

Understanding undernutrition in Búa, Ecuador

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The school were this research took place



One of the children for anthropometric measurement

List of Abbreviations

BMI	Body Mass Index
CDC	Centers for Disease Control and Prevention
FAO	Food and Agriculture Organization
D	Iodine Deficiency
IDD	Iron Deficiency Anaemia
IMC	Indice de Masa Corporal
NGO	Non Governmental Organization
PAHO	Pan American Health Organization
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
USDA	United States Department of Agriculture
VAD	Vitamin A Deficiency
WHO	World Health Organization

Preface

During my fieldwork in Búa I stayed with a family who lived in a quiet area in between the trees, surprisingly with a television and a DVD recorder. First and foremost I want to thank them all for their hospitality and for giving me the feeling of being home. They supported me enormously to improve my Spanish, told me the most interesting stories and gave me the chance to gain a brief glance of their worldview. They gave their opinion on my ideas to gather information, which helped me tremendously to find my pathway. Alfonso, thanks for every time that you showed me how you painted your hair. For me it was a new custom, for you a practice that have been done for decades to protect yourself and family against diseases. Giovanni, thanks for all your support with the practical aspects of my research and the good stories in the evening. Beth, thanks for your help and suggestions, the extremely funny evenings and the laughs we had. I want to thank the director and all the teachers of the Abraham Calazacon School for their engagement. Especially I want to thank the women and children who trusted me to participate and wanted to give me their information. My special thanks go to Andy Kirby, the director of the non-governmental organization and my supervisor in Ecuador. He gave me the opportunity to carry out my research and gave me the freedom to use my own theories and to develop my own research methods. I want to express my gratitude to both my supervisors; dr. Frea Haker and dr. Carina Furnee. Frea guided me with all her enthusiasm and critical view in designing my research. Carina supported me to finish my research and triggered me to broaden my writing skills and to structure my thoughts. Thanks Karlien for your friendship and the way in which you have supported me for thick and thin. You never stopped believing in me and read my report and gave me the critical feedback, which made me to go beyond my own limits. Hanna, thanks for your phone calls, your love and your dedication to my work. You never had doubts on my abilities to carry out this research and I needed the wonderful words you gave me to carry on. Paul thanks for your love and friendship, your critical and motivating words during my time in Ecuador and the wonderful job of reading my whole document and the comments on my writing skills afterwards. Without you all I never could have done my research. Mom and dad, a special thank for supporting me to go abroad and the encouraging words during our wonderful trip and when I was back home. Marloes en Leonie, both thanks for the enthusiastic words and spirits you gave me.

Table of Contents

List of Abbreviation	4
Preface.....	5
Summary.....	7
Resumen.....	8
Introduction	9
Chapter 1: Background	
Ecuador.....	13
Indigenous people.....	14
Búa Community.....	16
Consequences of nutrition.....	18
Problem statement.....	20
Chapter 2: Theoretical framework	
Causal framework for childhood undernutrition.....	22
Outcome and immediate causes.....	24
Underlying causes.....	24
Nutritional education.....	26
Health Belief Model.....	26
Theory of Planned Behavior.....	28
Chapter 3: Conceptual framework	
Nutritional beliefs, knowledge and attitudes.....	30
Food security.....	31
Dietary intake and infectious diseases.....	32
Undernutrition.....	33
Undernutrition in Búa.....	33
Research question.....	34
Study questions.....	34
Chapter 4: Methods	
Study design.....	35
Study sample.....	36
Instruments.....	37
Procedure.....	38
Children’s measurements.....	39
Maternal measurements.....	40
Statistics.....	42
Chapter 5: Results	
Results of children’s interviews.....	44
Results of maternal interviews.....	49
Chapter 6: Conclusion and recommendations.....	54
Chapter 7: Discussion.....	57
References.....	60
Appendices.....	66

Summary

Objectives This study had two purposes. First; to explore the health beliefs and food practices related to nutrition and the level of food security among Indigenous women in the Búa community in Ecuador to be able to make recommendations for a nutritional education program. And second; to search for the level of undernourishment which is measured by the prevalence of height-for-age, or stunting and the dietary intake among children.

Methods Twenty-four women enrolled in this study, randomly selected in an Indigenous rural area in the coastal province in Ecuador, to participate in interviews. In addition hundred-and-eighty-five children 4-14 years of age attending a main primary school in the same area were included in this study, of which nine dropped out, to examine their nutritional status.

Results This study found that 24% of the children suffer from stunting. Five % of the children consume too less energy than that is required for their age. Children's diet mainly contains carbohydrates, some proteins and hardly comprises vegetables and fruits. The intake of energy is not statistical related with stunting. Maternal knowledge regarding the nutritive value of food and diseases such as diarrhea, anaemia and parasites is guided by their health beliefs. Fifty-four % of the interviewed mothers experience food insecurity whether 46% reported a food secure situation.

Conclusion and recommendations Children are undernourished, which is not statistical related with both; energy intake and food insecurity. Health beliefs still exist in the Búa community that guide the maternal opinions and thoughts regarding nutrition and diseases influencing knowledge and practices regarding food and diseases. These findings have implications for targeting undernutrition through nutritional education. It is recommended to improve nutritional knowledge regarding food and diseases among mothers living in the Búa community.

Resumen

Objetivos Este estudio tuvo dos propósitos. Primero; para explorar las creencias salud y los prácticos de alimentos que están relacionados con nutrición y el nivel de seguridad de alimentación de madres indígenas en la comunidad Búa de Ecuador para hacer recomendaciones por un programa de nutrición. Segundo; para calcular el nivel de desnutrición que esta expresado en la baja talla para la edad, o impedimento del crecimiento y el bajo índice de masa corporal (IMC) para la edad, o delgadez y la consumación de alimentos en niños.

Métodos Veinte y cuatro mujeres se matricularon en esta investigación elegida al azar de la comunidad indígena de la costa de Ecuador para participar en entrevistas. Además ciento ochenta y cinco niños de 4-14 años que van a una escuela en la comunidad fueron incluidos en las entrevistas para examinar su situación de nutrición.

Resultados Este estudio encontro que 24% de niños tiene impedimento del crecimiento. Cinco % de los niños no obtienen suficiente calorías para su edad. La dieta de los niños contiene principalmente carbohidratos, algunas proteínas y escasas verduras y frutas. El conocimiento de las madres sobre el valor nutritivo de alimentos y enfermedades como diarrea, parásitos y anaemia es limitado. Cincuenta y cuatro % de la maders tiene inseguridad de alimentación y 46% tienen una situación de seguridad de alimentación.

Conclusion y recomendaciones Los niños tienen desnutrición, cual coasa que no está relacionada estadística con el consumo de calorías y la seguridad de alimentación. En la comunidad de Búa hay creencias en la salud tradicional que guian las opiniones y ideas de las madres sobre nutrición y enfermedades y tienen influencia en el conocimiento y prácticas en lo que concierne alimentos y enfermedades. Por eso para proteger a los ninos de desnutrición es importante implementar educación de nutricion y aumentar concocimientos de nutrición por las madres de la comunidad de Búa.

Introduction

In many developing countries undernutrition is still pervasive and causing deaths, especially among women and children. According to the World Health Organization (WHO) over half of all child starvation in developing countries is related to poor nourishment. About one-third million of the children in developing countries younger than 5 years of age are stunted (low height-for-age) and 10% of them are wasted (low weight-for-height). Since 1990 the global prevalence of underweight (low weight-for-age) has declined from 43% to 27% and today it affects a lot of children less than 5 years old (Stephenson et al., 2000, Black et al., 2008). Undernourished children are more vulnerable for infections, diarrheal diseases and respiratory infections (UNICEF, 2006). Negative long-term effects of this nutritional problem have been found on health, educational attainment and capacity to work (Grantham-McGregor et al., 2000, Fogel, 2001, Sembal & Bloem, 2001). The United Nations Children's Fund (UNICEF) has defined undernutrition as 'the outcome of insufficient food intake and repeated infectious diseases. It includes being underweight for one's age, too short for one's age (stunted), dangerously thin for one's height (wasted) and deficient in vitamins and minerals (micronutrient undernutrition)'.

Multiple factors are considered responsible for undernourishment in children but an inadequate dietary intake has been accepted as the most important and immediate cause (WHO, 2005). Poor dietary intake does not meet normal standards for energy, protein and micronutrient requirements needed to support tissue growth, function and maintenance for a healthy physical life. An inadequate dietary intake has been linked with low food security or food insecurity. According to the WHO and United States Department of Agriculture (USDA), household food security refers to access to enough food at any time for every member of a household maximizing the chance for a healthy and active life (Pérez-Escamilla et al., 2004). Low economic resources and low food availability are directly related to undernourishment (Wachs, 2008). Some studies describe the relation between food security with poverty, and is supposed to be one of the major basis causes of undernourishment (Waters, 2002).

Results from other studies that searched for the relation between nutritional knowledge and nutritional status showed a significant relationship between maternal nutritional knowledge and child nutritional status (Webb & Block, 2003, Glewwe, 1999). Earlier research supported this conclusion showing that nutritional knowledge is a significant contributor to child nutritional status (Webb & Lapping, 2002). According to Dutta and Pant (2003) lack of knowledge about nutritive food especially influences the nutritional status of children.

Promising results to prevent child undernutrition have been shown in education programs for mothers, to increase their knowledge about nutrition. These programs focus on increasing maternal nutritional knowledge and practices through knowledge transmission and modifying health behavior to improve children's dietary intake (Guthrie et al., 1990, World Bank, 2005, Guldan et al., 2000) Large-scale

programs have been implemented in Latin America in order to improve dietary intake. One of these programs, Atención Integral al la Niñez, focuses on health behavioral change of mothers regarding nutritional practices. This program entails nutritional counseling and growth monitoring and has shown potential to improve nutrition outcomes. It was first developed in Honduras and comparable programs have been developed and carried out in other countries in Central and South America such as, Bolivia, Al Salvador, Guatemala and Nicaragua (World Bank, 2007). In addition UNICEF has implemented several promotion campaigns through South America providing information about good and healthy feeding practices for children with in addition promotion of healthy food (UNICEF, 2003, UNICEF, 2002). For example in large cities of Ecuador nutritional programs enclose food recipies which are culturally adapted and adequately nutritious for each population. Municipal and civil cervaints promote and explain these recipies in order to try to incorporate these recipies into the diet of the target group. And in a poor peri-urban area of Peru a cluster-randomized controlled effectiveness trial of a nutritional education program, delivered through health services showed that key messages regarding nutrition and demonstrations of the preparation of food lead to a decrease in the prevalence of stunted growth among children of 18 months (Penny et al., 2005).

In the Republic of Ecuador, a developing country, undernutrition rates were respectively 34% in 1986, 26 % in 1998 and 23% in 2004 (Farrow et al., 2005). Although the undernourished proportion of the total population decreased from 8% in 1990-1992 to 4% in 1999-2001, at this moment Ecuador is still one of the Latin American countries that face the highest rates of chronic undernutrition (FAO, 2003). Of the Ecuadorian population, especially Indigenous people who make up 43% of the total population, deal with higher rates of chronic undernourishment, mortality and morbidity compared with their non-indigenous counterparts. Especially the amount of undernourished children among these people continues to be extremely high (Farrow et al., 2005, Casapia et al, 2007, World Bank, 2005).

Although there is no universally accepted definition of indigeneity in Latin America it refers to the first-listed people of the nations, also called the aboriginal population. This interpretation draws the differences between the native people and the colonial settlers. Indigenous people have remained their traditional lifestyle, cultural norms and practices although some western ideas and cultures have been incorporated in the way of living of these Indigenous people. This ethnic group is often characterized by poverty; they are at risk for food security and have low levels of food consumption. Among distinctive cultural groups mother's decisions and knowledge regarding nutrition are influenced by health beliefs and customs (Mignone et al., 2007, Montenegro & Stephens, 2006). One of the Indigenous populations is the Tsáchila living in one of the Indigenous communities, Búa in Ecuador. This research took place in this community under supervision of the non governmental organization (NGO) Yanapuma. Since 2006, Yanapuma has been supporting the Indigenous population living in several communities throughout Ecuador. Their aim is to create multilevel sustainable practices, based on a participatory approach towards the needs and the demands of the

Indigenous people. Through cultural exchange programs, technical support and expertise in social fields, environmental fields, cultural fields and health fields they try to offer and exchange knowledge and abilities. The circumstances related to poor nutritional status in Búa have been described in formal student reports, written in order to advice the NGO, the Yanapuma foundation (Bundle, 2007, Burry, 2007, Ramkissoon, 2007). People in the village have poor hygienic practices and their consumption of fruits and vegetables is low. They face lack of knowledge about good food and in particularly mothers are concerned about the nutritional status of their children.

Nevertheless, the understanding of the nutritional status and the responsible key determinants was still limited. A better understanding of the possible responsible factors was seen as necessarily to implement a proper nutritional education program to improve maternal nutritional knowledge. The focus of this research is described as follow in a research objective.

To provide an overview of the undernutrition situation among children in the Búa community, Ecuador and to describe recommendations for a nutritional education program to reduce undernourishment among these children based on the needs in the community.

In summary undernourishment is still a major worldwide health problem and has a huge impact on child mortality and morbidity. A poor diet is the most important causing factor and both maternal nutritional knowledge and food security affect children's dietary intake causing childhood undernutrition. Of the Latin American continent, Ecuador is one of the countries that is facing the highest undernutrition rates. In particular among Indigenous children the rates continue to be extremely high. Indigenous people are an ethnic disparity who mainly has remained their traditional lifestyle and health beliefs.

