The Social and Economic Impact of Child Undernutrition on Lesotho Vision 2020

THE CO$T OF HUNGER IN AFRICA | COHA
SOCIAL AND ECONOMIC IMPACT OF CHILD UNDERNUTRITION
LESOTHO

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HUNGER
IN **AFRICA**

C O H A

SOCIAL AND ECONOMIC IMPACT
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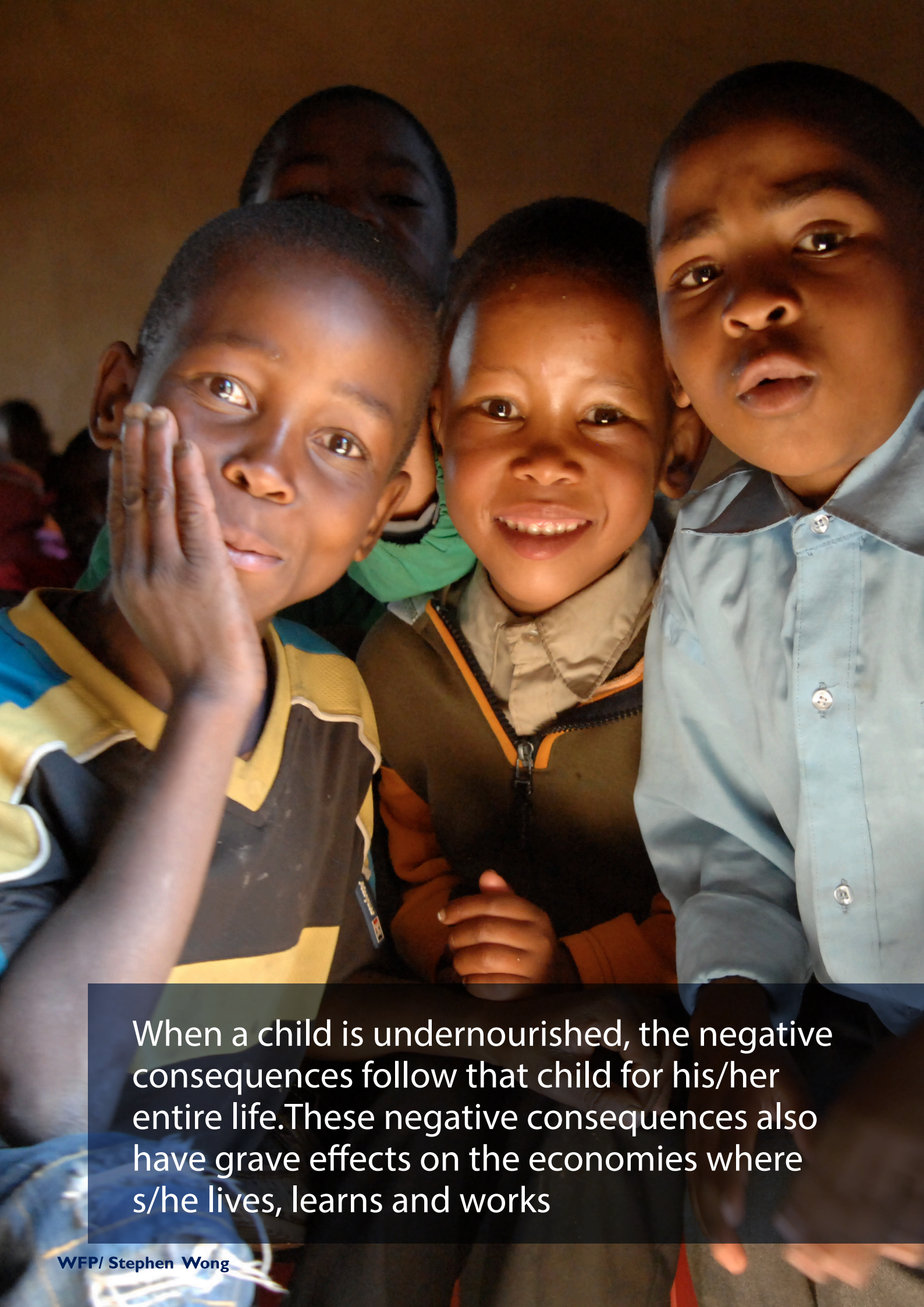
When a child is undernourished, the negative consequences follow that child for his/her entire life.These negative consequences also have grave effects on the economies where s/he lives, learns and works

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Foreword

The Government of Lesotho is committed to the eradication of hunger and undernutrition. Lesotho is among the seven countries in the world that have shown progress in improving child nutrition outcomes, as evidenced by the 6 percent reduction in stunting in the past five years. However, the stunting rates still remain unacceptably high at 33.2 percent among children under five years, which is an indication that chronic food and nutrition insecurity are still prevalent. The high prevalence of malnutrition has impacted greatly on education and health outcomes.

The Cost of Hunger in Africa study, which was commissioned by the African Union and supported by the United Nations Economic Commission for Latin America and the Caribbean and the World Food programme, in which the Kingdom of Lesotho participated has confirmed the magnitude of the consequences that child malnutrition has on health, education and the national economy. The study has highlighted that the country has incurred huge economic losses associated with undernutrition, the highest being the cost in loss of potential productivity.

The study findings have clearly shown that adequate nutrition is critical for one's physical and intellectual development and work productivity, and hence an integral element for socio-economic development. It is in this context that we are determined as a Government that, moving forward, we need to channel adequate resources towards nutrition interventions. The Government will also strengthen institutional and human capacities for effective delivery of nutrition services, as well as support sustainable social-protection programmes that promote resilience-building for communities.

I would like to thank World Food Programme Lesotho, United Nations Development Programme and United Nations Children's Fund for providing financial support towards the data collection, processing, and presenting and producing the report. Special recognition should also go to the United Nations Economic Commission for Latin America and the Caribbean and the World Food Programme for their technical support.

It is my hope that the commitment of the Government of Lesotho and all stakeholders to undertake the study, and the findings of the study will be an inspiration to expedite the implementation of study recommendations in achieving a well-nourished, healthy and economically productive nation. This will be in line with the Government of Lesotho's National Strategic Development Plan, including the Lesotho Vision 2020, Agenda 2063, Regional Indicative Strategic Development Plan (RISDP) and the Sustainable Development Goals.

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Acknowledgements

Acronyms

ACS   African Centre for Statistics

ADFNS   Africa Day for Food and Nutrition

ADS   Acute Diarrheal Syndrome

ARI   Acute Respiratory Infection

ARNS   Africa Regional Nutrition Strategy

ATYS-VMD   Africa Ten Year Strategy for the Reduction of Vitamin and Mineral Deficiencies

AU   Africa Union

AUC   Africa Union Commission

CAADP   Comprehensive Africa Agriculture Development Programme

CSO   Central Statistics Office

COHA   Cost of Hunger in Africa

DHS   Demographic and Health Survey

ECA   Economic Commission for Africa

ECLAC   Economic Commission for Latin America and the Caribbean

EDPRS   Economic Development and Poverty Reduction Strategy

FAFS   Framework for African Food Security

FAO   Food and Agriculture Organization

FTF   Feed the Future

GDP   Gross Domestic Product

GNI   Gross National Income

ICU   Intensive Care Unit

ILO   International Labour Organization

IUGR   Intra Uterine Growth Retardation

LAC   Latin America and the Caribbean

LBW   Low Birth Weight

LSL   Lesotho loti (maloti)

MDG   Millennium Development Goal

MICS   Multiple Indicator Clustor Survey

NCHS   National Centre for Health Statistics

NEPAD   The New Partnership for Africa's Development

NIT   National Implementation Team

NPCA   NEPAD Planning and Coordinating Agency

OECD   Organization for Economic Cooperation and Development

PANI   Pan- African Nutrition Initiative

P4P   Purchase for Progress

REACH   Renewed Efforts Against Child Hunger

RECs   Regional Economic Communities

SAM   Severe Acute Malnutrition

SUN   Scaling Up Nutrition

UNECA   United Nations Economic Commission for Africa

UNESCO   United Nations Educational, Scientific and Cultural Organization

UNICEF   United Nations Children's Fund

USAID   United States Agency for International Development

WFP   World Food Programme

WHO   World Health Organization

Executive Summary

The Cost of Hunger in Africa (COHA) study is an African Union Commission (AUC) and the NEPAD Planning and Coordinating Agency (NPCA) initiative through which countries are able to estimate the social and economic impacts of child undernutrition in a given year. In March 2012, the regional COHA study was presented at the Fifth Joint Meeting of the AU Conference of Ministers of Economy and Finance and the ECA Conference of African Ministers of Finance, Planning and Economic Development, held in Addis Ababa, Ethiopia. At the meeting, the ministers issued a resolution confirming the importance of the study and recommending it to continue beyond the initial stage. Twelve countries have been initially selected to participate in the study.

However, following the Malabo Declaration, passed in June 2014, by the African Union Heads of State and Government, on Nutrition Security for Inclusive Economic Growth and Sustainable Development in Africa, which called for all Member States to participate in the study, and noting the invaluable contribution of the COHA study in highlighting the consequences of child undernutrition, many more African countries have requested to be part of the study. The Kingdom of Lesotho (hereafter referred to as Lesotho) is the eleventh country on the continent and the third country in the Southern Africa region to implement the study.

Methodology

The COHA model is used to estimate the additional cases of morbidity, mortality, school repetitions and dropouts, and reduced physical capacity that can be associated with a person's undernutrition status before the age of five. In order to estimate these social impacts for a single year, the model focuses on the current population,[1] identifies the percentage of that population who were undernourished before the age of five, and then estimates the associated negative impacts experienced by the population in the current year. Using this information and the data provided by the Lesotho National Implementation Team, the model estimates the associated economic losses incurred by the economy in health, education and potential productivity in a single year. The reference year used in the analysis of the study model is 2014, which is referred throughout the text as "current year".

During the implementation process of the study, secondary datasets were obtained from the Bureau of Statistics of Lesotho, Demographic and Health Survey (DHS-2014), Lesotho Government Gazette, Central Bank of Lesotho, Ministry of Finance, World Health Organization, United Nations Department of Economic and Social Affairs, Multiple Indicator Cluster Surveys 2000 and national surveys, while primary data were collected from the Lesotho Central Drug Store, Mafeteng Hospital in Mafeteng District and Leribe Referral Hospital in Leribe District.

Trends in Child Undernutrition

Recent improvements in poverty rates in Lesotho have been accompanied by a reduction in child undernutrition. However, stunting rates remain high. The recent 2014 Demographic and Health Survey (DHS) showed a decrease in the prevalence of stunted children by 6 percentage points, approximately 33.2 percent of Basotho children under the age of 5 were suffering from stunting and 10.3 percent of the children were underweight. In 2014, an estimated 88,919 (of 275 000) children were affected by stunting and almost 28,292 children were underweight. This situation is especially critical for children between 12 and 23 months, where 32.2 percent were affected by stunting and 11 percent were underweight.

Initial Results: The Social and Economic Cost of Child Undernutrition in Lesotho

Social and Economic Impacts on Health

- Overall, estimated data from the 2014 DHS shows that 50,335 clinical episodes in Lesotho were associated with the higher risk of children being underweight, generating a total cost of 40.8 million maloti (US$ 4.2 million). Cases of diarrhoea, fever, respiratory infections and anaemia totalled 7,316 episodes. According to the estimated data, only 42.1 percent of these cases received proper health attention.

- Between 2008 and 2014 alone, it is estimated that 9,272 child deaths in Lesotho were directly associated with undernutrition, which represents 19.5 percent of all child mortalities for this period.

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[1] As the model set 2012 as the base year, it is referred to as "current" in this report.

- The model also estimated that 45.1 percent of the working age population (939,842 adults) suffered from growth retardation before reaching the age of five. Out of the total current working age population, 7.2 percent (i.e. 90,906 people who would be between 15–64 years old) has been lost because of the impact of undernutrition with the increasing child mortality rates.

Social and Economic Impacts on Education

- Results show that the repetition rate for stunted children in 2014 was 14.1 percent, as compared with 5.8 percent for non-stunted children, i.e. an incremental risk of 8.3 percentage points for stunted children. Overall 17.7 percent (17,044) of all repetitions in 2014 were associated with stunting, bearing a total cost of 115 million maloti, (US$11.7 million), 44 percent of which was borne by the families.

- The lower educational achievement of the stunted population has an impact on the expected level of income a person would earn as anw adult. Based on historical information, the model estimates that 45.1 percent of the working age population in Lesotho were stunted as children

Social and Economic Impacts on Productivity

- Of the 478,802 people in Lesotho that are engaged in manual activities, 210,653 (44 percent) were stunted as children. This has represented an annual loss in potential income due to lower productivity that surpasses 183 million maloti (US$18.6 million), equivalent to 0.7 percent of the gross domestic product (GDP). The results further indicate that 342,341 people engaged in non-manual activities also suffered from childhood stunting. The estimated annual losses in productivity for this group is 110 million maloti (US$11.2 million), equivalent to 0.4 percent of the GDP in 2014.

- An estimated 1,077,906 working hours were lost in 2014 due to the absent workforce and as a result of the incremental undernutrition-related child mortalities. This represented 1.5 billion maloti (US$154.6 million), equivalent to 5.5 percent of the country's GDP. Worth noting is the fact that the largest share of productivity loss is attributed to undernutrition-related mortality, which represents 77.2 percent of the total cost. Altogether, the productivity loss in 2014 due to the impact of child undernutrition is 1.8 billion maloti (US$184.4 million), equivalent to 6.56 percent of the GDP.

Total Economic Impact

- Results in Lesotho show that an estimated 1.96 billion maloti (or US$200 million) were lost in the year 2014 as a result of child undernutrition. These losses are equivalent to 7.13 percent of GDP in 2014. The highest element in this cost is the loss in potential productivity as a result of undernutrition-related mortalities.

Analysis of scenarios

There are potential savings to the economy should a reduction in child undernutrition be achieved. The below model generates a baseline that allows development of various scenarios based on nutritional goals established in each country using the prospective dimension. This is a call for action to take preventive measures and reduce the number of undernourished children to avoid large future costs to society

The scenarios developed for this report are as follows.

Scenario	Scenario #1: Halving the Prevalence of Child Undernutrition by 2025		Scenario #2: The 'Goal 'Scenario: "10 and 5 by 2025"	
	LSL (in Millions)	US$ (in Millions)	LSL (in Millions)	US$ (in Millions)
Total Potential Savings (2014-2025)*	1 824	185.9	2 864	291.99
Average Annual Savings (2014-2025)*	152	15	239	24
Annual Percentage Reduction of Stunting Necessary (2014-2025)	1.38		1.93	

*By having the prevalence of child undernutrtion by 2025, Lesotho stands to save 1.8 billion maloti (US$$186 million), while saving 2.8 billion maloti (US$$292 million) should Lesotho reach the African Union targets of reducing stunting to 10 percent and underweight by 5 percent by 2025.

Section

I

The Cost of
Hunger in Africa

THE COST OF
HUNGER
IN **AFRICA**
SOCIAL AND ECONOMIC IMPACT
OF CHILD UNDERNUTRITION
LESOTHO

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The Cost of Hunger in Africa: Towards the Elimination of Child Undernutrition in Africa

A. Introduction: Why is it important?

Over the past decade, Africa has experienced a remarkable economic performance that has made the continent increasingly attractive for global investment and trade. The pace of real GDP growth on the continent has doubled in the last decade, and six of the world's fastest growing economies are in Africa[2]. Yet, the continent still displays some of the highest rates of child undernutrition in the world.

Human capital is the foundation of social and economic development, as articulated in the African Agenda 2063 and the Sustainable Development Goals (SDGs). Improved nutritional status of people has a direct impact on economic performance through increased productivity and enhanced national comparative advantage. In order for Africa to maximize its present and future economic prospects, there is an urgent need for sustainable, cost-effective interventions that address the nutritional situation of the most vulnerable members of its society.

As noted by the African Heads of State and Government in 2014, food security without improved nutrition will not deliver the desired socio-economic outcomes, as the number of those affected by hunger and malnutrition has continued to increase over the past few years. Therefore, if child undernutrition were reduced, there would be a direct improvement in child mortality rates, as undernutrition is the single most important contributor to child mortality.[3] If women were not undernourished as children, they would be less likely to bear underweight children. Further, healthy children would achieve better education, be more productive as adults and have higher chances of breaking the cycle of poverty.

Undernutrition leads to a significant loss in human and economic potential. The World Bank estimates that undernourished children are at risk of losing about 10 percent of their lifetime earning potential, thus affecting national productivity. Recently, a panel of expert economists at the Copenhagen Consensus Conference concluded that fighting malnourishment should be the top priority for policymakers and philanthropists.[4] At that conference, Nobel laureate economist Vernon Smith stated that: "One of the most compelling investments is to get nutrients to the world's undernourished. The benefits from doing so – in terms of increased health, schooling, and productivity – are tremendous."[5] Improving the nutritional status of children is therefore a priority that needs urgent policy attention to accelerate socio-economic progress and development in Africa. However, in spite of the compelling economic value of nutrition interventions, investments with apparent shorter-term returns are prioritized in social budgets. Hence, efforts need to be scaled up to sensitize the general population, policymakers and development partners on the high costs of undernutrition in order to strengthen national and international commitments and ensure that young children in Africa grow healthy and properly nourished.

Positioning nutrition interventions as a top priority for development and poverty reduction is often difficult, partly due to the lack of credible data on both short- and long-term returns. Indeed, there is not enough country-specific evidence to demonstrate how improved nutrition can have a direct impact on school performance, and thereby improving opportunities in the labour market and physical work. Additionally, nutrition is too often regarded as a health issue, disregarding the rippling social and economic implications it has on other areas of development.

Despite the aforementioned challenges, efforts continue, both at the regional and global levels, to address the issues of undernutrition and hunger. At the regional level, these efforts include initiatives, such as the African Regional Nutrition Strategy (ARNS), the Comprehensive Africa Agriculture Development Programme (CAADP), especially CAADP Pillar III that focuses on reducing hunger and improving food and nutrition security, the Pan-African Nutrition Initiative (PANI), the Framework for African Food Security, the Africa Ten-Year Strategy for the Reduction of Vitamin and Mineral Deficiencies (ATYS-VMD),

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[2] "World Economic Outlook Database October 2012. www.imf.org/external/pubs/ft/weo/2012/02/weodata/index.aspx.
[3] Robert E. Black et al. Maternal and Child Undernutrition: Global and Regional Exposures and Health Consequences. The Lancet, 371, No. 9608, 2008. doi: 10.1016/S0140-6736(07)61690-0.
[4] Copenhagen Consensus 2012. Top Economists Identify the Smartest Investments for Policy-Makers and Philanthropists. 14 May 2012. www.copenhagenconsensus.com/Default.aspx?ID=1637.
[5] Idem.

Africa Day for Food and Nutrition Security (ADFNS), and the recently launched Africa Day for School Feeding. At the global level, initiatives include Renewed Efforts Against Child Hunger (REACH), Purchase for Progress (P4P), Scaling Up Nutrition (SUN), Feed the Future, the "1,000 Days" partnership, as well as the Abuja Food Security Summit of 2006. All these efforts are designed to reduce hunger, malnutrition and vulnerability in a bid to also achieve the Sustainable Development Goals as well as the Africa Agenda 2063.

Within the framework of the African Regional Nutrition Strategy (2005–2015),[6] the objectives of the African Task Force on Food and Nutrition Development [7] and CAADP, the African Union, and the New Partnership for Africa's Development (NEPAD) Planning and Coordinating Agency (NPCA), the United Nations Economic Commission for Africa (UNECA), and the World Food Programme (WFP) combined their efforts to conduct the Cost of Hunger Study on the Social and Economic Impact of Child Undernutrition in Africa. This study is built on a model developed by the United Nations Economic Commission for Latin America and the Caribbean (ECLAC). Through a South-South cooperation agreement, ECLAC has supported the adaptation of the model to the African context and continues to support the implementation of the study in the ongoing countries.

