

The Cost of Hunger

**Analysis of the Social and Economic Impact of Child
Undernutrition in Latin America:**

**Central America and
the Dominican Republic**

SUMMARY

July 2007



ACKNOWLEDGMENTS

The following is a synopsis of the report “*The Social and Economic Impact of Child Undernutrition in Central America and the Dominican Republic*”, part of the project *Analysis of the Economic and Social Impact of Hunger in Latin America*, jointly undertaken by José Luis Machinea, Executive Secretary of the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), and Pedro Medrano Rojas, Regional Director for Latin America and the Caribbean of the United Nations World Food Programme (WFP). The project was coordinated by Rodrigo Martínez of the Social Development Division at ECLAC and Judith Thimke and Carlos Acosta Bermúdez of WFP's Regional Office for Latin America and the Caribbean within the framework of WFP's project 10411.0: Capacity-Building in Support of Food-Based Social-Protection Programs.

The team in charge of designing, implementing and writing the study was led by Rodrigo Martínez and Andrés Fernández with the assistance of Ernesto Espíndola, Lorena Flores, Ana María Montoya, Enrique Oviedo and Andrea Peroni from the Social Development Division at ECLAC. Additional support for the analysis was provided by Fernando Vío, Jorge Martínez, Marco Méndez and Daniza Ivanovic from the Institute of Nutrition and Food Technology at the University of Chile (INTA). The information gathering component in the various countries was undertaken by a professional team from the Institute of Nutrition of Central America and Panama (INCAP) under the coordination of Mireya Palmieri, and with the assistance of WFP country offices and a team of professionals and technical staff from the Health and Education Ministries and Secretariats of each country

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FOREWORD

Undernutrition deprives children of essential nutrients that are required during their most important period of growth, creating permanent and irreversible physical and mental damage. Besides impeding the full development potential for these children, undernutrition also affects general economic progress as well as imposes additional costs on society by placing increased pressure on health and educational systems.

Undernourished children begin life with an inherent impediment: a higher prevalence of death during the first few days after birth as compared with those children born with adequate weight. Undernourished children are also more vulnerable to infectious diseases that reduce their appetite, prolong their undernutrition and continue to inhibit their development.

Furthermore, the cognitive and behavioral development of these children is more likely to become impaired over the years. Even if undernourished children reach school age, their ability to learn and concentrate will be limited, eventually hindering their opportunity to access better jobs. Unless immediate action is taken, this pattern is likely to repeat itself in future generations, perpetuating the devastating cycle of poverty and undernutrition.

In addition to the ethical and social issues of child undernutrition, there are significant negative economic repercussions that affect the life cycle of each individual and that of their children. This contributes directly to the perpetuation of undernutrition and poverty.

Undernutrition is a serious problem in Latin America and the Caribbean, despite the fact that the region produces more than enough food to meet the nutritional requirements for its population. While governments have expressed a strong will to fight hunger and undernutrition, the problem persists, revealing the vast inequalities that exist in the region. Today, 53 million people in the region lack the food required to meet their most basic nutritional needs, 7 percent of children under the age of five are underweight, and 16 percent of all children under five show low height-for-age.

Faced with the gravity of this situation, the Economic Commission for Latin America and the Caribbean (ECLAC) and the World Food Programme (WFP) launched a joint effort to assist governments in raising awareness of the magnitude of this problem. A

series of descriptive and analytical studies have been prepared, including an estimate of the social and economic costs generated by child undernutrition. These studies and estimates aim to help share lessons-learned, methodologies, and best practices among stakeholders in the region.

Within this framework, the report “The Social and Economic Impact of Child Undernutrition in Central America and the Dominican Republic” provides concrete and compelling evidence of the importance of good nutrition and most importantly, it analyses the impact of the high prevalence of undernutrition on the region and the enormous and unnecessary loss of human and economic potential. The report concludes that for the seven countries under study in 2004, the losses amounted to US\$6.658 billion. This huge toll not only highlights the importance of fighting hunger and undernutrition, but also provides an increased motivation for strengthening alliances among national governments, the private sector and civil society, in order to prompt immediate action to eradicate hunger and undernutrition.

Eradicating hunger and undernutrition is a moral, ethical, and economic obligation. We recognize that our region produces three times the amount of food required to meet the needs of our population, so there is room for hope and an opportunity to work together to help children break free from the vicious cycle of hunger and poverty. Furthermore, by mustering political will and making determined efforts, we can provide pregnant women and children under the age of five universal access to nutritious foods, basic health services and education, thus helping to break the destructive cycle of undernutrition within a generation.

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REGIONAL REPORT

Comparative Analysis



THE ECONOMIC AND SOCIAL IMPACT OF CHILD UNDERNUTRITION IN CENTRAL AMERICA AND THE DOMINICAN REPUBLIC

Concern surrounding the devastating effects of hunger and undernutrition has been developing in Latin America and the Caribbean. The ethical imperative for citizens and governments to combat undernutrition, which particularly afflicts groups in Central America, is increasingly apparent. Simultaneously, researchers have stressed the serious individual and collective consequences that result when people lack access to sufficient food to meet their mental and physical developmental needs. These consequences translate into higher societal costs in health, education, and lost productivity in addition to the damaging impacts on individual achievement.

In response to the devastating social and economic consequences of hunger and child undernutrition in the region, in 2005 the World Food Programme (WFP) and the Economic Commission for Latin America and the Caribbean (ECLAC) agreed to jointly undertake the project “Analysis of the Social and Economic Impact of Hunger in Latin America”. The resulting document reveals the findings of the cost analysis of undernutrition performed in Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua and Panama.

The results highlight that the damaging repercussions identified at global level are not only increasingly evident in the countries of Central America and in the Dominican Republic, but that the economic impact is decidedly significant as it generates a loss equivalent to between 2 and 11 percent of the Gross Domestic Product (GDP). Approximately 90 percent of the cost comes from the loss in productivity caused by a higher prevalence of mortality as well as low levels of education.

In addition to the ethical responsibility of eradicating undernutrition, there is as well the economic benefit to be derived from an adequately nourished population. Any program that effectively manages to minimize the prevalence of undernutrition has the potential to improve the quality of people’s lives as well as to increase savings for society as a whole. In economic terms, eradicating undernutrition will require significant investments; however the economic benefits that will be attained will be even greater.

1. THEORETICAL AND METHODOLOGICAL BASIS OF THE ANALYSIS

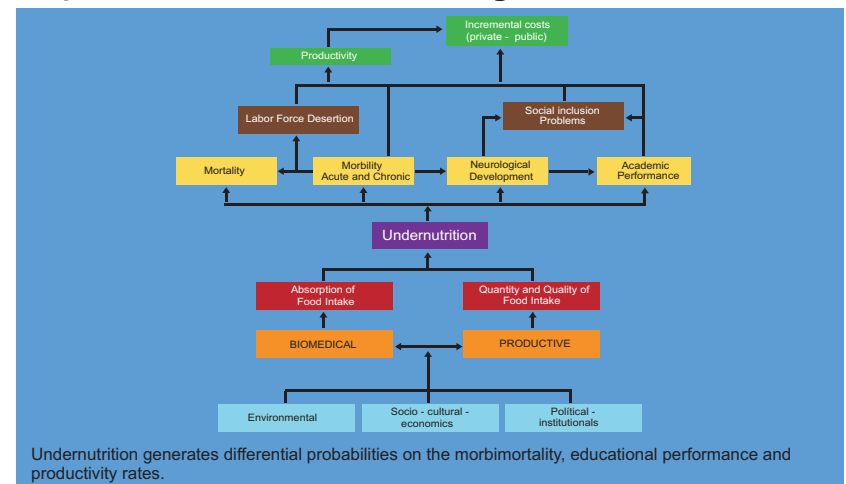
The main factors associated with undernutrition as a public health concern are: environmental (natural or man-made), socio-cultural-economic (related to poverty and inequality) and political-institutional. Together these factors determine quality and quantity of food available to an individual as well as the body’s capacity to absorb it. This will in turn determine the severity of undernutrition.

Hence, the weight given to each factor, which as a whole can determine the intensity of vulnerability, depends on the demographic and epidemiological conditions of each country and on the individual's stage in the life cycle.

Undernutrition has negative impacts on the various aspects of people's lives, such as health, education and income. These effects can yield greater problems such as social exclusion, poverty and indigence: all of which perpetuate the vicious cycle of nutritional vulnerability.

Not all victims of child undernutrition will suffer these effects, but they are at a higher risk during the course of their lifetime. Moreover, there is a greater risk of future undernutrition for those who suffered from it early in life, as well as a greater incidence of grade repetitions, illnesses and lower productivity. Indeed, the problems of maternal intrauterine undernutrition can generate difficulties from the moment of birth right up to adulthood.

Graph 1 - Cause and Effect Tree Diagram of Undernutrition



In order to produce a comprehensive economic analysis of the phenomenon of undernutrition in any given country, the ECLAC model (ECLAC-WFP 2006) first studies each of the abovementioned impacted areas (health, education and productivity), and translates them into corresponding costs. Thus, the analysis takes two dimensions into account:

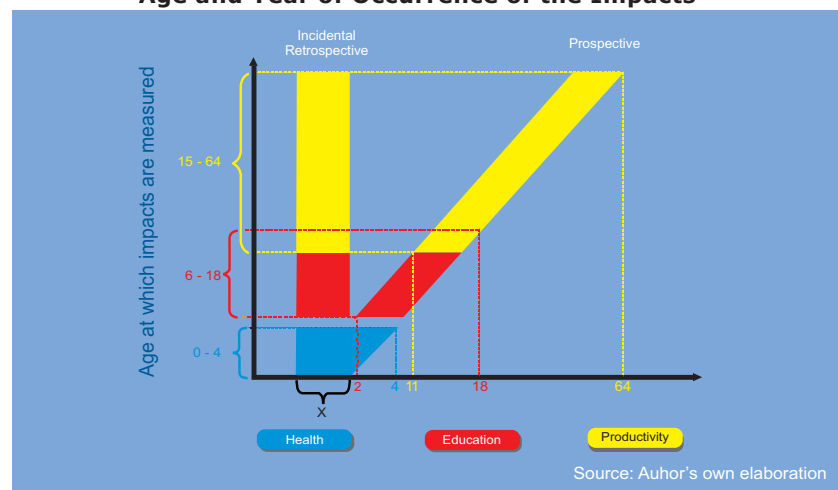
1. *Incidental Retrospective.* This approach enables one to estimate the accumulative cost of *past* undernutrition affecting a country's population in a given year. The costs associated with health are based on the prevalence of underweight children for the year of the analysis; the costs related to education are based on additional expenditures incurred by educational institutions as a result of a child's impaired performance, i.e. repeating grades, as a result of suffering from undernutrition before the age of five; and the losses in productivity are estimated based on the effects of undernutrition on adults who are currently of working age, who were exposed to undernutrition before the age of five.

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2. *Prospective or Potential Savings*. This approach allows one to forecast the *current and future* losses caused by health treatments, school repetitions and lower productivity resulting from the undernutrition that affects children under the age of five in a given country in a given year. With these forecasts, it is possible to estimate the potential savings of a country if the actions required to achieve the nutritional objectives are effectively implemented (for example, reaching the target of the Millennium Development Goal of halving the prevalence of underweight children by 2015).

As shown by the graph, the Incidental Retrospective dimension includes the social and economic consequences of undernutrition in a given year (X) for the various groups that have been affected (for health, ages 0 to 4; for education, ages 6 to 18, and for productivity, ages 15 to 64). The Prospective or Potential Savings approach, presents the future costs and impacts resulting from the current levels of undernutrition in a given year (X) within a group of children under the age of five (for health, between the years X and X+4; for education, between X+2 and X+18; and for productivity, between X+11 and X+64).

Graph 2 - Analysis of Dimensions According to Population Age and Year of Occurrence of the Impacts

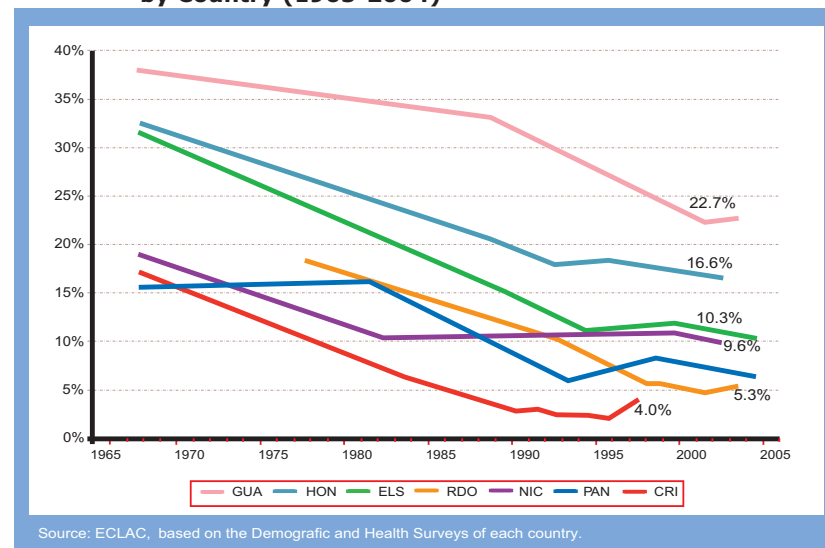


2. SOCIO-ECONOMIC AND NUTRITIONAL BACKGROUND OF THE COUNTRIES UNDER ANALYSIS

The reality of undernutrition is a reflection of the different demographic, epidemiologic and nutritional phases in each country, as well as the socio-economic situation and social vulnerability of its population. These aspects are particularly relevant in this study given the disparities among Central American countries, which lead to differing results in terms of estimated costs for each country.