This internship report is divided into six chapters. In the next section the geographic and economic aspects of Ecuador will be described. It includes background information of the Indigenous people regarding their life style, environment and their health system. This presents an overview of the Búa community where this research was carried out and will end with the national and local nutritional consequences for civilians of this country. Chapter two describes the theories that provide a better understanding of the development of undernourishment among children and of health behavior. In chapter three the pathway of nutritional beliefs, knowledge and attitudes, food security and dietary intake with undernutrition will be described. It continues with the research question of this study and the sub questions to be able to answer the main question. Chapter four describes the methodology used in this study, divided across the study design, the study sample, the used instruments, the procedure of data collection, the measured aspects and data analysis. Chapter five presents the quantitative and qualitative findings. Chapter six includes the conclusion and recommendations for a nutritional education program based on this research. Chapter seven describes the discussion on this study.

Chapter 1

Background

This chapter describes the demographic factors of Ecuador, and gives a brief glance on the economic situation in Ecuador, its relation to poverty and to nutrition. This chapter continues with the lifestyle, cultural views, and the current health situation of the Indigenous people. It describes the Búa community where this research was carried out and describes the consequences of undernutrition and the national nutritional statistics in Ecuador. This chapter ends with the problem statement.

Ecuador

Although Ecuador is eight times bigger compared to the Netherlands it is one of the smallest countries of Latin America. It is divided into three regions; the coastal lowlands (Costa), the Andean highlands (Sierra) and the upper Amazon basin (Oriente). Each region has its own climate and its own topographical and ecological characteristics. In addition, Ecuador has an insular region, the Galapagos Islands. Ecuador contains a total population of approximately 13, 8 million. Since 1950, urbanization took place and the total amount of Ecuadorians living in rural areas has decreased towards 36% (FAO, 2001a). Ecuador is one of the countries in the Latin American region with the lowest per capita income and the highest inequalities. Besides its high levels of poverty, the situation has worsened since 1995, because of natural disasters, political instability and a financial crisis; the dollarization in 2000 (World Bank, 2000). From 1995-1998 poverty increased and in 1998 62% of the total population lived below the poverty line, with 41.5% of the population classified as poor and 8.5% as extremely poor (Farrow et al., 2005). The poor mostly live in rural areas, are Indigenous and tend to have more children that live in one household. Among them educational attainment is low, sanitary conditions are of low quality, undernutrition rates are high and diseases, including malaria are very common. Across the different areas in Ecuador extreme poverty is the highest in the Sierra, but poverty also has increased precipitously in rural areas in the Costa, that has negative effects on nutrition, particularly for children (World Bank, 2000).

Although the country is reaching progress in achieving the millennium development goals, the decrease of poverty alleviation and extreme hunger is still insufficient (UNICEF, 2006).

Indigenous people

In Ecuador thirteen different historical groups have remained in isolated and remote areas, also called communities (FAO, 2001a). Indigenous people have their own local traditional knowledge, health belief systems, traditions, values, customs, ceremonies and objects that have been transmitted across different generations to specify their sustainable identities and relations with worldviews (FPSRAD, 2006, Montenegro & Stephens, 2006). Although there are some commonalities among Indigenous communities these people have distinct cultural diversity in their cultural practices, local traditional knowledge, beliefs systems, values, language, their internal hierarchy in communities, the self-determination by individuals, maintenance or protection of their territory, wellbeing strategies that people use and how they use their natural resources (Montserrat Ventura I Oller, 2000). Their traditional holistic worldview is fundamental for their health system that begins with the spiritual and ecological relationship with the surrounding ecosystem. And in addition, specific transmitted knowledge like cultural health beliefs, religious practices and health practitioners are of importance for their health system.

The relationship with the surrounding ecosystem means that their surrounding area and ecosystem provides Indigenous people plant and animal food, living space, medicinal organisms, building materials, water, and their landscape within lands of their community. So any shortage in their surrounding resources affects their health or wellbeing. Natural disasters, deforestation and mining have declined natural resources such as the qualitative and quantitative availability of food from plants, animals and medicinal plants. This has threatened harvesting and the perseverance of their productions, which has led to an increased risk for less food availability and the experience of food insecurity. But being depended on natural resources can protect against food security. They are also depending on the international and national markets. If they cannot purchase food from the markets they still have the opportunity to eat own produced food or to obtain food from their surrounded natural resources (Farrow et al., 2005).

Indigenous people have their own knowledge and beliefs on health and explanations of diseases. The details of health beliefs of Indigenous people vary worldwide from community to community but one of the most pervasive health belief systems in South- America that determines the view of them on food and nutrition is the 'hot' and 'cold' belief. This belief determines that every plant, food item, beverage, emotional or physical status and remedy, is considered to be 'hot' or 'cold' and a person is healthy if the opposites are in balance. For example if a child's hair is washed too soon after childbirth it causes disequilibrium of the body. This infant is considered 'hot' while water is considered 'cold' that enters the body causing an excessive 'cold' disturbing the equilibrium which makes the child vulnerable for diseases. Other actions that disturb the equilibrium are touching 'cold' ground, eating 'cold' food, eating 'hot' or heavy food at night or giving a child breastfeeding while the mother is upset. If a mother is upset, the milk is 'hot' that violates the equilibrium of her child. So

these qualities have consequences for the diet and they play a role in the performance of behavior of individuals. To maintain equilibrium in the body people have to eat the right food and act based on the 'hot' and 'cold' aspects of emotional and physical wellbeing. A remedy for disequilibrium is the consumption of the right food, beverage or medicinal plant with the opposite quality. Other studies found that to the belief of the Indigenous people food itself can cause diseases if it is raw, spoiled or dirty, or if it is combined in the wrong way (Goldman et al., 2001, Scrimshaw, 2006). According to Kuhnlein & Receveur (1996) Indigenous people locally harvest particular products or obtain their food found in natural resources. The harvested products are culturally accepted, have socio-cultural meanings, need a particular acquisition and processing techniques, require a particular use and composition. For these reasons limited products are cultivated which has nutritional consequences for those eating it. Creed-Kanashiro et al., (2003) described that balanced meals determine the nutritive value of food since some, for example milk, vegetables, fish, beans, fruits, eggs, quinoa and beef are considered as high nutritive whereas other like chicken, rice and pasta are considered to be nonnutritive.

In Latin America another traditional health belief is attributing diseases to supernatural origin. This attribution varies among groups, but the similarity is that they are all found in the nature, they can involve a malevolent person or intention and a spirit world. The most important diseases are considered to be 'mal aire', 'mal de ojo', 'espanto' and 'susto'. 'Mal aire' is caused by negative energy from the nature that enters the body, which results in a thermal disbalance. This disease is also attributed to bewitching by an individual who literally wishes somebody ill or by a practitioner with bad meanings. 'Mal de ojo' or 'evil eye' is a widespread concept among Indigenous people as well. In South-America people with light eyes are seen as dangerous because the majority of the inhabitants have dark eyes. If a light eye person admires a child, the child can be harmed by the evil eye. 'Espanto' and 'susto' both refer to soul loss which is a disharmony between the body and the soul caused by moments of panic or an inappropriate treatment for problems with the urine or faeces (Saizar & Disderi, 2003). All these diseases are considered to particularly occur among children, because their personality is not completely formed and they are not as strong as adults (World Bank, 2007).

Indigenous people often treat diseases with medicinal plants or if necessarily the Shaman, a traditional healer, practicing healing rituals and plants, is visited. In many Indigenous communities the adherence to their traditional culture ranges from traditional practices and isolated systems to the use of western medicine. However some of them are becoming more and more involved with the rest of the Ecuadorian inhabitants, their cultural habits still have a large impact on their daily lives. Which highly influence the health standards of the Indigenous people in Ecuador. Indigenous people still have inadequate access to western interventions regarding health services, health promotion and prevention programs mainly because they are culturally inappropriate. In particular women and children continue to have poor access to basic health care services (Montenegro & Stephens, 2006).

Búa community

This research was carried out among Tsáchilas in the Búa community. The Tsáchila is one of the Indigenous groups living in the western lowlands of Ecuador in Santa Domingo de los Tsáchilas (figure 1, it used to be Santa Domingo de los Colorados). They are politically organised in their own Tsáchila governmental body and geographically divided in eight separate communities with Búa as the largest one. Their first language is Tsafiki, a South Barbacoan language (Montserrat Venutra I Oller, 2000). Most of the Tsáchilas speak both their local community language and Spanish.



Figure 1: source: <http://en.18dao.net/images/2/29/Map-Ecuador.jpg>

Búa covers a total area of 2885 h² along a paved road, from Km 13 to Km 21 at the Via Tsáchilas del Búa, from the large city; Santa Domingo to a small village; Umpe Chico. Besides the Amerindian population also Mestizo's live in the community. Mestizo's means: a mix of Spanish, Indigenous, or African genes. The land has always been the property of the Tsáchilas, while the Mestizo's have been moving into the area causing several political and social tensions between the both groups.

There are approximately 136 families living in the community with their houses located directly along the paved road, each occupying some 4 h². The houses are wooden shelters or concrete houses encompassing cooking facilities and sleeping facilities giving protection against the weather. According to western standards, they live in poor personal and domestic hygiene. Some of the households have electricity and latrines. Almost every family has domestic animals like chickens and dogs. The majority cultivates their own food, buys it from local stores in the community or gets it from markets in Santa Domingo. Water is gathered from the river, usually boiled before drinking and everybody washes their selves in the river.

Four different schools provide primary and secondary school for children about three up to about fifteen years of age, with grades that range from one to nine. The majority of the children attend the Abraham Calazacon School, which is the largest school in the village. Three months a year from Monday till Friday a school lunch is provided for all, funded by the Ecuadorian government. Different health care services exist in or around the community. The dispensary in Umpe Chico provides basic health care for everybody in this area. People have to pay for the medical costs or can register for a medical assurance. There is a hospital in Santa Domingo providing western health care. It takes one hour by bus to go to the hospital, which is too expensive for most of the people too expensive. Another commonly used option is to seek health care from the traditional healer living in the community. He uses medicinal plants and ritual traditions in healing people or preventing against diseases. Prior to data collection for this research no nutritional education program was implemented in Búa.

Consequences of nutrition

A diet that is poor in quality due to a lack of protein and energy; or is low of quantity which reflects that it is inadequate in the biological value of protein; or it contains not enough or an unequal amount of micronutrients; or too many "antinutrients" leads to undernutrition (Scrimshaw, 2006). Undernutrition encompasses stunting, wasting underweight and micronutrient deficiency. While stunting reflects reduced health and nutrition conditions clinically seen by linear growth failure, it also refers to chronic poor nourishment. The difference between stunting and wasting is that wasting refers to significant and sudden weight loss mainly due to famine or severe diseases such as diarrhea. So the presents of wasting identifies acute undernutrition. At the other hand, underweight implies global undernourishment and reflects the current condition of the body proportion together with linear growth (WHO, 2005). These three dimensions described above are not the only forms of undernutrition. The last dimension is micronutrient deficiency. The body of children needs micronutrients, such as vitamin A, iron and iodine, for healthy growth and good development. Any shortage in protein, energy and micronutrients affects child health.

To provide an overview of the nutritional situation in Ecuador the statistics regarding nutrition are shown in table 1. The prevalence of the under-five mortality rate is 24. This is a basic health indicator that measures the probability that children dye between birth and five years of age expressed per 1,000 live births. Twenty-three % of the under-fives in Ecuador are affected by stunting, 2% of them are wasted and 1% of them are underweight. The percentage of households that consume iodized salt is 99%. UNICEF has calculated these statistics. Finally the proportion of undernourishment people and the total number of people with undernourishment in Ecuador are shown, both calculated by the Food and Agriculture Organization (FAO). Five % (0,6 million) of the inhabitants of Ecuador are undernourished.

As presentend in table 1, in Ecuador among children aged below the age of 5 stunting is the main common dimension of undernutrition (World Bank, 2007). Stunting is a good indicator to measure undernourishment. Compared to national statistics of UNICEF on nutrition in neighbouring countries in the Andean region the prevalence of low height-for-age is more or les the same as in Peru and Bolivia. In Peru the prevalence of stunting under-fives is 24%, in Bolivia 27%, while in Colombia the rate (12%) is markedly lower. In Ecuador, the probability that children are stunted is 30% higher among those living in rural areas than those living in urban areas. Differences in gender show that the prevalence is 24% for boys and 22% for girls. For both groups the prevalence increases with the age of the child. After 12-23 months of age the prevalence remains generally stable (World Bank, 2007).