This study aims at generating evidence to inform key decision-makers and the general public about the cost African societies are already paying for not addressing the problem of child undernutrition. The results provide compelling evidence to guide policy dialogue and increase advocacy around the importance of preventing child undernutrition. Ultimately, it is expected that the study will encourage revision of current budgetary allocation practices in each participating country to ensure provision of the human and financial resources needed to effectively combat child undernutrition, specifically during the first 1,000 days of life when most of the damage occurs.

B. Current Food and Nutrition Situation in Africa

Globally, there has been tremendous progress in reducing both the rate of stunting (low height for age) and the number of stunted children over the past 24 years, 1990 to 2014. In Africa, the reported rate of stunted children has decreased from 42.3 percent in 1990 to 32 percent in 2014 (see Table 1.1). Nevertheless, over the same period, the absolute number of stunted children has increased from 46.6 million to 58.1 million[8] . Southern Africa has the least propotion of these children, 1.9 million, representing 28.7 percent while the largest proportion of these children, 24 million, is located in East Africa, representing more than 41 percent of all stunted children on the continent.

TABLE 1.1: ESTIMATED PREVALENCE AND NUMBER OF STUNTED CHILDREN UNDER FIVE YEARS OF AGE (MODERATE OR SEVERE), BY UNITED NATIONS REGION, 1990, 2010 and 2014

Region	Prevalence estimate (%)				Number (millions)		
	1990	2010	2014		1990	2010	2014
Africa	**42.3**	**33.9**	**32.0**		**46.6**	**56.1**	**58.1**
Eastern	51.2	40.1	38.0		19.0	23.4	24.0
Middle	46.7	34.1	31.8		6.3	8.1	8.3
Northern	27.7	19.7	18.3		6.0	4.7	5.0
Southern	36.6	30.0	28.7		2.2	2.0	1.9
Western	40.9	33.7	32.4		13.2	18.0	19.0

Source: Source: United Nations Children's Fund, World Health Organization, World Bank. UNICEF-WHO-World Bank joint child malnutrition estimate. Accessed on 6 September 2016 at http://apps.who.int/gho/data/node.main.ngest?lang=en

The rising number of food insecure and undernourished people continues to pose serious challenges in Africa. Over the past few years, the increase in global food prices, followed by the economic and financial crisis, have pushed more people into poverty, vulnerability and hunger. Even though the number of undernourished people has fallen globally by 13.2 percent from 1 billion to 868 million in the last 20 years, Africa has fallen back, reporting an increase in the absolute number of underweight children from 32.4 million to 36.9 million (see Table 1.2).[9] AAfrica's share in the world's undernourished population has

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[6] African Regional Nutrition Strategy (2005–2015). Objectives I–III: I. To increase awareness among governments of the region, regional and international development partners and the community on the nature and magnitude of nutrition problems in Africa and their implications for the development of the continent and advocate for additional resources for nutrition. II. To advocate for renewed focus, attention, commitment and a redoubling of efforts by member states, in the wake of the worsening nutrition status of vulnerable groups. III. To stimulate action at the national and regional level that lead to improved nutrition outcome, by providing guidance on strategic areas of focus.

[7] African Union. CAHM5 Moves into Gear with Meeting on Food and Nutrition Development. 14 April 2011. www.au.int/en/sites/default/files/task%20force%20on%20food%20 and%20nutrition%20development.pdf

[8] United Nations Children's Fund, World Health Organization, World Bank. UNICEF-WHO-World Bank Joint Child Malnutrition Estimates. UNICEF, New York; WHO, Geneva; World Bank: Washington, DC.

[9] FAO, WFP and IFAD. 2012. The State of Food Insecurity in the World 2012. Economic growth is necessary but not sufficient to accelerate reduction of hunger and malnutrition. Rome: FAO.

decreased from 35.5 percent in 1990 to 23.5 percent in 2014.[10] However, this alarming rate still calls for stronger efforts to improve food and nutrition security on the continent.

TABLE 1.2: NUMBER OF UNDERWEIGHT PEOPLE, BY REGION, 1990 TO 2014

Region	Prevalence in % (1990)	Number in millions	Prevalence in % (2014)	Number in millions
Africa	35.5	32.4	23.5	36.9
South East Asia	46.9	83.5	24.8	44.6
Eastern Mediterranean	22.1	13.5	13.7	10.8
Western Pacific	13.4	22.6	2.6	3.0

Source: Source: United Nations Children's Fund, World Health Organization, World Bank. UNICEF-WHO-World Bank joint child malnutrition estimate. Accessed on 6 September 2016 at http://apps.who.int/gho/data/node.main.ngest?lang=en

Figure 1.1 illustrates the rates of stunting (low height for age) in Africa. According to these data, 17 countries on the continent have stunting rates above 40 percent and 36 countries have rates above 30 percent. Furthermore, a large proportion of Africa's population often does not have access to food containing the essential vitamins and minerals required for optimum health and nutrition.

FIGURE1.1 STUNTING RATES BY COUNTRY

	>50%
	40-50%
	30-40%
	20-30%
	10-20%
	>10%
	Data not available
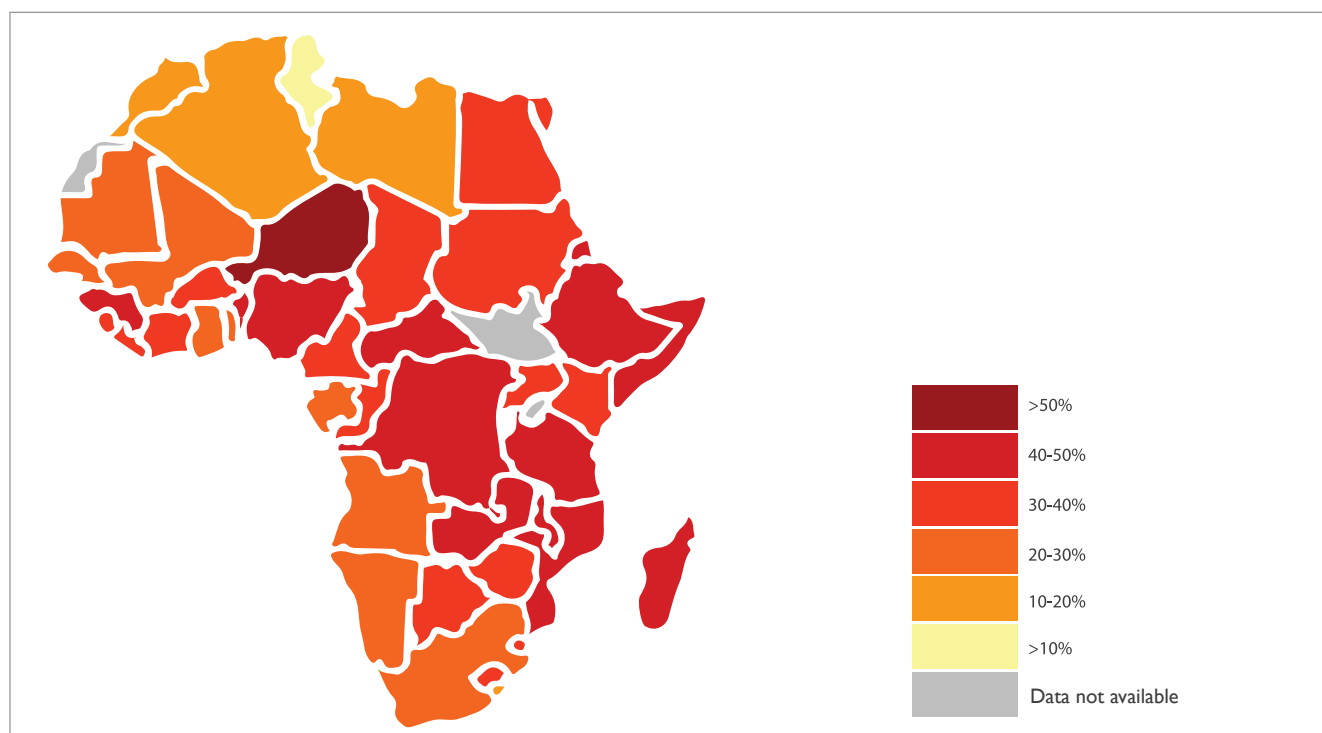
Source: Data from WHO Global Database on Child Growth and Malnutrition

The first Millennium Development Goal (MDG 1) called for the eradication of extreme poverty and hunger. Nutritional status of children under 5 years of age was a key indicator to assess progress towards MDG 1. The target to reduce by half the prevalence of underweight children was not met by the end of the MDG-period in 2015.

Building on the unfinished business of the MDGs, the 2030 Agenda for Sustainable Development places a high premium on promoting good nutritional status for realizing inclusive development. More specifically, the Sustainable Development Goal (SDG 2), which aims at "ending hunger, achieving food security and improved nutrition and promoting sustainable agriculture", will contribute to the attainment of the other interrelated goals. Thus, Goal 2 should not be seen in isolation from Goals 1 (end hunger), 3 (ensure healthy lives), 4 (ensure inclusive and equitable quality education), 5 (achieve gender equality), 8 (promote sustained, inclusive and sustainable economic growth), and 10 (reduce inequality). Coherent national strategies and well-coordinated programmatic interventions are urgently required to achieve the SDG on nutrition and ensure that small gains are not reversed.

10 Ibid.

C. Mandate to Advocate for Nutrition in Africa

At the Fourth Joint Meeting of the AU Conference of Ministers of Economy and Finance and the ECA Conference of African Ministers of Finance, Planning and Economic Development, held in 2011, the African Union (AU) recognized the compelling evidence that vibrant economic growth in Africa has not translated into equitable social progress, particularly with regard to poverty reduction and job creation.

Experience from other regions of the world – most notably Latin America and Asia – confirms that cutting hunger and thereby achieving food and nutrition security in Africa is not only one of the most urgent needs for reducing vulnerability and enhancing resilience, but also offers one of the highest return outcomes for broader social and economic development. This suggests that, had more progress been made against hunger in Africa, the continent's recent growth performance would have been even more impressive with potentially stronger impacts on poverty reduction.

Nevertheless, advocating for nutrition investments has been a challenge for development stakeholders. Often, child nutrition is perceived as a long-term investment, which will take several years to generate social returns, thus making short-term investments being prioritized in budget allocations. Further, food security and response to emergency hunger situations often retain most of the attention associated with nutrition investments.

Recognizing these challenges, the African Union Commission (AUC), strongly supported by WFP, NEPAD and other partners, proposed the development of the Cost of Hunger in Africa (COHA) study at the Fifth Joint Meeting of the AU Conference of Ministers of Economy and Finance and the ECA Conference of African Ministers of Finance, Planning and Economic Development in March 2012. The purpose of this multi-country study was to provide strong evidence on the social and economic consequences of child undernutrition in order to inform, raise awareness, build consensus and catalyse action towards undernutrition in Africa. As a result, Resolution 898 (XLV) [11] *the Cost of Hunger in Africa: Social and Economic Impacts of Child Undernutrition* was adopted, acknowledging the importance of the study and recommending it to continue beyond the initial stage.

"The Conference of Ministers…

Welcomes *the multi-country study on the Cost of Hunger in Africa being led by the African Union Commission and the Economic Commission for Africa, in collaboration with the World Food Programme, to quantify the aggregate social and economic impacts of chronic hunger in Africa;*

Anticipates *that the study will lead to increased understanding among key national and regional policymakers of the depth and breadth of child undernutrition on the continent, and its aggregate social and economic consequences, and thereby establish a firmer foundation for policies and investments to cut hunger in Africa; and*

[Requests *partners] to expedite the successful completion of the study, including wide dissemination of the results at country and regional levels."*

Extract from Resolution 898 (XLV) the Cost of Hunger in Africa:
Social and Economic Impacts of Child Undernutrition

This mandate was a clear guideline for the AUC to integrate the COHA study into the advocacy efforts of the ARNS (2005–2015), [12] which has now been revised to 2025, and use the results of the study as a tool to mainstream nutrition in the development process. The resolution also promoted a dialogue with political actors at the country level, motivated consideration of nutrition issues within the economic and planning sectors, and repositioned child nutrition in the context of economic development. This report is the result of the commitment by the AUC, NEPAD, WFP and other partners to highlight the tangible consequences of child undernutrition in Africa.

Most recently, the Heads of State and Government of the African Union, having met at their Twenty-Third Ordinary Session of the African Union Assembly in Malabo, Equatorial Guinea, from 26 to 27 June 2014, on the theme of the African Year of Agriculture and Food Security: "Transforming Africa's Agriculture for Shared Prosperity and Improved Livelihoods through Harnessing Opportunities for Inclusive Growth and Sustainable Development", further reiterated the importance of COHA. In Declaration 4 of the Assembly, titled "Declaration on Nutrition Security for Inclusive Economic Growth and Sustainable Development in Africa", the 15 Heads of State noted with concern that the results of the study on COHA revealed the

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[11] Resolution 898: The Cost of Hunger in Africa: Social and Economic Impacts of Child Undernutrition," in Report of the Committee of Experts of The Fifth Joint Annual Meetings of the AU Conference of Ministers of Economy and Finance and ECA Conference of African Ministers of Finance, Planning and Economic Development (Addis Ababa: African Union, 2012), pg. 15, http://www.uneca.org/sites/default/files/uploaded-documents/COM/com2012/com2012-reportcommittee-of-experts_en.pdf.

[12] African Regional Nutrition Strategy: 2005-2015, report (Addis Ababa: African Union), http://www.who.int/nutrition/topics/African_Nutritional_strategy.pdf

degree to which child undernutrition influences health and educational outcomes, the additional barrier it has on children's ability to achieve their full potential, and the impact it has on national productivity, and called upon Member States who have not yet done so to consider participating in the COHA study and to request the Commission, UNECA, WFP, United Nations Children's Fund (UNICEF) and other development partners to expedite the successful completion of the study, including wide dissemination of the results at the country and regional levels.

D. Adapting a Methodology for Africa: a Consultative Process

The model for the COHA study represents a step forward in estimating the social and economic consequences of child undernutrition in Africa. Several national and regional efforts have been implemented to assess the costs of undernutrition globally and in the region. Notable initiatives at the regional level include those led by ECLAC, carried out jointly with WFP in Latin America and the Caribbean (LAC) and the PROFILES initiatives,[13] which developed similar country-level estimations in selected countries worldwide. The COHA, however, represents the only effort constructed for the African continent involving nutrition experts from the continent, who provided recommendations during the adaptation process with critical support of country teams. The model developed by ECLAC to estimate the social and economic consequences on child undernutrition in LAC,[14] presented the most appropriate base to develop a model for Africa. In the development of the model for LAC, the authors focused on the consequences of child undernutrition from a life-cycle approach, avoiding the potential overlaps with other nutritional deficiencies. This approach proved to be an important political instrument to mobilize stakeholders around nutrition in LAC, and was considered by many to be state-of-the-art knowledge in this field.

The development of the COHA model proved to be a good practice of South-South collaboration between two regional United Nations economic commissions, Economic Commission for Latin America and the Caribbean (ECLAC) and the Economic Commission for Africa (ECA); and WFP from Latin America and Africa worked together in a series of joint technical activities and consultations to transfer knowledge and generate the adjustments for the development of the new model to Africa. An interdivisional working group was created within ECA that included the African Centre for Statistics, the African Centre for Gender and Social Development, the Economic Development and NEPAD Division of the ECA, as well as a number of United Nations partners, namely WFP, UNICEF, the International Labour Organization (ILO) and the World Health Organization (WHO), to ensure multidisciplinary contributions in the development of the model.

At the regional level, the technical validation of the COHA model was provided by the African Task Force on Food and Nutrition Development (ATFFND). The task force, which brings together regional nutrition experts and practitioners, was the ideal body to provide guidance in the development of the model. In consecutive meetings, the ATFFND provided key recommendations, thus laying out a roadmap for the adaptation process, and finally expressed its satisfaction with the proposed COHA model.

To facilitate the implementation of the project, leadership roles are identified: the AUC Department of Social Affairs and the NEPAD Planning and Coordinating Agency lead the initiative, while WFP and ECLAC provide overall technical support. The following governing structures have been established:

1. The Steering Committee/ATFFND: The high-level Steering Committee is chaired by the AUC. The Steering Committee is charged with convening partner organizations, approving the study design and action plan, and overseeing the implementation of the study and dissemination of results. The Steering Committee also provides political support to the initiative.

2. The Regional Secretariat: The Regional Secretariat, based at WFP, works through a small technical team, drawn from AUC, NEPAD, ECLAC, WFP and other relevant organizations, to support the preparation, implementation and dissemination of the study, as well as to facilitate smooth and quality work of the national implementation teams and expert committees. The Secretariat reports to the Steering Committee.

3. The National Implementation Team (NIT): The core implementation of the study is carried out by a national team in each participating country, drawn from relevant governmental institutions, such as the Ministry of Health, Ministry of Education, Ministry of Social Development, Ministry of Planning, Ministry of Finance, National Statistics Institution, and the Nutrition Council. In certain situations, a broader reference group is also created to include other actors and United Nations agencies, such as WFP, UNICEF, Food and Agriculture Organization of the United Nations (FAO) and WHO. The WFP country offices facilitated the process according to specific

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13 "FHI 360 Profiles," FHI 360 Profiles, accessed September 27, 2013, http://fhi360profiles.org.
14 Rodrigo Martínez and Andrés Fernández. Model for Analysing the Social and Economic Impact of Child Undernutrition in Latin America. Santiago De Chile: Naciones Unidas, CEPAL, Social Development Division, 2007.

country situations and supported coordination of the NIT as required.

The criteria for implementing and selecting the initial COHA countries were as follows:

1. Data availability: The availability of at least two recent, nationally representative survey datasets on fertility, family planning, maternal and child health, gender, malaria, and nutrition, preferably the Demographic and Health Survey (DHS).

2. Sub-regional coverage: At least one country selected from each African Union region: Community of Sahel-Saharan States (CEN-SAD), Common Market for Eastern and Southern Africa (COMESA), Economic Community of Central African States (ECCAS), Economic Community of Western African States (ECOWAS), Intergovernmental Authority for Development (IGAD), Southern African Development Community (SADC) and Union du Maghreb Arabe (UMA). Overlapping membership to various Regional Economic Communities (RECs) was also taken into account in the final selection of countries.

3. Socio-economic representation: Prevalence of poverty and undernourishment in the overall population and occurrence of episodes of drought or other natural disasters.

4. Existence of a national platform on malnutrition and hunger.

Based on these criteria, 12 initial countries were selected (see Table 1.3). Eight of these countries, namely Burkina Faso, Egypt, Ethiopia, Ghana, Malawi, Rwanda, Swaziland and Uganda, have completed the study. However, with the expansion of the study to other countries, more countries have requested to be part of the COHA study, among them, being Lesotho.