This study highlights the unique prevalence and historical trend of underweight children in each country. For example, in the graph below, El Salvador and Nicaragua show similar rates of child undernutrition today, but between 1965 and 2004 El Salvador recorded a steep decline in the prevalence of child undernutrition.

Graph 3 - Trends in the Prevalence of Child Undernutrition by Country (1965-2004)



As has been suggested in other studies (ECLAC-WFP 2004 and 2005), the prevalence of undernutrition increases during the first years of life. Nonetheless, low birth-weight (LBW - less than 2500 grams) is also very relevant in assessing the effects of undernutrition. The most critical conditions are found in Guatemala, Honduras, and Nicaragua, where between 7 and 12.5 of each 100 live births are low birth-weight with intrauterine growth restriction (IUGR).

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3. EFFECTS AND COSTS OF CHILD UNDERNUTRITION IN 2004

In 2004, the estimated cost of child undernutrition for the countries under study through the Incidental Retrospective analysis amounted to **US\$6.658 billion**. Nearly 47 percent of this amount corresponded to Guatemala, responsible for 43 percent of the region's undernourished children, while it only represented 28 percent of the total population of children under 5 years. El Salvador, in second place, represented 18 percent of the total cost, and registered 15 percent of its children's population suffering from undernutrition.

At the opposite end of the spectrum was Nicaragua with 7 percent of underweight children, corresponding to only 4 percent of the total cost, which would be related to a lower income potential. Costa Rica and Panama follow, representing close to 5 percent of the total cost, and approximately 3 percent each, of the total cases of undernutrition in the region.

In regards to the GDP of each country, the most significant cases are Guatemala and Honduras, as both bear costs that reach over 10 percent of GDP; Costa Rica and Panama, on the other hand, bear costs equivalent to about 2 percent of GDP.

When comparing the costs of child undernutrition with the level of public social expenditure in Guatemala and El Salvador, the study found that the cost exceeds social expenditure by 185 percent and 137 percent respectively. In contrast, in Costa Rica, where there is a low prevalence of child undernutrition, the relationship is less than 10 percent. For the Central American sub-region this relationship averages 78 percent.

Table 1 - Estimates of the Total Costs of Child Undernutrition for Each Country (2004) - Incidental-Retrospective

| | Forecast by country | | | | | | | TOTAL |
|---|---------------------|-------------|-----------|----------|-----------|--------|--------------------|----------------|
| | Costa Rica | El Salvador | Guatemala | Honduras | Nicaragua | Panama | Dominican Republic | |
| Total (US \$ MM) | 317.6 | 1,175.3 | 3,128.4 | 780.1 | 264.3 | 321.5 | 671.6 | 6,658.8 |
| Total (US \$ million PPP) | 687.5 | 2,554.8 | 6,029.1 | 2,113.0 | 1,147.6 | 518.3 | 2,334.8 | -- |
| Percentage of GDP | 1.7% | 7.4% | 11.4% | 10.6% | 5.8% | 2.3% | 3.6% | |
| Percentage of Public Social Expenditure | 9.3% | 136.6% | 185.4% | 80.9% | 64.3% | 8.5% | 59.1% | |

Source: ECLAC, based on official information and record of costs on education of each country. Income and schooling information from the household surveys of each country.

The results are shown in USD, USD PPA, and as percentages of GDP and public social expenditure.

Why the use of the Indicator for Underweight Children?

Although, chronic undernutrition (stunting or low height-for-age) is the most critical nutritional problem facing the region, this study focuses on the prevalence of underweight children (low weight-for-age) for the following reasons:

- In the Latin American region, there is empirical evidence about the magnitude of the impact of underweight children on the prevalence of morbidity, mortality, and educational performance (Demographic and Health Surveys, and Ivanovic 2005). In contrast, while there is broad consensus on the impact of chronic undernutrition, the available scientific information on the impact of chronic undernutrition is currently insufficient to accurately estimate the costs.
- The indicator for weight deficit allows for a thorough comparison among countries. Also, the prevalence of child undernutrition is the indicator employed to measure the first objective of the Millennium Development Goals, and it is the indicator that is widely used in developing countries (WHO 2004).
- Underweight is the most visible indicator when a nutritional problem is present during the first months and years of life; even when the indicator does not distinguish whether the origin of the undernutrition was first manifested through low weight-for-height or low height-for-age (WHO 2005). In addition, the factor most commonly used to verify the initial impact of the nutritional interventions is weight recovery.

This study analyzed three key factors to establish the linkages with the effects of child undernutrition: Productivity, Health and Education.

- **Losses in productivity** account for 93 percent of the total cost. The losses are distributed almost equally between losses resulting from higher mortality rates and those resulting from lower levels of schooling. In 2004, the costs that resulted from higher mortality that amounted to 2.6 million cases, 1.7 million of which were part of the working-age population group (WAP), generating a total loss of 6 percent of the total working population in the entire sub-region. The losses in productivity attributed to lower levels of schooling are estimated based on the fact that affected children achieve an average two years less of schooling.
- **Health costs** account for 6.5 percent of the total, as a result of 157,000 extra cases suffering from acute diarrheic illnesses, acute respiratory infections, anemia, in addition to the costs of direct treatments for undernutrition.
- **Education costs**, in turn, make up for less than 1 percent of the total cost, resulting from 129,000 additional grade repetitions, associated to undernutrition.

Although the proportions vary amongst countries, the general distribution remains: a low productive capacity yields major economic losses for a country, given that a segment of its population suffered from undernutrition before reaching the age of five.

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Undernourished children under the age of five in 2004: a look ahead

If costs are projected forward from 2004 for the seven countries involved, the study estimates the cost of child undernutrition today would be **US\$ 2.271 million**. Guatemala accounts for 71 percent of this cost, while 90 percent of the total cost in the Central American sub-region is concentrated by grouping Guatemala, Honduras and El Salvador.

The distribution of the costs show that productivity losses resulting from lower levels of schooling are the main source of costs derived from child undernutrition. These cost are almost three times those generated by health, and represent almost 70 percent of the total economic impact of child undernutrition in the region. However, this preponderance is absent in Nicaragua and the Dominican Republic, where infant mortality generates a higher economic impact, and significantly lower in the case of Panama, where the economic effects of lower schooling represent only half of the total estimated costs.

The impact of mortality represents on average less than 5 percent of the total projected cost of child undernutrition, however in the Dominican Republic it accounts for almost 25 percent. The cost associated with grade repetition in the educational system is under one percent.

Table 2 - Forecast for the Costs of Child Undernutrition for 2004

| | Estimates by country | | | | | | | TOTAL |
|-------------------------------|----------------------|-------------|-----------|----------|-----------|--------|--------------------|-------|
| | Costa Rica | El Salvador | Guatemala | Honduras | Nicaragua | Panama | Dominican Republic | |
| Total NPV (US \$ million) | 48 | 147 | 1,607 | 291 | 78 | 65 | 35 | 2,271 |
| Total NPV (US \$ million PPP) | 105 | 323 | 3,286 | 791 | 339 | 104 | 131 | |

Source: ECLAC

Assuming an annual depreciation rate of 8%, the estimated Net Present Value (NPV) in the Incidental Prospective Dimension is equivalent to 1/3 of the estimated cost for 2004.

The Annual Equivalent Cost (AEC) over a 65-year period, during which the various estimated values are distributed, amounts to almost US\$183 million per year for the sub-region. This cost represents on average 1.9 percent of the public social expenditure and 0.15 percent of GDP. In Guatemala and Honduras, however, these percentages are higher, reaching almost 7.7 and 2.5 percent of public social expenditure, and 0.5 and 0.3 percentage points of the GDP, respectively.

When comparing the Incidental Retrospective and the Prospective Dimensions, there is a significant difference in the distribution of the costs, even when in both cases the costs related to productivity are the highest. While in the Incidental Retrospective Dimension mortality and schooling represent a similar portion, in the Prospective analysis, lower productivity lost due to lower schooling costs weighs five times more than losses due to infant mortality. This reflects the progress made by reducing the mortality rates and the potential productivity gains from increased levels of schooling.

Table 3 - Forecast for the Savings in Various Scenarios by Country from 2004 to 2015 (NPV in US\$ million)

| | Estimates by country | | | | | | | TOTAL |
|------------------------|----------------------|-------------|-----------|----------|-----------|--------|--------------------|-------|
| | Costa Rica | El Salvador | Guatemala | Honduras | Nicaragua | Panama | Dominican Republic | |
| Achievement MDGs (60%) | 49 | 133 | 525 | 118 | 25 | 99 | 71 | 1,019 |
| Eradication (2.5%) | 49 | 203 | 1,534 | 243 | 46 | 125 | 71 | 2,271 |

Source: ECLAC

Since Costa Rica and the Dominican Republic would achieved eradication by halving the prevalence, the costs and the resulting savings were the same in both scenarios.

4. SCENARIO ANALYSIS

Based on the 2004 estimated costs that each of the seven countries would bear due to the prevalence of underweight children under the age of five, three alternative scenarios are analyzed for 2015:

- Scenario #1** – The prevalence of underweight children in 2004 remains unchanged.
 - As a result of population growth, the costs for 2015 would increase by 10 percent.
- Scenario #2** – Achieving the second Objective of the first Millennium Development Goal of halving the prevalence of underweight children by 2015.
 - The cost would decrease by 40 percent from that estimated cost for Scenario #1 (65 percent of the reduction generated by Guatemala), with potential savings of up to US\$1.019 million.
- Scenario #3** – The eradication of child undernutrition is achieved by 2015 (reduced to a prevalence of approximately 2.5 percent).
 - The cost would decrease by 88 percent from that estimated for Scenario #1 generating potential savings of up to US\$2.271 million.

If the estimates for the different scenarios were extended beyond 2015, the potential savings resulting from comparing Scenarios #2 and #3 against Scenario #1 would increase over time.

5. CONCLUSIONS

The call to action for ending child undernutrition has traditionally been made on the basis of moral, ethical and humanitarian imperatives. They are, unquestionably, essential motives for attempting to eradicate a condition that causes unnecessary loss of life and generates suffering on a vast scale. However, this study adds an additional motivation: the economic interest of each country in the region as well as the world community.

In moving forward, leaders and citizens alike will have to stop viewing action against undernutrition as a non-recoverable 'cost' to be paid out of a government's budget, and instead see it as an 'investment' in human capital that benefits everyone. This is particularly true when the cost of hunger and undernutrition is being disproportionately borne by the private sector. It is hoped that this study will contribute to improving the well-being of all citizens.

In arriving at its conclusions the study has scrupulously endeavored to err on the side of caution. Given the constraints found in the sources of information available and the lack of specialized research studies on related topics developed in the region, the model of analysis used for this study has been developed with a conservative approach. It means that in the event of any scientific doubt about the trustworthiness and validity of the data, certain information has been excluded to avoid the error of overestimating results. Thus, certain aspects such as micronutrient deficiencies and other complementary impacts have not been included as part of the analysis.

Nonetheless, the calculations, which include both the costs currently yielded by each country and future costs directly resulting from the current prevalence of child undernutrition, prove an important hypothesis. Despite the ethical imperative to tackle child undernutrition and the commitment of each national government to do so, the challenge of eradicating hunger and undernutrition still remains an unmet challenge. However, when accomplished, it will generate important social benefits and significant economic savings for the entire region.

These results also highlight that more benefit from hunger-eradication programs than just those who directly receive assistance. The entire society, including public and private sectors benefit. Thus, fighting against hunger is a good business for all.

The challenge that remains for the region is to identify specific interventions that will maximize the impact and efficiency for each country and sub-region. Within these actions, it will be particularly important to strengthen monitoring and impact evaluation systems to minimize risks and accelerate the progress towards eradicating hunger and undernutrition. We must be doubly sure that interventions are truly cost-effective. This assurance, in turn, will contribute to continued political support.

Above all, achieving eradication will require the political will to assign and sustain the fight against undernutrition at the highest level of priority. At stake is both the overall well-being of the region's societies and their ability to function in today's highly globalized and competitive world economy. It will be necessary for all sectors of society to come together and ensure that development is not being held back because the most valuable resource - children - are hungry and undernourished.



THE ECONOMIC AND SOCIAL IMPACT OF CHILD UNDERNUTRITION IN COSTA RICA

THE NUTRITIONAL SITUATION IN COSTA RICA

Costa Rica is among the countries with the lowest child undernutrition prevalence in Latin America and the Caribbean, concurrently showing one of the lowest levels of poverty and indigence in Central America (ECLAC 2005). Approximately, one out of every 25 children is underweight. In addition, Costa Rica has one of the lowest rates of undernourishment in Latin America, and has currently achieved 67 percent of the target set in the first Millennium Development Goal.

According to the latest data available at national level (Ministry of Health, 1996), in 2004 more than 17,000 children aged 1 to 59 months were underweight ('moderate' or 'severe') and approximately 25,000 suffered from chronic undernutrition.