Table 1: Nutrition statistics Ecuador

Under-five mortality rate (2006)	24
% of under-fives (2000-2006) suffering from: underweight, moderate & severe	9%
% of under-fives (2000-2006) suffering from: underweight, severe	1%
% of under-fives (2000-2006) suffering from: wasting, moderate & severe	2%
% of under-fives (2000-2006) suffering from: stunting, moderate & severe	23%
% of households consuming iodized salt (2000-2006)	99%
Proportion of undernourishment (2001-2003)	5%
Number of undernourished (2001-2003)	0,6 million

Source: http://www.fao.org/faostat/foodsecurity/Countries/EN/Ecuador_e.pdf
and http://www.unicef.org/infobycountry/ecuador_statistics.html

Global the most common micronutrient deficiencies are iron deficiency, iodine deficiency and vitamin A deficiency. Worldwide 90 % of the people with iron deficiency of which anaemia, a condition with abnormal low blood haemoglobin concentration, is the most common clinical manifestation lives in developing countries. In the world 53% (526 million) of the children between 5-14 years are suffering from anaemia. Anaemia results in less mental and physical activities and as the most prevalent micronutrient deficiency it is related with increased morbidity due to infectious diseases (Stephenson et al., 2000). In Ecuador anaemia is a serious problem. Approximately 42 % (54 million) of school-aged children suffer from iodine deficiency (WHO, 2004). In one of the rural coastal provinces of Ecuador the prevalence of vitamin A deficiency among children younger than 5 years was estimated at 18.7% (WHO, 2006). Another study conducted in urban and rural surroundings in this nation found that 12 % of the children living in the coast suffered from vitamin A deficiency (World Bank, 2007). The subclinical form of vitamin A deficiency retards child growth, development, hemoglobin synthesis and increases the risk of illness and death. Severe vitamin A deficiency (clinical form) is the only one and most important reason for the development of visual impairments in children in the developing world. And, if deficient children get vitamin A supplementation their risk of dying because of infectious diseases lowers by an estimated 23 %.

Problem statement

The stunting prevalence's among Indigenous children, which are 20-36 % higher among Indigenous children compared to country averages, continue to be high (Kuhnlein et al., 2006). Few recent studies on exploring stunted growth in Indigenous tribes found that Indigenous tribes in Colombia and Ecuador face high stunting rates among children (World Bank, 2007, Orr et al., 2001 and Fagundes et al., 2004). Foster et al. (2005) demonstrated that stunted growth affects 52% of the boys and 43 % of the girls in an Indigenous village in the Bolivian Andes. According to the data from the ENDEMAIN study from 2004, which was carried out in Ecuador, the prevalence of stunted Indigenous children below 5 years of age is 47%. The high stunting rates among these children may not directly be a consequence of the inability to purchase food. Since households with stunted children and households without stunted children spend the same amount of money on food. Though the meat consumption in households with stunted children is lower compared to those without stunted children. But until now research has showed that the traditional diet of Indigenous people is poor and has little variation. It shows a specific pattern, contains an extraordinary amount of carbohydrates, is deficient in proteins and lacks important micronutrients (Larrea et al., 2004). And the Indigenous children consume too less minerals and vitamins like iron, calcium, vitamin A and C and they do not receive the sufficient amount of recommended fat (Damman et al., 2008). In Ecuador, in the Búa community, there are concerns about the nutritional status of the children. Given the decisive function of maternal health behavior in deciding which food children consume influencing their nutritional status it is important to understand the cultural and behavioural elements of Indigenous people (World Bank, 2007).

Although the NGO is trying to gain insight the nutritional situation of the Tsáchila children and there are nutritional programs to prevent for undernutrition, the nutritional situation of the children and the causing factors in the Búa community must be assessed to target undernutrition among children in this village.

It is obvious that Ecuador faces enormous economic inequalities with a large impact and consequences for nutrition among the poor, in particular for Indigenous children. Growth faltering prevalence's are the worst for children of this ethnic disparity. They are at higher risk to live in a food insecure household and the traditional holistic worldview and health beliefs affect caregiver's food practices and their view on nutrition and health. Also in Búa, an Indigenous community, which is in an isolate and remote area with low access to health care, where people live in poor circumstances compared to western countries.

Chapter 2

Theoretical framework

Literature has mentioned child undernourishment as a result of poor health knowledge, food insecurity and poor dietary intake. Nutritional education programs are effective to improve nutrition conditions among children. This chapter describes a theory, which presents undernourishment in the context of the complex contributing problems and provides information to understand the impact of each causal element. It addresses those responsible factors mentioned before, to explore which possibilities exist to reach progress in reducing undernutrition among children. It continues with two theories that have been developed to explain health behavior, health beliefs and behavioural change. To be able to examine the aspects on which a nutritional education can seize.

Causal framework for childhood undernutrition

Childhood undernutrition is a difficult, complex and multifactorial problem of third world countries. It is necessary to explore the underlying factors causing a poor nutritional status among children and it is important to highlight the possibilities that exist to prevent this major health problem.

A commonly used framework has been developed by UNICEF (UNICEF, 1990) and describes interrelated factors operating at several levels (UNICEF, 2004). This model provides an overview of the responsible elements, and enables researchers and policy makers to assess and analyse the nutritional problems to design an appropriate nutritional strategy to prevent for undernutrition. The theory (figure 2) is presented in its total form, providing immediate, underlying and basic causes. It identifies poor nourishment as exposure, because it contributes to mortality and morbidity, or outcome since it is a health problem itself. In this study child undernutrition is seen as an outcome and the basic causes are not described below, because they are far beyond this research.

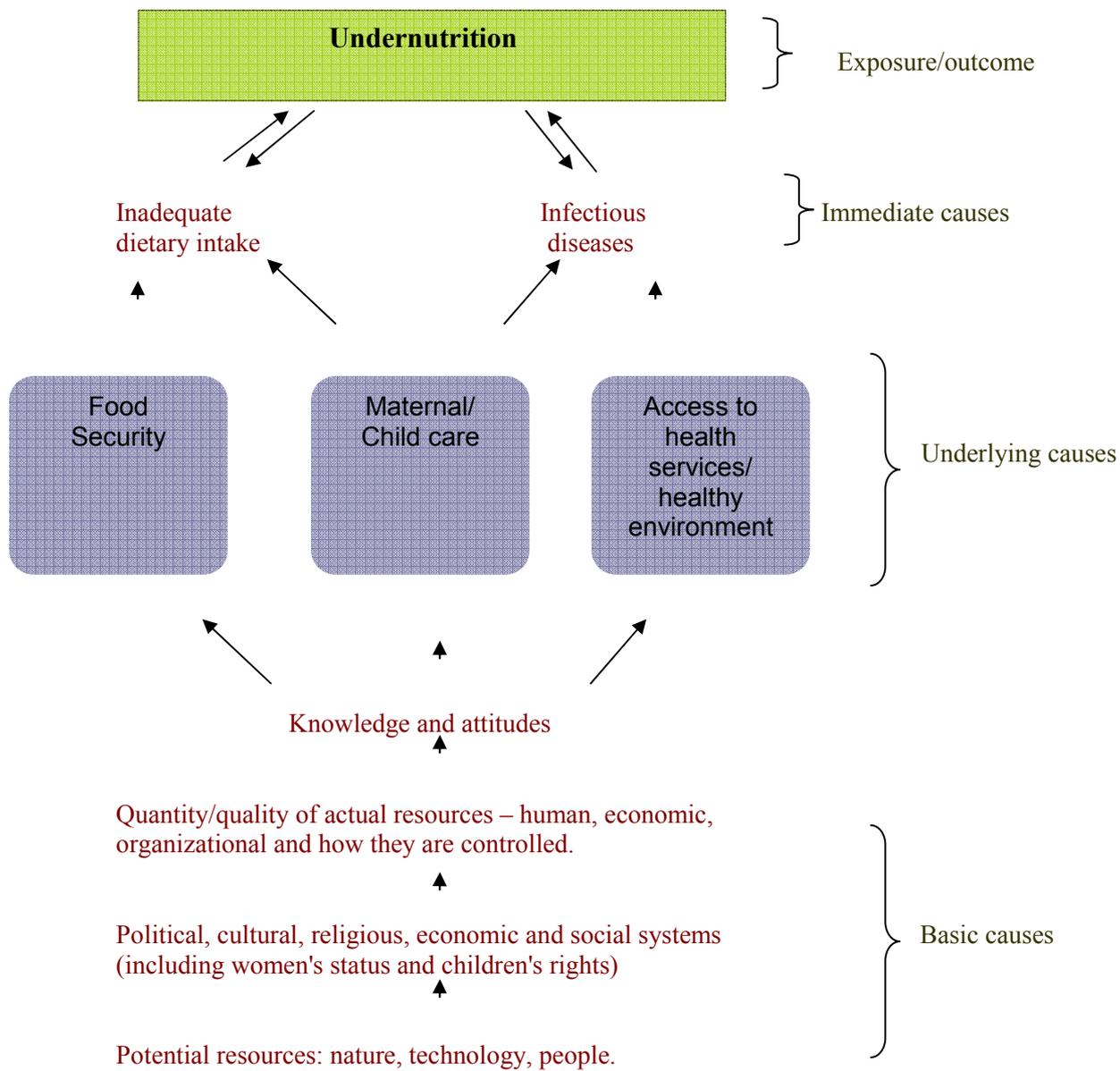


Figure 2: Causal framework for child undernutrition (UNICEF, 1990)

Outcome and immediate causes

The manifestations of undernourishment, depending on severity and duration, are less nutrient concentrations in tissue, specific clinical signs such as lowered body composition, functional disability and overall poor health. Children, one of the most vulnerable groups, become more susceptible for infectious diseases, pneumonia, severe diarrheal and mortality (Scrimshaw, 2006, Stephenson et al., 2000). The interaction between the most crucial immediate causes of undernutrition, poor dietary intake and infectious diseases appear in a vicious cycle. Once children enter this cycle they quickly fall into one of the conditions that continuously feed off each other. Undernourishment reduces the response of the immune system that makes children more vulnerable for infectious diseases. Infectious disease again can lead to a decrease of the nutritional status. Infectious diseases are responsible for metabolic and behavioral changes leading to loss of appetite and malabsorption. These different processes increase nutrient requirements for children's dietary pattern (UNICEF, 1998).

Underlying causes

The quality of the immediate factors depends on food security, childcare and access to health services and the environment and all are of equal importance.

Household food security encompasses food availability, access to food and proper food utilization that occurs at household level, regional level or national level, which is often categorized as chronic, seasonal or temporally. Available food needs to be sufficient, safe and nutritious. At national level it is not necessarily a consequence that enough food ensures an equal distribution for every family or individual. While in rural areas people mainly depend on their agricultural resources, domestic cultivation and the ability to purchase food from the local markets in urban areas households mainly depend on financial abilities. In particular in rural areas the food distribution to poor families depends on seasonal production and fluctuating prices. These families food security is more precarious. Moreover adequate food storage to prevent spoilage, appropriate handling protecting against disease transmission and ensuring nutritiously balanced meals with a proper preparation are aspects of proper food utilization (Bickel et al., 2000, UNICEF, 1998). In particular women play a special role in taking care of food security. They are mainly responsible for the preparation, the cooking, and storage and how they keep food fresh and prevent it from rotting. In addition in many societies the women also take care of purchasing and producing food.

Access to medical health services that provide affordable, both preventive and curative health care that is of good quality is crucial for good health. Every family should have the ability to visit a health care centre, which is at reasonable distance, provides adequate and appropriate health care, which is employed by adequate staff. According to the United Nations Development Programme (UNDP) access to health care still varies widely among populations in countries worldwide. Environmental

health refers to the presence or absence of good sanitation, clean water and hygienic conditions in and around houses, all equal contributing to the nutritional status of children (UNICEF, 1998).

It has become clear that even when families experience food security, can ensure enough and good food for their children, have good access to appropriate health care centers and live in a safe and healthy environment, children still have the risk to become undernourished. Recently inappropriate childcare has been recognised as an important key cause of undernutrition. Child care is captured through the way in which a child is fed, guided, taught or raised. With regard to nutrition, this means that if children receive the right food they are most likely to grow healthy. An effective and appropriate diet hinge upon health related behaviour of caregiver's that transform nutrition into good physical and mental child development and proper child growth. Caregiver's are usually mothers, but can also be fathers or other family members and even a whole community. Among ethnic groups food choices and food practices are guided through cultural practices and domestic health beliefs. This influences for example knowledge on breastfeeding practices, when a child receives food and how food distribution in a family is organized. It determines how caregiver's adapt the nutritional needs of children at different ages, if they decide to give children complementary feeding and if they shape a diet or decide to perform other food practices in case a child is ill. For instance, in certain cultures children with episodes of diarrhea do not receive any kind of liquid or food. While during this disease children should be fed and receive liquids to recover (UNICEF, 1998).

Nutritional education

Without an understanding of the local health beliefs and health behavior of the mothers, the recommendations for the nutritional education program may be irrelevant or even inappropriate and ineffective. Several theories have been described to understand health beliefs, behavior and the progress of educational programs trying to change behavior. Gochman proposed a working definition of health behavior as “those personal attributes such as beliefs, expectations, motives, values, perceptions and other cognitive elements; personality characteristics, including affective and emotional status and traits; and overt behavior patterns, actions and habits that relate to health maintenance to health restoration and to health improvement (Gochman, 1982, Gochman, 1997). In this study the Health Belief Model (Rosenstock, 1974) and the Theory of Planned Behavior (Ajzen, 1988) is applied to gain insight into health behavior. The Theory of Planned Behavior has been used in understanding participation and the evaluation of a nutritional education program for families (Westeneng et al., 2006). The Health Belief model has been applied in several studies throughout the world to describe health decision behavior (Scrimshaw, 2006). Both have been applied in for example predicting soy sauce consumption in women (Sun et al., 2006) and examining the effectiveness of a prevention and control program for diabetes among Aborigines (Daniela et al., 1999).