TABLE 1.3: COUNTRY SELECTION CRITERIA

Country	AU Region	Data availability (Survey Dates)[a]	Proportion of under-nourished in total pop. (%)[b]	Crude birth rate (births per 1,000 pop.)[c]	<5 mortality rate, (per 1,000 live births)[d]	UN HDI value ranking[e]	Prevalence of Stunting in children <5 years[f]
Botswana	SADC	CSO/UNICEF.	27.9	24	48	118	31[g]
Burkina Faso	ECOWAS	2010, 2003, 1998-99 Standard DHS	25.9	41	102	181	34.6
Cameroon	ECCAS	2004, 1998, 1991 Standard DHS	15.7	38	97	150	32.5
Egypt	CEN-SAD, COMESA	2008, 2005, 2000 Standard DHS	<5	24	22	113	28.9
Ethiopia	IGAD, COMESA	2010, 2005, 2000 Standard DHS	40.2	34	68	174	44.4
Ghana	ECOWAS	2008, 2006, 1998 Standard DHS, 2011, 2006 MICS	<5	31	80	135	28.0
Kenya	IGAD, COMESA	2008-09, 2003, 1998 Standard DHS	30.4	36	73	143	35.3
Malawi	SADC, COMESA	2010, 2004, 2000 Standard DHS	23.1	40	71	171	47.1
Mauritania	UMA	2003-04 Special 2000-01 Standard DHS	…	34	93	159	23[g]
Rwanda	COMESA	2010, 2005, 2000 Standard DHS	28.9	36	55	166	44.2
Swaziland	SADC, COMESA	2006-07 Standard DHS, 2002 MICS	…	30	82	140	28.9
Uganda	IGAD, COMESA	2010 Standard AIS, 2006, 2000-01 Standard DHS	34.6	44	69	161	33.4

a MEASURE DHS – Quality information to plan, monitor and improve population, health, and nutrition programs." MEASURE DHS. Accessed 26 December 2014. www.measuredhs.com.
b The State of Food Insecurity in the World. FAO, Rome. 2012. www.fao.org/docrep/016/i3027e/i3027e00.htm.
c "Birth rate, crude (per 1,000 people)." Data. World Bank. Accessed 26 December 2014. http://data.worldbank.org/indicator/SP.DYN.CBRT.IN.
d "Mortality rate, under-5 (per 1,000 live births)." Data, World Bank. Accessed 26 December 2014. http://data.worldbank.org/indicator/SH.DYN.MORT.
e Human Development Report 2011. UNDP, New York. 2011. http://hdr.undp.org/en/content/human-development-report-2011.
f "MEASURE DHS – Quality information to plan, monitor and improve population, health, and nutrition programs." MEASURE DHS. Accessed 26 December 2014. www.measuredhs.com.
g The State of the World's Children 2013. UNICEF statistics. Accessed 26 December 2014. www.unicef.org/sowc2013/statistics.html.
Note: CEN-SAD = Community of Sahel-Saharan States; COMESA = Common Market for Eastern and Southern Africa; DHS = Demographic and Health Survey; ECCAS = Economic Community of Central African States; ECOWAS = Economic Community of Western African States; HDI = Human Development Index; IGAD = Intergovernmental Authority for Development; MICS = Multiple Indicator Clustor Survey; SADC = Southern African Development Community; UMA = Union du Maghreb Arabe.

E. Guiding Principles

Throughout the adaptation, implementation and utilization of the COHA model, four guiding principles were developed. With the overall goal of improving the nutritional situation in Africa, these principles allowed the team to approach the study in a holistic manner, considering the necessary steps for its implementation. The four guiding principles are described below.

A. National ownership of the process

One of the guiding principles in the development of the COHA study is to engage regional experts and policymakers as the main actors of the process. To this purpose, a feasibility workshop was carried out in the early stages of the process, bringing together practitioners across various sectors in order to analyse the challenges ahead and jointly produce a roadmap. Representatives from the 12 initial countries and major partners met to assess the process ahead and provided key recommendations for the adaptation of the ECLAC model. Some of these elements included capacity development, strong communication strategies and synergies with other ongoing costing initiatives.

As a result of this feasibility workshop, NITs were established in each of the four first-phase countries, and an initial training on the model and data requirements was carried out. A key milestone of the adaptation process was a regional technical meeting held in Entebbe, Uganda, where NITs presented a series of specific recommendations to the process based on the constraints and lessons learned. This feedback allowed the Regional Secretariat to develop a final roadmap for methodological adaptation, adjust the data collection instruments, and develop a final proposal for the COHA model for Africa.

B. Building national capacity to advocate for child nutrition

A second guiding principle for the COHA is to ensure that national capacity is strengthened during the implementation of the study. Similar costing initiatives have had limited impact due, in part, to the lack of national ownership and limited understanding by the stakeholders of the technical aspects of the study. These elements hinder the national stakeholders' capacities to effectively communicate the results, which could limit the policy impact of the study.

The main implementing actors of COHA in each country are specialists from the key government institutions, academics and practitioners, often led by the Ministry of Economy and/or Planning or the Ministry of Health. Once a team of eight to ten specialists was established, a training workshop was held to review all technical aspects of the model, form a task force for data collection and develop an initial communication strategy. In this workshop, a work plan was developed by the NIT that served as a guideline for future activities.

The Regional Secretariat supported the capacity development process of the NITs by holding regular teleconferences with representatives from each team and by providing technical assistance in the analysis of data and initial results. The national ownership of the study was emphasized by creating an NIT-led approach and by relying on nationally validated information. Once a country report was drafted, a national validation workshop of the results was held by the NIT and specific advocacy documents were prepared for key stakeholders.

One of the advantages of this process was the integration of the COHA by the NITs within their national nutritional strategies. This was possible, as the actors participating in the study were the same professionals shaping national nutritional strategies. This ensured alignment within the processes and maximized the potential contribution and sustainability of the initiative.

C. Engagement of COHA with global nutrition initiatives and movements

The third guiding principle for the COHA is to generate synergies with partners and global initiatives to maximize contributions. To achieve this, strong efforts were made to link the COHA with relevant initiatives that contribute to reducing child undernutrition.

The Scaling Up Nutrition (SUN) Movement was launched in 2010 and includes selected countries with high burdens of malnutrition. The purpose of the movement is described as follows :

It unites people – governments, civil society, the United Nations, donors, businesses and scientists – in a collective effort to improve nutrition. The Movement recognizes that good nutrition in the 1,000 days of a mother's pregnancy until her child's second birthday is an essential requirement and right for each world citizen to earn, learn, stay healthy and achieve his or her lifetime potential. The SUN Movement is founded on the compelling evidence that investment in nutrition yields major economic returns.[45]

COHA contributes to the SUN Movement by presenting strong arguments for investing in child nutrition in specific country contexts. This has helped countries to make some improvements in the nutritional situation of their populations.

The COHA contributes to the SUN Movement by presenting strong arguments for investing in child nutrition in specific country contexts. By doing so, countries have developed the capacity to generate change in the nutritional situation of their populations.

Another important global actor in the nutrition context is represented by the Renewed Efforts Against Child Hunger (REACH) initiative. This joint initiative proposed by WFP, WHO, UNICEF and FAO provides technical assistance to national governments in developing plans and strategies to scale up nutrition investments. An important part of their advocacy actions at the country level includes engaging non-traditional actors in discussions on nutrition in order to mainstream nutrition in their planning and activities. The COHA also represents an opportunity for joint collaboration, as it provides strong evidence on the consequences of stunting in educational performance, the loss of working hours by the working age population and the loss in manual and non-manual productivity, thus helping to position nutrition in the wider development agenda. REACH facilitators are also typically members of the NIT in each country where REACH is present.

D. Strategic advocacy for change

The fourth guiding principle of the COHA is to ensure that the results reach key stakeholders with the capacity to make a change. The communication strategy of the COHA is a basic component of the project. As a result, strong efforts are carried out by each NIT to reach decision-makers with the appropriate information in order to increase their interest and understand the consequences of child undernutrition. In this regard, a six-step approach has been developed, as follows:

1. Familiarize the team with the problems contributing to undernutrition and proven nutrition interventions;
2. Identify and categorize key actors;
3. Envelop objectives for each actor;
4. Produce information materials and brief stakeholders;
5. Adapt results and present them to target decision-makers; and
6. Follow up and provide support.

Each NIT was provided detailed information on the six steps. Additionally, the NIT held communication and advocacy sessions at each of the technical workshops to discuss the implementation of the six-step approach.

Section **II**

Cost of Hunger in Africa
Methodology

THE COST OF
HUNGER
IN **AFRICA**
SOCIAL AND ECONOMIC IMPACT
OF CHILD UNDERNUTRITION
LESOTHO

COHA

Cost of Hunger in Africa Methodology

A. Brief description of the model

I. Conceptual framework

Hunger is caused and affected by a set of contextual factors. "Hunger" is an overarching term that reflects an individual's food and nutrition insecurity. Food and nutrition insecurity occur when part of the population does not have assured physical, social and economic access to safe and nutritional food to satisfy dietary needs.

DEFINITION OF TERMS FOR COHA MODEL

1. Chronic hunger: The status of people, whose food intake regularly provides less than their minimum energy requirements leading to undernutrition.[15]

2. Child undernutrition: The result of prolonged low levels of food intake (hunger) and/or low absorption of food consumed. It is generally applied to energy or protein deficiency, but it may also relate to vitamin and mineral deficiencies. Anthropometric measurements (stunting, underweight and wasting) are the most widely used indicators of undernutrition. [16]

3. Malnutrition: A broad term for a range of conditions that hinder good health caused by inadequate or unbalanced food intake or from poor absorption of food consumed. It refers to both undernutrition (food deprivation) and overnutrition (excessive food intake in relation to energy requirements). [17]

4. Food insecurity: Exists when people lack access to sufficient amounts of safe and nutritious food, and therefore are not consuming enough for an active and healthy life. This may be due to the unavailability of food, inadequate purchasing power or inappropriate utilization at the household level.[18]

5. Food vulnerability: Reflects the probability of an acute decline in food access or consumption, often in reference to some critical value that defines minimum levels of human well-being.[19]

Nutrition security, therefore, depends on a person's food security or insecurity. Specifically, nutrition security can be described as the "appropriate quantity and combination of food, nutrition, health services and caretaker's time needed to ensure adequate nutrition status for an active and healthy life at all times for all people."[20]

A direct and measurable consequence of nutrition insecurity is low birthweight, underweight and/or lower than normal height for age. Levels of nutrition security in a country are related to epidemiological and nutritional transitions, which can be evaluated to assess the population's nutritional situation. Further, a person's nutritional situation is part of a process that is expressed differently depending on the stage of the life cycle: intrauterine and neonatal life, infancy and preschool, school years or adult life. This is because the nutrient requirements and the needs are different for each stage.[21]

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[15] "Hunger statistics", FAO Hunger Portal, Undernourishment or Chronic Hunger, FAO, accessed March 14, 2013, http://www.fao.org/hunger/ en/.
[16] Ibid
[17] Ibid
[18] Ibid
[19] WFP, VAM Standard analytical framework, World Food Programme, 2002.
[20] USAID, USAID Commodities reference guide, Annex I: Definitions, January 2006, http://transition.usaid.gov/our_work/humanitarian_assistance/ ffp/crg/annex-I.htm.
[21] Rodrigo Martínez and Andrés Fernández, Model for analysing the social and economic impact of child undernutrition in Latin America, Naciones Unidas, CEPAL, Social Development Division, Santiago de Chile, 2007.

Below is the discussion of the central elements, considered in the model, to estimate the effects and costs of child undernutrition based on the concepts mentioned above, along with a brief description of the causes and consequences of undernutrition. The discussion also describes the dimension of analysis and the principal methodological aspects used to interpret the results.[22]

II. Causes of undernutrition

The main factors associated with undernutrition, as a public health problem, can be grouped into the following: environmental (natural or entropic causes), socio-cultural-economic (linked to poverty and inequality) and political-institutional. Together, these factors increase or decrease biomedical and productivity vulnerabilities through which they determine the quantity and quality of dietary intake and the absorption capacity, which constitute the elements of undernutrition.[23]

Each of these factors helps increase or decrease the likelihood of a person to suffer from undernutrition (see Figure 2.I). Further, the importance of each of these factors depends on the level of the country's demographic and epidemiological transition, as well as on the person's current stage in the life cycle. Together, these factors determine the intensity of the resulting vulnerability to undernutrition.

FIGURE 2.1: CAUSES OF UNDERNUTRTION
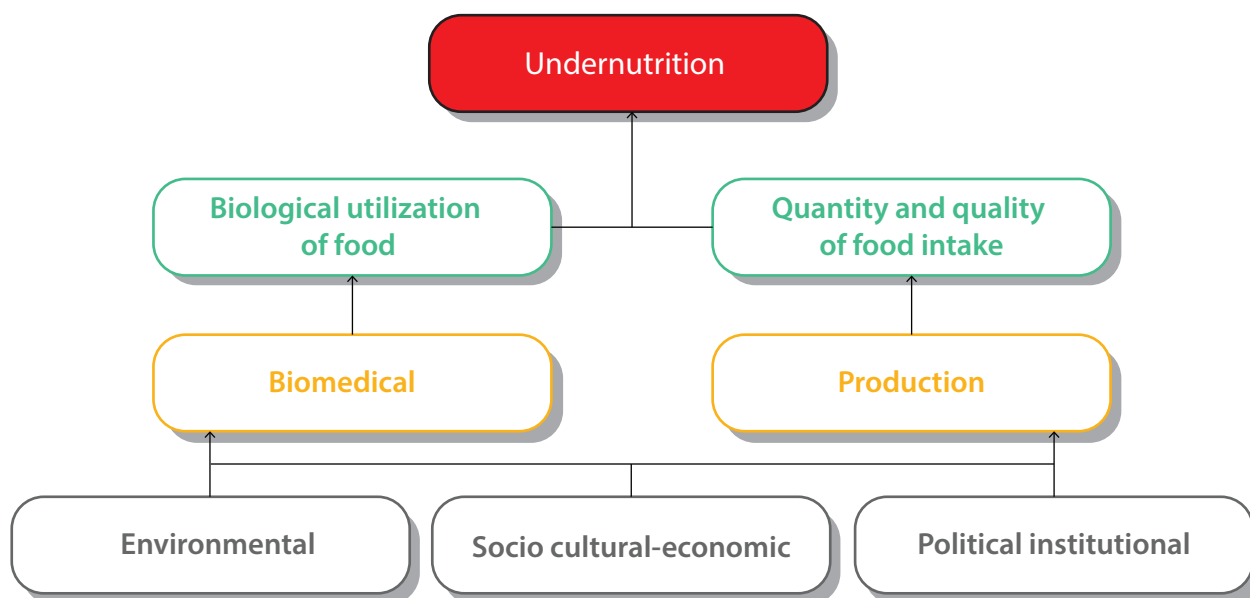
Source: Modified from Rodrigo Martinez and Andrés Fernández, Model for analysing the social and economic impact of child undernutrition in Latin America (see footnote) based on consultations carried out by authors.

One of the key considerations in assessing undernutrition is the environmental factor. Environmental factors define the surroundings in which the subject and his or her family live, including the risks stemming from the natural environment itself and its cycles (from floods, droughts, frosts, earthquakes and other phenomena), and those produced by humans themselves (such as the contamination of water, air and food, the expansion of agriculture into new territories, etc.). The socio-cultural-economic determinants include elements associated with poverty and equality, education and cultural norms, employment and wages, access to social security, and coverage of aid programmes. The political-institutional factors encompass government policies and programmes aimed specifically at solving the population's food and nutritional problems.

Another key factor in the analysis relates to production. The production factors have been directly associated with the food output in Africa, but an important element of this dimension is the unequal access that people living in social, environmental and economic vulnerability have to food. The availability and autonomy of each country's dietary energy supply depend directly on the characteristics of production processes, the degree to which they utilize natural resources, and the extent to which these processes mitigate or aggravate environmental risks and hence access to food and nutrition.

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[22] A summarized version of the theoretical background and the basic characteristics considered in the model of analysis are presented here. For a more detailed discussion of the model, see Rodrigo Martínez and Andrés Fernández, Model for analysing the social and economic impact of child undernutrition in Latin America, NacionesUnidas, CEPAL, Social Development Division, Santiago De Chile, 2007.

[23] Rodrigo Martínez and Andrés Fernández, Model for analysing the social and economic impact of child undernutrition in Latin America, Naciones Unidas, CEPAL, Social Development Division, Santiago de Chile, 2007.

Finally, the analysis is also based on the biomedical factors. The analysis based on these factors provides the opportunity for an in-depth analysis of the individual's susceptibility to undernutrition, insofar as deficiencies in certain elements limit the capacity to make biological use of the food consumed (regardless of quantity and quality).

III. Consequences of undernutrition

Child undernutrition has long-term negative effects on a person's life,[24] most notably in the aspects of health, education and productivity (see Figure 2.2). These elements are quantifiable as costs and expenditures to both the public sector and to individuals. Consequently, these effects exacerbate problems in social integration and increase or intensify poverty. A vicious cycle is perpetuated as vulnerability to undernutrition grows.

FIGURE 2.2: CONSEQUENCES OF UNDERNUTRITION
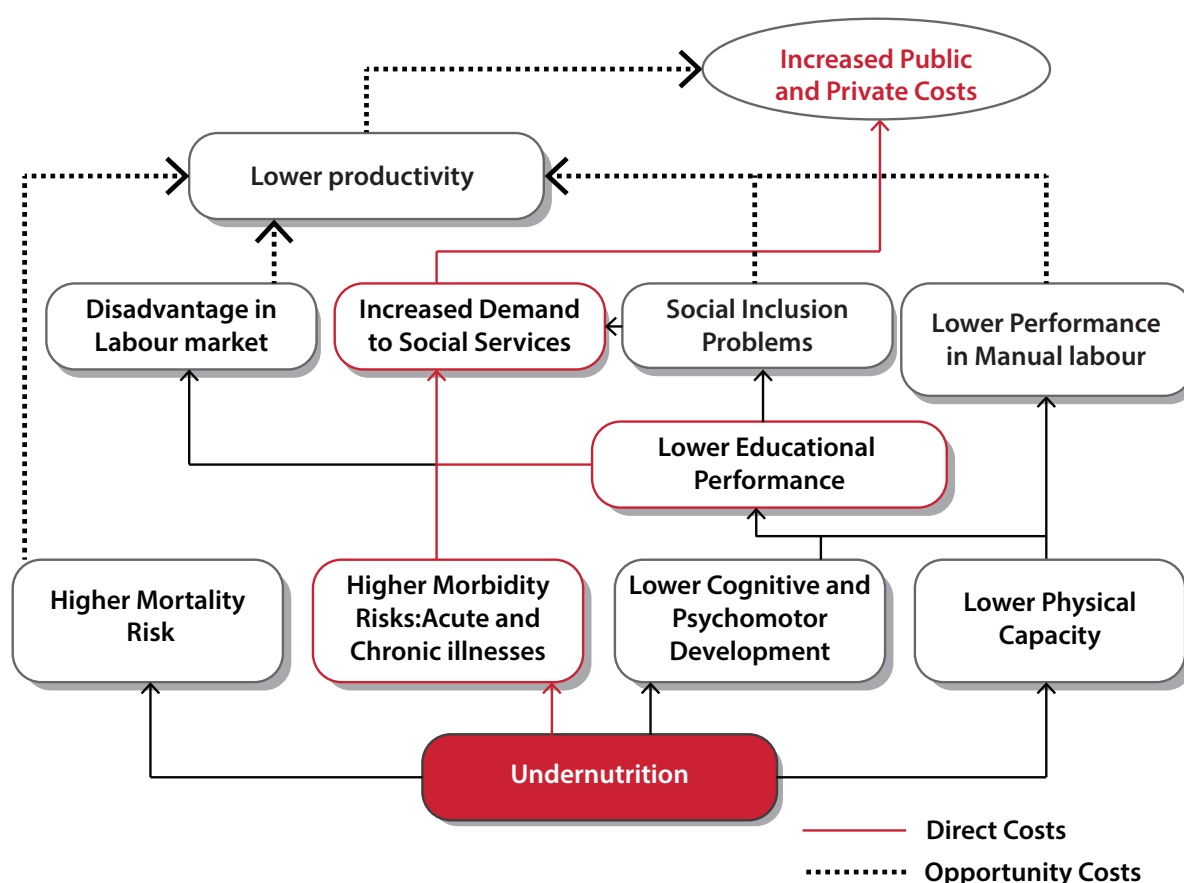
Source: Rodrigo Martinez and Andrés Fernández, Model for analysing the social and economic impact of child undernutrition in Latin America (see footnote) based on consultations carried out by authors.