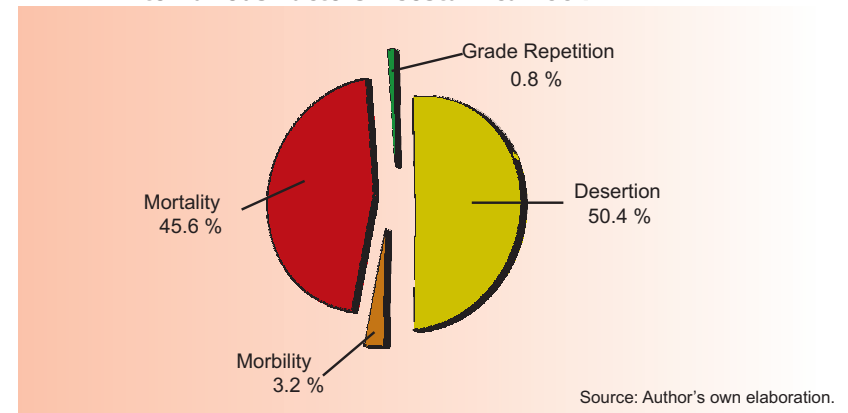
Historically, child undernutrition in Costa Rica showed a downward trend between 1966 and 1994, making it possible to estimate an average annual reduction of approximately 0.5 percentage points during this period. As the quality of the data available from the past decade might present some problems, there could be a possible underestimation that prevents from making an absolutely reliable interpretation. However, the change in trend observed in 1996 would indicate an increase of up to 80 percent in child undernutrition compared with 1994.

Between the years 2000 and 2004, Costa Rica devoted some 18.3 percent of its GDP to public social expenditure. Some 5.4 percent corresponded to expenditures in both education and health, totaling close to 60 percent of the total public social expenditure. Since 1990, the total public expenditure, as a percentage of GDP, has increased by 13 percent (33 percent increase in education and 8 percent in health).

RESULTS OF THE STUDY OF THE COST OF HUNGER IN COSTA RICA

Based on the model developed for this study, it was estimated that for 2004 the total cost of child undernutrition in Costa Rica reached *133 billion colones*, or **US\$318 million**, equivalent to 1.7 percent of the GDP and 9.5 percent of the public social expenditure.

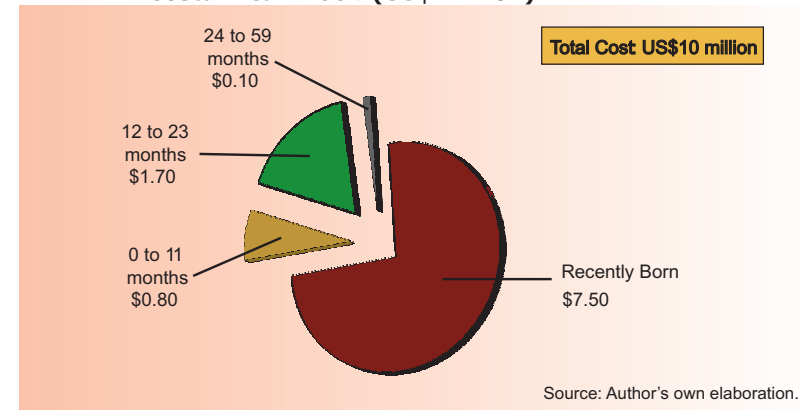
Graph 4 - Distribution of Costs of Child Undernutrition According to Various Factors - Costa Rica 2004



Health Costs

In 2004, nearly 19,000 additional cases were handled by the healthcare system as a result of higher risks of diarrhea, acute respiratory infections and anemia as well as direct treatment for underweight children. This generated a cost of US\$10 million, which represents 1.1 percent of the public social expenditure in health.

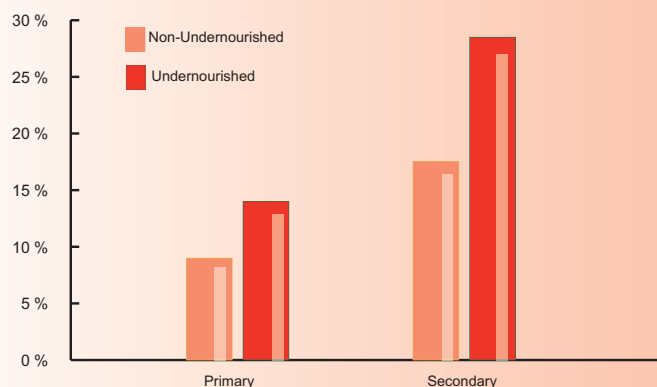
Graph 5 - Cost of Child Undernutrition in Health Costa Rica - 2004 (US\$ million)



Education Costs

In 2004, low school performance associated with undernutrition caused 4,300 grade repetitions by children who were undernourished before five years of age, generating a cost of US\$2.6 million, equivalent to 0.25 percent of public spending in education.

Graph 6 - Effects of Child Undernutrition in Grade Repetition Costa Rica - 2004



Source: ECLAC, based on official statistics of education (2004), Ministry of Health (1996), and CELADE population estimates (2004).

Productivity Costs

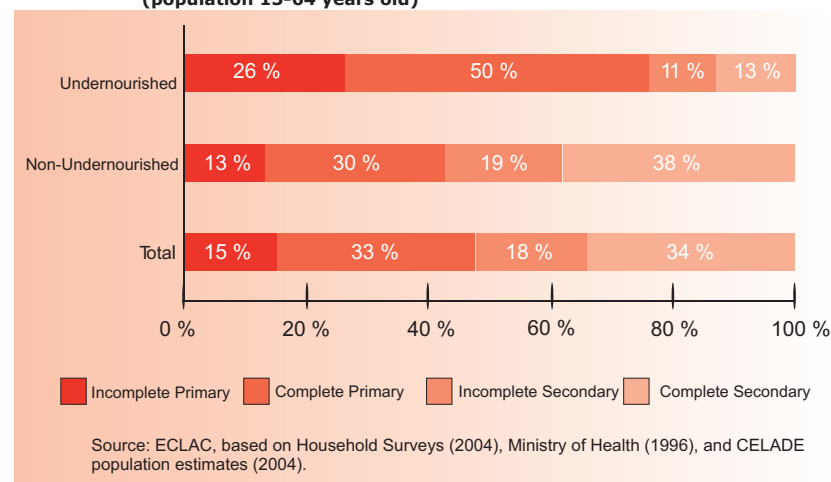
The greatest share of undernutrition costs comes from losses in productivity generated by the present-day working-age population (15-64 years), who during their childhood suffered from undernutrition: A total of US\$160 million (50 percent of the overall total) is generated from a deficit of 1.7 years of schooling, and US\$145 million corresponding to the 46,000 people who did not reach the productive phase, due to mortality rates associated with undernutrition, during the first years of life.

Table 4 - Effects of Child Undernutrition in Productivity due to Mortality in Costa Rica

| Age Group | Mortality due to Undernutrition (N, 1940 - 1989) | Loss of Working Hours (2004) |
|---|--|------------------------------|
| 15 - 24 years | 1,845 | 1,769,810 |
| 25 - 34 years | 6,189 | 10,861,918 |
| 35 - 44 years | 15,820 | 27,706,938 |
| 45 - 54 years | 14,073 | 22,965,784 |
| 55 - 64 years | 8,487 | 9,132,182 |
| Total | 46,413 | 72,436,633 |
| Hours lost in relation to economically active population (%) | | 1.8 |

Source: ECLAC, based on CELADE population and mortality statistics, relative risks estimated by Fishman et al, and the Ministry of Health (1996).

Graph 7 - Effects of Child Undernutrition in the Educational Level of the Population - Costa Rica 2004 (population 15-64 years old)



FORECAST OF THE ECONOMIC IMPACT OF UNDERNUTRITION

The Future Cost of the Current Situation

The future effects of undernutrition in children under the age of five in 2004 will generate added costs of **US\$48 million**¹ to the country's economy. From this total, US\$35 million (73 percent) will be generated from the loss of potential productivity during the working-age period, when these children reach between 15 and 64 years old. Additionally, the effects on health, from additional healthcare for greater morbidity from anemia, diarrhea, acute respiratory infections, and direct treatments for undernutrition, are projected to cost US\$11 million (23 percent), of which US\$10 million correspond to expenditures incurred from 2004 to 2008.

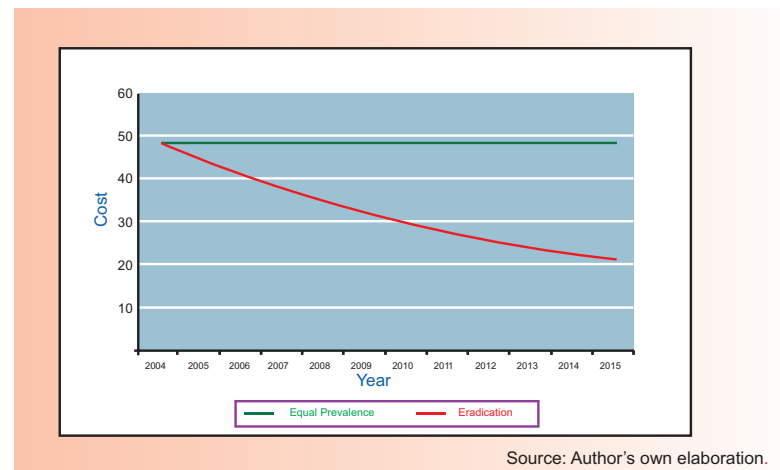
Possible Scenarios

Based on the situation in 2004, it is possible to project the effects and costs that would result in various future scenarios ending in 2015, and the difference in costs that would be generated during the process:

Scenario #1- As Costa Rica presents a rising trend among its 0-4 age group, if the prevalence of child undernutrition remains constant, the costs would slightly rise.

Scenario #2- If eradication² were fully attained, the costs of child undernutrition would reach US\$14.8 million by 2015.

Graph 8 - Estimated Costs of Child Undernutrition in Two Scenarios (US\$ million) - Costa Rica 2004-2015



The progressive reduction in the prevalence of child undernutrition would generate a similar effect in all its related costs. Consequently, if the required interventions to eradicate such a problem are implemented, the economic benefits are estimated at US\$49 million, 50 percent, of which, would be achieved by 2010.

1. Equivalent to reducing the prevalence to 2.5 percent, which represents the "normal" proportion according to parameters used to estimate child undernutrition.

2. Value updated to 2015, with an annual discount rate of 8 percent.

Dominican Republic

THE ECONOMIC AND SOCIAL IMPACT OF CHILD UNDERNUTRITION IN THE DOMINICAN REPUBLIC

THE NUTRITIONAL SITUATION IN THE DOMINICAN REPUBLIC

The Dominican Republic is among the group of countries in the Latin American and the Caribbean region with lower levels of child undernutrition. For every 19 children under the age of 5, one is underweight and stunting affects one out of 11 children. From a different perspective, the Dominican Republic has one of the highest undernourishment rates in the sub-region, as measured by FAO, and indigence affects one in every five individuals. Although the child undernutrition target for the MDGs has been achieved, the rate of progress to reduce undernourishment is one third of what is required (ECLAC 2005).

According to estimations from the Demographics and Health Survey (ENDESA, from its acronym in Spanish, 2002), approximately 53,000 children aged one to 59 months (5.3 percent) are underweight ('moderate' and 'severe'), and over 90,000 (8.9 percent) show stunting.

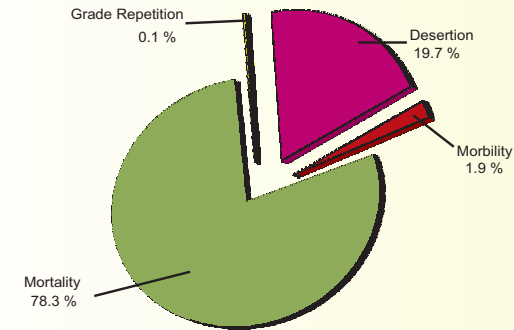
Over the last forty years, historical trends show that child undernutrition rates in the Dominican Republic have moved consistently downward, but recently they have shown a sharp deceleration in reduction. Thus, in the period from 1986 to 1996 the annual reduction rate dropped at an average of 0.65 percentage points annually, but from 1996 to 2002 this rate reached only approximately 0.1 percentage points annually. It is important to note that the prevalence of underweight children in 2002 was 15 percent higher than in 2000 (5.3 percent and 4.6 percent respectively), though still half of the prevalence in 1990.

Between the years 2000 and 2003, the Dominican Republic devoted approximately 7.3 percent of its GDP to public social expenditure. An average of 2.9 percent corresponded to expenditures in education and 1.7 percent in health, totaling close to 62 percent of total public social expenditure. Since 1990, total public expenditure as a percentage of the GDP has increased by 55 percent (a 121 percent increase in education and 48 percent in health).

RESULTS OF THE STUDY OF THE COST OF HUNGER IN THE DOMINICAN REPUBLIC

Based on the model developed for this study, it was estimated that for 2004 the total cost of child undernutrition in the Dominican Republic reached 22.350 billion pesos or **US\$672 million**, amounting to 3.6 percent of the GDP and approximately 59 percent of the public social expenditure.

Graph 9 - Distribution of Child Undernutrition According to Various Factors - Dominican Republic 2004

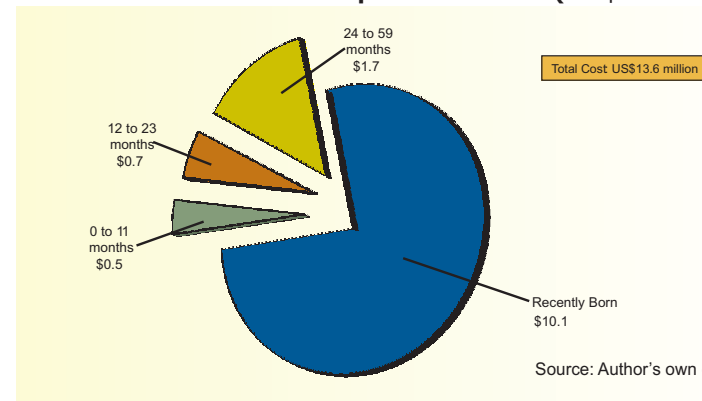


Source: Author's own elaboration.