The Health Belief Model

According to this model, originally developed by social psychologists in 1950's, (figure 3) people decide to perform a particular behavior or make a decision in health related actions based on four different assumptions. These are the personal perceived susceptibility to a disease, perceptions of severity of a disease, perceived benefits of any kind of prevention behavior and perceived barriers upon a specific behavior (Rosenstock, 1974). The perceived susceptibility and perceived severity determine the perceived threat of an illness and the perceived benefits and perceived barriers determine the effectiveness of health behavior. Overall individuals take into account how likely it is to develop or get a disease and how severe or serious this disease is against the benefits and the effectiveness to perform a certain behavior, change their behavior and the barriers that they face like costs and time. They decide to perform a certain form of health behavior or make a decision to change their health behavior based on the benefits. The strongest statements to explain health behavior are the perceived barriers followed by the benefits and susceptibility. In addition socio-demographic factors like age and ethnicity have their influence (Rosenstock et al., 1988). Later on the concept of self-efficacy was included to better understand the challenge of changing unhealthy habitual behaviors. Self-efficacy is defined as “the conviction that one can successfully execute the behavior required to produce the desired outcome” (Bandura, 1977, 1989). Young (1981) has described health decision behavior based on the mentioned assumptions long ago. According to his findings from a study carried

out in a Mexican Village, people think about and weigh the perceived severity of a disease against the efficacy and the costs of the treatment and the possibilities to cure a disease themselves in choosing between different remedies for a disease. In this study different remedies encompassed a traditional healer, self-remedies or a western pharmacy.

Concept	Definition	Application
Perceived Susceptibility	One's opinion of chances of getting a condition	Define population(s) at risk, risk levels; personalize risk based on a person's features or behavior; heighten perceived susceptibility if too low.
Perceived Severity	One's opinion of how serious a condition and its consequences are	Specify consequences of the risk and the condition
Perceived Benefits	One's belief in the efficacy of the advised action to reduce risk or seriousness of impact	Define action to take; how, where, when; clarify the positive effects to be expected.
Perceived Barriers	One's opinion of the tangible and psychological costs of the advised action	Identify and reduce barriers through reassurance, incentives, assistance.
Cues to Action	Strategies to activate "readiness"	Provide how-to information, promote awareness, reminders.
Self-Efficacy	Confidence in one's ability to take action	Provide training, guidance in performing action.

Figure 3: the Health Belief Model (Glanz et al., 1997)

Theory of Planned Behavior

This model is an extension of the Theory of Reasoned Actions and was originally described by Ajzen in 1988 (figure 4). According to the Theory of Planned Behavior intention directly determines how people act. Intention refers to a cognitive representation of an individual's preparedness to perform a certain behavior. Intention is a function of three other factors that are attitudes about the behavior, the presence of subjective norm and the perceived behavioral control. Attitudes are the beliefs of individuals about the consequences of engaging a specific behavior. People consider the strength of their belief about a topic, subject or object against the evaluation of the result of their behavior. The subjective norm is the social pressure of for example families, experts, co-workers, members of communities or friends, which are experienced by individuals, determining the performance of a specific manner of acting. The third factor is the perceived behavioral control that originates from the self-efficacy (Bandura, 1977, 1989) and describes individual's behavioral control that is depended on the past experiences, opinions and other external factors that shape a person's perceptions to have the quality to perform a specific health behavior. Together they refer to individual's control beliefs, perceptions about the performance and the difficulty of specific behavior.

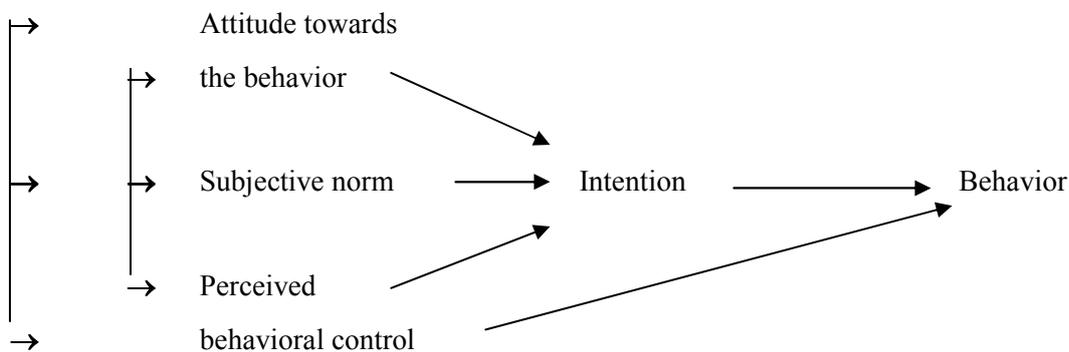


Figure 4: The model of The Theory of Planned Behavior (Ajzen, 1988, p. 133)

For example if a mother believes that breastfeeding protects her child against infectious diseases and has a positive experience with giving breastfeeding then it is more likely that she has a positive attitude about breastfeeding. If all the sisters of this mother give their children breastfeeding and a health worker stimulates it than the social norms are supportive. Finally people need to have some control on their behavior before the positive attitudes and supportive social norms transform into behavior. If the mother in this example thinks that she is able to breastfeed her child and she has confidence in her own way of acting, than she perceive herself as having control on this behavior.

In summary the causal framework for childhood undernutrition provides an overview of the consequences of poor health knowledge to food insecurity to insufficient dietary intake in the context of the multifactorial causes of undernourishment among children. In addition to gain information on health behavior in order to be able to design a nutritional education program the Health Belief Model and the Theory of Health Behavior are applied.

Chapter 3

Conceptual framework

This study links maternal health beliefs with undernutrition through 1) how mothers deal with food choices and therefore determine the dietary intake of children and 2) the influence of the food security situation on the availability of food for children (figure 2). This chapter describes the influence of cultural maternal health beliefs on children's food consumption and the nutritional status of children. It continues with the role for traditional health beliefs on the food security situation. It describes consequences of food insecurity for nourishment among children and presents levels of food security. It discusses the interaction between undernutrition, dietary intake and infectious diseases and assessment of undernutrition. It ends with the research question and the study questions of this study.

Nutritional beliefs, knowledge and attitudes

Several studies have shown that traditional health beliefs still exist in South America (Gorter et al., 1995, Goldman et al. 2001). Health beliefs guide the local knowledge and values, affecting health related behavior and explanations of disease causation.

People believing in traditional health beliefs address good nutrition and health to their correct food practices. They ignore the function of different types of food stating food is healthy because of availability and consider their traditional food as healthier than food that is not culturally accepted (Kruger & Gericke, 2002, FPSRAD, 2006). Women do not recognize undernourishment as a health problem as they see that food intake of their children is poor and insufficient. Women with poor health knowledge cannot distinguish undernourished children with well-fed children. Children of parents who have improper general health knowledge and lack of awareness about causing factors of undernourishment, are suffering from poor nutritional status. In particular when mothers have poor health knowledge, children more often suffer from growth faltering (Aubel et al., 2001). Lack of basic nutritional knowledge strongly contributes to poor child nutritional status (Kilaru et al., 2005). Especially attitudes regarding nutrition of mothers are strongly related to children's health (Zeitlin et al., 1990).

Mothers do not have intuitive instinct to make a difference between good or bad nutritious food. Those believing in cultural health beliefs have their own perceptions on nutrition, which determines how they deal with food availability and make food choices (Chopra, 1999, Kilaru et al., 2005 and World Bank, 2006).

Food security

A culture determines which food is culturally accepted, what the requirements are concerning harvesting, preserving and preparing. Affecting access to food, food availability and the way into which people make food choices and prepare their food (FAO, 2001b, FPSRAD, 2006). A study has illustrated that food insecurity also influences food variety and the consumption of food (Melgar-Quiñonez et al., 2005).

The feeling of being food secure is an essential component of household and personal wellbeing. To better understand the concept of household food security, extensive research has been done which led to the development of conceptual definitions of three distinct concepts. These concepts were published in 1990 by the Life Sciences research Office of the Federation of American Societies for Experimental Biology:

Food security reflects access to enough food at any time for every member of a household, maximizing the chance for a healthy and active life

Food insecurity means a low or uncertain availability of nutritionally adequate and safe food or acquiring acceptable foods in a social acceptable way.

Hunger is an uncomfortable or painful sensation due to lack of food or lack of access to food.

To be able to measure the level of household food security the USDA Food and Nutrition Service and Economic Research Service have developed a questionnaire with eighteen items measuring the level of household food security. According to this questionnaire households are classified into food secure and food insecure without the experience of hunger, with moderate hunger or with severe hunger. In general hunger can be considered as a consequence of many situations, encompassing too less time to eat or dieting. In this view it is classified as a severe stage of food insecurity instead of a separate or discrete condition of this condition (Bickel et al., 2000).

A household is food secure if the family members do not experience any or experience minimal aspects of food insecurity. While a household is classified into food insecurity without hunger if family members report little reduction of food consumption, have concerns about the adequacy of their food supply and adjust their food management. This means that they purchase less food of good quality. The difference between a household that is determined food insecure with moderate hunger is that the adults in a household often experience the physical sensation of hunger due to a decrease in their food consumption. In this stage of food security children of these households do not experience hunger. The worst situation of food insecurity is if children in a household experience hunger as a consequence of a decrease in their food intake. And adults have to experience several episodes of reductions in their intake of food with the consequence of hunger. If these described situations occur, a household is classified as food insecure with severe hunger (Bickel et al., 2000).

While culture can influence food security, financial resource constrains can lead to food insecurity and hunger. Research findings mention that if income increases, food insecurity decreases (Gulliford et al., 2006).

Dietary intake and infectious diseases

Since undernutrition, poor dietary intake and infectious disease interact with each other in a vicious cycle it is necessarily to mention the interaction between infectious diseases dietary intake and undernutrition, although this research is not primarily focused upon infectious diseases. It is obvious that children develop undernutrition when being fed from a poor dietary intake or receive diets with a chronically low energy and protein intake. Once a diet is inadequate, biological processes in the child's body lower to maintain energy resulting in less cognitive development and social activity. And in worse cases, the body conserves energy that is normally used for growth. These children can deal with weight loss, a dysfunction of the immune system, which puts children at a greater risk of invasion of pathogens and carry an increased risk of death.

On the other hand infectious diseases have also long been accepted as an influencing factor on physical child growth and undernutrition rates in developing countries. Since infectious diseases cause diarrhea, malabsorption, loss of appetite, diversion of nutrients for the immune response and urinary nitrogen loss (Reuters, 2004). Several studies have been carried out monitoring episodes of illness and growth presentations. Most of these studies have examined the most prevalent childhood infectious diseases, which are diarrhea and respiratory diseases. These researches show that growth faltering due to diarrhea is higher compared to other infectious diseases and although the magnitude of the effect has varied, it is very clear that diarrhea has a negative effect on child weight and during or after a period of acute diarrhea on height gain (Scrimshaw, 2006). Parasites are also related with less food intake, loss of endogenous nutrients, malabsorption and anaemia causing poor nourishment (Katona & Katona-Apte, 2008). Worldwide 400 million school-aged children are infected with various intestinal parasites. While helminthes infections are related with reduced learning abilities, hookworm, schistosomes and giardia are linked with iron-deficiency anaemia causing micronutrient loss.

Of more importance is the interaction between undernutrition and infectious diseases. There is a synergistic reaction between undernutrition and infectious diseases that has long been postulated (Scrimshaw et al., 1968). Among undernourished children infectious diseases are more severe which causes an increase of case fatality rate. Research concluded that approximately 53% of all childhood deaths are attributable to the potentiating effects of undernutrition on infectious morbidity (Caulfield & Black, 2004). Important to mention is that even a mild form of undernourishment maximise changes to die, since most of the children are dealing with mild to moderate forms of undernutrition.

Undernutrition

Assessment of undernourishment relies on the anthropometric indicators reflecting stunting, wasting and underweight (WHO, 2005). Height-for-age, weight-for-height and weight-for-age of children are compared with age and gender-specific population data, free obtained from www.who.int/nutgrowthdb. To evaluate the different aspects of a child's nutritional status, her or his anthropometric indicator is compared with standardized normal deviations or Z-scores from the reference distribution. According to the WHO International Growth Reference and National Center for Health Statistics, children with a height that is lower than 2 Z-scores below the median of the same month of age and gender-specific reference distribution, are stunted. Children are wasted if their weight-for-height is -2 Z-scores below the median of the gender-specific reference distribution. An underweighted child has a weight-for-age Z-score lower than -2 below the median of the reference group (de Onis et al., 1993, WHO, 1995).

In summary people believing in traditional health beliefs perform health behavior regarding nutrition and have health knowledge, which is guided through their historical health beliefs. These health beliefs determine maternal food practices influencing food consumption. In addition food security influences which food is available for children and therefore a condition contributing to their dietary intake. Undernourishment is directly a result of poor food intake, both interacting with infectious diseases. Assessment of undernutrition relies on measurement of stunting, wasting or underweight.

Undernutrition in Búa

The information on the nutritional situation of the children in the Búa community in Ecuador is limited. It can be assumed that children in this village are stunted since the national data from the ENDEMAIN study of 2004 showed that 47% of the Indigenous children in Ecuador are stunted and that children living in the Costa have a stunting rate of 16%. No consistent evidence is available to conclude that undernourishment among children is a direct result of economic deprivation and food insecurity (Larrea & Kawachi, 2005). However literature has confirmed that there is a relation between maternal feeding practices and their health seeking behavior with poor nourishment among children (Jacobs & Robert, 2004). But no literature was found on the traditional health beliefs of the Tsáchila people. If they believe in health beliefs, adhere to those and how and if these beliefs affect maternal health behaviour and the food practices of mothers. And may play a role when looking at the nutritional status among children in the Búa community.