Undernutrition may have immediate or evolving impacts throughout a person's lifetime, although individuals who suffered from undernutrition during early years of their life cycle (including intrauterine) are more likely to be undernourished later in life. Health studies have shown that undernutrition leads to increased appearance or intensified severity of specific pathologies, and increases the chance of death during specific stages of the life cycle.[25] The nature and intensity of the impact of undernutrition on pathologies depends on the epidemiological profile of a given country.

In education, undernutrition affects student performance through disease-related weaknesses and results in limited learning capacity associated with deficient cognitive development[26] This translates into a greater probability of starting school at a later age, repeating grades, dropping out of school, and ultimately obtaining a lower level of education.

[24] Alderman H., et al., "Long-term consequences of early childhood malnutrition", FCND Discussion Paper No. 168, IFPRI, 2003.
[25] Amy L. Rice et al., "Malnutrition as an underlying cause of childhood deaths associated with infectious diseases in developing countries," Bulletin of the World Health Organization 78, No. 2000,
[26] Melissa C. Daniels and Linda S. Adair, "Growth in young Filipino children predicts schooling trajectories through high school," The Journal of Nutrition, March 22, 2004, Jn.nutrition.org.

Later in life, individuals may experience lower physical capacity in manual labour as a result of stunting.[27] Stunting, which is caused by food deprivation and nutrient deficiencies, is established by low height-for-age measurements during childhood. In adulthood, it leads to an overall reduced body mass when compared with the full adult potential.

Undernutrition and each of its negative impacts on health, education and productivity, as described above, lead to a social as well as an economic loss to the individual and society as a whole (see Figure 2.3). Thus, the total cost of undernutrition (TC^U) iis a function of higher health-care spending (HC^U), inefficiencies in education (EC^U) and lower productivity (PC^U). As a result, to account for the total cost of undernutrition (TC^U), the function can be written as:

$$TC^U = f(HC^U, EC^U, PC^U)$$

In the area of health, the high probability resulting from the epidemiological profile of individuals suffering from undernutrition proportionally increases the costs in the health-care sector (HSC^U). In aggregate, this is equal to the sum of the interactions between the probability of undernutrition in each age group, the probability that a particular group will suffer from the diseases because of undernutrition, and the costs of treating the pathology (HSC^U), which typically includes diagnosis, treatment and control. To these are added the costs paid by individuals and their families as a result of lost time and quality of life (IHC^U). Thus, to study the variables associated with the health cost (HC^U), the formula is:

$$HC^U = f(HSC^U, IHC^U)$$

In education, the reduced attention and learning capacity of those who have suffered from child undernutrition increase costs to the educational system (ESC^U). Repeating one or more grades commensurately increases the demand that the educational system must meet, with the resulting extra costs in infrastructure, equipment, human resources and educational inputs. In addition, the private costs (incurred by students and their families) derived from the larger quantity of inputs, external educational supplementation and more time devoted to solving or mitigating low performance problems (IEC^U) are added to the above costs. Thus, in the case of the education cost (EC^U), the formula is:

$$EC^U = f(ESC^U, IEC^U)$$

The productivity cost associated with undernutrition is equal to the loss in human capital (HK) incurred by a society, stemming from a lower educational level achieved by malnourished individuals (ELC^U), a lower productivity in manual labour experienced by individuals who suffered from stunting (MLC^U), and the loss of productive capacity resulting from a higher number of deaths caused by undernutrition (MMC^U). In the model, these costs are reflected as losses in potential productivity (PC^U). Thus:

$$PC^U = f(ELC^U, MLC^U, MMC^U)$$

As a result, in order to comprehensively analyse the phenomenon of undernutrition, the model considers its consequences on health, education and productivity by translating them into costs.

IV. Dimensions of analysis

Considering that a country's undernutrition situation and the consequences thereof reflect a specific epidemiological and nutritional transition process, a comprehensive analysis involves estimates of the current situation extrapolated from previous transitional stages, as well as estimates of the future, to predict potential cost and saving scenarios based on prospective interventions to control or eradicate the problem.

On this basis, a two-dimensional analysis model was developed to estimate the costs arising from the consequences of child undernutrition in health, education and productivity:

1. **Incidental retrospective dimension.** This dimension focuses on the population in the study year, including mortality cases of those who would have been alive in the study year. The retrospective dimension estimates the nutritional situation of individuals under the age of five to identify the related economic costs in the study year. Thus, it is possible to estimate the health costs of preschool boys and girls who suffer from undernutrition during the year of analysis, the education costs stemming from the children currently in school who suffered from undernutrition during the first five years of life, and the economic costs due to lost productivity by working-age individuals who were exposed to undernutrition before the age of five.

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[27] Lawrence J. Haddad and Howarth E. Bouis, "The impact of nutritional status on agricultural productivity: wage evidence from the Philippines," Oxford Bulletin of Economics and Statistics 53, No. 1, February 1991, doi:10.1111/j.1468-0084.1991.mp53001004.x.

2. Prospective or potential savings dimension. This dimension focuses on children under 5 in a given year and allows analysis of the present and future losses incurred as a result of medical treatment, repetition of grades in school and lower productivity. Based on this analysis, potential savings derived from actions taken to achieve nutritional objectives can be estimated.

As shown in Figure 2.3, the incidental retrospective dimension includes the social and economic consequences of undernutrition in a specific year (for the purposes of this report 2014 was set as the base year) for cohorts that have been affected (0 to 4 years of age for health, 6 to 18 years for education, and 15 to 64 years for productivity). The prospective dimension on the other hand, projects the costs and effects of undernutrition recorded in the reference year of the study. These are based on the number of children born during the period selected in the analysis and, with the application of a discount rate, on the present value estimates of future costs to be incurred due to the consequences of undernutrition. The prospective dimension is the basis for establishing scenarios to estimate the economic and social savings of an improved nutritional situation.

FIGURE 2.3: DIMENSIONS OF ANALYSIS BY POPULATION AGE AND YEAR WHEN EFFECTS OCCUR
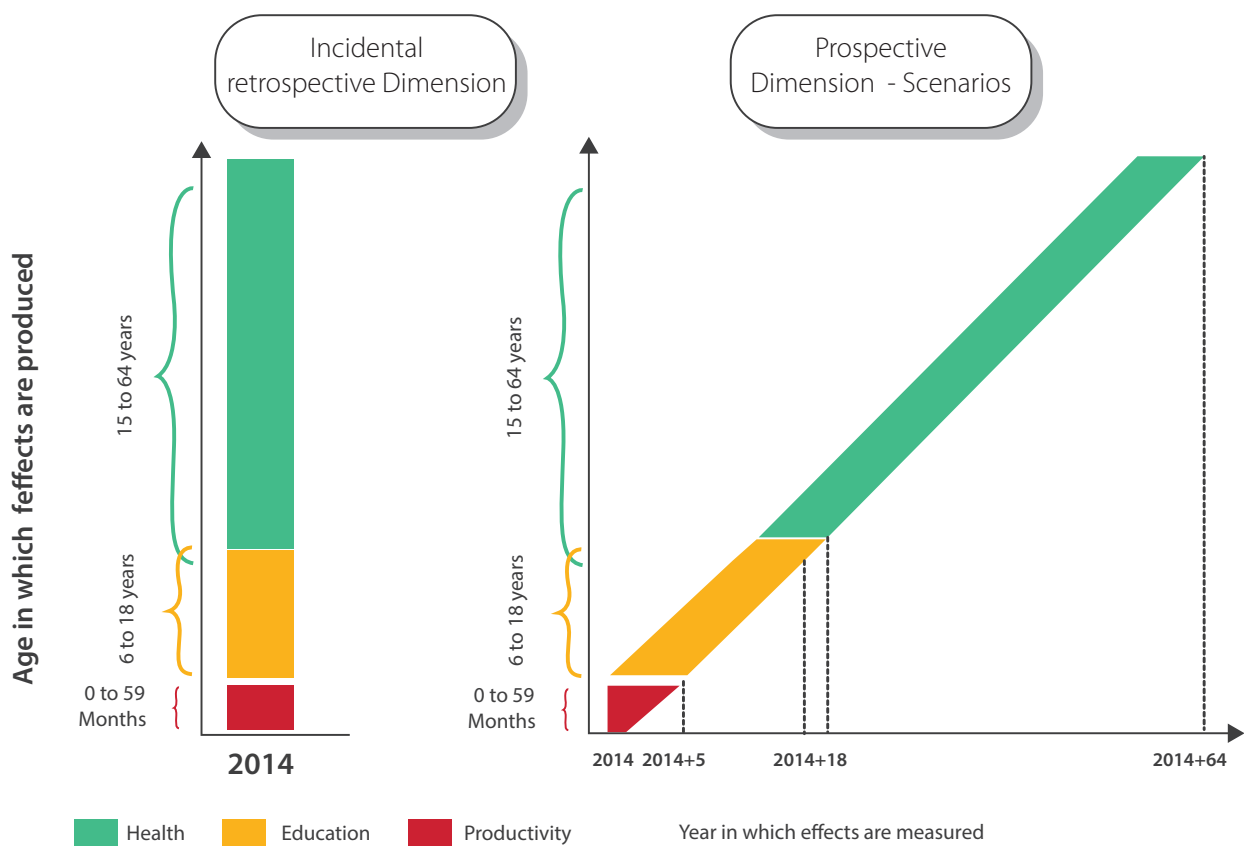
Source: Rodrigo Martinez and Andrés Fernández, Model for analysing the social and economic impact of child undernutrition in Latin America (see footnote) based on consultations carried out by authors.

V. Methodological aspects

The analysis focuses on undernutrition during the initial stages of the life cycle and its consequences throughout life. This limits the study to the health of the foetus, the infant and the preschooler, i.e. those aged 0 to 59 months.[28] Similarly, the effects on education and productivity are analysed in the other demographic groups, i.e. 6–18 years old and 15–64 years old, respectively.

The population of children suffering from undernutrition was divided into subcohorts (0 to 28 days, 1 to 11 months, 12 to 23 months, and 24 to 59 months) in order to highlight the specificity of certain effects during each stage of the life cycle.

The study uses undernutrition indicators that are measurable and appropriate to the different stages of an individual's life cycle. For intrauterine undernutrition, low birthweight (LBW), due to intrauterine growth restriction (IUGR, defined as a weight below the tenth percentile for gestational age) is estimated, and the period until 5 years, the indicator used as a proxy for children suffering of undernutrition is underweight (weight for age). For the preschool stage, after the child turns 6, moderate and severe stunting categories (weight-for-height scores below -2 standard deviations) are used, with reference, where possible, to the WHO distribution for comparison purpose.[29] For losses in productivity at working age population, the model continues to use height-for-age as a proxy for the lifelong consequences of childhood undernutrition.

Estimates of the impacts of undernutrition on health, education and productivity are based on the concept of the relative (or differential) risk run by individuals who suffer from undernutrition during the first stages of life as compared with a healthy child. This is valid both for the incidental-retrospective analysis and for the prospective-savings analysis; however, as its application has specific characteristics in each case, they are detailed separately in this document.

To estimate the costs for the incidental retrospective dimension, the values occurring in the year of analysis are totalled based on estimates of differential risks undergone by the different cohorts of the population. In the prospective analysis on the other hand, a future cost flow is estimated and updated (to present value).

The methodological approach presented here considers the most detailed and complete set of causes and effects of child undernutrition. Furthermore, consideration has been made to ensure that certain causes and effects are not overemphasized or double counted. The methodological framework is based on strong research as well as institutional support from international organizations, and has been deemed a strong basis for the purpose of the research described in this report.

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[28] In the original design, the idea of analyzing direct information on the nutritional and health situation of pregnant women was considered, but the lack of reliable information on the incidence of undernutrition led to its exclusion from the analysis.

[29] In the estimation of stunting, a complementary analysis is done based on the NCHS standard in order to estimate the relative risk of lower productivity.

Section

III

Brief Socio Economic Background

Brief Socio-Economic and Nutritional Background

Lesotho is a country in Southern Africa with a population of about 1.8 million. Lesotho has a gross domestic product (GDP) estimated at 27.6 billion maloti[30] (US$281 million in 2014) and a per capita gross national income (GNI) of approximately US$1,330, which has grown considerably in the last decade. In 2014, the economy of Lesotho continued to experience moderate growth of 3.6 percent (Bureau of Statistics, 2015). This was attributed to the global economic recovery and increased external demand, and the recent positive growth figures are driven by agriculture, mining and large-scale construction projects, as well as the health, financial intermediation, transport and communications sectors (UNECA Country Profile, Lesotho 2015). However, Lesotho is ranked twenty-nine globally and among the tenth African countries with a most improved food security situation since 1990, according to the Global Hunger Index 2014.
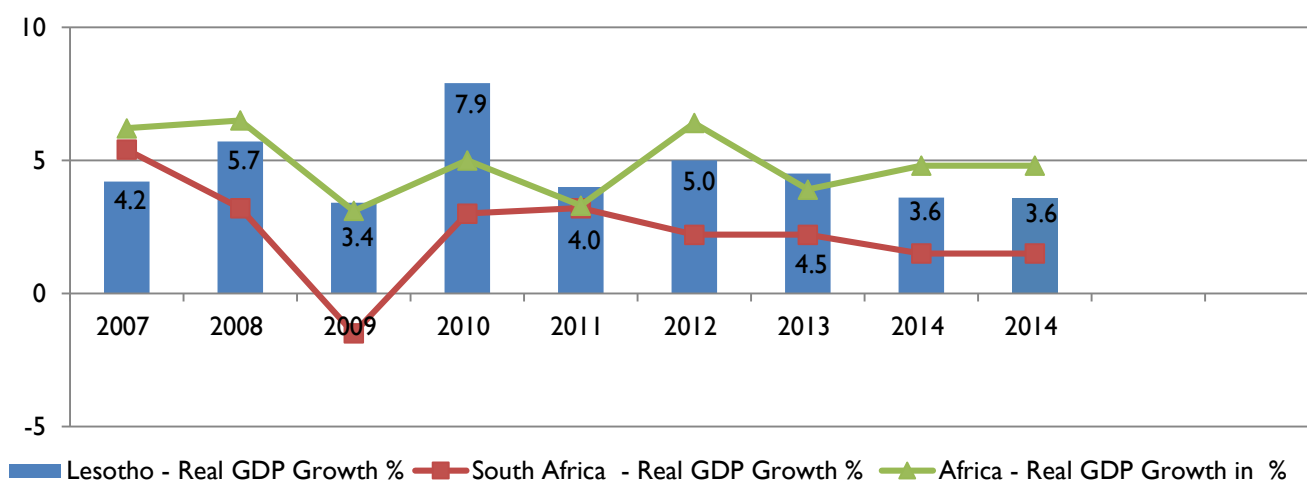
Source: World Bank, World Development Indicators, 2012, and African Economic Outlook for Lesotho, 2014.

Despite significant growth and improvements in the quality of life, Lesotho faces persistent development challenges that must be addressed to realize and sustain the benefits. These include high levels of inequality (with a GINI index of 52.5), with strong geographic disparity in income and serious challenges in the health sector, high burden of disease, high micronutrient deficiencies, low private-sector employment opportunities, climate change which pose risks for agriculture, food and water supplies are some of the important challenges which presented for the country's development.

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[30] Ministry of Finance and Economic Planning 2012

TABLE 3.1: SOCIO-ECONOMIC-INDICATORS

Indicators	2000-2002	2006–2008	2012–2014
Total population, in millions	1.9	2	2.1
GDP, total in billions of US$	0.7	1.6	2.26
GNI per capita (atlas method current US$)	600	1023.3	1446.7
Poverty headcount ratio at national poverty line (% of the population	56.6	56.6	57.1 (2010)
GINI Index	51.6	51.6	53.8 (2010)
Unemployment, % of total labour force	32.2	28.1	26
Unemployment, youth total (% of total labour force ages 16-24) /a	40.1	36	33,2
Population growth (annual %)	0.821	0.793	1.227
Life expectancy at birth, total (years)	45.8	44.9	49.2

Source: African Economic Outlook 2014 and World Development Indicators of the World Bank, 2014

Poverty remains a continuous challenge for Lesotho. In 2014, approximately 62.3 percent of the population was living on less than US$2 a day, and 57.1 percent living on less than US$1.25 a day. Notwithstanding the high levels of poverty and as a result of low wages and lack of employment opportunities, many young people in Lesotho have sought work outside the country, mainly in South Africa.

Public investment in the social sector has also been maintained in the last decade, with public spending on education being above the average of Sub-Saharan Africa. Public spending in education is estimated at 12.98 percent, which ranks above the regional average of 3.6 percent. Health expenditures are 14.4 percent of the GDP compared with 5.5 percent for the rest of the region.[31] In 2008, Lesotho spent 24 percent of GDP on education on each student compared with 14 percent in South Africa and 12 percent in Botswana[32].

TABLE 3.2: SOCIAL INVESTMENT INDICATORS

Indicators	2000–2002	2006–2010	2012–2014	Sub-Saharan Africa
Public spending on education, total (% of government exp.)	18.5	23.7	23.7	16.2
Public spending on education, total (% of GDP)	11.8	12.98	12.98	3.6
Health expenditure per capita (current US$)	27.6	108.9	123.42	65.6
Health expenditure, total (% of GDP)	6.5	13.4	14.48	5.53
Health expenditure, public (% of total health expenditure)	51.0	76.2	79.0	42.2

Source: World Development Indicators, World Bank. Most recent year available

[31] World Development Indicators, World Bank.
[32] World Bank, Lesotho, Public Expenditure Review, August 2012.

A. Nutritional Status in Lesotho

According to the 2014 Demographic and Household Survey (DHS), approximately 33.2 percent of Lesotho children under the age of 5 were suffering from low height for their age (stunting), which is a noticeable reduction from the 39.2 percent reported by DHS in 2009. The prevalence of underweight children has also marginally improved, from 13.5 percent to 10.3 percent. During the same period, the level of low birthweight prevalence in children has also remained steady, at around 9.4 percent.

FIGURE 3.2: ESTIMATED UNDERNUTRITION TRENDS IN CHILDREN UNDER 5, 1990–2014 *(in percentage)*
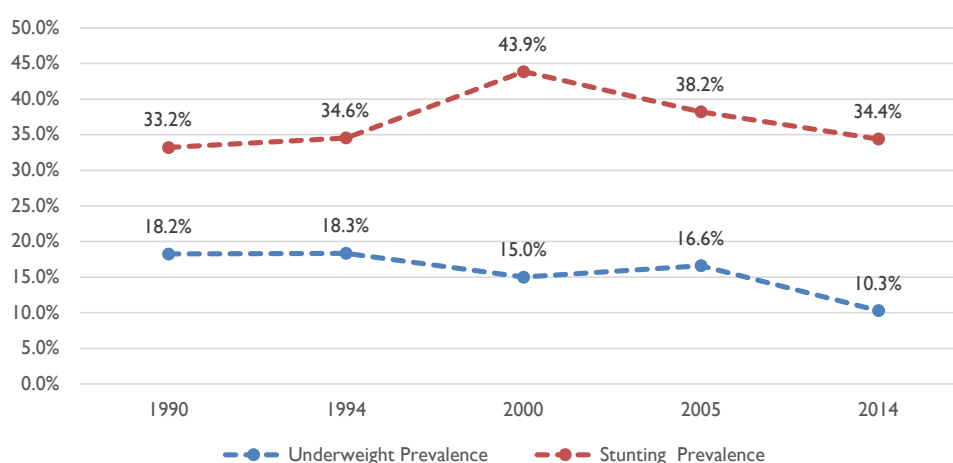
Source: Constructed by authors based on MICS 2011, GDHS 2008 and GDHS 2003. Data prior to 2006 have been updated in line with new Child Growth Standards16 introduced by WHO in 2006 to replace the 1977 International Growth Reference, formulated by the National Centre for Health Statistics (NCHS) of WHO

When analysing progress at the subnational level, it is evident that the policies and responses to child undernutrition have been more effective in certain regions than others. As shown in Table 3.3, for the period from 2004 to 2014, the highest rates of reduction were experienced in the Qacha's Nek, where the prevalence of child stunting fell by 31.6 percentage points, from 45.9 percent in 2004 to 32.5 percent in 2014. This represents an average rate of reduction of 1.45 percent annually. Maseru Region also recorded significant change, with prevalence falling by 27.8 percentage points, from 41.4 percent in 2004 to 31.7 in 2014, an average rate of reduction of 1.15 percent annually. The regions that have shown relatively low progress are the Butha Buthe, Leribe and Mohale's Hoek, where prevalence of child stunting has instead increased (Table 3.3).