Health Costs

In 2004, nearly 66,000 additional cases were handled by the healthcare system as a result of a larger number of cases of diarrhea, acute respiratory infections, and anemia as well as direct treatments for underweight children. This gave rise to a cost of US\$13 million, which represents 6.3 percent of the public social expenditure in health. Approximately 91 percent of this was absorbed by the health care system and 9 percent by the families of the undernourished.

Graph 10 - Cost of Child Undernutrition in Health Dominican Republic - 2004 (US\$ million)



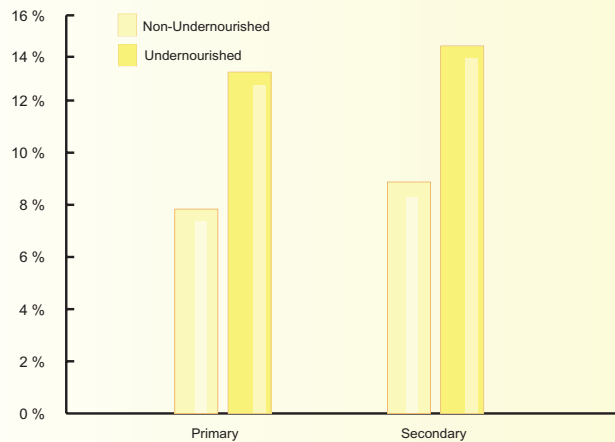
Source: Author's own elaboration.

Dominican Republic

Education Costs

In 2004, low school performance associated with undernutrition caused 5,000 extra repetitions by children who were undernourished before five years of age, generating a cost of almost US\$500,000, which is equivalent to 0.1 percent of public spending in education.

Graph 11 - Effects of Child Undernutrition in Grade Repetition Dominican Republic - 2004



Source: ECLAC, based on official statistics on education (2003), DHS (2002), and CELADE population estimates (2004).

Productivity Costs

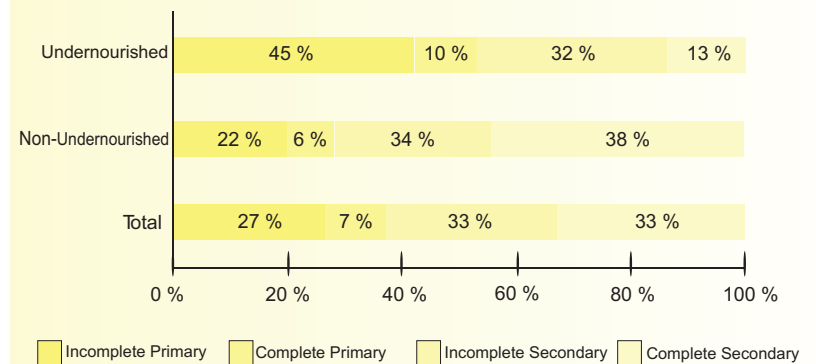
The largest share of undernutrition costs comes from losses in productivity generated by the present-day working-age population (15-64 years), who suffered from undernutrition during their childhood: A total of US\$132 million (20 percent of the overall total) from a deficit of 2.1 years of schooling, and US\$526 million (78 percent) from the 265,000 people who did not reach the productive phase, due to mortality rates associated with undernutrition, during the first years of life.

Table 5 - Effects of Child Undernutrition in Productivity due to Mortality in Dominican Republic

| Age Group | Mortality due to Undernutrition (N, 1940 - 1989) | Loss of WorkingHours (2004) |
|--|--|-----------------------------|
| 15 - 24 years | 37,982 | 45,825,587 |
| 25 - 34 years | 61,434 | 48,927,468 |
| 35 - 44 years | 72,888 | 109,930,030 |
| 45 - 54 years | 55,795 | 87,286,099 |
| 55 - 64 years | 37,580 | 50,569,686 |
| Total | 265,680 | 342,538,869 |
| Hours lost in relation to economically active population(%) | | 5.0 |

Source: ECLAC, based on CELADE population and mortality statistics, relative risks estimated by Fishman et al, and DHS 2002..

Graph 12 - Effects of Child Undernutrition in the Educational Level of the Population - Dominican Republic (population from 25 to 64 years old)



Source: ECLAC, based on Household Surveys (2002), DHS (2002), and CELADE population estimates (2004).

Dominican Republic

FORECAST OF THE ECONOMIC IMPACT OF UNDERNUTRITION

The Future Cost of the Current Situation

The future effects of undernutrition on children under the age of five in 2004 will generate an added cost of **US\$35 million**¹ to the country's economy. Of this total, US\$21 million (59 percent) will be generated from the loss of potential productivity during the working-age period, when these children reach between 15 and 64 years old. Additionally, the effects on health in the period between 2004 and 2008 (additional healthcare for greater morbidity in anemia, diarrhea, acute respiratory infections, and direct treatments for undernutrition) are projected to cost US\$14 million (40 percent).

Possible Scenarios

Based on the situation in 2004, it is possible to project the effects and costs that would result in various future scenarios ending in 2015, and the differences in costs that would be generated during the process:

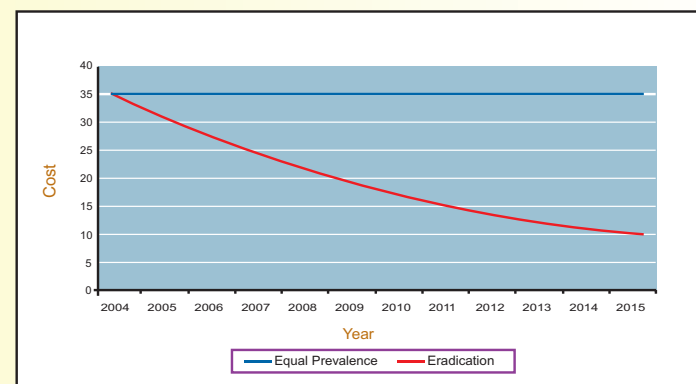
Scenario #1- If the prevalence of child undernutrition remains constant, the Dominican Republic should be able to meet the target of the first Millennium Development Goal: halving the prevalence of underweight children by 2015. In that case, it is estimated that by 2015 costs could reach US\$35.3 million as a direct consequence of the increase in the size of the Dominican Republic's 0-4 year age group.

Scenario #2- If eradication² were fully attained, the costs of child undernutrition would drop to US\$9.9 million by 2015.

1. Values updated to 2015, using an annual discount rate of 8 percent.

2. Equivalent to reducing the prevalence to 2.5 percent, which represents the "normal" proportion of cases, according to the medical parameters used to estimate child undernutrition.

Graph 13 - Estimated Costs of Child Undernutrition Under Two Scenarios (US\$ million) Dominican Republic 2004-2015



Source: Author's own elaboration.

Effective, efficient and long-term efforts are required to mitigate the effects of undernutrition and to reduce its corresponding costs. In addition to the positive impacts that would enable people to live quality lives, these efforts would generate significant economic benefits for society. Consequently, if the interventions required to eradicate child undernutrition are implemented by 2015, then the economic benefits are estimated at US\$71 million, 52 percent, of which would be achieved by 2010.

THE ECONOMIC AND SOCIAL IMPACT OF CHILD UNDERNUTRITION IN EL SALVADOR

THE NUTRITIONAL SITUATION IN EL SALVADOR

El Salvador has one of the highest levels of child undernutrition in the region. According to estimates from the National Family Health Survey (FESAL, from its acronym in Spanish, 2002/2003), the prevalence of underweight children under five reaches one in every 10 children (83,000 children aged 1 to 59 months are underweight in the 'moderate' and 'severe' categories), while stunting affects almost one fifth of this population. This occurs in a country where the undernourishment rate is one of the lowest in the region, the progress rate in meeting the Millennium Development Goals is equivalent to one-third of what is required, and indigence affects one in every five individuals (ECLAC, 2005).

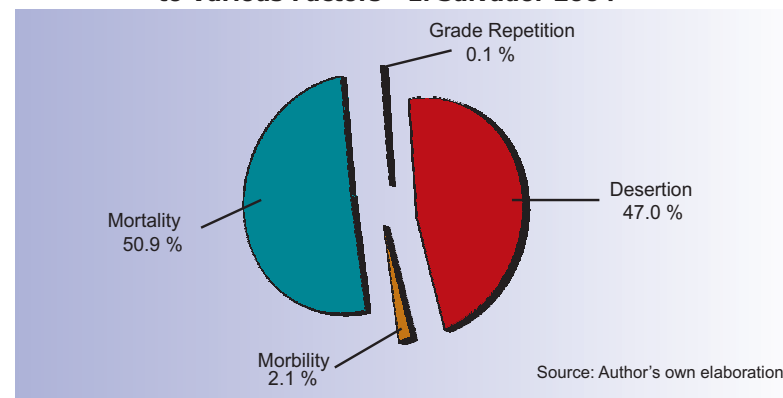
Over the last forty years, historical trends show child undernutrition rates in El Salvador have moved steadily downward, in particular after 1993, but recently the trend has shown a strong deceleration. Thus, in the period from 1966 to 1993 the rate dropped at an average of over 0.7 percentage points annually followed by insignificant changes until the period from 1998 to 2003, when there was a slight decrease of 0.3 percentage points annually. The trend during this last period could prove insufficient to meet the target of reducing the 1990 child undernutrition rates by half.

Between the years 2000 and 2004, El Salvador devoted approximately 5.7 percent of its GDP to public social expenditure. An average of 3.1 percent corresponded to expenditures in education and 1.4 percent in health, totaling close to 80 percent of the total public social expenditure. Since 1993, the total public expenditure, as a percentage of GDP, has increased by 38 percent (65 percent increase in education and 21 percent in health).

RESULTS OF THE STUDY OF THE COST OF HUNGER IN EL SALVADOR

Based on the model developed for this study, it was estimated that in 2004 the total cost of child undernutrition in El Salvador rose to **US\$1.175 billion**, equivalent to 7.4 percent of the GDP and 137 percent of public social expenditure.

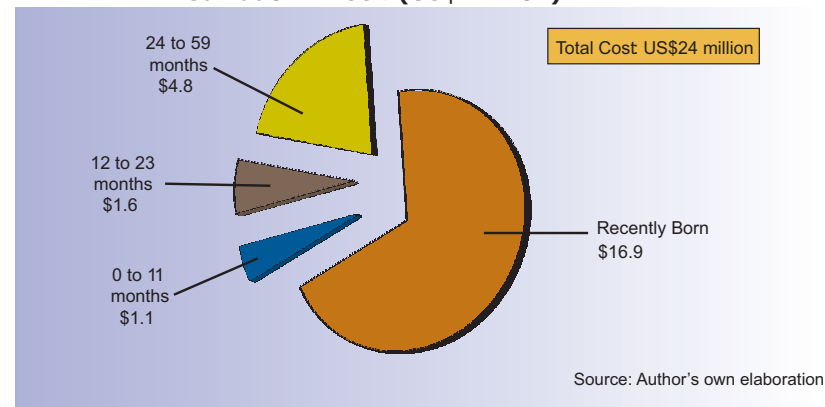
Graph 14 - Distribution of Cost of Child Undernutrition According to Various Factors - El Salvador 2004



Health Costs

In 2004, nearly 97,000 additional cases were handled by the healthcare system as a result of higher risks of diarrhea, acute respiratory infections, and anemia as well as direct treatments for underweight children. This generated a cost of US\$24 million, which represents 10.4 percent of the public social expenditure in health. Approximately 95 percent of this is absorbed by the health care system and 5 percent by the families of the undernourished.

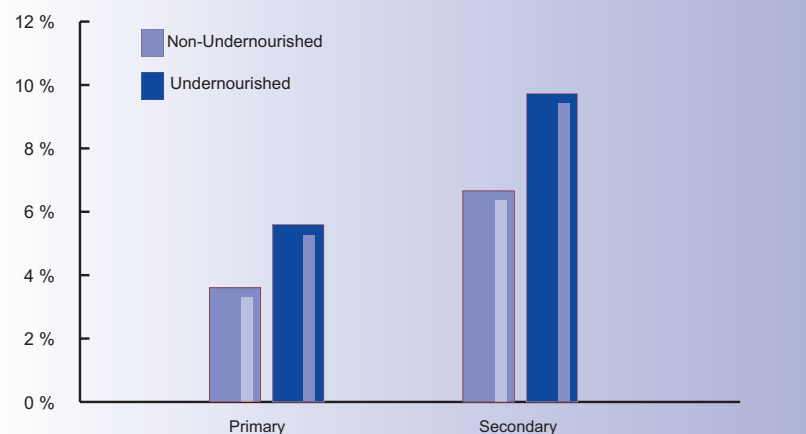
Graph 15 - Cost of Child Undernutrition in Health El Salvador - 2004 (US\$ million)



Education Costs

In 2004, low school performance associated with undernutrition caused 4,000 extra grade repetitions by children who were undernourished before five years of age, generating a cost of US\$1.0 million (0.1 percent of the total cost), equivalent to 0.21 percent of public spending in education.