To obtain information about the children's nutritional situation and to gain insight to the influence of health beliefs and food security in the Búa community the following research question is formulated:

How do nutrition health beliefs and practices of mothers and food security affect the nutritional status of dependent children?

Study questions

In order to be able to answer the main research question the following relevant study questions and their sub questions are formulated;

1. What are the nutritional status and the dietary intake of school-aged children years and maternal nutritional health beliefs, knowledge and attitudes in the Búa community?
 - a. What is the prevalence of low height-for-age among children among school aged children?
 - b. What is dietary intake age and BMI- for- age among school aged children?
 - c. What health beliefs, knowledge and attitudes do mothers have concerning nutrition and diseases?
2. Do people experience food insecurity and does it affect food availability for children?
 - a. What is the level of food security experienced by mothers?
 - b. Which food is cultivated?

Chapter 4

Methods

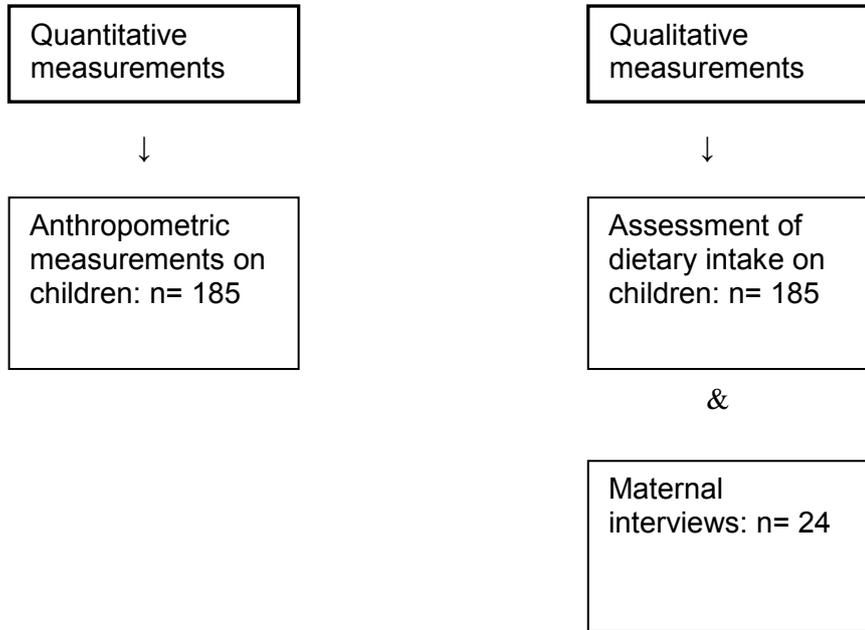
This chapter describes the methodology used for this research. It explains and describes choices for data collection, the study design, the study sample, the instruments, the procedure and the measured aspects of the mothers, children and data analysis.

Study design

To answer the research question; “How do nutrition health beliefs and practices of mothers affect the nutritional status of dependent children”? both qualitative and quantitative approaches have been employed. The qualitative approach gives possibilities to search the ‘story’ behind personal experiences and investigates contributing elements of behaviour. A quantitative approach provides information on the ‘reality’ of a situation. The benefit of using both approaches, also called triangulation, is described by Kelle (2001) in his three definitions of this concept. “A mean toward obtaining a larger or complete picture of the phenomenon under study and as a combination of methods necessary to gain any picture of the relevant phenomenon at all”. Data has been collected in two different ways. First of all, semi-structured interviews and anthropometric assessment was conducted on children at the main school in the Búa community. Secondly information was gathered by doing semi-structured interviews on mothers. The study design is presented in figure 5.

Figure 5:

Study Design



Study sample

School-aged children were assumed to have the cognitive skills to understand the questions of the interview. For this reason this study focuses on children in this age-class, in perspective of this research, children attending the main primary school in the community. Gathering information at a school gave the possibility to collect data at one place in the community. And children attend the school from Monday to Friday, which increased the easiness to include children. The choice for the Abraham Calazacon school was based on the willingness for co-operation from the school, the representation of a mix of both Tsáchila and Mestizo ethnicities and because it is the largest school in the community. In Ecuador the primary school encompasses the 2nd until the 7th level, which provides education to school-aged children. Every child attending these levels at this Abraham Calazacon school was enrolled in this study between 30th of April and the 19th of May 2008. This led to a total group of 185 children from 4-14 years of age. In addition 24 mothers were randomly selected by visiting every fifth household in the community for interviews. Mothers were interviewed because they were considered to be the most usual caregiver's, being assumed to spend the most time on food preparation and moreover mainly responsible for food choices (Puertas & Schlessler, 2001, Lindsay et

al., 2008). Requirement for inclusion in this research was that mothers needed to have children living in their household. A map of the community gave information on the number and distribution of houses (see appendices) making it possible to choose every fifth household.

Instruments

Information was gathered by interviews, which relied on two different questionnaires with both enclosing open and closed questions. Children's dietary assessment was employed by a 24 hr recall, which was adopted from the Canadian Community Health Survey Cycle 2.2, Nutrition (Health Canada, 2004). Questions were translated into Spanish and modified into easily understandable questions. Details on what children had eaten for breakfast, lunch and dinner during the previous day, either at school or at home, which other food they had eaten and the liquids they had drunk has been required. In addition socio-demographic factors to identify age, sex, ethnicity and their address have been enclosed (see appendices). Age and sex were asked to be able to calculate the height-for-age Z-scores and BMI-for-age Z-scores (which is further explained below), ethnicity to distinguish between Tsáchila and Mestizo children and their address to be able to relate children to their household in the community.

A self-made semi-structured questionnaire has been designed for the maternal interviews, together with people of the Yanapuma Foundation who are familiar with the people of the Búa community, because there was no suitable questionnaire. The main focus of the interview was to explore the level of food security and to search for maternal knowledge, beliefs and attitudes. A structured part relying on the 18-item food security questionnaire from the USDA Food and Nutrition Service and Economic Research Service has been used to measure the level of food security. This questionnaire is available from the Canadian Community Health Survey Cycle 2.2, Nutrition (Health Canada, 2004), both in English and Spanish. Items from the Spanish version were adopted and modified into easily understandable questions.

To explore the maternal health beliefs, knowledge and attitudes a theory-based part relying on both the Health Belief Model (Rosenstock, 1974) and the Theory of Planned Behavior (Ajzen, 1988) was used. The Health Belief Model served as a guideline to search for health beliefs and knowledge, the Theory of Planned Behavior to gain insight attitudes. For the development of the questions according to the Health Belief Model, first, the maternal health belief questionnaire that has been employed to discover maternal health beliefs towards childcare and has shown to be reliable and valid has been used (Bates et al., 1994). According to the persons who helped to develop the questionnaire the questions of the maternal health belief questionnaire were too difficult for the women in the community. Therefore items of this questionnaire were used to formulate open, Spanish and easily understandable questions to explore maternal knowledge, views and their opinion's on nutrition and diseases. Secondly to examine the maternal attitudes the Theory of Planned Behavior was used. From

the website (<http://people.umass.edu/aizen/tpb.html>) information was gathered to be able to develop questions according to this theory. Attitudes were not directly asked but rather based on health seeking behavior and ethnicity. Because literature has shown that Indigenous people do not seek western health care, instead adherence to the 'hot' and 'cold' imbalance or belief that evil-spirits cause diseases (Burleigh et al., 1990). Research findings from another study showed that ethnicity and Spanish language ability differs among people seeking modern health care (Pebley et al., 1996). This theory describes that intention directly has an effect on behavior, which made it necessary to explore. Intention was explored by an easy understandable Spanish open question.

In addition socio-demographic factors were enclosed because they play a role in health behavior (Rosenstock et al., 1988) along with water supply and sanitation since they have been related with nutritional outcomes long ago (Esrey & Habicht, 1988). The final questionnaire (see appendices) contains twenty-seven questions divided into four modules: socio-demographic factors, hygienic factors, food security items and a nutritional knowledge, beliefs and attitudes part.

Procedure

Before data collection draft versions of the questionnaires have been discussed with managers of the non-governmental organization and the lecturer of the Free University. A pilot-study for both questionnaires was carried out among five women and five children living in the community for validation. Based on the results, difficult items were modified or deleted. Before and during the pilot-study teachers and the director of the school were informed about this research and asked for cooperation so the researcher was able to measure every child. All children were informed classically about the measurements and the aim of the research to reduce non-response. There was spoken with the government of the community for permission to carry out a research in the community and for their cooperation so the women were also willing to cooperate. Every mother selected for an interview research has been asked to participate in this research and only if permission was given interviews were taped. If necessary, an interpreter translated the Spanish questions into Tsafiki. After collecting the data interviews have been translated into English. To reduce interview bias one person did data collection. On average per day twenty-five children were interviewed and measured, whereas the maximum of maternal interviews per day was three.

Children's measurements

Dietary intake

Children filled out the 24 hr recall to investigate their dietary intake. Children of the 5th until the 7th level filled out while they were in the classroom and were asked later on one by one again. Children of the 2nd until the 4th level were orally asked one by one. Per child age, sex, ethnicity and address were directly asked. Address was obtained by using the kilometre of living at the road from Santa Domingo to Umpe Chico. Three children were excluded because they could not remember their address or were not able to respond to the questions.

Anthropometry

As mentioned in chapter one undernutrition encompasses stunting, wasting, underweight and micronutrient deficiency. In this study there was chosen to assess the level of stunting among children in the Búa community. Because stunting has the highest prevalence compared with wasting and underweight in Ecuador and stunting reflects chronic poor dietary intake. To be able to measure stunting which is calculated by height-for-age of a child compared to the growth references of the WHO every child's height had to be measured. The calculation of BMI-for-age provides information on the energy intake. This anthropometric indicator is recommended and is a valid and reliable measure to calculate the adequacy of energy intake (Health Canada, 2004). So in addition every child's weight had to be defined. The measurements of height and weight were taken following the recommendations of the anthropometric procedures manual of Centres for Disease Control and Prevention (CDC) (2000). Standing height, without shoes or sandals and socks was measured using a tape. Weight was expressed in kilograms to the nearest 10 g using a kitchen scale. Daily the kitchen scale was checked using a known weight for reliability. Every time before the child's weight was established the kitchen scale was equilibrated to zero. Six children were excluded from the anthropometric measurements, as one child suffered from deafness, one child refused to take off her shoes and two children didn't know their age. Height-for-age Z-scores and BMI-for-age Z-scores were calculated and compared with the growth references from the WHO (2007). Children were affected by stunting if their Z-score was lower than -2 under the international median. Children received too less energy if their BMI-for-age was lower than -2 below the median.

Maternal measurements

Socio-demographic factors

The socio-demographic factors, which are added to the questionnaire used for the maternal interviews include age, maternal education level, the address on the map, the amount of children and the language that mothers mostly speak with her children at home. Mother's age and amount of children was included to capture experience regarding raising a child. Because previous studies have linked maternal education with childhood nutrition, education level was included (Frost et al., 2005). In this study seizures no schooling or partial primary school, completed primary school, completed secondary school, or other education. The address in the community was verified through the number of the household according to the map of the community. Languages mostly spoken at home differentiated between utter historical traditional language and Spanish, important for proper communication.

Hygienic factors

Two questions addressed these conditions. The first one is; "What is your main source of water?" and women could respond with; from the river, rainwater, bought water, well or other. The second one is; "What kinds of toilet facility do your children use?" with the possible answers pit latrine, no facility/field or an ecological toilet

Food security

A household is determined food insecure if mothers responded affirmative at at least five out of the eight questions. Food availability was elucidated through four questions addressing seasonal food cultivation.

Health Beliefs and knowledge

Those were examined through in total seven questions. The women had to choose which visual plate of food they thought was the best for her child or children's health and she had to explain why she thought that this plate was the healthiest for her children. The pictures of the different types of food are added in the appendices. Additionally the women had to answer the open question: "What are vitamins and minerals?"

Three gathered information on maternal opinion's upon the risk for their children to get diarrhea, parasites and anaemia. These were: "Can you tell me what you know about anaemia?", "What is the cause of anaemia?", "Can you tell me what you know about diarrhea?", "What is the cause of diarrhea?" and the last one "Can you tell me what you know about parasites?" and "What is the cause of parasites?". The perceived severity was analysed through "How is food related with the growth of your children?" and "How is food related with these diseases?"

Attitudes

The open question: “If your child or one of your children is sick which person are you going to visit to treat the disease?” clarified traditional attitudes or western attitudes. Another component serving as an attitudinal indicator towards nutrition is ethnicity. Tsáchila represents traditional attitudes and Mestiza western attitudes.

Intention

The open question: “Do you want to change the diet of your child or children, why and how?” explored if mothers had the intention to change their health related behavior and wanted to improve their children’s food intake. In addition it addressed the beneficial aspects and / or possible barriers.

Statistics

Quantitative data was processed by Statistical Package for the Social Sciences (SPSS, Version 15.0). Qualitative data from the interviews were analyzed and described after data collection to determine children's food intake and the maternal knowledge, beliefs and attitudes concerning nutrition.