As a step forward, it is important to review current policies and programmes in order to scale up and replicate successes to other regions and in countries with similar conditions and challenges.

TABLE 3.3: TENDENCIES IN CHILDHOOD STUNTING AT THE SUBREGIONAL LEVEL, 2004–2014
(in percentage)

Region	2004	2009	2014	Proportional Reduction (%)2004-2014	Reduction in Percentage Points	Annual average Rate of Reduction[a]
Butha Buthe	30.4	32.5	40.3			
Leribe	30.7	39.6	31.3			
Berea	28.4	35.3	27.4	3.5	1.0	0.1
Maseru	41.4	31.7	29.9	27.8	11.5	1.15
Mafeteng	36.0	37.6	25.9	22.9	10.1	1.01
Mohale's Hoek	35.0	44.8	38.1			
Quthing	44.2	37.6	34.1	22.9	10.1	1.01
Qacha's Nek	45.9	47.0	32.5	31.6	14.5	1.45
Mokhotlong	49.2	48.2	47.7	3.0	1.5	0.15
Thaba Tseka	51.9	51.8	40.0	22.9	11.9	1.19
National	**38.2**	**39.2**	**33.2**	**13.1**	**5.0**	**0.5**

Source: Source: Constructed by the authors – based on DHS surveys 2004, 2009 and 2014.

The current levels of child undernutrition illustrate the continuing challenges for reduction of child hunger. It is estimated that 88,919 of the 275,390 children under the age of five in Lesotho were affected by stunting in 2014 and almost 28,297 children were underweight. This situation is especially critical for children between 24 and 59 months, where 37.8 percent of children are affected by stunting, and between 12 to 23 months, where 11 percent of the children are underweight.

TABLE 3.4: POPULATION AND CHILD UNDERNUTRITION, 2014

Age groups	Population size	Low Birth Weight		Underweight		Stunting	
		Population affected	Prevalence	Population affected	Underweight prevalence	Population affected	Stunting prevalence
Newborn (IUGR)[a]		5534	9.4%				
0 to 11 months	58 868			5 592	9.5%	10 323	17.5%
12 to 23 months	57 470			6 322	11.0%	18 502	32.2%
24 to 59 months	159 052			16 382	10.3%	60 094	37.8%
Total	**275 390**	**5 534**	**9.4%**	**28 297**	**10.3%**	**88 919**	**33.2%**

Source: Constructed by authors – based on DHS surveys 2014
a./ In a given year, the new-born population is the same as the 0-11 month's age group.

Section

IV

Effects and Costs of Child Undernutrition

THE COST OF **HUNGER**
IN **AFRICA**

COHA

SOCIAL AND ECONOMIC IMPACT
OF CHILD UNDERNUTRITION

LESOTHO

Effects and Costs of Child Undernutrition

Undernutrition is mainly characterized by wasting (a low weight for height), stunting (low height for age) and underweight (low weight for age). In early childhood, undernutrition has negative lifelong and intergenerational consequences; undernourished children are more likely to require medical care as a result of undernutrition-related diseases and deficiencies,[33]. This increases the burden on public social services and health costs incurred by the government and the affected families. Without proper care, underweight and wasting in children results in higher risk of mortality[34]. During schooling years, stunted children are more likely to repeat grades and drop out of school,[35] thus reducing their income-earning capability later in life.[36] Furthermore, adults who were stunted as children are less likely to achieve their expected physical and cognitive development, thereby impacting on their productivity[37].

A. Social and economic cost of child undernutrition in the health sector

Undernutrition at an early age predisposes children to higher morbidity and mortality risks.[38] The risk of becoming ill due to undernutrition has been estimated using probability differentials, as described in the methodology. Specifically, the study has examined medical costs associated with treating low birthweight, underweight, anaemia, acute respiratory infections (ARI), acute diarrhoeal syndrome (ADS), and fever/malaria associated with undernutrition in children under the age of five

I. Effects on morbidity

Undernourished children are more susceptible to recurring illness.[39] Based on the differential probability analysis undertaken using DHS 2014 data in Lesotho, underweight children under 5 years have an 8.4 percent increased risk of anaemia, 4.9 percent increased risk of diarrhoea, a 1.2 percent increased risk of acute respiratory infections, and a 3.3 percent increased risk of fever.

The study estimated that, as a consequence of this incremental risk, in 2014 there were 7,151 incremental episodes of illness from diseases associated with underweight in Lesotho (Table 4.1). The highest proportion of all incremental illnesses are associated with diarrhoea followed by acute anaemia. In addition, pathologies related to calorie and protein deficiencies and low birthweight associated with IUGR totalled more than 43,019 episodes in 2014. As a consequence, the country had to address 50,170 morbidities in children that required medical attention and generated costs both to families and to the health sector.

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[33] World Bank, Lesotho Public Expenditure Review, August 2012

[34] Robert E. Black et al. Maternal and Child Undernutrition: Global and Regional Exposures and Health Consequences. The Lancet, 371, No. 9608, 2008. doi:10.1016/S0140-6736(07)61690-0

[35] Melissa C. Daniels and Linda S. Adair. Growth in Young Filipino Children Predicts Schooling Trajectories Through High School. The Journal of Nutrition, 22 March 2004, pp. 1439–1446. Accessed 11 September 2012. Jn.nutrition.org.

[36] H. Alderman. Long Term Consequences of Early Childhood Malnutrition. Oxford Economic Papers 58, No. 3. 3 May 2006. doi:10.1093/oep /gpl008

[37] Idem

[38] P. Ramachandran and H. Gopalan. Undernutrition and Risk of Infections in Preschool Children. Indian J Med Res, 130, November 2009, pp. 579–583.

[39] Idem

TABLE 4.1: MORBIDITIES FOR CHILDREN UNDER-5 ASSOCIATED WITH UNDERWEIGHT, BY PATHOLOGY, 2014

Pathology	Number of episodes	Percentage of episodes
Anaemia	2 924	52
Acute Diarrhoeal Syndrome	3 723	41
Acute Respiratory Infections	504	7
Subtotal	7151	
Low birth weight	2 809	6.5
Underweight	40 211	93.5
Subtotal	43 019	
Total	**50 170**	
Source: Constructed by the authors; model estimations based on 2014 Lesotho demographic information		

II. Stunting levels of the working age population

Undernutrition leads to stunting in children, which can impact on their productivity at later stages in life.[40] Lesotho has made progress in reducing stunting in children, but the historically high stunting rates of the past remain a burden for an important percentage of the population. As illustrated in Figure 4.1, the model estimates that 939,842 adults in the working age population suffered from growth retardation before reaching five years of age. In 2014, this represented 45.1 percent of the population aged 15–64 who were in a disadvantaged position as compared with those who were not undernourished as children. This is particularly important for the group aged 15–24, where almost 227,876 out of 536,753 representing 42 percent of the current young population of the country suffered from childhood stunting .

FIGURE 4.1: WORKING-AGE POPULATION AFFECTED BY CHILDHOOD STUNTING, BY AGE *(in thousands of people)*
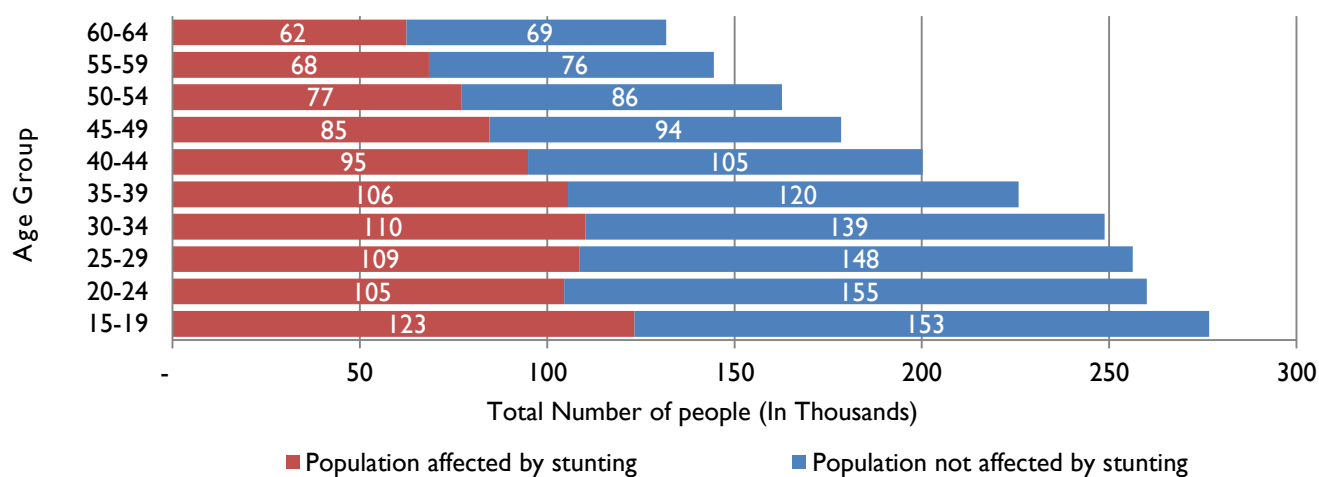
Source: Constructed by the authors; model estimations based on demographic information and the WHO/NCHS database

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[40] H. Alderman. Long Term Consequences of Early Childhood Malnutrition. Oxford Economic Papers 58, No. 3. 3 May 2006. doi:10.1093/oep /gpl008

III. Effects on mortality

Child undernutrition can lead to increased cases of mortality – most often associated with incidences of diarrhoea, pneumonia and malaria.[41] Nevertheless, when the cause of death is determined, it is rarely attributed to the nutritional deficit of the child, but rather to the related illnesses. Given this limitation in attribution, the model utilizes relative risk factors[42] to estimate the risk of increased child mortality as a result of child undernutrition. Mortality risk associated with undernutrition was calculated using these relative risk factors, historical survival and mortality rates,[43] as well as historical nutrition information.

Between 2008 and 2014, it is estimated that 9,272 child deaths in Lesotho were directly associated with undernutrition. These deaths represent 19.5 percent of all child mortalities for this period. Thus, it is evident that undernutrition significantly exacerbates the rates of death among children in the country.

TABLE 4.2: IMPACT OF UNDERNUTRITION ON CHILD MORTALITY, ADJUSTED BY SURVIVAL RATE, 1948-2012 *(In number of child mortalities)*

Period	Number of child mortalities associated to undernutrition
1950–1997	90 906
1998–2007	18 619
2008–2014	9 272
Total	**118 797**

Source: Constructed by authors - Estimates based on life tables provided from UN Population Division database

These historical mortality rates will also have an impact on national productivity. The model estimates that an equivalent of 7.2 percent of the current workforce has been lost due to the impact of undernutrition in increasing child mortality rates. This represents 90,906 people who would be between 15–64 years old, and part of the working age population of the country.

IV. Public and private health costs of undernutrition

The treatment of undernutrition and related illnesses is a critical recurrent cost for the health system. Treating a severely underweight child, for example, requires a comprehensive protocol[44] that can often be prevented with appropriate nutrition-sensitive actions. The economic cost of each episode can be increased by inefficiencies when such episodes are treated without proper guidance from a health-care professional or due to lack of access to proper health services. These costs generate an important burden not just to the public sector but to society as a whole.

In the section "Effects on Morbidity", it is estimated that 50,170 clinical episodes in 2014 in Lesotho were associated with the incremental risk to illness associated with children being underweight. Each of these episodes required a specific protocol for treatment that includes medicines and medical care costs, in addition to the cost of caretakers of providing these treatments. The data collection process generated cost estimations for the in-patient and out-patient treatment of each of the pathologies, namely anaemia, ADS and ARI, as well as the cost of therapeutic treatment of underweight children and low birthweight in children, as described in detail in Annex 2.

By aggregating each individual cost associated with specific pathologies by the number of incremental episodes given by the risk associated with underweight children, as indicated in Table 4.3, these episodes generated an estimated incremental cost of LSL 41 million.

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[41] Robert E. Black et al. Maternal and Child Undernutrition: Global and Regional Exposures and Health Consequences. The Lancet, 371, No. 9608, 2008. doi:10.1016/S0140-6736(07)61690-0
[42] Idem.
[43] Data provided by the United Nations Population Division. www.un.org/esa/population/unpop.htm.
[44] WHO. Management of Severe Malnutrition: A Manual for Physicians and Other Senior Health Workers. ISBN 92 4 154511 9, NLM Classification: WD 101, 1999.

**TABLE 4.3: HEALTH COSTS OF UNDERNUTRITION-RELATED PATHOLOGIES, 2014**

Pathology	% of episodes	Cost *(millions of LSL)*	Cost *(millions of US$)*	% of cost
Underweight	79.9	28.7	2.92	70.3
LBW/IUGR	5.6	4.9	0.50	11.9
Acute diarrhoeal syndrome	7.4	2.1	0.22	5.3
Acute respiratory infection	1.3	0.8	0.09	2.0
Anaemia	5.8	4.3	0.44	10.5
Total		**40.8**	**4.2**	

Source: Constructed by the authors; model estimations based on DHS 2014

When analysing the origin of the cost by the different pathologies, it is evident that the majority of the costs incurred were associated with the protocol required to bring an underweight child back to proper nutritional status, which often requires therapeutic feeding and special care. However, the treatment of a low birthweight child represents the highest per capita cost of all pathologies. These cases represented 5.6 percent of all the episodes, but generated 11.9 percent of the total cost. This is due to the special management protocol required by low birthweight children which often includes hospitalization and time in intensive care.

Another important perspective of this analysis is organizing the information based on specific age groups. As shown in Figure 4.2, children under 12 months generate 36 percent of all episodes associated with undernutrition, which, however, represent 39 percent of the total costs in the health sector. This result emphasizes the importance of focusing the interventions on the prevention of child malnutrition, in accordance with the 1,000 Days campaign,[45] and working with mothers before and during pregnancy to ensure that children are born and develop with proper weight and health during this most difficult stage of life.

FIGURE 4.2: DISTRIBUTION OF INCREMENTAL EPISODES AND COSTS OF ILLNESS ASSOCIATED WITH UNDERNUTRITION BY AGE GROUP
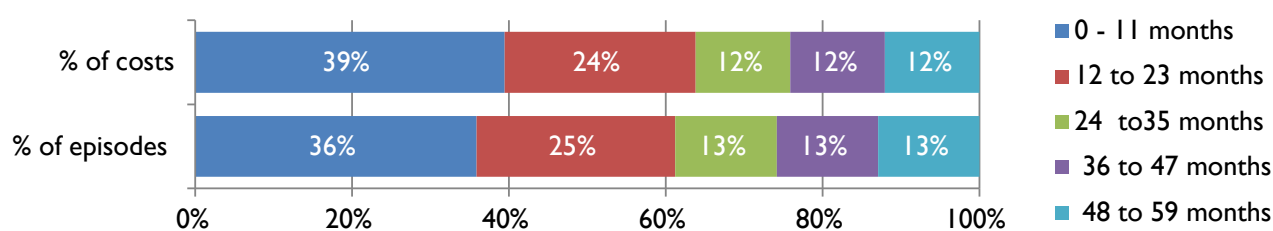
Source: Source: Constructed by the authors; model estimations based on DHS 2014..

Another important element to consider is the distribution of private and public costs of care. The public cost is based on two major elements: the cost of the medical inputs, such as medicines and tests, and the unit cost per attention for the health system, such as the time of the physicians and the overhead costs to the medical centre. These costs are separated to avoid duplications, as one episode of any pathology might require several follow-up visits, but only one full set of medical inputs. For the private costs, the main costs considered are transportation costs to and from the health centre, the opportunity cost of waiting time, and the medical inputs not covered by the system. These costs are also calculated differentially for ambulatory care, and for in-patients who require hospitalization, for each pathology and age group.

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[45] The 1,000 Days partnership promotes targeted action and investment to improve nutrition for mothers and children in the 1,000 days between a woman's pregnancy and her child's second birthday when better nutrition can have a life-changing impact on a child's future and help break the cycle of poverty. For more information, visit www.thousanddays.org

The model also takes into account the large proportion of cases that are tended to at home and that do not obtain formal health treatment. For this estimation, the model utilizes information based on the DHS surveys, complemented by information gathered from field visits to the health centres, interviews with experts, and information from national health systems. As there is very little information on the actual costs and time allocation of home care for underweight children who present compounding illnesses, a shadow cost equivalent to the per unit treatment of each episode is set for the treatment of each pathology, and associated with those cases that did not receive formal medical attention. This, however, does not consider the inefficiencies and complications that can arise from non-formal home treatment and might lead to the underestimation of the real cost of home care.

Figure 4.3 summarizes the institutional (public system) and private costs of treating pathologies associated with undernutrition. In Lesotho, it is estimated that families bear around 43 percent of the costs associated with undernutrition, as compared with 57 percent for the public health system.
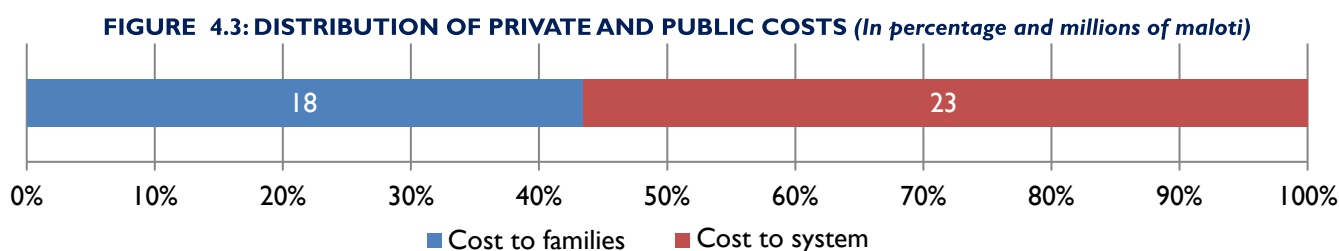
FIGURE 4.3: DISTRIBUTION OF PRIVATE AND PUBLIC COSTS *(In percentage and millions of maloti)*

Source: Source: Constructed by the authors; estimations based on data provided by the Ministry of Health.
Model estimations based on demographic information and WHO/DHS nutritional surveys

In 2014, the annual cost of undernutrition to the public sector was estimated at 0.1 percent of the total budget allocated to health. At the macro level, the economic impact of undernutrition in health-related aspects was also equivalent to 0.1 percent of the GDP of that year.

B. Social and economic cost of child undernutrition in education

There is no single cause for repetition and dropout; however, there is substantive research suggesting that students who were stunted before the age of five are more likely to underperform in school,[46] The number of repetition and dropout cases considered in this section result from applying a differential risk factor associated with stunted children to the official government information on grade repetition and dropouts in 2014. The cost estimations are based on information provided by the Ministry of Education on the average cost of a child to attend primary and secondary school in Lesotho in 2014, as well as estimations of costs incurred by families to support schooling.

1. Effects on repetition

Children who suffered from undernutrition before five years of age are more likely to repeat grades, as compared with those who were not affected by undernutrition[47]. In Lesotho in 2014, enrolment rates were relatively high, with 81.63 percent enrolment in primary education, and very low with 34.69 percent enrolment in secondary education[48].