Graph 16 - Effects of Child Undernutrition in Grade Repetition El Salvador - 2004



Source: Authors own elaboration based on the database from the Ministry of Education (2003), National Family Health Survey (2002/2003), and CELADE population estimates (2004).

Productivity Costs

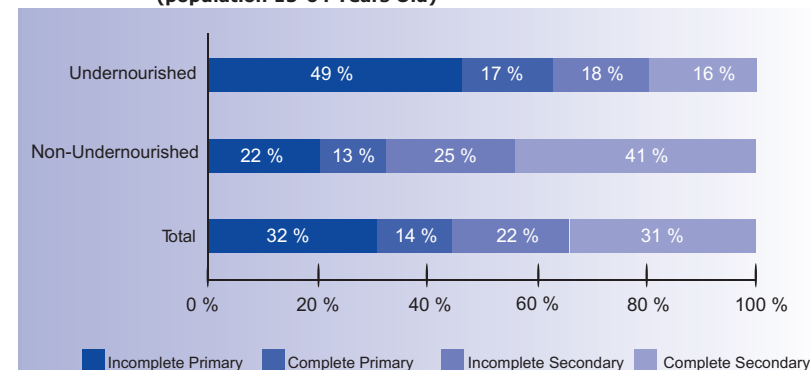
The greatest share of undernutrition costs comes from losses in productivity generated by the present-day working-age population (15-64 years), who during their childhood suffered from undernutrition: A total of US\$552 million (47 percent of the overall total) is generated from a deficit of 2.2 years of schooling, and US\$598 million (51 percent) correspond to the 289,000 people who did not reach the productive phase, due to mortality rates associated with undernutrition, during their first years of life.

Table 6 - Effects of Child Undernutrition in Productivity due to Mortality in El Salvador

| Age Group | Mortality due to Undernutrition (N, 1940 - 1989) | Loss of Working Hours (2004) |
|---|--|------------------------------|
| 15 - 24 years | 42,015 | 33,903,151 |
| 25 - 34 years | 72,629 | 110,648,069 |
| 35 - 44 years | 78,027 | 128,036,985 |
| 45 - 54 years | 57,781 | 86,480,043 |
| 55 - 64 years | 39,111 | 45,396,632 |
| Total | 289,562 | 404,464,880 |
| Hours lost in relation to economically active population (%) | | 7.7 |

Source: ECLAC, based on CELADE population and mortality statistics, relative risks estimates Fishman et al, and FESAL 2002.

Graph 17 - Effects of Child Undernutrition in the Educational Level of the Population - El Salvador 2004 (population 15-64 Years Old)



Source: ECLAC, based Household Surveys (2003), FESAL 2002/2003, and CELADE population estimates (2004).

FORECAST OF THE ECONOMIC IMPACT OF UNDERNUTRITION

The Future Cost of the Current Situation

The future effects of undernutrition on children under the age of five in 2004 will generate an added cost of **US\$147 million**¹ to the country's economy. From this total, US\$119 million (81 percent) will be the result of loss of potential productivity during the working-age period, when these children reach between 15 and 64 years old. Additionally, the effects on health between 2004 and 2008 (additional healthcare for greater morbidity from anemia, diarrhea, acute respiratory infections, and direct treatments for undernutrition, including marasmus and kwashiorkor) are projected to cost US\$27 million (19 percent).

Possible Scenarios

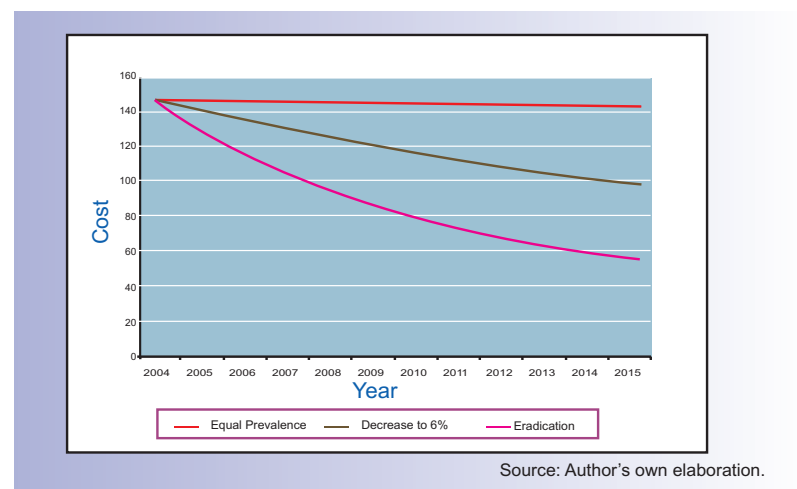
Based on the situation in 2004, it is possible to project the effects and costs that would result in various future scenarios ending in 2015, and the differences in costs that would be generated during the process:

Scenario #1- As El Salvador presents a rising trend among its 0-4 age group, if the prevalence of child undernutrition remains constant, the costs for 2015 would be US\$ 142.6 million, slightly less than those in 2004.

Scenario #2- In the event that El Salvador meets the target established in the first Millennium Development Goal-halving the prevalence of underweight children by 2015-the costs of child undernutrition would drop to US\$84.1 million by 2015.

Scenario #3- If eradication² were fully attained, the costs of child undernutrition would drop to US\$27.6 million by 2015.

Graph 18 - Estimated Costs of Child Undernutrition under Three Scenarios (US\$ million) - El Salvador 2004-2015



The progressive reduction in the prevalence of child undernutrition would generate a similar effect in all its related costs. Consequently, if the required interventions to meet the target established by the Millennium Development Goals are implemented, the benefits are estimated at US\$133 million. In a scenario of eradication of child undernutrition, the economic benefits are estimated at US\$203 million. In this latter scenario, almost 55 percent would be achieved between the years 2005 and 2010.

1. This value has been calculated base on an annual discount rate of 8 percent.

2. Equivalent to reducing the prevalence to 2.5 percent, which represents the "normal" proportion of cases according to parameters used to estimate child undernutrition.

THE ECONOMIC AND SOCIAL IMPACT OF CHILD UNDERNUTRITION IN GUATEMALA

THE NUTRITIONAL SITUATION IN GUATEMALA

Guatemala has the highest levels of child undernutrition in the Latin American and Caribbean region: Nearly one in every four children under the age of five are underweight and almost half of all children in this age group are stunted (low height-for-age). In addition, Guatemala is one of the only three countries in the region showing an increase in undernourishment rates between the years 1990-1992 and 2000-2002, as well as one with the highest rates of poverty and indigence (ECLAC 2005).

According to estimates from the National Mother-Child Health Survey (ENSMI, from its acronym in Spanish, 2004), approximately 470,000 children under the age of five are underweight ('moderate' and 'severe'), and almost one million suffer from chronic undernutrition, with greater vulnerability among indigenous children living in rural areas.

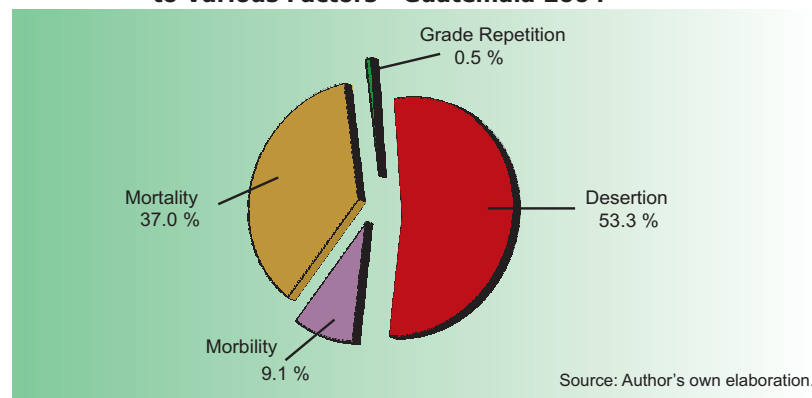
Over the past forty years, child undernutrition rates of Guatemala have shown a steady downward trend, more intensely after 1985. Nevertheless, after 1998 the rate of progress has stabilized at around 20 percent.

Between the years 2000 and 2004, Guatemala allocated about 6.3 percent of its GDP to public social expenditures. An average of 2.6 percent corresponded to expenditures in education and 1.0 percent in health, totaling approximately 57 percent of the total public social expenditure. Since 1990, the total public expenditure, as a percentage of GDP, has increased by 80 percent (55 percent increase in education and 10 percent in health).

RESULTS OF THE STUDY OF THE COST OF HUNGER IN GUATEMALA

Based on the model developed for this study, it was estimated that for 2004 the total cost of child undernutrition in Guatemala reached 24.953 billion quetzales or **US\$3.128 billion**, equivalent to 11.4 percent of the GDP and 1.85 percent of the public social expenditure.

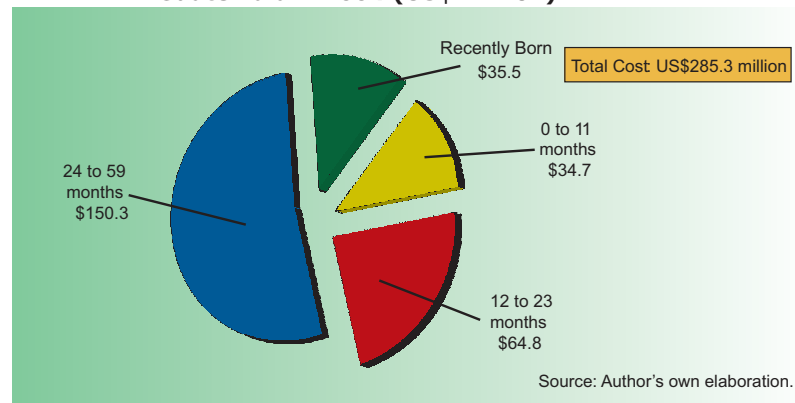
Graph 19 - Distribution of Cost of Child Undernutrition According to Various Factors - Guatemala 2004



Health Costs

In 2004, nearly 560,000 additional cases were handled by the healthcare system as a result of higher risks of diarrhea, acute respiratory infections, and anemia as well as direct treatments for underweight children including marasmus and kwashiorkor. This generated a cost of US\$285 million, which represents 1.17 times the public social expenditure in health. Approximately 94 percent of this is absorbed by the health care system and 6 percent by the families of the undernourished.

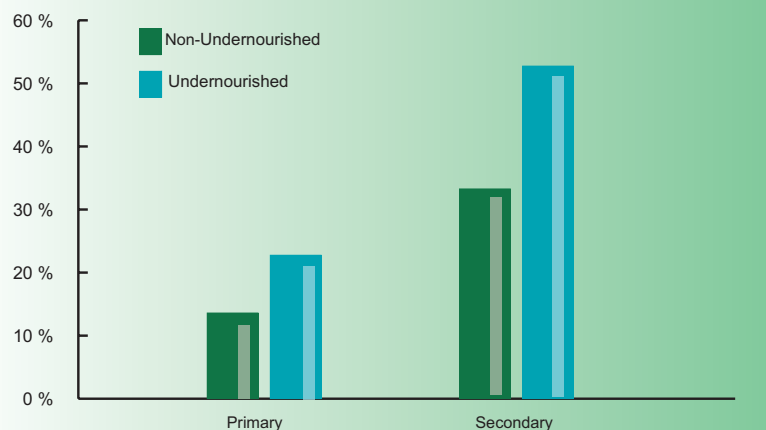
Graph 20 - Cost of Child Undernutrition in Health Guatemala - 2004 (US\$ million)



Education Costs

In 2004, low school performance associated with undernutrition caused 82,000 grade repetitions by children who were undernourished before five years of age, generating a cost of US\$16.5 million (0.5 percent of the total cost), equivalent to 2.45 percent of public spending in education.

Graph 21 - Effects of Child Undernutrition in Grade Repetition Guatemala - 2004



Source: ECLAC, based on data from the Ministry of Education (2003), ENSMI (2002), and CELADE population estimates (2004).

Productivity Costs

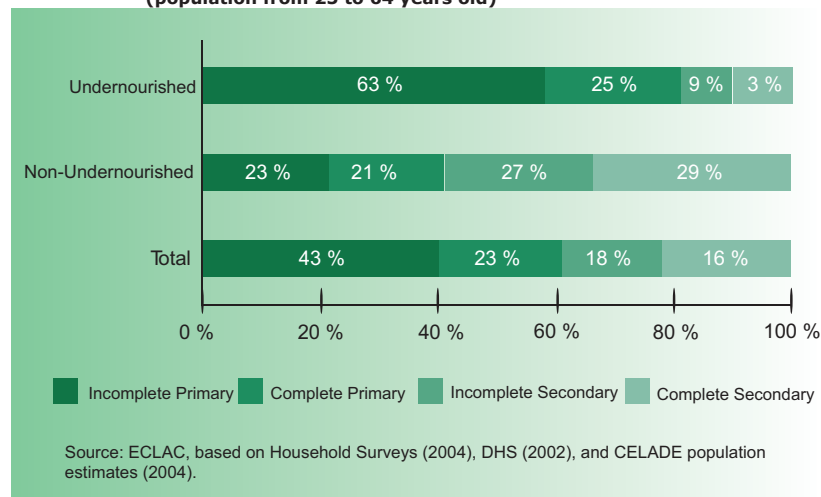
The greatest share of the costs of undernutrition comes from losses in productivity generated by the present-day working-age population (15-64 years), who suffered from undernutrition during their childhood: A total of US\$1.668 billion (53 percent of the overall total) is generated from a deficit of 2.4 years of schooling, and US\$1.158 billion (37 percent) corresponds to the 641,000 people who did not reach the productive phase, due to mortality rates associated with undernutrition, during the first years of life.

