenatal care	-0,15459	0,264264	0,559	0,86	
Iron supplementation					
Yes				1.000	
No	-0,49271	0,320212	0,124	0,61	
Vitamin supplementation					
Yes				1.000	
No	-0,02472	0,312581	0,937	0,98	
Follic acid supplementation					
Yes				1.000	
No	-0,14746	0,364793	0,686	0,86	
Nipple					
Yes				1.000	
No	0,080148	0,239654	0,738	1,08	
Has Fever					
Yes				1.000	
No	0,304413	0,187871	0,105	1,36	
Place of delivery			0,004		**
Home				1.000	
Health Centre	-0,0716	0,291002	0,806	0,93	
Other	2,439443	0,78702	0,002	11,47	**
Has Health Card					
Yes				1.000	
No	-0,49034	0,206862	0,018	0,61	**
Constant	-2,0158	0,429096	0,000	0,13	**

Table B.6. Results of Logistic Regression Analyses For Underweight Children Model II

Variables	B	S.E.	Sig.	Exp(B)	
Age of children (in months)			0,041		*
0-5					
6-11	1,146247	0,740605	0,122	3,15	
12-23	1,353108	0,700911	0,054	3,87	
24-35	1,83544	0,68557	0,007	6,27	**
36-47	1,900698	0,686661	0,006	6,69	**
48-59	1,714547	0,69585	0,014	5,55	*
Sex of children					
Male					
Female	-0,50371	0,194209	0,009	0,60	**
Birth order			0,027		*
1					
2-3	0,496433	0,306915	0,106	1,64	
4-5	1,015757	0,393985	0,010	2,76	**
6+	0,413181	0,478419	0,388	1,51	
Duration of breastfeeding			0,117		
Never breastfed/less than 6 months					
6-11	0,173515	0,264776	0,512	1,19	
12-24	0,285634	0,260943	0,274	1,33	
24+	0,872879	0,362628	0,016	2,39	*
Wanting status of pregnancy			0,428		
Then					
Later	-0,3826	0,34914	0,273	0,68	
No more	-0,21794	0,243983	0,372	0,80	
Birthweight			0,010		*
Less than 2500					
Don't know	2,685241	0,984964	0,006	14,66	**
Not weighed	2,400886	1,027485	0,019	11,03	*
2500-3999	2,091544	0,995307	0,036	8,10	*
4000+	1,842287	0,975393	0,059	6,31	
Initial breastfeeding			0,120		
Immediately					
Within one day	-0,17616	0,237666	0,459	0,84	
After one day	0,379507	0,264121	0,151	1,46	
Children were given milk other than breast milk for first 3 days					
Yes					
No	-0,3025	0,463673	0,514	0,74	
Children were given plain water for first 3 days					
Yes					
No	-0,38113	0,556618	0,494	0,68	
Children were sugar/glucose water for first 3 days					
Yes					
No	-0,2601	0,237149	0,273	0,77	
Children were given sugar/salt/water solution for first 3 days					
Yes					
No	-18,856	33381,67	1,000	0,00	

Table B.6. **Results of Logistic Regression Analyses For Underweight Children Model II (Continued)**

Variables	B	S.E.	Sig.	Exp(B)	
Children were given fruit juice first 3 days					
Yes					
No	-16,2555	14038,02	0,999	0,00	
Children were given infant formula first 3 days					
Yes					
No	0,233444	0,348876	0,503	1,26	
Children were given tea/infusions for first 3 days					
Yes					
No	0,45976	1,040654	0,659	1,58	
Children were given honey for first 3 days					
Yes					
No	-18,4374	10036,03	0,999	0,00	
Children were given juice of cooked meal for first 3 days					
Yes					
No	-18,5061	45315,4	1,000	0,00	
Antenatal visits					
1-60 visits					
No antenatal care	-0,10655	0,270543	0,694	0,90	
Iron supplementation					
Yes					
No	-0,45701	0,335494	0,173	0,63	
Vitamin supplementation					
Yes					
No	0,108385	0,334398	0,746	1,11	
Follic acid supplementation					
Yes					
No	-0,15099	0,373513	0,686	0,86	
Nipple					
Yes					
No	0,192708	0,247187	0,436	1,21	
Has Fever					
Yes					
No	0,305582	0,191884	0,111	1,36	
Place of delivery			0,001		**
Home					
Health Centre	0,012724	0,297792	0,966	1,01	
Other	2,921946	0,825547	0,000	18,58	**
Has Health Card					
Yes					
No	-0,40894	0,213835	0,056	0,66	
Mother's Educational Status			0,175		
No education/incomp.primary					
First level	1,001067	0,578105	0,083	2,72	
Second level and higher	0,636501	0,523497	0,224	1,89	

Table B.6. **Results of Logistic Regression Analyses For Underweight Children Model II (Continued)**

Variables	B	S.E.	Sig.	Exp(B)	
Children under 5			0,154		
0					
1	0,671708	1,101798	0,542	1,96	
2	0,885469	1,100179	0,421	2,42	
3+	1,284714	1,111897	0,248	3,61	
Mother's Age			0,129		
15-19					
20-24	-1,24649	0,486512	0,010	0,29	*
25-29	-1,06418	0,495954	0,032	0,35	*
30-34	-1,30727	0,539104	0,015	0,27	*
35-39	-0,84227	0,576803	0,144	0,43	
40-44	-0,83606	0,668961	0,211	0,43	
45-49	-2,27814	1,409609	0,106	0,10	
Mother's Smoking Status			0,764		
Never smoke					
Rarely smoke	0,076673	0,372665	0,837	1,08	
Regularly smoke	0,215217	0,272575	0,430	1,24	
Smoked in the past	0,32874	0,389019	0,398	1,39	
Mother Tongue			0,338		
Turkish					
Kurdish	0,366626	0,279604	0,190	1,44	
Other	0,512254	0,437336	0,241	1,67	
Mother's Body Mass Index			0,027		*
Less than 18.5					
18.5-24.9	-1,04469	0,574602	0,069	0,35	
25-29.9	-1,30556	0,584282	0,025	0,27	*
30+	-1,62329	0,611059	0,008	0,20	**
Mother's Employment Status			0,564		
Not employed					
All year	0,242136	0,24792	0,329	1,27	
Seasonal	-0,04379	0,249187	0,861	0,96	
Constant	-1,98598	0,603487	0,001	0,14	**