Based on official information provided by the Ministry of Education[49]. 96,148 children repeated grades in 2014. Using data on increased risk of repetition among stunted students, the model estimates that the repetition rate for stunted children was 14.1 percent, while the repetition rate for non-stunted children was 5.8 percent, i.e. an incremental differential risk of 8.3 percentage points for stunted children (Figure 4.4). Thus, given the proportion of stunted students, the model estimates that 17,044 students, or 17.7 percent of all repetitions in 2014, were associated with stunting.

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[46] Melissa C. Daniels and Linda S. Adair. Growth in Young Filipino Children Predicts Schooling Trajectories Through High School. The Journal of Nutrition, 22 March 2004, pp. 1439–1446. Accessed 11 September 2012. Jn.nutrition.org.
[47] Idem.
[48] UNESCO (www.uis.unesco.org/DataCentre/Pages/country-profile.aspx?code=LSO). Accessed 6 September 2016.
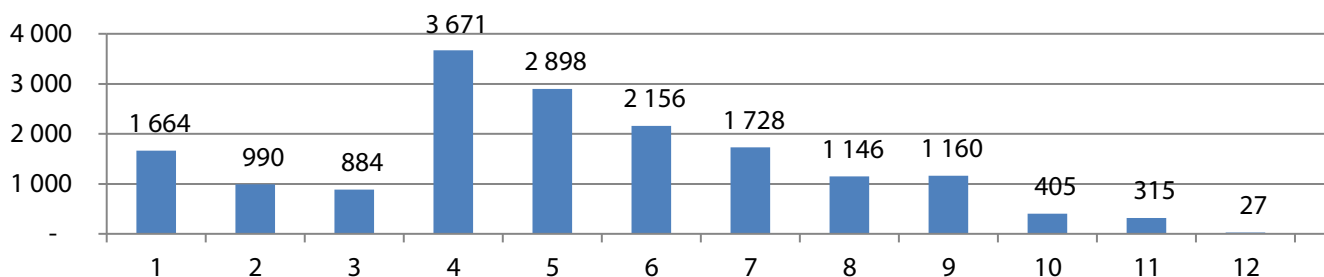[49] Lesotho. Ministry of Education.

FIGURE 4.4: REPETITION RATES IN EDUCATION, BY NUTRITIONAL STATUS, 2014 *(In percentage)*
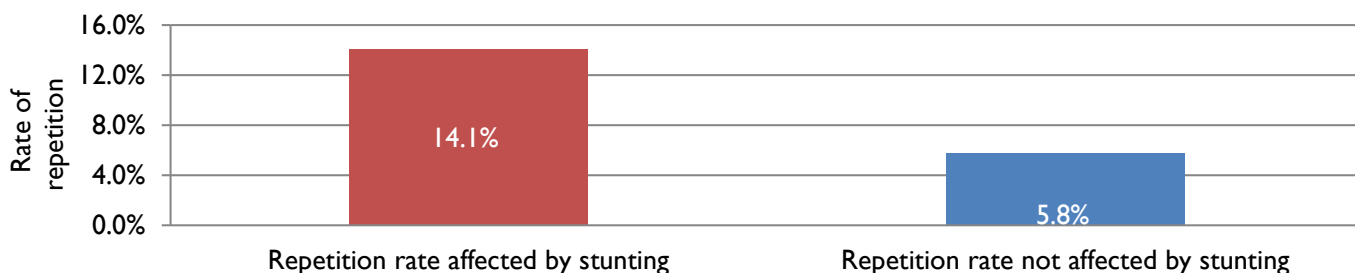
Source: Constructed by the authors; estimations based on data provided by the Ministry of Education and relative risk factors.

As shown in Figure 4.5, most of these grade repetitions happen during the primary school levels. There are far fewer children who repeat grades during secondary school levels – likely due to the fact that many underperforming students would have dropped out of school before reaching secondary education.

FIGURE 4.5: GRADE REPETITION OF STUNTED CHILDREN, BY GRADE, 2014 *(In number of repetitions)*

Source: Constructed by authors - Estimations based on data from Ministry of Education.

II. Effects on retention

Progressive education is a key driver of human capital, and keeping children longer in school is a key element of inclusive development and economic growth. There are several compounding factors that combine to increase the risk of dropping out of school, both contextual such as living in poor households, distance to schools, school fees, teacher absenteeism, and intrinsic such as health and motivation.[50] Additionally, the relationship between grade repetitions and school desertion has been documented in literature[51-52] In this sense, the incremental risk of repetition, and higher absenteeism associated with children who are stunted also augments the risk of those children to drop out of school.

According to available data and taking into account the relative risks associated with the consequences of stunting on educational performance, there is a significant gap in school completion between those who suffered from stunting as children and those with a healthy childhood. The model estimates that from the current working age population aged 15 to 64, about 48 percent of those who were stunted as a child (and presently of working age) completed primary school compared with 81 percent of those who were never stunted.

[50] C. Colclough, P.Rose and M. Tembon. 2000. Gender Inequalities in Primary Schooling: The Roles of Poverty and Adverse Cultural Practice. International Journal of Educational Development, 20: 5–27
[51] GUNESCO Institute of Statistics. Global Education Digest 2012. Opportunities Lost: The Impact of Grade Repetition and Early School Leaving. UNESCO
[52] Pierre André. Is Grade Repetition One of the Causes of Early School Dropout? Evidence from Senegalese primary schools. 4 December 2009.

FIGURE 4.6: GRADE ACHIEVEMENT, BY NUTRITIONAL STATUS, 2014 *(In percentage)*
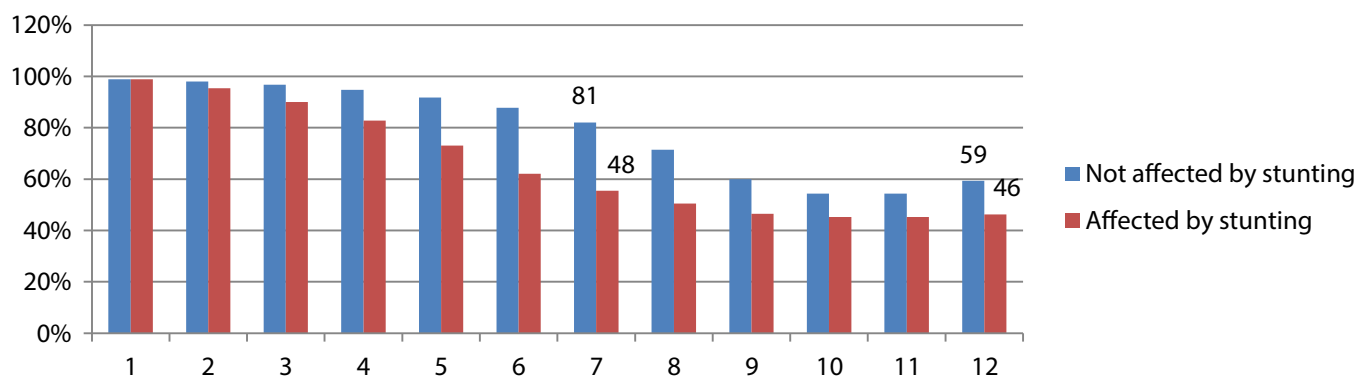
Source: Constructed by the authors: estimations based on data from the Ministry of Education.

The costs associated with school dropouts are reflected in the productivity losses experienced by individuals searching for opportunities in the labour market. As such, the impact is not reflected in the school-age population, but in the working age population. Hence, in order to assess the social and economic costs in 2014, the analysis focuses on the differential in schooling levels achieved by the population who suffered from stunting as children and the schooling levels of the population who were never stunted.

III. Estimation of public and private education costs

Repetition in schooling has direct cost implications for families and the school system. Students who repeat grades generate an incremental cost to the educational system, as they require twice as many resources to repeat the year. In addition, the caretakers have to pay for an additional year of education.

In 2014, the 17,044 students who repeated grades (and whose repetitions are considered to be associated with undernutrition) incurred a cost of 115 million maloti (US$ 11.7 million). The largest proportion of repetitions occurred during primary school. Table 4.4 summarizes the public and private education costs associated with stunting.

TABLE 4.4: COSTS OF GRADE REPETITION ASSOCIATED WITH STUNTING *(In millions of maloti)*

	Primary		Secondary		Total	
	In maloti	In US$	In maloti	In US$	In maloti	In US$
Number of repetitions associated with stunting	12 263		4 781		17 044	
Public Costs per student	3 521	358,9	3850	392		
Total Public Costs (in millions)	43.2	4,4	21.34	2.2	64,5	6,6
Private Costs per student	2 420	246,7	4,470	456		
Total Private Costs (in millions)	**29,7**	**3,0**	**20.96**	**2.2**	**50,6**	**5,2**
Total Costs	72.9	7.4	42.3	4.3	115.2	11.7
% Social expenditure on education	0.6					

Source: Constructed by authors - Model estimations based on costing data from the Ministry of Education

As in the case of health, the social cost of undernutrition in education is shared between the public sector and the families. Of the overall costs, a total of 50,636,296 maloti (US$ 5.2 million) or (44 percent) is covered by families, while 64,520,892 maloti (US$ 6.6 million) (56 percent) is borne by the public education system. Moreover, the distribution of this cost varies depending on whether the child repeated grades in primary or secondary education. In primary education, the families

cover 40.73 percent of the associated costs of repeating a year, whereas in secondary education the burden on the families is increased to 49 percent. In both cases, families cover a significant proportion of the burden. The increase on the costs to the families in secondary education is driven by a higher spending on educational materials and a higher contribution that the families make for the tuition fee in secondary education. See also figure 4.7.

FIGURE 4.7: DISTRIBUTION OF COSTS IN EDUCATION *(In percentage and millions of maloti)*
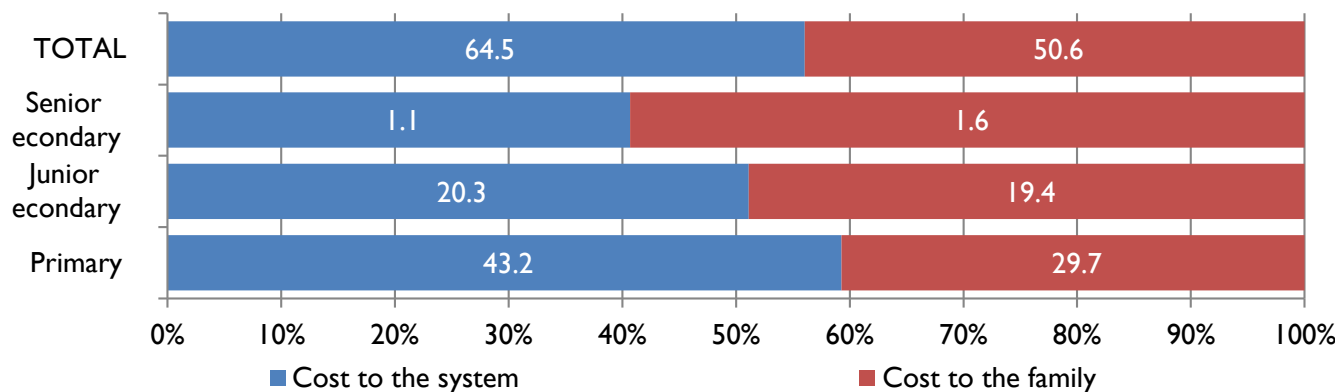
Source: Constructed by the authors: estimations based of education data provided by NIT – key informants.

C. The social and economic cost of child undernutrition in productivity

National productivity is significantly affected by historical rates of child undernutrition. Firstly, stunted people, on average, have achieved fewer years of schooling than non-stunted people.[53] In non-manual activities, higher academic achievement is directly correlated with higher income[54] Research shows that stunted workers engaged in manual activities tend to have less lean body mass[55] and are more likely to be less productive in manual activities than those who were never affected by growth retardation.[56] Finally, the population lost due to child mortality lower economic growth, as they could have been healthy and productive members of the society.

The model utilizes historical nutritional information, in-country demographic projections, adjusted mortality rates, and data reported in the DHS survey from 2014 to estimate the proportion of the population whose labour productivity is affected by childhood nutrition.

As described in the health section of the report, the model estimated that 45.1 percent of the working age population in Lesotho were stunted as children. Research shows that adults who suffered from stunting as children are less productive than non-stunted workers and are less able to contribute to the economy. This represents more than 939,842 people whose potential productivity is affected by undernutrition

The model utilizes historical nutritional information, in-country demographic projections, adjusted mortality rates, and data reported in the LDHS Survey from 2008 to estimate the proportion of the population whose labour productivity is affected by childhood nutrition.

The cost estimates in labour productivity were estimated by identifying differential income associated with lower schooling in non-manual activities, as well as the lower productivity associated with stunted people in manual work, such as agriculture. The opportunity cost of productivity due to mortality is based on the expected income that a healthy person would have been earning had he or she been part of the workforce in 2014.

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[53] Melissa C. Daniels and Linda S. Adair. Growth in Young Filipino Children Predicts Schooling Trajectories Through High School. The Journal of Nutrition, 22 March 2004, pp. 1439-1446. Accessed 11 September 2012. Jn.nutrition.org.
[54] Based on the expenditure/income data from the Bureau of Statistics Lesotho Intergrated Labour Force Survey, 2008.
[55] C. Nascimento et al. Stunted Children Gain Less Lean Body Mass and More Fat Mass Than Their Non-Stunted Counterparts: A Prospective Study. Report. Sao Paulo: Federal University of Sao Paulo, 2004.
[56] Lawrence J. Haddad and Howarth E. Bouis. The Impact of Nutritional Status on Agricultural Productivity: Wage Evidence from the Philippines. Oxford Bulletin of Economics and Statistics, 53, No. 1, February 1991. doi: 10.1111/j.1468-0084.1991.mp53001004.x.

The distribution of the labour market is an important contextual element in determining the impact of undernutrition on national productivity. As illustrated in Figure 4.8, 37.8 percent of the working age population is engaged in manual activities.

FIGURE 4.8: MANUAL AND NON-MANUAL LABOUR DISTRIBUTION, BY AGE, 2014 *(In percentage)*
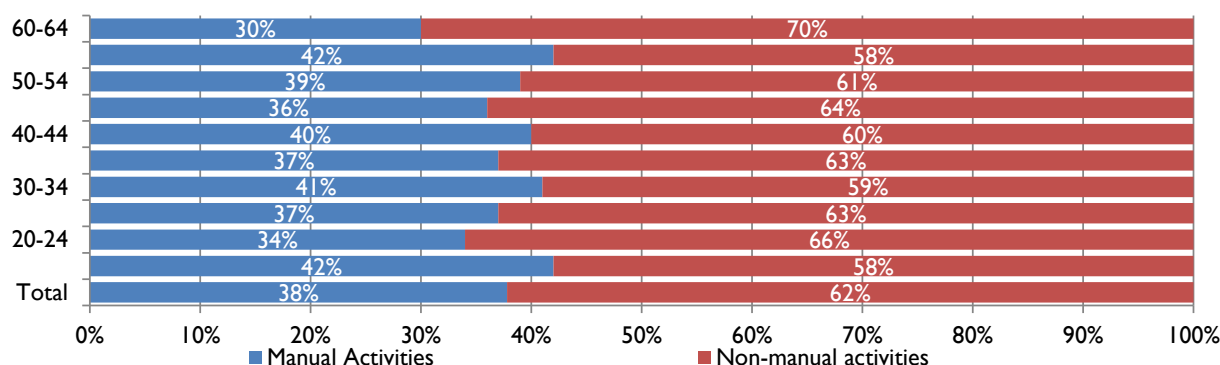
Source: Constructed by the authors; model estimations based on procuctivity data provided by NIT.

I. Losses from non-manual activities due to reduced schooling

As described in the education section of this report, students who were undernourished as children complete, on average, fewer years of schooling than students who were adequately nourished as children[57]. This loss in educational years has particular impact for people who are engaged in non-manual activities, in which a higher academic education represents a higher income.

Based on information from the NIT, seen as key informants, it is estimated that the educational gap between the stunted and non-stunted population is 3.6 years (Figure 4.9). However, it is important to note that over time there has been an improvement in the average years of schooling among the working population: while the cohorts from 60–64 years show an average level of school education of 5.6 years, the cohort aged 20–24 shows an average of 8.2 years of education.

FIGURE 4.9: AVERAGE YEARS OF SCHOOLING FOR STUNTED AND NON-STUNTED POPULATION
(In years of education)
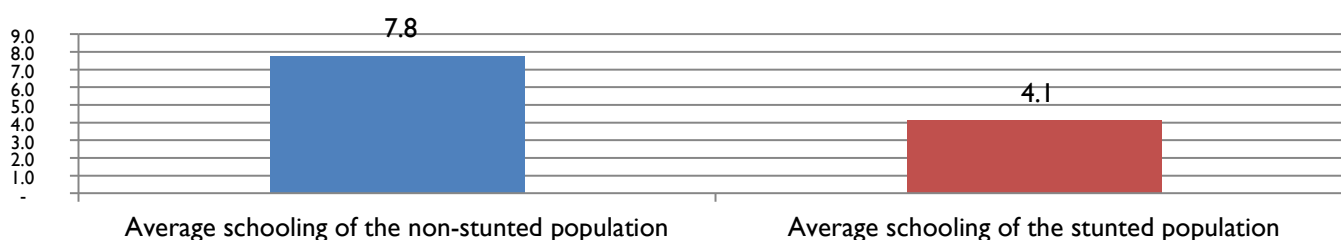
Source: Constructed by the authors: model estimations based on data provided by NIT

The lower educational achievement of the stunted population has an impact on the expected level of income a person would earn as an adult. As presented in Table 4.5, the model estimates that 342,341 people engaged in non-manual activities suffered from childhood stunting. This represents 27.3 percent of the country's labour force that is currently less productive due to lower schooling levels associated with stunting. The estimated annual losses in productivity for this group are 110 million maloti (US$11.22 million), equivalent to 0.4 percent of the GDP in 2014.

[57] Melissa C. Daniels and Linda S. Adair. Growth in Young Filipino Children Predicts Schooling Trajectories Through High School. The Journal of Nutrition, 22 March 2004, pp. 1439–1446. Accessed 11 September 2012. Jn.nutrition.org.

TABLE 4.5 REDUCED INCOME IN NON-MANUAL ACTIVITIES DUE TO STUNTING, 2014

Age in 2014	Population working in non-manual sectors who were stunted as children	Income losses in non-manual labour	
		Millions of LSL	Millions of US$
15–24	127 028	71.2	7.3
25–34	101 611	3.8	0.4
35–44	54 403	73.3	4.4
45–54	30 878	(70.2)	(5.7)
55–64	28 422	32	16
Total	342 341	110.1	11.2
% GDP	**...**	**0.4**	

Source: COHA model estimations based on data from the Intergrated Labour Force Survey (2008).

II. Losses in manual intensive activities

Earlier research shows that stunted workers engaged in manual activities tend to have less lean body mass [58] and are more likely to be less productive in manual activities than those who were never affected by growth retardation.[59]

The model estimated that 478,802 people in Lesotho are engaged in manual activities, of which 210,653 were stunted as children. This represented an annual loss in potential income that surpasses 182.7 million maloti (US$18.6 million), equivalent to 0.7 percent of the GDP in potential income lost due to lower productivity (Table 4.6).