The Z-scores, which are obtained from the WHO are available for girls and boys and calculated for every year of age plus the months of age. In this study age is known in years. Therefore to correct for the fact that the age of the participating children was not available in years plus the months, or the exact date of birth, for every child who was included in this study the height-for-age Z-score and BMI-for-age Z-score is studied based on the comparison of every child's height and BMI with the same gender and age plus six months of the reference population. The reference population for children 0-5 years of age is available in months. For children for years of age, their age was calculated into months. Their height and BMI was compared with the same gender and age reference population plus the six months. To compare children's height-for-age and BMI-for-age with the reference population children were classified in a Z-score higher than three, between 3 and 2, between 2 and 1, between 1 and median, between median and minus 1, between minus 1 and minus 2, between minus 2 and minus 3 and lower than minus 3. If they had exact the same Z-score compared with the reference population these was mentioned. The total amount of children in the different areas was counted. If a child had a Z-score lower than -2 he or she was stunted when looking at height-for-age or too thin, when looking at BMI-for-age. If a child had a Z-score of -2 he or she was considered non-stunted or non-thin. To be able to measure the prevalence of stunting and thinness children are classified into stunted and non-stunted and thin and non-thin based on their Z-score. For the distribution of stunted and thin children according to sex, ethnicity and area the frequencies are calculated. The Fisher's exact test is used to be able to search for a relation between energy intake and stunting. There was chosen for this test, because the Chi-square test presented too small expected values.

Reported meals form breakfast, lunch and dinner were reviewed, unknown meals were clarified and classified into the food categories of carbohydrates, protein, vegetables and plantain, fruits and sweets. Liquids were also reviewed and if necessarily clarified. Liquids are categorized into coffee, chocolate milk, juices, water and colorado. Colorado is a drink that contains oatmeal and water. The frequency of the mentioned categories of food or liquids consumed by the children is counted. To be able to relate children's data with the level of food security the twenty-four different households in Búa are classified into six groups. Children who live in the Búa community are arranged in the six different areas based on their address in the community. Household 5 - 20 contains kilometre 13 -14, 5, household 25 - 40 contains kilometre 14, 5 - 15, 5 household 45 - 61 contains kilometre 15,5 - 16,5, household 65 - 80 contains kilometre 16,5 - 18,5, household 85 - 100 contains kilometre 18,5 - 19,5 and household 105 - 120 contains kilometre 19,5 - 21. An area is determined food insecure if

three or more households were experiencing food insecurity whereas an area was classified into food secure if three or more households were food secure. To be able to search for a relation between food insecurity and stunting the Fisher's exact test is employed. Instead of the Chi-square test, because the results of this test showed that there was a problem with small expected values.

Chapter 5

Results

In this chapter the results of this study will be presented. First, children's socio-demographic characteristics and anthropometric characteristics are described, their Z-scores for height-for-age and the prevalence for low height-for-age is given. Z-scores for BMI-for-age are presented with the prevalence of children who receive too less energy. Then children's reported dietary intake is presented. Finally the maternal socio-demographic characteristics, hygienic circumstances, maternal health beliefs, knowledge and attitudes and food security are described.

Results of children's interviews and anthropometric assessment

Children's characteristics and anthropometric measurements are presented in table 2. The average age of the children is nine years. Forty-one children are Tsáchilas and hundred-and-thirty-five are Mestizos. Seventy-two children live outside Búa, while hundred-and-four live in the community. Height expressed in centimetres ranges from 100-163, the mean is 126, 4 and a standard deviation of 12, 7. Weight is expressed in kilograms with a range of 13, 0 -51, 0, the mean is 26, 2 and the standard deviation is 7, 7. BMI range from 12, 2-28, it has a mean of 16, 1 and a standard deviation of 2, 3.

Table 2: Children's characteristics

Age	4-14 ¹	9 ²	
Urban/Rural	72/104		
Tsáchila/Mestizo	41/135		
Males/Females	91/85		
Height (cm)	100-163 ¹	126, 4 ²	12, 7 ³
Weight (kg)	13, 0-51, 0 ¹	26, 2 ²	7, 7 ³
BMI (kg/m ²)	12, 2-28, 0 ¹	16, 1 ²	2, 3 ³

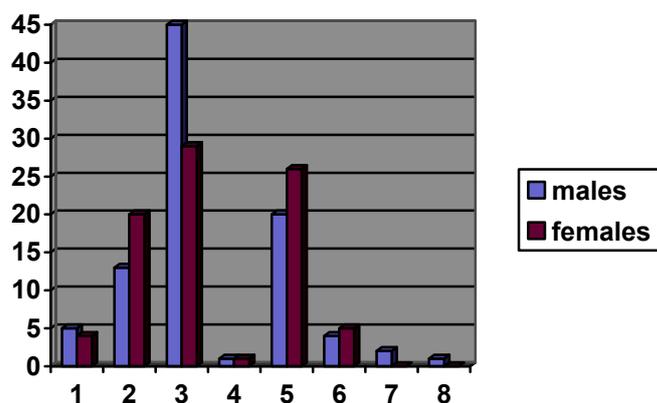
1 Range

2 Mean

3 Standard deviation

The distribution of the Z-scores for height-for-age compared with the gender specific WHO reference population is presented in figure 6. Twenty-four % of the children have a Z-score below minus two and are too short for their age.

Figure 6: Height-for-age distribution compared with reference distribution



- 1 Z-score lower than -3
- 2 Z-score between -2 and -3
- 3 Z-score between -1 and -2
- 4 Z-score of -1
- 5 Z-score between -1 and the median
- 6 Z-score between the median and 1
- 7 Z-score between 1 and 2
- 8 Z-score higher than 3

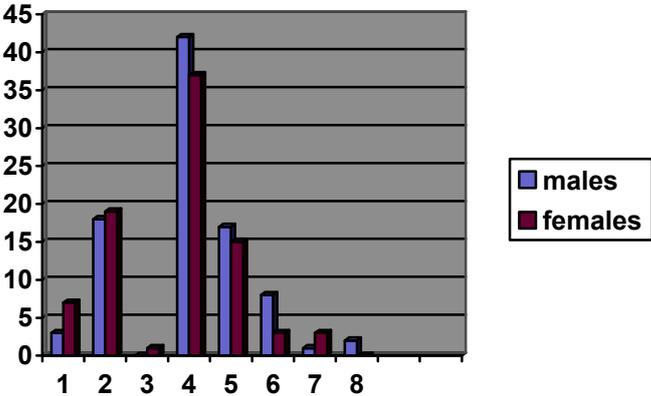
In table 3 low height-for-ages are presented according to boys and girls, Indigenous and non Indigenous children and rural and urban areas. The prevalence of this indicator is slightly higher among girls than among boys. It is a little bit higher among Indigenous children compared with those who are non Indigenous. Children who live in an urban area have a higher prevalence compared to these who live in a rural area.

Table 3: Stunting according to sex, ethnicity and area

Characteristics	Stunted	Non stunted
Males	18 (20%)	73 (80%)
Females	24 (28%)	61 (72)%
Tsáchila	11 (27%)	30 (73%)
Mestizo	30 (22%)	105 (78%)
Urban	21 (29%)	51 (71%)
Rural	20 (19%)	84 (81%)

Figure 7 presents the distribution of the Z-scores for BMI-for-age compared with the reference population of the WHO. Six % of the children have a Z-score below minus two and are too thin for their age or receive too less energy. In the appendices the frequencies for height-for-age and BMI-for-age are shown in table 11 and table 12. In the appendices, in table 13, the available anthropometric measurements and the Z-score classification for Height-for-age and BMI-for-age are also presented for children who are excluded from this study.

Figure 7: BMI-for-age distribution compared with reference distribution



- 1 Z-score between -3 and -2
- 2 Z-score between -2 and -1
- 3 Z-score of -1
- 4 Z-score between -1 and the median
- 5 Z-score between the median and 1
- 6 Z-score between 1 and 2
- 7 Z-score between 2 and 3
- 8 Z-score higher than 3

Table 4 presents low BMI-for-age among boys and girls, Indigenous children and non Indigenous children and those living in a rural or urban area. All prevalence’s among the thin children classified into ethnicity, area and sex are more or less the same.

Characteristics	Thin	Non thin
Males	3 (3%)	88 (97%)
Females	7 (8%)	78 (92%)
Tsáchila	1 (2%)	40 (99%)
Mestizo	9 (7%)	126 (93%)
Urban	2 (3%)	70 (97%)
Rural	8 (8%)	96 (92%)

The food intake, reported by children is shown in table 5. This table presents the amount of children for every frequency of food and liquid intake divided across the different categories during a day. To get an idea on which meals and liquids children did report, the reported plates and drinks by children are presented in table 14 and 15 in the appendices. As shown in table 5, some (10%) of the children did report that they did not consume any proteins, according to 20 % they did consume one time a meal with proteins, 72% of the children did report that they consume two or three times a day proteins, and 2% reported that they did consume proteins four times a day. While 1% did not eat carbohydrates, 9% did consume carbohydrates once a day, more children (30%) consumed twice a day carbohydrates. More than half of the children (54%) consumed three times a day carbohydrates, and even 6% did eat carbohydrates four times. Almost half of the children (42%) did not eat any vegetables or plantain. Thirty-seven % did consume such a food item one time; a little bit less children (12%) consumed two times a day and some (9%) three times a day. According to 64 % of the children they did not consume fruits, 41% consumed one fruit, 15% two fruits, 4% three fruits, 2% four fruits and even 1% five fruits.

Thirty-five % of the children did not drink any coffee, whereas almost half of the children (47%) did. Some (15%) drank two times coffee and even some children (3%) drank three times a day coffee. Another drink that is consumed by children is chocolate milk, even though the majority (83%) reported that they did not drink chocolate milk, some (12%) did drink it once and some (5%) twice. Juices are consumed by almost half of the children (49%) These children did report to consume juices one time a day. While 28% reported not to drink any juices, some (17%) consume two times a day juices and some (6%) three times a day. The majority of the children (72%) do not drink any water, some (21%) of them drink it once a day and less children two times (5%) or three times (2%) a day. The most of the children eat sweets during the day, though 17% did report not to consume sweets. Sixteen % did consume one sweet, 23% two sweets, 21% three sweets, 14% four sweets and 9% five sweets. Colorado was not consumed by 67% of the children. Thirty % did report that they drink it once a day, 2% drank it twice and 1% three times a day.

Table 5: Dietary intake of children

Characteristics	1	2	3	4	5	6
Proteins	10 (6%)	36 (20%)	63 (36%)	64 (36%)	3 (2%)	
Carbohydrates	1 (1%)	16 (9%)	53 (30%)	96 (54%)	10 (6%)	
Vegetables/plantain	74 (42%)	65 (37%)	22 (12%)	15 (9%)		
Fruits	64 (36%)	73 (41%)	27 (15%)	7 (4%)	3 (2%)	2 (1%)
Coffee	61 (35%)	84 (47%)	26 (15%)	5 (3%)		
Chocolate milk	146 (83%)	22 (12%)	8 (5%)			
Juices	50 (28%)	87 (49%)	29 (17%)	10 (6%)		
Water	127 (72%)	37 (21%)	9 (5%)	3 (2%)		
Sweets	31 (17%)	28 (16%)	40 (23%)	37 (21%)	24 (14%)	16 (9%)
Colorado	119 (67%)	52 (30%)	4 (2%)	1 (1%)		

1 No intake of food or liquid

2 One time a day intake of food or liquid

3 Two times a day intake of food or liquid

4 Three times a day intake of food or liquid

5 Four times a day intake of food or liquid

6 Five until seven times a day intake of food or liquid

Table 6: Stunting and energy intake

Characteristics	Fisher's exact test	P ¹
Thinness	1,656	0,245

¹ P value is 0, 05

There was not statistical relationship found between children's daily energy intake and stunting. This result is presented in table 6.

Results of maternal interviews

The maternal socio-demographic characteristics and hygienic factors are presented in table 7. Maternal mean age is 40 (range 15-58 years) and they have an average of four (range 1-13) children each. Mothers reported an equal percentage for speaking Spanish and Tsafiki (both 38%) with their children, about 24% spoke both Spanish and Tsafiki at home. Seventy-one % did not have any education or had not completed primary school, whereas 25% finished primary school and 4% finished university. While most of the mothers reported that their household (67%) has a pit latrine, there are some (8%) with an ecological toilet and there are still households (25%) with not toilet facility at all. Mothers mostly have their own well for water (79%), 17 % gathers water from the river and 4% buys water.