Table 7 - Effects of Child Undernutrition in Productivity due to Mortality in Guatemala

| Age Group | Mortality due to Undernutrition (N, 1940 - 1989) | Loss of Working Hours (2004) |
|---|--|------------------------------|
| 15 - 24 years | 137,509 | 153,877,370 |
| 25 - 34 years | 154,096 | 252,731,814 |
| 35 - 44 years | 148,370 | 268,002,111 |
| 45 - 54 years | 115,231 | 183,737,219 |
| 55 - 64 years | 86,197 | 124,955,092 |
| Total | 641,403 | 983,303,605 |
| Hours lost in relation to economically active population (%) | | 10.5 |

Source: ECLAC, based on CELADE population and mortality statistics, relative risks calculated by Fishman et al, and DHS 2002.

Graph 22 - Effects of Child Undernutrition in the Educational Level of the Population - Guatemala 2004 (population from 25 to 64 years old)



FORECAST OF THE ECONOMIC IMPACT OF UNDERNUTRITION

The Future Cost of the Current Situation

The future effects of undernutrition on children under the age of five in 2004 will generate an added cost of **US\$1.607 million**¹ to the country's economy. This cost is mostly attributed to the loss of human resources due to low educational achievement, and higher health costs due to increased morbidity (76 percent and 24 percent respectively).

Possible Scenarios

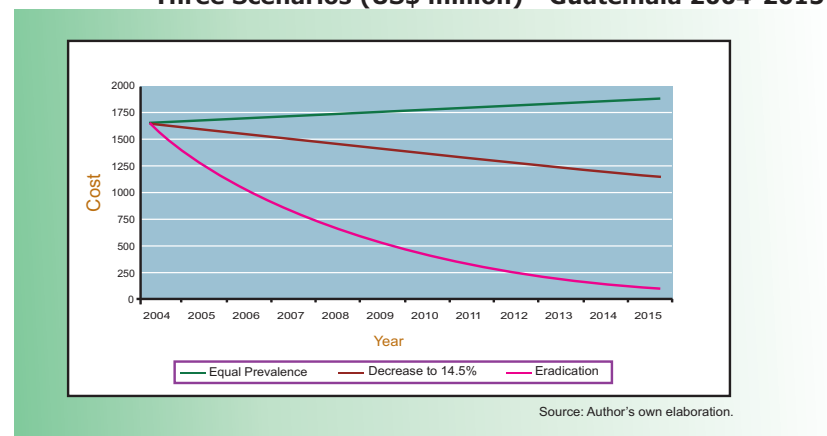
Based on the situation in 2004, it is possible to project the effects and costs that would result in various future scenarios ending in 2015, and the difference in costs that would be generated during the process:

Scenario #1- As Guatemala presents a rising trend among its 0-4 age group, if the prevalence of child undernutrition remains constant, the costs for 2015 would reach US\$1.817 billion, a 13 percent increase from 2004.

Scenario #2- In the event that Guatemala meets the target established in the first Millennium Development Goal-halving the prevalence of underweight children by 2015-the costs of child undernutrition would drop to US\$1.161 billion by 2015.

Scenario #3- If eradication² were fully attained, the costs of child undernutrition would decrease even further, to US\$170 million by 2015.

Graph 23 - Estimated Costs of Child Undernutrition Under Three Scenarios (US\$ million) - Guatemala 2004-2015



The progressive reduction in the prevalence of child undernutrition would generate a similar effect in all its related costs. In a scenario of achieving the target established by the first Millennium Development Goal, the economic benefits are estimated at US\$525 million; a value that would triple if the problem were to be eradicated.

1. Values updated to 2015, with an annual discount rate of 8 percent.

2. Equivalent to reducing the prevalence to 2.5 percent, which represents the "normal" proportion of cases according to parameters used to estimate child undernutrition.

THE ECONOMIC AND SOCIAL IMPACT OF CHILD UNDERNUTRITION IN HONDURAS

THE NUTRITIONAL SITUATION IN HONDURAS

Honduras has one of the highest levels of child undernutrition in the Latin America and Caribbean region. According to the most recent information available, one child out of every six is underweight and nearly one third of all children in the same age group are stunted. In 2001, Honduras's rate of progress in combating undernourishment was equivalent to only one third of what is required to meet the target established by the first Millennium Development Goal for 2015. Additionally, extreme poverty affects more than half of the population (ECLAC, 2005).

According to estimates from the National Survey of Epidemiology and Family Health (ENESE from its acronym in Spanish, 2001), some 170,000 children under the age of five are underweight ('moderate' and 'severe'), and over 200,000 suffer from chronic undernutrition.

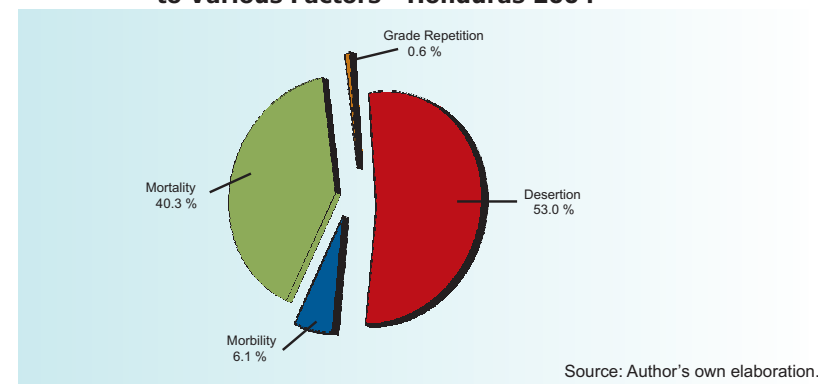
Over the past 40 years, the rate of child undernutrition in Honduras has shown a steady downward trend, but recently this trend has shown a strong deceleration. While the prevalence of underweight children dropped approximately 0.6 percentage points annually from 1966 to 1987, between 1987 and 1993 the annual reduction rate was only 0.3 percentage points, declining further to about 0.2 percentage points annually after 1994. This recent setback is likely to prevent Honduras from achieving the target of halving its 1990 undernutrition rates by 2015.

Between 2000 and 2004, Honduras allocated almost 10 percent of its GDP to public social expenditure. An average of 6.2 percent corresponded to expenditures in education and 3.2 percent in health, totaling over 85 percent of the total public social expenditure. Since 1990, the total public expenditure, as percentage of the GDP, has increased by 40 percent (50 percent in education and 30 percent in health).

RESULTS OF THE STUDY OF THE COST OF HUNGER IN HONDURAS

Based on the model developed for this study, it was estimated that for 2004 the total cost of child undernutrition in Honduras rose to *13.934 billion lempiras*, or **US\$751 million**, corresponding to 10.6 percent of GDP and approximately 81 percent of the public social expenditure for that year.

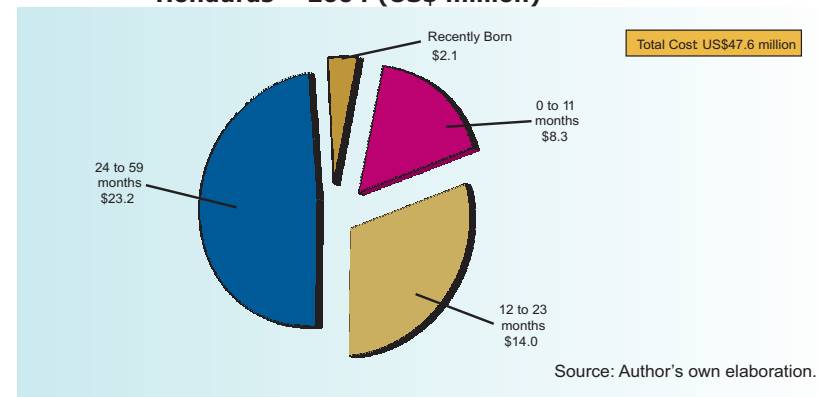
Graph 24 - Distribution of Cost of Child Undernutrition According to Various Factors - Honduras 2004



Health Costs

In 2004, nearly 201,000 additional cases were handled by the healthcare system as a result of higher risks of diarrhea, acute respiratory infections, and anemia as well as direct treatments for underweight children. This generated a cost of US\$48 million, which represents 18 percent of the public social expenditure in health. Approximately 92 percent of this cost is absorbed by the healthcare system and 8 percent by the families of the undernourished.

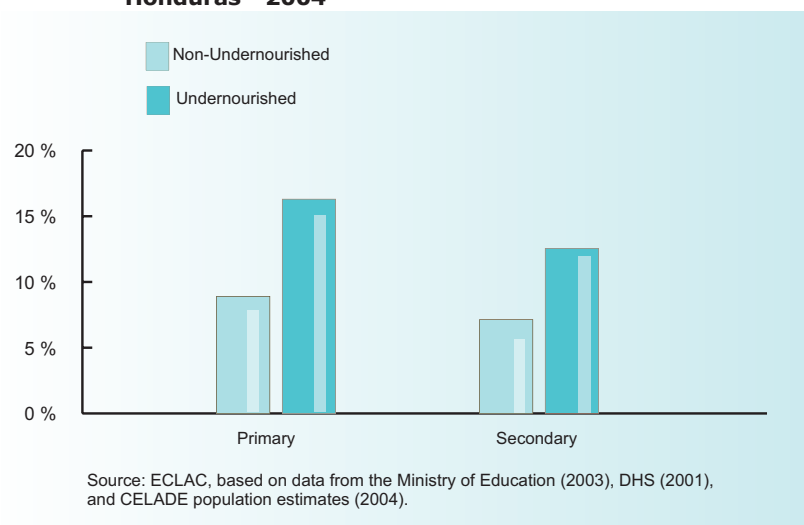
Graph 25 - Cost of Child Undernutrition in Health Honduras - 2004 (US\$ million)



Education Costs

In 2004, low school performance associated with undernutrition caused 18,000 grade repetitions by children who were undernourished before five years of age, generating a cost of US\$5 million, equivalent to 0.93 percent of public spending in education.

Graph 26 - Effects of Child Undernutrition in Grade Repetition Honduras - 2004



Productivity Costs

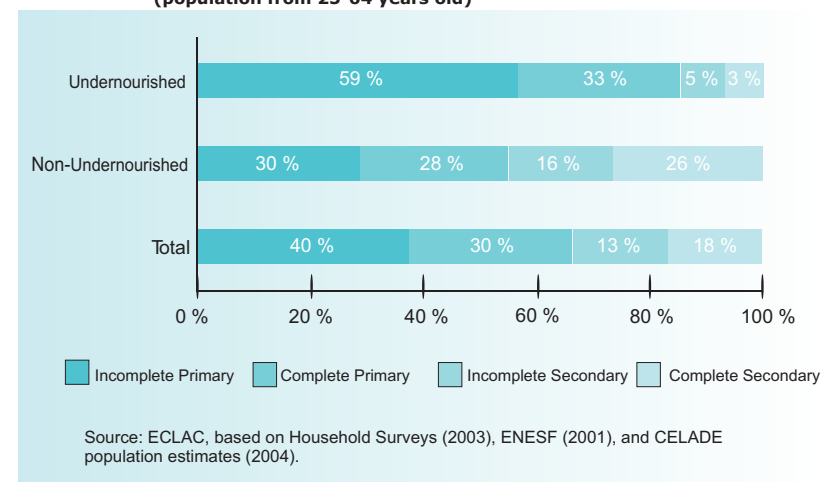
The greatest share of the costs of undernutrition comes from losses in productivity generated by the present-day working-age population (15-64 years), who during their childhood suffered from undernutrition: A total of US\$414 million (53 percent of the total) is generated from a 2.2 year deficit in schooling, and US\$314 million (40 percent) corresponds to the 266,000 people who did not reach the productive phase, due to mortality rates associated with undernutrition, during the first years of life.

Tabla 8 - Effects of Child Undernutrition in Productivity due to Mortality in Honduras

| Age Group | Mortality due to Undernutrition (N, 1940 - 1989) | Loss of Working Hours (2004) |
|---|--|------------------------------|
| 15 - 24 years | 48,902 | 46,304,738 |
| 25 - 34 years | 65,241 | 101,623,379 |
| 35 - 44 years | 70,158 | 116,675,282 |
| 45 - 54 years | 49,563 | 78,242,082 |
| 55 - 64 years | 32,915 | 43,542,644 |
| Total | 266,779 | 386,388,125 |
| Hours lost in relation to economically active population (%) | | 7.1 |

Source: ECLAC, based on CELADE population and mortality statistics, relative risks calculated by Fishman et al, and Family Health Survey (ENESF) 2001.

Graph 27 - Effects of Child Undernutrition in the Educational Level of the Population - Honduras 2004 (population from 25-64 years old)



FORECAST OF THE ECONOMIC IMPACT OF UNDERNUTRITION

The Future Cost of the Current Situation

The future effects of undernutrition on children under the age of five in 2004 will generate an added cost of **US\$291 million**¹ to the country's economy. From this total, US\$225 million (77 percent of the overall cost) is expected to be generated from the loss of potential productivity during the working-age period, when these children are between 15 and 64 years old. Additionally, the effects on health between 2004 and 2008, including additional healthcare for greater morbidity from anemia, diarrhea, acute respiratory infections, and direct treatments for undernutrition, including marasmus and kwashiorkor, are projected to cost US\$64 million (22 percent of the overall cost).