TABLE 4.6: REDUCED INCOME IN MANUAL ACTIVITIES DUE TO STUNTING, 2014

Age in 2014	Population working in manual labour who were stunted as children	Income losses in manual labour	
		Millions of LSL	Millions of US$
15-24	78 968	67.4	6.9
25-34	65 532	47.4	4.8
35-44	33 839	34.2	3.5
45-54	18 846	20.3	2.1
55-64	13 846	13.5	1.4
Total	**210 653**	**182.7**	**18.6**
% GDP	**...**	**0.7**	

Source: Constructed by the authors; model estimations based on productivity data provided by NIT

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[58] C. Nascimento et al. Stunted Children Gain Less Lean Body Mass and More Fat Mass Than Their Non-Stunted Counterparts: A Prospective Study. Report. Sao Paulo: Federal University of Sao Paulo, 2004.
[59] Lawrence J. Haddad and Howarth E. Bouis. The Impact of Nutritional Status on Agricultural Productivity: Wage Evidence from the Philippines. Oxford Bulletin of Economics and Statistics, 53, No. 1, February 1991. doi: 10.1111/j.1468-0084.1991.mp53001004.x

III. Opportunity cost due to mortality

As indicated in the health section of this report, there is an increased risk of child mortality associated with undernutrition.[60] The model estimated that 90,906 people of working age were absent from Lesotho's workforce in 2014 due to child mortality associated with undernutrition. This represents a 7.2 percent reduction in the current workforce. See table 4.7.

TABLE 4.7: LOSSES IN POTENTIAL PRODUCTIVITY DUE TO MORTALITY ASSOCIATED WITH UNDERNUTRITION, 2014

Age in 2014	Mortality associated with undernutrition	Income losses in non-manual labour	
		Millions of LSL	**Millions of US$**
15-24	14 605	251.9	25.7
25-34	20 208	374.8	38.2
35-44	20 330	338.8	34.5
45-54	18 997	265.6	27
55-64	16 776	285.2	29
Total	90 906	1 516.4	154.6
% GDP	...		5.5

Source: COHA Constructed by the authors; COHA model estimations based on adjusted mortality rates, demographic projections and data from productivity (income).

Considering the productive levels of the population, by their age and sector of labour, the model estimated that in 2014, the economic losses (measured by working hours lost due to undernutrition-related child mortality) were 1.5 billion maloti (US$ 154 million) which represented 5.5 percent of the country's GDP.

IV. Overall productivity losses

The total losses in productivity for 2014 are estimated at approximately LSL 1.8 billion (US$184.4 million), equivalent to 6.56 percent of Lesotho's GDP. As presented in Figure 4.10, the largest share of productivity loss is the result of reduced productivity due to mortality related to undernutrition, which represents 84 percent of the total cost. The lost productivity in non-manual activities represents 6 percent of the costs. The income differential in manual labour, due to the lower physical and cognitive capacity of people who suffered from growth retardation as children, represents 10 percent of the total costs.

GRAPHIQUE 4.10: DISTRIBUTION OF LOSSES IN PRODUCTIVITY *(in percentage and millions of maloti)*

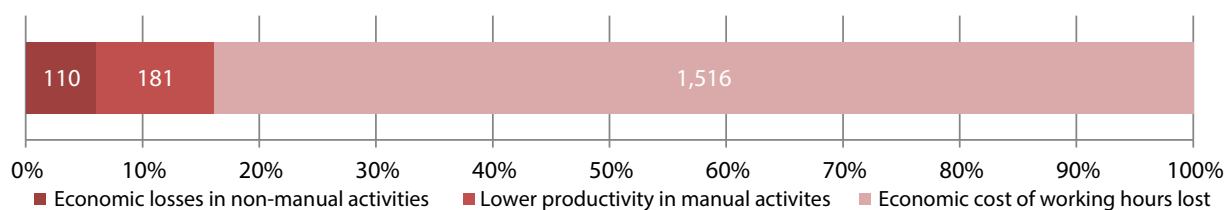
Source: Constructed by the authors; COHA model estimations based on adjusted mortality rates, demographic projections and data from the Intergrated Labour Force Survey (2008).

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[60] Robert E. Black et al. Maternal and Child Undernutrition: Global and Regional Exposures and Health Consequences. The Lancet, 371, No. 9608, 2008. doi:10.1016/S0140-6736(07)61690-0

D. Summary of effects and costs

The methodology described in Section II is used to analyse the impact of child undernutrition in different stages of the life cycle without generating overlaps. As a result, the individual sectorial costs can be aggregated to establish a total social and economic cost of child undernutrition. For Lesotho, the total losses associated with undernutrition are estimated at 1.96 billion maloti, (US$200.3 million) for the year 2014. These losses are equivalent to 7.13 percent of the GDP of that year. The highest element in this cost is the loss in potential productivity as a result of undernutrition-related mortalities (Table 4.8).

TABLE 4.8: SUMMARY OF COSTS, 2014

	Episodes	Cost in millions of LSL	Cost in millions of US$	Percentage of GDP
Heath Costs				
LBW and Underweight	43 019	33.5	3.4	
Increased Morbidity	7 151	7,3	0,7	
Total for Health	**50 170**	**40.8**	**4.2**	**0.15**
Education Cost				
Increased Repetition - Primary	12 263	72.9	7,4	
Increased Repetition - Secondary	4 781	42.3	4,3	
Total for Education	**17 044**	**115**	**11.7**	**0.42**
Productivity Costs				
Lower Productivity - Non-Manual Activities	342 341	110.1	11.2	
Lower Productivity - Manual Activities	210 653	182.7	18.6	
Lower Productivity - Mortality	90 906	1 516.4	154.6	
Total for Productivity	643 901	1 809.2	184.4	6.56
TOTAL COSTS		**1 965.1**	**200.3**	**7.13**

Constructed by the authors; estimations based on the COHA model.

Section V

Analysis of Scenarios

Analysis of Scenarios

The previous chapter showed the social and economic costs that affected Lesotho in 2014 due to high historical trends of child undernutrition. Most of these costs are already cemented in the society, and policies must be put in place to improve the lives of those already affected by childhood undernutrition. Nevertheless, there is still room to prevent these costs in the future.

Currently, one out of every three children under the age of five in Losotho is stunted.

This section analyses the impact that a reduction in child undernutrition could have on the socio-economic context of the country. The results presented in this section project the additional costs to the health and education sectors, as well as the losses in productivity that Lesotho children would bear in the future. They also indicate potential savings to be achieved. This is a call for action to take preventive measures and reduce the number of undernourished children to avoid large future costs to society.

The model generates a baseline that allows development of various scenarios based on nutritional goals established in each country using the prospective dimension. The generated outcomes can be used to advocate for increased investments in proven nutritional interventions. These scenarios are constructed based on the estimated net present value of the costs of children born in each year between 2014 and 2025. The methodology follows each group of children and, based on each scenario, estimates a progressive path towards achieving the set nutritional goals.

The scenarios developed for this report are as follows:

1. Baseline: The cost of inaction. Progress in reduction of stunting and underweight children remains at the level achieved in 2014.

For the baseline, the progress of reduction of the prevalence of undernutrition stops at the levels achieved in 2014. It also assumes that the population growth would maintain the pace reported in the year of the analysis, hence increasing the number of undernourished children and the estimated cost. As this scenario is highly unlikely, its main purpose is to establish a baseline to which any improvements in the nutritional situation are compared in order to determine the potential savings in economic costs.

2. Scenario #1: Cutting by half the prevalence of child undernutrition by 2025.

In this scenario, the prevalence of underweight and stunted children would be reduced to half of the 2014 values corresponding to the reference year. In the case of Lesotho, this would mean a constant reduction of 1.38 percentage points annually in the stunting rate from 33.2 percent (estimate for 2014) to 16.6 percent in 2025. A strong effort has to be carried out to complete this scenario that would require a revision of the effectiveness of ongoing interventions for the reduction of stunting, as the average rate of reduction for stunting between 2000 and 2014 was estimated at 0.87 percent annually.

3. Scenario #2: The "Goal" Scenario. Reduce stunting to 10 percent and underweight children to 5 percent by 2025.

IIn this scenario, the prevalence of stunted children would be reduced to 10 percent and the prevalence of underweight children under the age of five to 5 percent. Currently, the global stunting rate is estimated at 26 percent, with Africa having the highest prevalence at 36 percent. This Goal Scenario would require a true call for action and would represent an important regional challenge, in which countries of the region could collaborate jointly in its achievement. The progress rate required to achieve this scenario would be 1.93 percent annual reduction for a period of 12 years, from 2014 to 2025.

As shown in Figure 5.1, the progressive reduction of child undernutrition generates a similar reduction in the costs associated with it. The distances between the trend lines would indicate the savings that would be achieved in each scenario

FIGURE 5.1: TRENDS OF ESTIMATED COSTS OF CHILD UNDERNUTRITION, 2014-2025 *(in millions of LSL)*
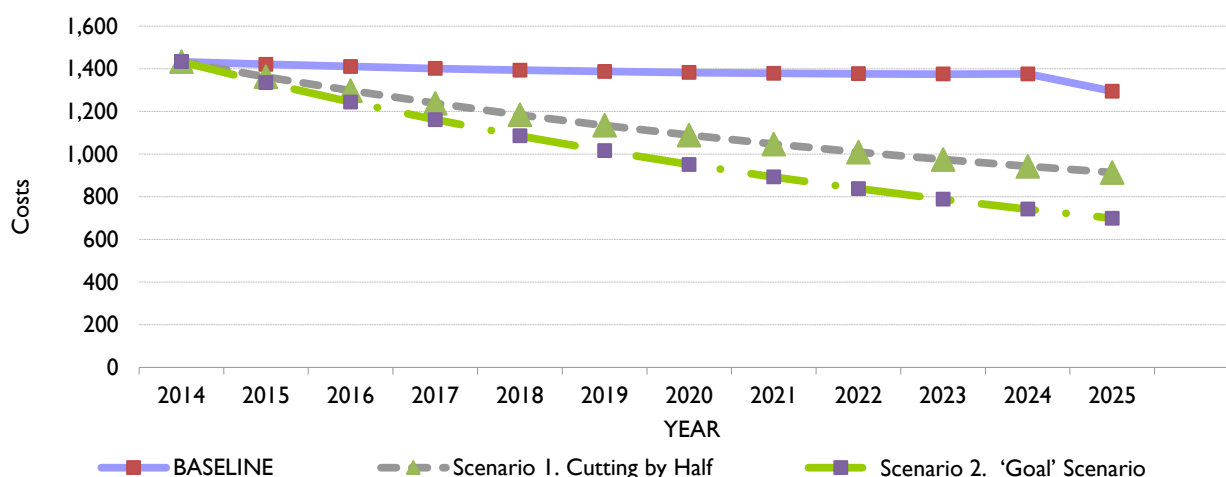
In the baseline, where the progress and efforts in reducing child undernutrition would stay at the levels of 2014, the total cost would be reduced by 10 percent, from 1.43 billion maloti to 1.3 billion maloti during the period leading to 2025. This is justified due to the observed decline in the stunting rate, from 45.4 percent to 33.2 percent between the years 2000 and 2014. Nevertheless, in Scenario 1, in which a reduction by half of the current prevalence is achieved, the total cost would reduce by 36 percent from 1.4 maloti to 0.9 billion maloti. In the case of the Goal Scenario on the other hand, observation show a significant reduction of 51 percent in the estimated total costs, amounting to 0.7 billion maloti. See table 5.1.

TABLE 5.1: ESTIMATED TOTAL COSTS OF CHILD UNDERNUTRITION, BY SCENARIO, 2014
(in millions of LSL)[a]

		Scenarios for the Year 2025		
	2014	**Baseline. The Cost of Inaction**	**S1. Cutting by Half**	**S2. Goal Scenario**
Heath Costs				
Increased Morbidity	59	56	28	27
Education Cost				
Increased Grade Repetition	61.3	39.4	23.2	13.7
Productivity Costs				
Lower Productivity in Non-Manual Activities	537	690	556	338
Lower Productivity in Manual Activities	158	121	77	46
Lower Productivity due to Mortality	618	389	229	223
Total Costs	**1 433**	**1 295**	**913**	**699**
Percentage Change from Baseline		-10%	-36%	-51%
Source: Constructed by the authors; estimations based on the COHA model				

The potential economic benefits of reducing undernutrition are a key element in making a case for nutrition investments. The reduction in clinical cases in the health system, lowered grade repetition and improved educational performance, as well as physical capacity are elements that contribute directly to national productivity.

As presented in Table 5.2, cutting undernutrition by half by 2025 would represent a reduction in costs of over 1.8 billion maloti, equivalent to US$186 million for the period of 12 years, from 2014 to 2025. Although the tendency of savings would not be linear, as they would increase over time with the achieved progress, a simple average of the annual savings would

represent 152 million maloti, or US$15 million per year. In the case of the Goal Scenario, the savings would increase to 2.86 billion maloti, or US$292 million, which represents a simple average of US$24 million per year.

TABLE 5.2: ESTIMATED SAVINGS, BY SCENARIO, 2014 *(in millions)*

	Cutting Undernutrition by Half by 2025	Goal Scenario
Heath Costs		
Reduced Morbidity	109	112
Education Cost		
Reduced grade repetition	81	138
Productivity Costs		
Higher productivity in non-manual activities	498	1 203
Higher productivity in manual activities	423	574
Increased working hours	714	837
Total savings in millions of LSL	**1 824**	**2 864**
Total savings in millions of US$	185	292
Average[1] annual savings in millions of LSL	152	239
Average[1] annual savings in millions of US$	15	24

Source: Constructed by the authors; COHA model estimations based on
[1]Simple average of total savings divided by the years considered in the period from 2014 to 2025.

VI Section

Conclusions and Recommendations

THE COST OF
HUNGER
IN **AFRICA**

C
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SOCIAL AND ECONOMIC IMPACT
OF CHILD UNDERNUTRITION

LESOTHO

Conclusion and Recommendations

A. Conclusion

The Government of Lesotho has put forth Vision 2020, among whose goals is to to ensure that by 2020 the country will have a healthy and well-developed human resource base : *"The vision aims at a stable democracy, a united and prosperous nation at peace with itself and its neighbour".* The Cost of Hunger in the Lesotho study therefore presents an opportunity to better understand the role child nutrition can play in the achievement of Vision 2020.

As in many similar case studies across Africa, the Cost of Hunger in Africa Lesotho study confirms the magnitude of the consequences that child malnutrition can have on health, education and productivity. Most importantly, it emphasizes the impact on the national economy and the need for a multisectoral policy approach in order to stem the consequences of stunting. If not addressed early enough, child malnutrition has the potential to impair a child's capacity to develop cognitive skills, a condition often described as mental retardation. More fundamentally, the study has shown that child malnutrition leads to repeated episodes of illness, increased repetition in school grades, and poor performance in labour markets in adult life.

The study highlights both challenges and opportunities for the country in reducing child undernutrition. It sheds some new light on the implications of adequate child nutrition for development, and thus provides an opportunity to renew national commitments towards the elimination of child malnutrition. Arguably, strategic investments in nutrition now will in future yield far higher benefits to Lesotho than the imputed costs imposed on the economy for not preventing the scourge of child malnutrition in early life. For instance, the report finds that total losses in productivity for 2014 were approximately 1 965 billion maloti (US$200 million), which is equivalent to 7.13 percent of Lesotho's GDP. **These costs or losses to the economy could be averted through strategic interventions such as ensuring adequate nutrition for newborns and pregnant mothers to optimize benefits from a child's first 1,000 days window of opportunity.**

Indeed, the report argues that the cost of inaction would be too colossal for the economy both now and in the future, and hence makes a case for Lesotho to leverage policy actions for a drastic reduction of stunting and malnutrition in the next 10 to 15 years. To achieve this, **it is recommended that aggressive targets are set in Lesotho for the reduction of stunting that go beyond the proportional reduction to an absolute goal. Several African countries, including Lesotho, are planning on setting the goal to reduce stunting to 10 percent by 2025, which would represent a 69 percent decrease from 2014.**

B. The Way Forward – Recommendations

The Cost of Hunger in Africa Lesotho study highlights both challenges and opportunities to the country regarding child undernutrition. In order to define actions and commitments towards the elimination of stunting in Lesotho, national experts and stakeholders comprising multisectoral representation met in Maseru in 2016 and suggested key actions that can contribute to this goal. In their recommendations, five key areas were identified

STRATEGIC PLANNING

It is recommended that appropriate strategies and policy actions should be implemented effectively to reduce the impact of child undernutrition in Lesotho:

i.   **Implementation of the Lesotho National Food and Nutrition Policy** as soon as possible to ensure that all efforts towards the reduction of stunting is properly controlled. This will facilitate and guide standardized and multisectoral and nutritional programming and implementation for better outcomes as well as clarifing clearly the mandates for various stakeholders towards nutrition.

COORDINATION

The socio-economic impact of malnutrition is not limited to the three sectors examined by the model (health, education and productivity) – many other sectors are affected just the same. It is in the nature of malnutrition, therefore, that the problem requires a multisectoral approach that is properly coordinated for significant progress to be realized. Thus emphasis must be placed in the report that its adaptation alone as an advocacy tool will not achieve much unless it is used together with other advocacy tools that look at impact beyond the three sectors covered by the model. Some of the steps needed to achieve a coordinated approach are:

i.   The **Food and Nutrition Coordinating Office must be capacitated** to adequately promote advocacy for nutrition at all levels; this will significantly improve the effectiveness of nutrition programming and interventions. This way, the COHA study results and other nutritional findings can be used to the greatest effect to reduce stunting in the country.

ii.   Lesotho should expeditiously **establish the various Scaling-Up Nutrition (SUN) platforms** to ensure that all stakeholders, especially the media, civil society organizations and business society can do their share in adequately addressing malnutrition in the country.

PROGRAMME IMPLEMENTATION

i.   It is imperative for Lesotho to exercise a **strong political commitment and continued allocation of adequate resources** for the implementation of the national nutrition and other related policies sensitive to nutrition..

ii.   Pregnant and lactating mothers are very critical, especially in the context of the first 1,000 days, which is the window of opportunity presented by the fact that more than half the population among children below 5 years of age experience the highest rates of mortality and morbidity of all the other age groups. Health workers need **support and resources to engage with communities and strengthen awareness on opttimal infant and young children good feeding practices, especially in the first 1,000 days of a child's life.**

MONITORING AND EVALUATION

In order to ensure sustainability of interventions, authorities should enhance monitoring and evaluation (M&E) systems and practices to be more nutrition sensitive and effective in assessing the short-, medium- and long-term impacts of reducing child stunting in Lesotho. The following practical ways should be adopted to help make the programme sustainable:

a.   **Improve existing M&E systems and practices**; currently nutrition assessments at the national level are very sporadic in periodicity, so that it is impossible to establish reliable national nutritional status for Lesotho.

b.   **Strenthening and upscaling of the research sector** to ensure generation of strong nutrition evidence based that will inform effective nutrition programming and implementtaion such as promotion of biodiversification of seeds; this will also ensure that the production sector is more nutrition sensitive in planning.

c.   **Ensure the continous systematic production of credible data and findings** on nutrition issues and disseminate them widely to critical stakeholders, including communities, to generate national policy debates.

COMMUNICATION

Ultimately, the success of government and stakeholder interventions in addressing undernutrition in Lesotho will be judged by how many people it is able to reach with appropriate and accurate information. It is imperative to increase awareness and behavioural change in the population to adopt good practices of hygiene and nutrition in favour of children and pregnant women. The following is a proposal towards an effective communication strategy for Lesotho:

a.   **Strengthen awareness of good practices regarding nutrition and hygiene, while encouraging practices such as optimal infant and young child feeding practices and food diversification** from the perspective of nutrition, food hygiene and preservation of the environment.

VII Section

Annexes

THE COST OF
HUNGER
IN **AFRICA**

COHA

SOCIAL AND ECONOMIC IMPACT
OF CHILD UNDERNUTRITION

LESOTHO

Annexes

Annex 1. Glossary of Terms

1. Average number of days required for hospitalization: The average number of days a child needs to stay in a hospital when hospitalized, to receive adequate care.

2. Average number of days required for ICU: The average number of days a child needs to stay in the ICU when put in ICU care, to receive adequate care.

3. Average number of primary care visits per episode: When a child experiences a given pathology, he/she may require medical care multiple times. This variable is the average number of primary (outpatient) medical care visits a child requires per episode.