Table 7: Maternal characteristics

Age		
Range	15-58	
Mean	40	
Amount of children		
Range	1-13	
Mean	4	
Language mainly spoken at home		
Tsafiki	9	38%
Spanish	9	38%
Both	6	24%
Education level		
No schooling/ partial primary school	17	71%
Completed primary school	6	25%
Other (completed university)	1	4%
Toilet facility		
Pit latrine	16	67%
No facility/field	6	25%
Ecological toilet	2	8%
Maine source of water		
River	4	17%
Bought water	1	4%
Well	19	79%

Maternal health beliefs and knowledge on food and diseases

More mothers (58%) reported that she had heard about vitamins and minerals, in contrary 42% gave the answer that she could not give any explanation on vitamins and minerals. Six mothers answered that according to their opinion the meal with rice, plantain, vegetables and egg was the healthiest meal. According to two mothers, because it contains the most vitamins; according to two mothers, because it looks well prepared and according to two mothers, because it includes everything. For one mother only rice with vegetables was chosen because she thought it contains less fat. One mother reported that egg and rice is the most nutritious and therefore the healthiest food. And according to one mother egg and plantain are the healthiest since her children love this meal. Four others reported that the plate with rice, chicken and beans are the healthiest since it contains a little amount of fat, because of its easiness of preparation, the fact that rice contains fibers and because her children love this food. Rice, vegetables and plantain were elected as the healthiest because the main products of this plate are cultivated at the surrounding lands of this family. One mother elected papaya because it is a fruit. Three mothers could not respond to this question. According to one mother there was no particular healthy meal, she reported the importance of receiving various meals containing different kinds of vitamins for being healthy. Two mothers noticed that all plates were equally healthy. One mother reported that rice, chicken and beans were the healthiest but did not know why.

In total 29% of the mothers could not give any explanation on anaemia. The other mothers responded that anaemia is an insufficient amount of red blood cells; it is a consequence of insufficient blood; or a disease on children. Mothers described this disease as a headache; a lot of 'cold' in the body; 'sangre debil' translated as weak blood; it is a condition when children do not have vitamins and a 'debil' state. They reported several causes for anaemia. According to the mothers causes are; no intake of vitamins; food which is prepared very bad; poor nutritional food; insufficient intake of iron; 'cold' food; 'bad' food; the consumption of sweets; the intake of bad air; drinking rainwater; eating lemon with salt and washing in the river. Eight % replied that they did not know the cause for this illness.

In total 42 % of the mothers did not know what diarrhea was. Others gave several explanations on diarrhea. It was defined by them as: a lot of water in the faces; dehydration; a 'bad' stomach; a 'debil' state; a 'bad' body; a stomach 'debil'; a painful stomach; an infection intestinal and a disease. Diarrhea is according to the respondents: a consequence of food poisoning; parasites; food causes the pain; drinking water which is not boiled; the consumption of food that is prepared badly; the intake of 'bad' air; the intake of 'bad' food; the intake of 'cold' food; the intake of 'cold' water; the occurrence of a 'mal' infection and food that is prepared 'mal'. Thirteen % did not have any explanation for the cause of diarrhea. Thirty-three % of the mothers did not have information on parasites. According to other women parasites are: small animals in the digestive system or lumbrices; every young child has them; it is a painful stomach; it is 'bad' food or a 'bad' body. The participants reported several causes. These are the intake of contaminated foods; drinking water which is not boiled; not washing hands;

eating unwashed products; drinking cola and walking without shoes. Sweets are considered the cause of parasites with the nature and 'cold' water. 8 % of the participants could not reply on the causes of parasites.

Some participants did not consider nutritional food as being important for child growth. Others mentioned a relationship but did not give any explanation and one mother responded that there was no relationship. According to the respondents the following relationship exist: children grow less if they receive less food; children get sick because of poor nutritional food causing growth faltering; children need to eat three times a day for a healthy growth, child growth depends on nutritional food children face growth faltering because of unwashed food and if they do not eat at all children grow less.

Eight % of the mothers confirmed a relationship between food and the mentioned diseases, but they did not know which one. Twenty-five % of the mothers mentioned that they did not know if there was a relationship and according to 17 % there is no relationship. Four % replied that they had no knowledge on preventing diseases. Several other relations were considered: if food is not well prepared it is 'bad' and causes diseases: diseases come within nutritional food: food contains parasites that causes diarrhea: food needs to be washed and cooked well to prevent all the diseases; food (especially cassava and potatoes) contain parasites; all meals need to be warm to protect against the diseases; unwashed food cause illness; children need nutritious food to prevent for the diseases and not preparing food at all cause the diseases.

Attitudes

Among the women 58% is Tsáchila and 42% Mestiza. Some of them, 8% does not seek any health care; while the others do seek western health care (42%), use traditional remedies (25%) or even look for both (25%).

Intention

Sixty-three % of the mothers want to change their children's diet, 33 % of them do not want to change their children's food intake and 4% (one mother who is breastfeeding her child at the time of the interview) does not know if she wants to change her child's diet. Changing their children's diet through learning how to cook nutritional food was mentioned by 25 % of the mothers. According 21 % no money and no knowledge on nutritional food (8%) are barriers in changing food intake. The other respondents answering with yes could not give answers on how to change the diet or give examples of barriers in changing diets of children.

At the time of this interview thirteen (54%) of the mothers reported that they were experiencing food insecurity and eleven (46%) of them were in a situation of food security, as shown in table 8. In addition this table provides information on the cultivated products during summer and winter. Mothers answered that in both seasons in particular cassava, corn and plantain are cultivated for own use and to sell.

Table 8: Food security and reported food products from harvesting own products

Food security

Food secure	11	46%
Food insecure	13	54%

Food availability

	To eat		To sell	
	Summer	Winter	Summer	Winter
Rice	1	1	1	1
Cassava	21	13	17	11
Corn	12	10	6	4
Plantain	17	16	17	16
Chicken	1	1	0	0
Peanut	9	5	2	2
Orange	5	4	1	1
Papaya	5	4	0	0
Lemon	3	1	0	0
Aguanabana	2	1	0	0
Pineapple	1	0	0	0
Passion fruit	1	1	1	0
Mandarin	2	0	0	0
Tomato	1	1	0	0
Bean	10	6	0	1
Malanga	0	0	5	2

- 1 Amount of mothers that reported to harvest this product to eat in summer
- 2 Amount of mothers that reported to harvest this product to sell in summer
- 3 Amount of mothers that reported to harvest this product to eat in winter
- 4 Amount of mothers that reported to harvest this product to sell in winter

Table 9: Characteristics of children in Búa and those not in Búa

	Total group	Sub-group Búa	Sub-group not in Búa
Height (cm)	100 - 163 ¹ 126, 62 ² 12, 6 ³	105 - 155 ¹ 128, 1 ² 12, 6 ³	100 - 163 ¹ 124, 8 ² 12, 4 ³
Weight (kg)	13, 0-51, 0 ¹ 26, 2 ² 7, 8 ³	15, 0-51, 0 ¹ 26, 7 ² 7, 9 ³	13, 0-51, 0 ¹ 25, 5 ² 7, 6 ³
BMI (kg/m ²)	12, 2-28, 0 ¹ 16, 1 ² 2, 3 ³	12, 2-25, 3 ¹ 16, 1 ² 2, 0 ³	12, 9-28, 0 ¹ 16, 1 ² 2, 7 ³
Height	1,440 ⁴	0,152 ⁵	
Weight	1,033 ⁴	0,303 ⁵	
BMI	0,133 ⁴	0,894 ⁵	

1 Range

2 Mean

3 Standard deviation

4 Statistic t

5 P value (0, 05)

The differences of height, weight and BMI between the children living in Búa and those outside Búa are presented in table 9. The ranges, means and standard deviations are shown for height, weight and BMI for both groups. The independent sample t-test shows that there are no significant differences between both groups in height, weight and BMI.

Calculated with the group of the children living in Búa, as shown in table 10 no statistical significant relationship was found between household food insecurity and stunting.

Table 10: Stunting among food security situation

	Fisher's exact test	P ¹
Food security	1,525	0,320

1 P value is 0, 05

Chapter 6

Conclusion and recommendations

“How do nutrition health beliefs and practices of mothers affect the nutritional status of dependent children?”

To answer this research question, children’s and maternal interviews have been carried out in an Indigenous community in a rural area in the coastal province of Ecuador, the Búa community. Maternal interviews provided insight in the local health beliefs and the experiences of mothers concerning food security. While interviewing children resulted in information on food consumption and anthropometric assessment.

First of all it can be concluded in this study that 24% of the children have a low height-for-age. The prevalence of stunting among the investigated children in Búa is almost equal compared with the national calculation by UNICEF from 2001-2006.

The interviews showed that children in the Búa community consume meals that often contain carbohydrates and less often contain proteins or vegetables. Fruit is consumed occasionally, and sweets more often. These findings correspond with previous studies that found that Indigenous children’s diet consist of a large amount of carbohydrates, is deficient in proteins and hardly includes fruit. The children receive their macronutrients, vegetables and fruits from limited food items. Which makes the variation in intake low compared to non-indigenous children. However the little variation in food intake is in accordance with another study which concluded that the traditional diet of Indigenous children comprises a little amount of staples. The majority of the children receive enough energy for their age since only 5 % suffers from thinness. Also the energy intake among children is not significantly related with stunting. Which lead to the assumption that children can be stunted, because they suffer from insufficient intake of proteins. This is also mentioned in previous research concluding that poor protein intake causes stunting among children (World Bank, 2007). While it was expected that the food security situation contributes to poor nutritional status of children, since stunting and food insecurity have been linked in other studies, this is not a conclusion that can be drawn from this study. Because food insecurity and stunting are not statistically associated.

It can be concluded that mother’s knowledge on nutrition and diseases and food practices are influenced by traditional health beliefs. This is in accordance with findings in a rapport of the World Bank (2007) which addressed the importance of traditional health beliefs when gaining insight in Indigenous nutritional knowledge. The knowledge on nutrition and diseases of the mothers in Búa is limited compared to urban citizens of Ecuador, though more or less the same compared to mothers living in other Indigenous communities. Some mothers in Búa have adequate nutritional knowledge and some have heard about nutritional aspects of food or can give some general information on diseases, overall, most of the mothers have poor knowledge on the nutritive value of food, anaemia, diarrhea, parasites and the causes of the

diseases and the relation between food and child growth as well as food and diseases. Food is considered healthy if it is prepared according to the traditional practices or is accepted in the culture rather than the nutritive value of food. Therefore it can be assumed that mothers can not distinguish between nutritious and non nutritious food.

This study found that the belief in the 'hot' and 'cold' qualities of food influences food choices. This is in accordance with previous results which have shown that this belief still exist in Ecuador among Indigenous mothers which influence their food choices. Because mothers strongly belief in these qualities of food and that this correspond with the level of diseases women base their food choices on this belief. The other belief, that diseases are of supernatural origin, not directly effects their food choices. Though this belief can play a role in the choices for treatment when a child is sick. Overall the beliefs and knowledge of the mothers in the Búa community have consequences for their children's food intake and nutritional status. This is in accordance with other studies which concluded that adherence to traditional health beliefs affects children's nutritional situation (Kruger & Gericke, 2002, FPSRAD, 2006). It was expected that Indigenous women had negative attitudes towards western health care. Since other studies found that women of this ethnic disparity mainly seek traditional health care. However, though more mothers in this study are Tsáchila, almost half of the mothers seek western health care and are additionally motivated to change their children's diet.

Based on the results of this study it is recommended to develop and implement a nutritional education program in the Búa community, to improve maternal nutritional knowledge to improve their children's dietary intake and to decrease stunting. Such a program has not been executed in this area before this research took place. Studies described effective nutritional education programs implemented in South America. These programs focus upon increasing maternal nutritional knowledge through food preparation demonstrations, anthropometric measurement information, age-appropriate messages, food recipe flyers for caregiver's and problem solving moments regarding nutrition (Robert et al., 2007, Penny et al., 2005). And to prevent for undernutrition UNICEF started a nutritional education program in large cities in Ecuador. This program encloses culturally adapted and adequately nutritious recipes which are promoted and explained by municipal and civil servants. So that Ecuadorian citizens will incorporate these recipes in their diet.

To improve children's diets and reduce undernutrition in Búa, mothers in this community should have access to nutrition information addressed to:

- the nutritional aspects of food; about the vitamins and minerals that a food item contains and why it is important for child health
- the relationship between diet and diseases
- the normal growth of children
- how mothers can prepare other food such as vegetables

For the future, with regard to the food intake of the children in the community, it is worth exploring the consumed micronutrients of them. Since previous studies have concluded that Indigenous children's diet is insufficient in several important micronutrients for good health, such as iron, vitamin A and iodine. This study searched for macronutrients and it is important to gain more information on the micronutrients that they receive to be able to address those micronutrients possibly insufficient in the diet of the children in this village.

Chapter 7

Discussion

This chapter describes the limitations of this research and points out what has to be taken into account when using this study for further exploration. The limitations of the theories that have been applied will be discussed. It discusses critical comments on the methods which have been used, which concerns the study population, difficulties with maternal interviews, anthropometric assessment and the questionnaires.

This research emphasizes the influence of maternal health beliefs, knowledge and attitudes on food availability and food practices and explored the food security situation with its affect on food availability. And the effect of both pathways on children's dietary intake and their level of undernutrition. To be able to find out which recommendations for a nutritional education program could be formulated. The framework for child undernutrition of UNICEF was applied to link the mentioned aspects and the Health Belief Model and the Theory of Planned behavior have been used to explore the maternal health beliefs, knowledge and attitudes. Because of time limitation and the load of the interviews for the children and the mothers not every concept of the theory for undernutrition of UNICEF, the Health Belief Model and te Theory of Planned Behavior have been used.

According to the framework of UNICEF not only the pathway that is described above leads to undernutrition. The environment of a child can also influence the nutritional status of a child. For instance, if a child does not has access to proper health care in case of a disease, lives in unhygienic circumstances or only has the possibility to drink contaminated water he or she is more vulnerable for infectious diseases which besides insufficient food intake directly influences nutritional status. This study was interested in the chronic aspects of poor dietary intake, and not in sudden weight loss, therefore the occurrence of infectious diseases among the children was not taken into account. Though there could have been an effect of the occurrence of infectious diseases on the the nutritional status of children during the time of this research.