Possible Scenarios

Based on the situation in 2004, it is possible to project the effects and costs that would result in various future scenarios ending in 2015, and the difference in costs that would be generated during the process:

Scenario #1- As Honduras presents a rising trend among its 0-4 age group, if the prevalence of child undernutrition remains constant, the costs for 2015 would increase approximately six percent in 2004 to US\$ 308 million.

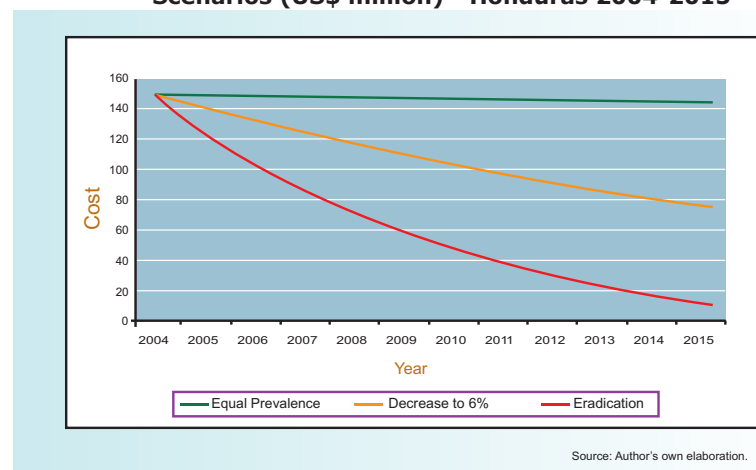
Scenario #2- In the event that Honduras meets the target established in the first Millennium Development Goal-halving the prevalence of underweight children by 2015-the costs of child undernutrition would decrease to US\$175.2 million¹ by 2015.

Scenario #3- If eradication² were fully attained, the costs of child undernutrition would decrease even further, reaching to US\$39.9 million by the year 2015.

1. Value updated to 2015, with an annual depreciation rate of 8 percent

2. Equivalent to reducing prevalence to 2.5 percent, which represents the "normal" proportion of cases according to the parameters used to estimate child undernutrition.

Graph 28 - Estimated Costs of Child Undernutrition Under Three Scenarios (US\$ million) - Honduras 2004-2015



The progressive reduction in the prevalence of child undernutrition would generate a similar effect in all its related costs. Consequently, if the required interventions to meet the target established by the first Millennium Development Goal are implemented, the benefits are estimated at US\$118 million. In a scenario of eradication of child undernutrition, the economic benefits are estimated at US\$243 million. In this latter scenario, almost 51 percent would be achieved between the years 2005 and 2010.

THE ECONOMIC AND SOCIAL IMPACT OF CHILD UNDERNUTRITION IN NICARAGUA

THE NUTRITIONAL SITUATION IN NICARAGUA

Nicaragua is one of the countries in Latin America and the Caribbean with an above average level of child undernutrition and ranks fourth in Central America. Nearly one out of every 10 children under five is underweight and 20 percent of all children in the same cohort are stunted. Nicaragua also suffers from the second-highest rate of undernourishment in the region (behind Haiti), and its progress in reducing this indicator is less than half of what would be necessary to meet the target set by the first Millennium Development Goal. Compounding this situation, over 40 percent of the country's population lives in conditions of extreme poverty (ECLAC, 2005).

According to estimates from the Survey on Demographics and Health (ENDESA 2001), 85,000 children aged one to 59 months are underweight ('moderate' and 'severe') and close to 150,000 are afflicted with chronic undernutrition.

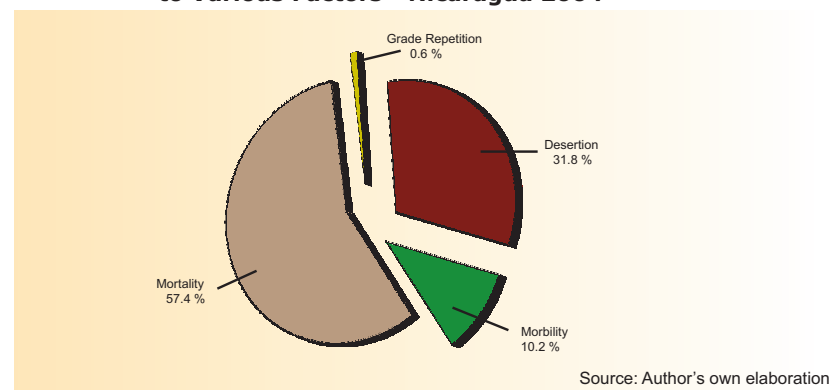
Over the past forty years, child undernutrition rates have shown a significant downward trend, but considerable variations in the rate of reduction appear. While from 1966 to 1980 the prevalence of underweight children dropped, on average, about 0.6 percentage points per year, between 1981 and 1998 it remained relatively constant. From 1998 until 2001, this prevalence decreased by an average of 0.5 percentage points per year.

Between the years 2000 and 2004, Nicaragua allocated 8.6 percent of its GDP to public social expenditures. An average of 3.9 percent corresponded to expenditures in education and 3.0 percent in health, totaling almost 80 percent of total public social expenditure. Since 1990, the total public expenditure, as percentage of the GDP, has increased by 23 percent (25 percent increase in education and 0.03 percent decreased in health).

RESULTS OF THE STUDY OF THE COST OF HUNGER IN NICARAGUA

Based on the model developed for this study, it was estimated that for 2004 the total of cost of child undernutrition in Nicaragua reached *4.086 billion cordobas* or **US\$264 million**, equivalent to 5.8 percent of the GDP and approximately 64 percent of total public social expenditure for that year.

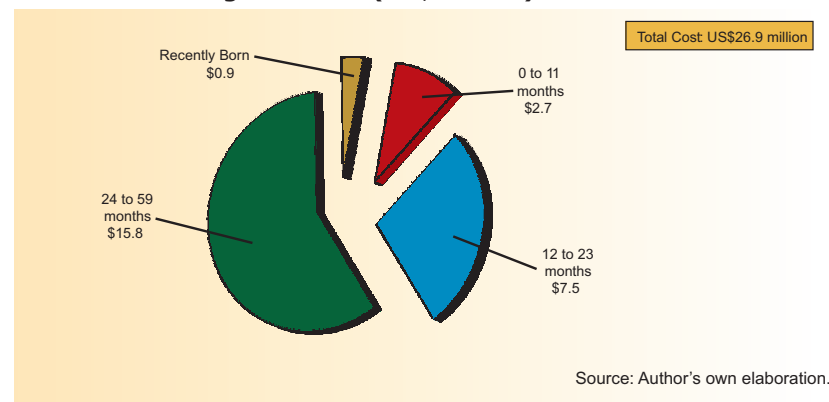
Graph 29 - Distribution of Cost of Child Undernutrition According to Various Factors - Nicaragua 2004



Health Costs

In 2004, nearly 97,000 additional cases were handled by the healthcare system as a result of higher risks of diarrhea, acute respiratory infections, and anemia as well as direct treatments for underweight children. This generated a cost of US\$27 million, which represents 20 percent of public social expenditure in health. Approximately 72 percent of this cost is absorbed by the healthcare system and 28 percent by the families of the undernourished.

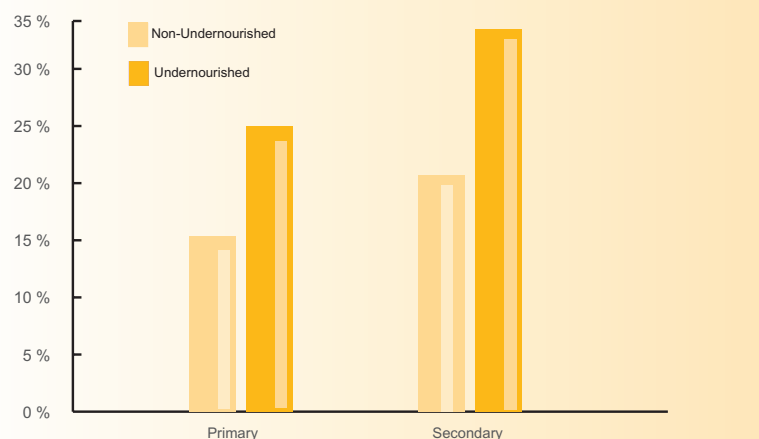
Graph 30 - Cost of Child Undernutrition in Health Nicaragua - 2004 (US\$ million)



Education Costs

In 2004, low school performance associated with undernutrition caused 82,000 grade repetitions by those who were undernourished before five years of age, generating a cost of US\$16.5 million, equivalent to 2.45 percent of public spending in education.

Graph 31 - Effects of Child Undernutrition in Grade Repetition Nicaragua 2004



Source: ECLAC, based on data from the Ministry of Education (2003), DHS(2001), and CELADE population estimates (2004).

Productivity Costs

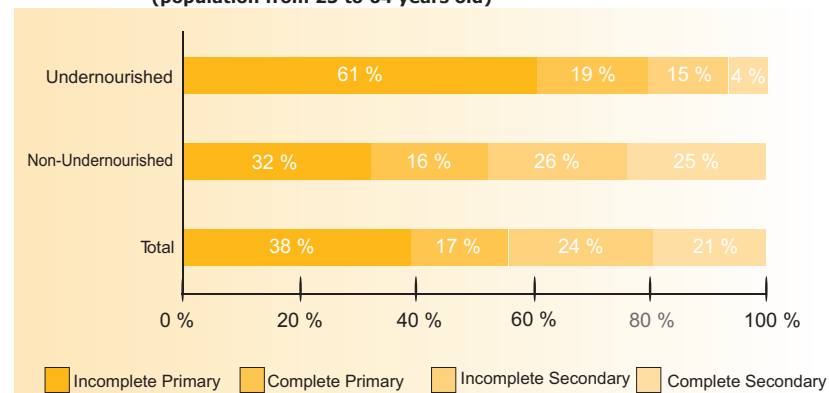
The greatest share of the costs of undernutrition comes from losses in productivity generated by the present-day working-age population (15-64 years), who during their childhood suffered from undernutrition. A total of US\$84 million (32 percent of the overall total) is generated from a 1.9 year deficit in schooling, and US\$152 million (57 percent) corresponds to the 164,000 people who did not reach the productive phase, due to mortality rates associated with undernutrition, during the first years of life.

Table 9 - Effects of Child Undernutrition in Productivity due to Mortality in Nicaragua

| Age Group | Mortality due to Undernutrition (N, 1940 - 1989) | Loss of Working Hours (2004) |
|---|--|------------------------------|
| 15 - 24 years | 29,141 | 40,433,098 |
| 25 - 34 years | 31,987 | 28,817,987 |
| 35 - 44 years | 36,116 | 59,982,265 |
| 45 - 54 years | 26,768 | 47,664,563 |
| 55 - 64 years | 16,043 | 26,821,443 |
| Total | 140,056 | 203,719,356 |
| Hours lost in relation to economically active population (%) | | 4.8 |

Source: ECLAC, based on CELADE population and mortality statistics, relative risks estimated by Fishman et al, and DHS 2001.

Graph 32 - Effects of Child Undernutrition in the Educational Level of the population - Nicaragua 2004 (population from 25 to 64 years old)



Source: ECLAC, based on Household Surveys (2001), DHS (2001), and CELADE population estimates (2004).

FORECAST OF THE ECONOMIC IMPACT OF UNDERNUTRITION

The Future Cost of the Current Situation

Undernutrition among children under the age of five in 2004 will generate an added future cost of **US\$78 million**¹ to the country's economy. From this total, US\$34 million (44 percent) is generated from the loss of potential productivity during the working-age period, when these children reach the ages between 15 and 64 years old. Additionally, the effects on the health sector, including additional healthcare for greater morbidity in anemia, diarrhea, acute respiratory infections, and direct treatments for undernutrition, including marasmus and kwashiorkor, are projected to cost US\$37 million (47 percent), of which US\$ 27 million correspond to expenditures incurred in 2004.

Possible Scenarios

Based on the situation in 2004, it is possible to project the effects and costs that would result in various future scenarios ending in 2015, and the differences in costs that would be generated during the process:

Scenario #1- As Nicaragua presents a rising trend among its 0-4 age group, if the prevalence of child undernutrition remains constant, the costs in 2015 would increase by 3 percent from 2004, to US\$ 80.4 million.

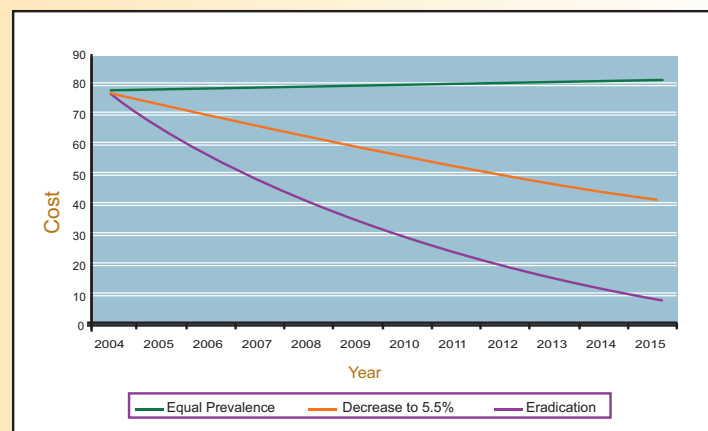
Scenario #2- In the event that Nicaragua meets the target established in the first Millennium Development Goal-halving the prevalence of underweight children by 2015- the costs of child undernutrition would drop to US\$42.2 million by 2015.