When looking at the both theories which are used to clarify health beliefs, knowledge and attitudes to be able to make a recommendations for a nutritional education program, it is clear that not every element of these theories are used. According to the framework of UNICEF knowledge and attitudes are of direct influence on food security and maternal child care. Therefore the Health Belief Model and the Theory of Planned Behavior are addressed to those elements of the theories. And in addition due to time limitation and load for the mothers these other elements are not included.

When looking at the results of the methods a few clear conclusions can be drawn. Though the maternal study sample was rather small this could have led to limited information retrieved by mothers. Because this sample group was rather small, and to be able to search for the effect of food insecurity on undernutrition, it was difficult to clasify every child into a household. Secondly a lot of the interviewed children did not live in the Búa community. Making the search for the influence of food security on

stunting difficult, because it relied on a rather small sample group of the children. According to this study mothers experience food insecurity and children face stunting but based on this research it is difficult to draw conclusions.

Sometimes cooperation from the community members was difficult since people in the community do not always trust 'strangers' from outside their community and were therefore sometimes suspicious towards me. To reduce prejudice and suspiciousness among these people the government of the community was asked to explain the reasons for this research to the community and asked them for their cooperation. In addition information was given to the women. However due to cultural difficulties, interviewing the mothers can have resulted in interview bias. Sometimes during the interviews women did get nervous and every now and then they asked their husband about a question before giving a response.

Indigenous children in several countries in South America are often affected by undernutrition. It is sometimes mentioned that this can be the result of comparing Indigenous children with a reference population with children of European ancestry. It is possible that Indigenous children are genetically programmed to be short. A child can be short, simply because of short parents and not because of an insufficient diet. However numerous studies have shown that genetic variation is not responsible for Indigenous children who are considered too short (World Bank, 2007). If in an identified study population more than 5% of the children have height-for-age Z-scores, more than -2 below the median it can be considered as a consequence of poor diet (Lewitt & Kerrebrock, 1997).

As mentioned in the conclusion is the prevalence of stunting among children living in the Búa community almost equal to the prevalence of UNICEF. Though compared to other studies that have been carried out among other Indigenous tribes in South-America and the ENDEMAIN study which was carried out in Ecuador and presented nutritional statistics of Indigenous children, the prevalence of stunting among Tsáchila children in Búa is low. So compared to national data of Ecuador, the prevalence of stunting among the total group is normal. Compared to other studies among Indigenous people the prevalence of low height-for-age is low.

The assessment of children's food intake may have errors, which can have contributed to an under-reporting or over-reporting of food consumption. It is also possible that because of limited knowledge on food preparation and knowledge of food the interviewed children made an error in the identification of food. Another important aspect to take into account is the 24 hr recall which investigates just one day, which is a relatively short period of time. Theory shows that this food assessment method of recalling one day, often underestimates dietary intake since an individual's food intake over the days varies widely (Livingstone & Robson, 2000).

To require a more valid estimation, multiple interviews are needed. Due to time limitation, it was impossible to collect more data than has been done in this research. So the results may not have estimated children's 'real' usual intake. Children need to have a good memory and attention span, an adequate time conception and knowledge of the several types of food. In particular cognitive functions of children younger than 8 years may be limited for dietary memory (Livingstone & Robson, 2000). Children can have

reported phantom foods or can have missed consumed food or could have reported the wrong type of food. This could be abolished by asking mothers to participate, but due to cultural differences and time limits they were not asked for participation.

Rural populations are mainly depend on their own production, as are the people living in the Búa community. Since this research took place during summer, the period when the products are being harvested, it can be suggested that food availability was higher compared to winter and times of product cultivation. This can influence the food intake and therefore the prevalence of stunting. In this study the prevalence of height-for-age and BMI-for-age can be lower compared to other times.

The last point of discussion is the questionnaire that has been used for interviewing the mothers. The 18- item questionnaire of the US Food Security Survey Module is universally used to determine food security and has shown to be to be valid in several countries in Central and South-America (Escamilla et al., 2004, Melgar-Quinonez et al., 2006, Alvarez et al., 2006 and Pérez-Escamilla et al., 2005). But during the pilot study it became clear that only eight questions of the questionnaire could be used, because only those were understandable for the women. This has led to bias in the determination between food security and food insecurity. To make a clear distinction between food security, food insecurity and hunger according to the US Food Security Survey Module it can be recommended to use the whole questionnaire. But the difficulty is that people in the community are not able to understand all these questions. Though the other subjects that are being asked in the questionnaire are sufficient and can be considered as un-biased.

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Appendices

Table 11: Height-for-age Z-scores

	♂	♀	total
↑3	1	0	1
2-1	2	0	2
1-M	4	5	9
M- -1	20	26	46
-1	1	1	2
-1- -2	45	29	74
-2- -3	13	20	33
↓-3	5	4	9
	91	85	176

Table 12: BMI-for-age Z-scores

	♂	♀	total
↑3	2	0	2
3-2	1	3	4
2-1	8	3	11
1-M	17	15	32
M- -1	42	37	79
-1	0	1	1
-1- -2	18	19	37
-2 - -3	3	7	10
	91	85	176

Table 13: available anthropometric characteristics of excluded children

age	height	weight	height-for-age Z-score	BMI-for-age Z-score
9	120 cm	24 kg	-2 and -1	Median and 1
-	115 cm	19 kg	-	-
-	138 cm	30 kg	-	-
-	135 cm	30 kg	-	-
9	134 cm	29 kg	-1 and Median	Median
12	147 cm	35 kg	-1 and -2	-1 and -2

Table 14: Classification of reported food consumption by children

Food category

Carbohydrates

Rice (cooked or in soup)
Pasta (cooked or in soup)
Bread (sweet)
Cassava
Empanada
Tortilla
Potatoes (cooked or in soup)

Proteins

Meat
Fish
Egg (fried, cooked or in soup)
Cheese

Vegetables and Fruits

Plantain (fried or cooked)
Beans
Onions
Maize
Lettuce (with tomato and onion)

Fruits

Mandarin
Orange
Watermelon
Orange
Apple
Grapes
Papaya
Mango

Table 15: Classification of reported food and liquid intake by children

Food category

Drinks

Orange juice
Pineapple juice
Maracuya juice
Lemon juice
Chocolate milk
Coffee (black with sugar)
Coke
Colorado

Sweets

Loly pop
Gum
Ice creams
Sweets

8. "The food that I buy just doesn't last, and I don't have money to get more." Is that often, sometimes, or never true for you/your household?

- often true
- sometimes true
- never true

9. "I relied on only a few kinds of low-cost food to feed my child/the children because I am running out of money to buy food." Is that often, sometimes, or never true for your household?

- often true
- sometimes true
- never true

10. My child or children is or are not eating enough because I just can't afford enough food." Is that often, sometimes, or never true for your household?

- often true
- sometimes true
- never true

11. Do you ever cut the size of your child's or any of the children's meals because there isn't enough money for food?

- yes
- no

12. Do you ever skip meals because there isn't enough money for food?

- yes
- no

IF YES ABOVE ASK

13. How often does this happen?

- often
- sometimes
- never

14. Is your child or are your children ever hungry but you just can't afford more food?

- yes
- no

15. What do you cultivate to eat this time of year?

.....

.....

.....

.....

16. What do you cultivate to sell this time of year?

.....

.....

.....

.....

17. What do you cultivate to eat in winter?

.....
.....
.....
.....

18. What do you cultivate to sell in winter?

.....
.....
.....
.....

19. What food is particularly healthy to give your child or children? Why?

.....
.....
.....
.....

20. What are vitamins and minerals? Can you tell me what you know about vitamins or minerals?

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.....
.....
.....

21. Can you tell me what you know about anaemia? And what is the cause of anaemia?

.....
.....
.....
.....

22. Can you tell me what you know about diarrhea? And what is the cause of diarrhea?

.....
.....
.....
.....

23. Can you tell me what you know about parasites? And what is the cause of parasites?

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.....
.....

24. How is food related with these diseases?

.....
.....
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.....

25. How is food related with the growth of your children?

.....
.....
.....
.....

26. If your child or one of your children is sick which person are you going to visit to treat the disease?

.....
.....
.....
.....

27. Do you want to change the diet of your child or children? Why and how?

.....
.....
.....
.....

Preguntas con madres

Fecha de entrevista:	Sample person:
Día de entrevista:	Nacionalidad: <input type="checkbox"/> Tsáchila <input type="checkbox"/> Mestiza
Dirección en carta:	Edad:

1. Nombre:.....
(Primer) (Apellido)

2. ¿Cuántos hijos tiene? ¿Como se llama y qué es su edad?

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

3. ¿Qué lengua habla normalmente en casa con su(s) hijo(s)?

- Tsafiqui
- Español

4. ¿Hasta qué grado estudió?

- no escuela / parcial de la escuela
- terminó escuela
- terminó colegio
- otra, específica

5. ¿De donde coge agua para tomar?

- río
- agua de la lluvia
- lo compra
- pozo
- otra, específica.....

6. ¿De donde hace pipo y popo?

- hueco / latrina
- campo / no facilidad
- baño ecologico

Seguridad de alimentación

Ahora le voy a leer algunas respuestas de la gente sobre su situación de comida. Para cada repuesta, favor de indicarme si ocurre en su casa muchas veces, pocas veces o nunca.

7. ¿Se preocupa que la comida se podía acabar antes de tener dinero para comprar más. Ahora para su casa, ¿Esto es muchas veces, pocas veces o nunca?

- muchas veces
- pocas veces
- nunca

8. ¿La comida que compra no dura mucho y no hay dinero para comprar más. Ahora para su casa, ¿Esto es muchas veces, pocas veces o nunca?

- muchas veces
- pocas veces
- nunca

9. ¿Depende de unos pocos alimentos de bajo costo para dar comida a su(s) hijo(s) por que usted termina el dinero disponible para comprar alimentos. Ahora para su casa, ¿Esto es muchas veces, pocas veces o nunca?

- muchas veces
- pocas veces
- nunca

10. ¿Su(s) hijo(s) no come(n) lo suficiente por que no tiene dinero para comprar suficiente comida. Ahora para su casa, ¿Esto es muchas veces, pocas veces o nunca?

- muchas veces
- pocas veces
- nunca

11. ¿Alguna vez le da menos cantidad de comida a su(s) hijo(s) por que no hay suficiente dinero para comida?

- sí
- no

12. ¿Alguna vez su hijo o cualquiera de su(s) hijo(s) no comen por que no hay suficiente dinero para comida?

- sí
- no

Cuando es sí va a pregunta 13

13. ¿Con qué frecuencia sucede esto?

- muchas veces
- pocas veces
- nunca

14. ¿Alguna vez su hijo o cualquiera de sus hijos tienen hambre pero no tiene suficiente dinero para comprar mas comida?

- sí
- no

15. ¿Ahora, qué cultiva en su terreno para comer?

.....

.....

.....

.....

16. ¿Ahora, qué cultiva en su terreno para vender?

.....

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17. ¿Qué cosecha en invierno para comer?

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.....
.....

18. ¿Qué cosecha en invierno para vender?

.....
.....
.....
.....

19. ¿Qué de estas comidas es especialmente saludable para dar a su(s) hijo(s)?

.....
.....
.....
.....

20. ¿Qué son vitaminas y minerales?

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.....
.....

21. ¿Qué es anaemia y porque se produce?

.....
.....
.....
.....

22. ¿Qué es diarrea y porque se produce?

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.....
.....
.....

23. ¿Qué son parásitos y porque se produce?

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.....
.....
.....

24. ¿Cómo estan relacionado las comidas con estas enfermedades?

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.....
.....
.....

25. ¿Cómo están relacionadas las comidas con el crecimiento de su(s) hijo(s)?

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.....
.....

26. ¿Cuándo uno de su(s) hijo(s) está enfermo, quién va a visitar?

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.....
.....
.....

27. ¿Quiere cambiar la comida que da a su(s) hijo(s)? ¿Cómo y por qué?

.....
.....
.....
.....

Visual meals of which mothers could elect



24 hr recall

Date:	Sexe:	0 boy	0 girl
Day:	Ethnicity:	0 Tsáchila	0 Mestizo
Level at school:	Age:		
Address:	Name:		

Weight:
Height:

1. What did you eat for breakfast yesterday?

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.....
.....

2. What did you eat for lunch yesterday?

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.....
.....

3. What did you eat for diner yesterday?

.....
.....
.....

4. Did you eat any snacks or other food during the day?

.....
.....
.....

5. Did you eat anything else in the morning, afternoon or at night? Are you sure you don't forget anything?

.....
.....
.....

24 hr recall

Fecha:	Sexo: 0 chico 0 chica
Día:	Nacionalidad: 0Tsáchila 0 Mestizo
Nivel en la escuela:	Edad:
Dirección:	Nombre:

Peso:
Altura:

1. ¿Qué almorzaste ayer en la mañana?

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.....
.....
.....

2. ¿Qué comiste ayer mediodía?

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.....
.....
.....

3. ¿Qué merendaste ayer en la noche?

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.....
.....
.....

4. ¿Qué dulces comiste ayer?

.....
.....
.....
.....

5. ¿Comiste algo más en la mañana en la tarde y en la noche? Estas seguro?

.....
.....
.....
.....