Scenario #3- If eradication² were fully attained, the costs of child undernutrition would decrease even further, to US\$18.9 million by 2015.

1. Values updated to 2015, with an annual discount rate of 8 percent

2. Equivalent to reducing the prevalence to 2.5 percent, which represents the "normal" proportion of cases according to the parameters used to estimate child undernutrition.

Graph 33 - Estimated Costs of Child Undernutrition Under Three Scenarios (US\$ million) - Nicaragua 2004-2015



Source: Author's own elaboration.

The progressive reduction in the prevalence of child undernutrition would generate a similar effect in all its related costs. Consequently, if the trend of reducing the prevalence of child undernutrition in Nicaragua shown in the years 1998 and 2001 remains constant - that is, an average decrease of 0.5 percentage points annually- then the eradication of child hunger would be achievable by 2015.

Thus, besides improving people's quality of life, reaching this goal would create economic benefits estimated at US\$46 million, some 48 percent, of which, would be achieved by 2010. In a scenario of fully achieving the target established by the first Millennium Development Goal, the economic benefits are estimated at US\$25 million.

THE ECONOMIC AND SOCIAL IMPACT OF CHILD UNDERNUTRITION IN PANAMA

THE NUTRITIONAL SITUATION IN PANAMA

Panama has one of the lowest levels of child undernutrition in Central America. In relation to the other countries in Latin America and the Caribbean, Panama's underweight rates are below average. Underweight affects one in every 15 children under the age of five, and stunting afflicts one fifth of all children, according to the most recent information available. This occurs in a country where the undernourishment rate is the second highest in the region, showing a negative trend in the last decade equivalent to a setback of 48 percent, which hinders Panama's ability to achieve the target established in the first Millennium Development Goal. In addition, Panama presents one of the lowest levels of poverty and indigence in the sub-region (ELAC 2005).

According to estimates from the Demographics and Health Survey from 2003, approximately 28,000 children under the age of five are underweight ('moderate' and 'severe'), and approximately 49,000 suffer from chronic undernutrition.

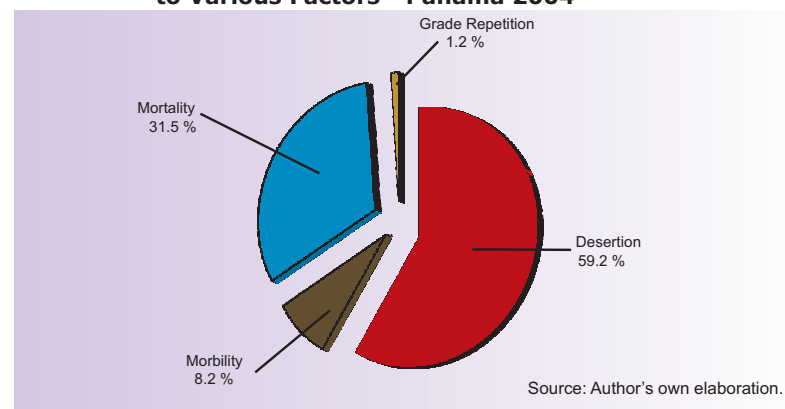
Over the last forty years, Panama's child undernutrition rates have shown a downward trend, with a strong heterogeneity between periods. Although the prevalence of underweight children remained relatively constant between the years 1966 and 1980, from 1980 until 1992 there was an average reduction of 0.4 percentage points annually. Since then, some periods have shown slight increases and others slight reductions (0.09 and 0.6 percentage points annually, respectively). As a consequence and due to these abrupt changes in trend, the undernutrition prevalence in 2003 was slightly higher than that in 1992.

This increase occurs despite Panama's public social expenditure per capita, which is as one of the highest in Central America. Between the years 2000 and 2004, Panama allocated 17.4 percent of its GDP to public social expenditure, an average of 4.7 percent on education and 5.9 percent on health, totaling 61 percent of the total public social expenditure. Since 1990, the total public expenditure, as percentage of the GDP, has increased by 14 percent (16 percent increase in education and 13 percent in health).

RESULTS OF THE STUDY OF THE COST OF HUNGER IN PANAMA

Based on the model developed for this study, it was estimated that for 2004 the total cost of child undernutrition in Panama reached **US\$332 million**, which is equivalent to 2.3 percent of the GDP and 13.2 percent of public social expenditure in the country for that year.

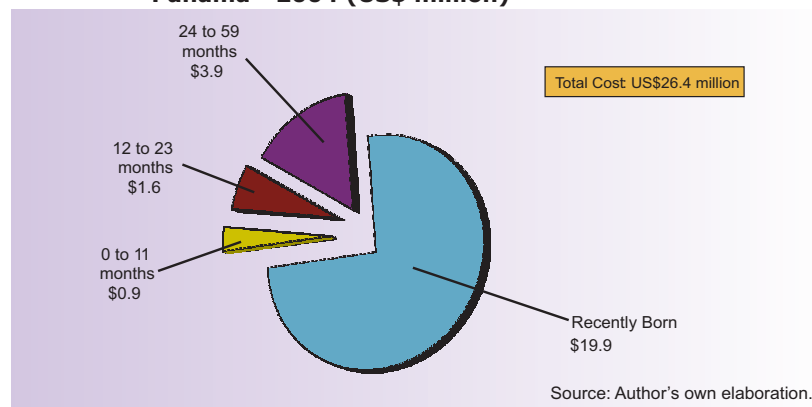
Graph 34 - Distribution of cost of Child Undernutrition According to Various Factors - Panama 2004



Health Costs

In 2004, nearly 66,000 additional cases were handled by the healthcare system as a result of higher risks of diarrhea, acute respiratory infections, and anemia as well as direct treatments for underweight children. This generated a cost of US\$26 million, which represents 3.3 percent of the public social expenditure in health.

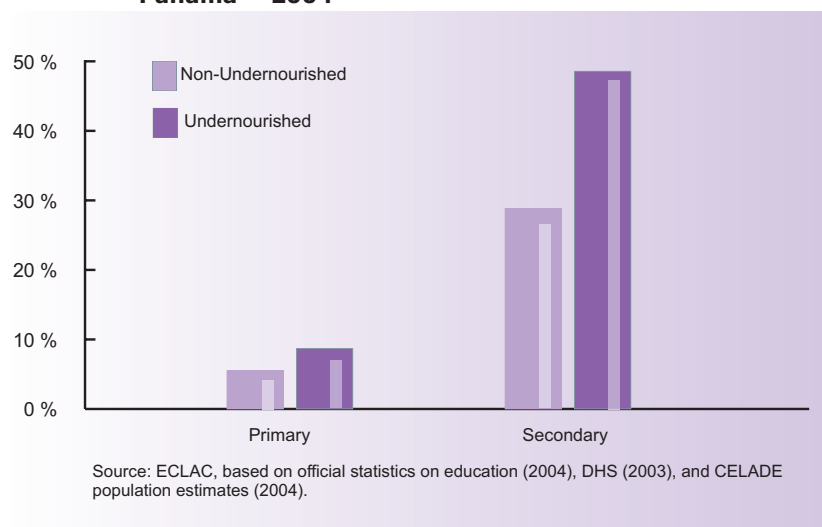
Graph 35 - Cost of Child Undernutrition in Health Panama - 2004 (US\$ million)



Education Costs

In 2004, low school performance associated with undernutrition caused 5,000 grade repetitions by children who were undernourished before five years of age, generating a cost of US\$4 million, equivalent to 0.6 percent of public spending in education.

**Graph 36 - Effects of Child Undernutrition in Grade Repetition
Panama - 2004**



Productivity Costs

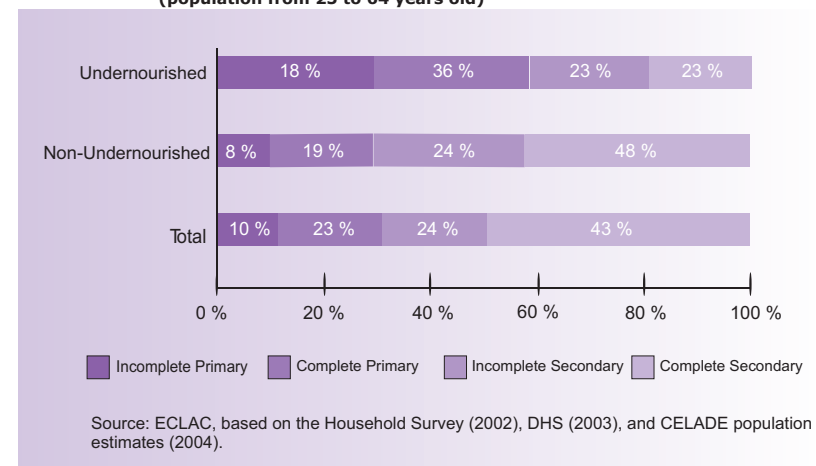
The greatest share of the costs of undernutrition comes from losses in productivity generated by the present-day working-age population (15-64 years), who during their childhood suffered from undernutrition: A total of US\$190 million (60 percent of the total) is generated from a deficit of 1.8 years of schooling, and US\$101 million (31 percent) correspond to the 41,000 people who did not reach the productive phase, due to mortality rates associated with undernutrition, during the early years of life.

Table 10 - Effects of Child Undernutrition in Productivity due to Mortality in Panama

| Age Group | Mortality due to Undernutrition (N, 1940 - 1989) | Loss of Working Hours (2004) |
|---|--|------------------------------|
| 15 - 24 years | 4,745 | 3,202,182 |
| 25 - 34 years | 9,690 | 14,411,580 |
| 35 - 44 years | 11,033 | 17,682,971 |
| 45 - 54 years | 9,103 | 13,703,371 |
| 55 - 64 years | 6,376 | 6,721,233 |
| Total | 40,948 | 55,721,336 |
| Hours lost in relation to economically active population (%) | | 2.2 |

Source: ECLAC, based on CELADE population and mortality statistics, relative risks estimated by Fishman et al, and DHS 2003.

**Graph 37 - Effects of Child Undernutrition in the Educational Level of the Population - Panama
(population from 25 to 64 years old)**



FORECAST OF THE ECONOMIC IMPACT OF UNDERNUTRITION

The Future Cost of the Current Situation

The future effects of undernutrition on children under the age of five in 2004 will generate an added cost of **US\$65 million**¹. From this total, US\$36 million (51 percent) is generated from the loss of potential productivity during the working-age period (when these children are between 15-64 years old). Additionally, the consequences on health between 2004 and 2008 (additional healthcare for greater morbidity in anemia, diarrhea, acute respiratory infections, and direct treatments for undernutrition, including marasmus and kwashiorkor) are projected to cost US\$26 million (44 percent).

Possible Scenarios

Based on the situation in 2004, it is possible to project the effects and costs that would result in various future scenarios ending in 2015, and the differences in costs that would be generated during the process:

Scenario #1- As Panama presents a decreasing trend among its 0-4 age group, if the prevalence of child undernutrition remains constant, the costs for 2015 would slightly decrease to US\$ 64.9 million.

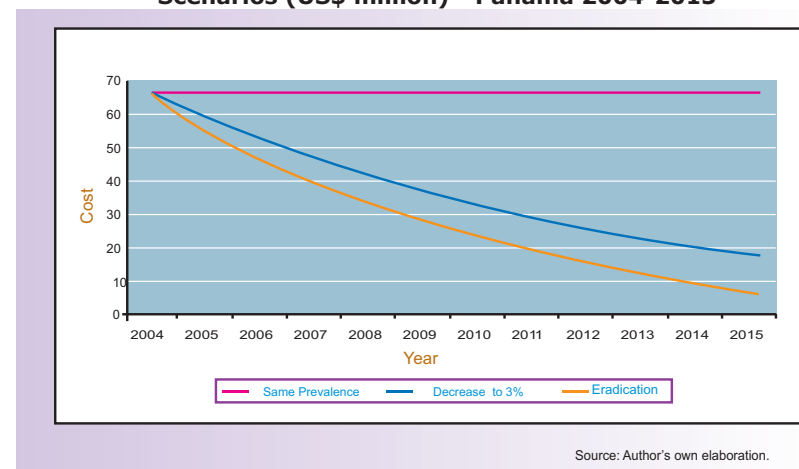
Scenario #2- In the event that Panama meets the target established by the first Millennium Development Goal-halving the prevalence of underweight children by 2015-the costs of child undernutrition would drop to US\$27.5 million by 2015.

Scenario #3- If eradication² were fully attained, the costs of child undernutrition would further decrease, to US\$15.1 million by 2015.

1. Value updated to 2015, using an annual discount rate of 8 percent.

2. Equivalent to reducing the prevalence to 2.5 percent, which represents the "normal" proportion of cases, according to the parameters used to estimate child undernutrition.

Graph 38 - Estimated Costs of Child Undernutrition Under Three Scenarios (US\$ million) - Panama 2004-2015



The progressive reduction in the prevalence of global undernutrition would generate a similar effect in all its related costs. Consequently, if the required interventions to meet the target established by the first Millennium Development Goal are implemented, then the benefits are estimated at US\$98.5 million. In a scenario of eradication of child undernutrition, the economic benefits are estimated at US\$125 million. In this latter scenario, almost 54 percent would be achieved between the years 2005 and 2010.

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For additional information on this study, please visit www.wfp.org/spanish