4. Average waiting time spent at primary care: When a caretaker brings a child to a primary care facility, the time the parent and child spend at the facility for waiting and receiving care.

5. Cost of medical inputs per event during hospitalization: This variable includes the medical materials (medicines, procedures) that are covered by the hospital for treatment of each pathology case.

6. Cost of medical inputs per event in ICU: This variable includes the medical materials (medicines, procedures) that are covered by the hospital for treatment of each pathology case in ICU.

7. Cost of medical inputs per event in primary care: This variable includes the medical materials (medicines, procedures) that are covered by the health facility for treatment of each pathology case.

8. Costs not covered by the health system: This variable includes the value of the inputs (i.e. medications) that are paid for by the family.

9. Daily cost of hospital bed during hospitalization: This variable includes the total cost to the hospital calculated per day per patient staying in the hospital. This value includes the cost of staff, facilities and equipment, as a unit cost per patient.

10. Daily cost of hospital bed in ICU: This variable includes the total cost to the hospital calculated per day per patient staying in the ICU. This value includes the cost of staff, facilities and equipment, as a unit cost per patient.

11. Daily hours lost due to hospitalization: The number of hours the caretaker spends at the hospital each day with the child when he/she brings a child to a primary care facility.

12. Differential Probability (DP): Refers to the difference between the probability of occurrence of a consequence (i.e., disease, grade repetition and lower productivity) given a specific condition. The model uses this variable specifically to determine the risk among those suffering from undernutrition and those who are not (ECLAC).

13. Discount rate: The interest rate used to assess a present value of a future value by discounting (FAO). In the model it is utilized to obtain the present value in the scenario section.

14. Dropout rate per grade: Percentage of students who drop out of a grade in a given school year (UNESCO).

15. Episodes: It is the number of disease events occurring for a given pathology. In the model it is based on a 1 year period, i.e. the number of times a specific pathology occurs in 1 year (ECLAC).

16. Food insecurity: Exists when people lack access to sufficient amount of safe and nutritious food and therefore, are not consuming enough for an active and healthy life. This may be due to the unavailability of food, inadequate purchasing power or inappropriate utilization at household level (FAO).

17. Food vulnerability: Reflects the probability of an acute decline in food access or consumption, often in reference to some critical value that defines minimum levels of human wellbeing (WFP).

18. Hunger: The status of persons, whose food intake regularly provides less than their minimum energy requirements, i.e. about 1800 kcal per day. It is operationally expressed by the undernourishment indicator (FAO).

19. Incidental retrospective dimension: Used to estimate the cost of undernutrition in a country's population in a given year. The model applies it by looking at the health costs of pre-school children (0 to 5-year-olds) suffering from undernutrition, the education costs of school-age children (6 to 18-year-olds) and the economic costs resulting from lost productivity by working-age individuals (15 to 64-year-olds) (ECLAC).

20. Intrauterine growth restriction (IUGR): Refers to the foetal weight that is below the 10th percentile for gestational age (WHO). In the model, this is the only type of condition considered in the estimation of cost for low birth weight children.

21. Low Birth Weight (LBW): A new-born is considered to have low birth weight when he/she weighs less than 2,500 grams (WHO).

22. Malnutrition: A broad term for a range of conditions that hinder good health caused by inadequate or unbalanced food intake or by poor absorption of the food consumed. It refers to both undernutrition (food deprivation) and over nutrition (excessive food intake in relation to energy requirements) (FAO).

23. Mortality rate: The proportion of deaths per year in a given population, usually multiplied by a 10th population size so it is expressed as the number per 1,000, 10,000, 100,000, individuals per year.

24. Percentage of cases that attend health services: The proportion of episodes for which a caretaker brings a child to a primary health facility for treatment.

25. Productivity/Labour productivity: Measures the amount of goods and services produced by each member of the labour force or the output per unit of labour (ILO). In the model, it refers to the average contribution that an individual can make to the economy, measured by consumption or income, depending on data availability.

26. Proportion of episodes requiring hospitalization: When a child experiences pathology, he/she may require in-patient care. This variable identifies the proportion of the episodes by pathology, for which a child requires hospitalization.

27. Proportion of episodes requiring ICU: When a child experiences pathology, he/she may require care in an ICU facility. This variable identifies the proportion of the episodes by pathology, for which a child requires ICU care.

28. Prospective or potential savings dimension: This dimension makes it possible to project the present and future losses incurred as a result of medical treatment, repetition of grades in school and lower productivity caused by undernutrition among children under the age of five in each country, in a specific year (ECLAC).

29. Public social spending: Social expenditure is the provision by public (and private) institutions of benefits to, and financial contributions targeted at, households and individuals in order to provide support during circumstances, which adversely affect their welfare, provided that the provision of the benefits and financial contributions constitutes neither a direct payment for a particular good or service nor an individual contract or transfer (OECD).

30. Relative risk: Refers to the risk of an event occurring, given a specific condition. It is expressed as a ratio of the probability of the event occurring in the exposed group versus a non-exposed group. In the model it is used to establish the risk level of disease, lower educational performance or lower productivity relative to exposure to undernutrition.

31. Repetition rate per grade: Number of repeaters in a given grade in a given school year, expressed as a percentage of enrolment in that grade in the previous school year (UNESCO).

32. Stunting: Reflects shortness-for-age; an indicator of chronic malnutrition, calculated by comparing the height-for-age of a child with a reference population of well-nourished and healthy children (WFP). The model uses it as the indicator to analyse the impact on educational performance and productivity.

33. Survival rate: A rate calculated for a given geographic area that presents the likelihood of a person surviving in a given period of time.

34. Undernourishment: Food intake that is continuously insufficient to meet dietary energy requirements. This term is used interchangeably with chronic hunger, or, in this report, hunger (FAO).

35. Undernutrition: The result of prolonged low levels of food intake and/or low absorption of food consumed (undernourishment). It is generally applied to energy (or protein and energy) deficiency, but it may also relate to vitamin and mineral deficiencies (FAO).

36. Underweight: Measured by comparing the weight-for-age of a child with a reference population of well-nourished and healthy children (WFP). The model utilizes it to analyse the impact of child undernutrition on health.

37. Unit cost per attention in primary care: This variable includes the total cost to the health facility per attention, comprising the cost of staff, facilities and equipment, as a unit cost per patient.

38. Wasting: Reflects a recent and severe process that led to substantial weight loss, usually associated with starvation and/or disease. Wasting is calculated by comparing weight-for-height of a child with a reference population of well-nourished and healthy children (WFP).

Annex II. Methods and Assumptions

Indicator	Data and Sources
Economic data	
Gross domestic product	Source: Lesotho Bureau of Statistics (BOS) 2014. The figure was cross-checked with the World Bank database. The NIT also provided the latest information during the validation workshop.
US$ exchange rate	Based on data obtained from the Centarl Bank of Lesotho. Official exchange rate refers to the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local). In this report 2014 exchange rate was applied.
Social expenditure	Budget Execution Report 2014, Ministry of Finance
Health expenditure	Budget Execution Report 2014, Ministry of Finance
Education expenditure	Budget Execution Report 2014, Ministry of Finance
Average transport cost (two public transportation tickets in urban areas in local currency)	Lesotho Government Gazette 2013. Average urban annual cash expenditure for transportation was considered as a proxy for average transport cost. Annual average cash expenditure for transport was LSL 12
Minimum wage per hour	11.3 minimum wage per hour base don Lesotho Government Gazette 2015
Average income per years of schooling	Based on the 'Lesotho Demographic Survey 2011' and the update Report 2013, 2011 Household Expenditure is adjusted/deflated to 2014.
Distribution of workers by manual and non-manual labour and age group	Based on International Standard Industrial Classification (ISIC) code list, 2008 and expenditure data from the 2008 'Lesotho Integrated Labour Force Survey (ILFS)'. Manual Activities include: 11.00 '11 Agriculture': 12.00 '12 Livestock'; 13.00 '13 Forestry'; 14.00 '14 Fishing & Hunting'; 21.00 '21 Mining'; 22.00 '22 Quarrying'; 31.00 '31 Food Manufacture'; 32.00 '32 Textile Manufacture" 33.00 '33 Wood Products Man.'; 34.00 '34 Paper Products Man.'; 35.00 '35 Chemical Industries'; 36.00 '36 Non-metallic Products. Man.'; 37.00 '37 Metal Manufacture'; 38.00 '38 Metal Products Man.'; 41.00 '41 Gas, Water & Electricity'; 51.00 '51 Construction Buildings"; 52.00 '52 Construction Roads'; 53.00 '53 Rural Reconstruction'. Non-Manual activities include 61.00 '61 Wholesale Trade' 62.00 '62 Retail Trade'; 63.00 '63 Other Trade'; 64.00 '64 Hotel & restaurants'; 65.00 '65 Import & Export'; 71.00 '71 Transport'; 72.00 '72 Warehousing'; 73.00 '73 Communications'; 81.00 '81 Banking'; 82.00 '82 Insurance'; 83.00 '83 Real Estate'; 84.00 '84 Business Services'; 91.00 '91 Government, Admin & Social Services'; 92.00 '92 Recreation & Tourism'.
Annual average income related to productive work, manual intensive activities, by age	Based on 2011 Lesotho Integrated Labour Force Survey (ILFS). Average expenditure data were considered as a proxy for income for manual work. 2008 household expenditure is adjusted to 2014.
Annual average income related to productive work, non-manual intensive activities, by highest educational level attained and age	Based on 2011 Lesotho Integrated Labour Force Survey (ILFS). Average expenditure data were considered as a proxy for income for non-manual work. 2008 household expenditure is adjusted to 2014.
Average working hours per week	It is estimated based on the average official government working hour per day (8 hours) and multiplied by the number of working days per week.
Annual worked hours per age group	Estimated based on the average official government working hour per day (8 hours) and multiplied by the number of working days per week (5 days) and total number of weeks (52 weeks) per year.
Demographic Data	
0 Years of Age - Total Population Projected from 1948-2012	0 Years of Age - Total Population Projected from 1948-2012 United Nations Statistics Division – Demographic and Social Statistics – Accessed July 2014. Warui. P. (2014)
0 - 4 years Total Population Projected from 1948-2012	
Population in 2012 by age	

Indicator	Data and Sources
Mortality rate for children under 5 and survival rate, projected from 1950 to 2050	Calculated from Abridged Life Tables provided by the UN Statistics Division – Demographic and Social Statistics. Warui P. (2014). For detailed calculation process please review Rodrigo Martínez and Andrés Fernández, Operational manual for the use of the model for analysing the social and economic impact of child undernutrition in Latin America, Naciones Unidas, CEPAL, Social Development Division, Santiago de Chile, 2008, pages 18-26.
Working age population (WAP) by educational level	Calculated from the Lesotho Intergrated Labour Force Survey. The total working age population was estimated based on the working age and educational level values obtained from ILFS. Grade level 12 includes all grade levels equal and above grade 12.

Health Data	
Primary health data were collected from representative hospitals collected from Lesotho Central Drug Store, Mafeteng Hospital in Mafeteng District and Leribe Referral Hospital in Leribe District to estimate the health protocol and cost data. Those hospitals and health centres were selected based on their national level representativeness for the number patients and services provided for both OPD and IPD medical cases. Professionals like pediatricians, nurses, pharmacists, and other non-health professionals from management, finance and planning units of each hospital and health centre were consulted to estimate the average cost. Therefore all the primary data are based on interviews with key informants and experts from the sample hospitals and health centres. Additional health data were also obtained from large insurance companies.	
Underweight prevalence among children under 5 years old	Calculated from Multiple Indicator Cluster Survey (MICS, 2000) and Ghana Demographic and Health Survey 2009/2014. Historical data calculated based on "WHO Global Database on Child Growth and Malnutrition" WHO. Accessed June 12, 2014. http://www.who.int/nutgrowthdb/en//
Stunting prevalence among children under 5 years old	
Stunting and Underweight mode prevalence	Calculated based on the highest prevalence register in the age groups based on historical data obtained from WHO Global Database on Child Growth and Malnutrition, WHO. Accessed June, 2014 http://www.who.int/nutgrowthdb/en//. The data were cross-checked with Lesotho Demographic and Health Survey 2009 and 2014.
Number of annual disease episodes per child for (anaemia, ADS, ARI, malaria, underweight) by age group	Estimated through consultation with Mafeteng and Leribe Referral Hospital and experts. And the following values were estimated. The incidence rate of **Anaemia** for 28days-11month is 1 episodes; 12-23 months is 1 episodes; 24-59 months is 1 episode per child. **ADS**: 28days-11months is 2 episodes; 12-23 months is 2 episodes; 24-59 months is 2 episode per child. **ARI**: 28days-11months is 2 episodes; 12-23 months is 2 episodes; 24-59 months is 2 episodes per child. **Underweight**: 28days-11months is 2 episodes; 12-23 months is 2 episodes; 24-59 months is 2 episodes per child.
Average number of primary care visits for each pathology (anaemia, ADS, ARI, underweight, malaria) by age group	Estimated through consultation with Mafeteng and Leribe Referral Hospital specialists and experts. And the following values were estimated. The average no. of primary care visits for Anaemia 28days-11months is 1 episode, 12-23 months is 1episode, 24-59 months is 1episodes per child per year. **ADS**: 28days-11months is 1 episodes; 12-23 months is 1 episodes; 24-59 months is 1 episode per child per year. **ARI**: 28days-11months is 1 episodes; 12-23 months is 1 episodes; 24-59 months is 1 episodes per child per year. **Underweight**: 28days-11months is 1 episode; 12-23 months is 1 episodes; 24-59 months is 1 episodes per child per year.
Proportion of events of pathology (anaemia, ADS, ARI, malaria, underweight) by age group requiring hospitalization	Estimated through consultation with Achimota hospital health specialists and experts. And the following values were estimated. **Anaemia**: (severe anaemia cases as proxy was considered) for 28-11m = 10%; for 12-23 months = 10%; for 24-59 months=10%, **ADS**: for 28-11m=15%; for 12-23 months= 15%; for 24-59 months=15%; **ARI**: for 28-11m= 20%; for 12-23 months= 20%; for 24-59 months=20%. **Underweight**: for 28-11m= 30%; for 12-23 months= 30%; for 24-59 months=30%,
Average number of days of hospital treatment for each event (anaemia, ADS, ARI, malaria, underweight) by age group	Estimated through consultation with with Mafeteng and Leribe Referral health specialists and experts. And the following values (in days of hospitalization) were estimated. **Anaemia**: 5 days (same for all sub-cohorts). **ADS**: 4 days (same for all sub-cohorts). **ARI**: 5 days (same for all sub-cohorts); **Underweight**: 5 days (same for all sub-cohorts).

Indicator	Data and Sources
Average waiting time spent at primary care attention, by pathology	It was estimated through consultation with Achimota hospital health specialists and experts. And the following values (in hours) were estimated. **Anaemia**: 2 hours; **ADS**: 2 hours; **ARI**: 2 hours; **Underweight**: for28-11m = 2 hours; for 12-23 months = 2 hours; for 24-59 months= 2 hours;
Daily hours lost due to hospitalization, by pathology	Estimated at an average of 8 daily hours lost.
Average unit cost for attention in primary care, by age group and pathology	The average unit cost for attention in primary care was estimated based on hospital/health facility records and interviews with health specialists and experts. The unit cost for **Out-Patient attention (OPD)** takes into account the **Overhead and Direct costs** associated with provision of medical consultation. Overhead costs include: annual expenditure of water, electric power, fuel as well as maintenance of the primary care facility. These overhead costs were divided by the annual number of outpatients. **Direct cost**s include: number and qualification (paediatricians, general practitioners, nurses, etc.) of medical staff and the time (in minutes) each of them dedicate to the patient. Based on their hourly salary, the unit cost for attention is subsequently calculated. For a full overview of the average unit cost for attention per pathology, see the Health Protocol and Costing Guidelines
Average cost of medical inputs for event in primary care, by age group and pathology	The average cost of medical inputs for an event in primary care was estimated based on hospital/health facility records and interviews with health specialists, experts from drug stores and central pharmacies. The costing of these inputs was done based on a full list of the different types of medicines for treatment of each pathology. For a full overview of all the medical inputs and cost per pathology, see the Health Protocol and Costing Guidelines.
Average unit cost for attention in hospital, by age group and pathology	Average unit cost for attention in hospital was estimated based on hospital records and interviews with health specialists and experts. The unit cost for **In-Patient attention (IPD)** takes into account the **Overhead and Direct Costs** associated with provision of medical consultation and hospital bed cost. **Overhead costs** considered: the annual expenditure of water, electric power, fuel and food as well as the maintenance of the hospital. These overhead costs were divided by the annual number of inpatients. **Direct costs** considered: the number and qualification (pediatricians, general practitioners, nurses, etc.) of medical staff and the time (in minutes) each of them dedicates to the patient. Based on their hourly salary, the unit cost of attention is subsequently calculated. In addition, the **average daily cost of a hospital bed** is also included. For a full overview of the average unit cost for attention per pathology, refer to the Health Protocol and Costing Guidelines.
Average cost of medical inputs for event in hospital, by age group and pathology	The average cost of medical inputs for an event in hospital was estimated based on hospital records and interviews with health specialists, experts from drug stores and central pharmacies. Medical inputs considered only medicines for treatment. The costing of these inputs was done based on the Central Drug Store or Central Pharmacy's drug costing records. For a full overview of all medical inputs and cost per pathology, consult the Health Protocol and Costing Guidelines.
% of cases that attend health services	For low birthweight, the percentage of all births with reported low birthweight was considered as a proxy for the percentage of cases that attend health services (47percent; page 164, Table 10.1). Calculated from Lesotho Demographic and Health Survey Report 2014. For anaemia, diarrhoeal, ARI and malaria cases, it is estimated in-house based on the percentage of people who sought medical services from health facilities, as per LDHS 2014 data (anaemia = 50 percent, diarrhoeal = 53 percent, ARI = 63 percent and Fever = 61 percent)

Indicator	Data and Sources
Average travel time for ambulatory care.	Established at 2 hours for all cases and pathologies. It was an average estimated time to reach a referral hospital from rural places, according to key informant interviews.
Percentage of low birthweight children	9.40 percent was considered for low birthweight as an estimate based on the number of births of low birthweight babies to total live births – % LBW = number of births of low birthweight/total live births
Proportion of events of LBW requiring/access hospitalization	100 percent of cases of LBW require hospitalization (estimated by health specialists and experts through in-depth interview).
Average number of days of hospital treatment for LBW	A minimum of 14 days is recommended for LBW. Estimated by health specialists and experts through in-depth interview.
Morbidity differential probability for anaemia among healthy versus underweight children, by age group.	Calculated in-house at 8.4 percent for children under 5, from LDHS data (LDHS, 2014) utilizing the prevalence of anaemia (moderate or severe) among underweight children and the prevalence among non-underweight children differentiated by age group.
Morbidity differential probability for ADS among healthy versus underweight children, by age group.	Calculated in-house at 4.9 percent for children under 5, from Demographic and Health Survey data (DHS, 2014) utilizing the prevalence of acute diarrhoeal syndrome – ADS (reported diarrhoea in the last 2 weeks) among underweight children and the prevalence among non-underweight children differentiated by age group.
Morbidity differential probability for ARI among healthy versus underweight children, by age group.	Calculated in-house at 1.2 percent for children under 5, from Demographic and Health Survey data (DHS, 2014) utilizing the prevalence of acute respiratory infection - ARI (data on children who were ill with a cough accompanied by rapid breathing) among underweight children and the prevalence among non-underweight children differentiated by age group.
Morbidity differential probability for fever among healthy versus underweight children, by age group.	Calculated in-house at 3.3 percent for children under 5, from Demographic and Health Survey data (DHS, 2014) utilizing the prevalence of fever/malaria (data on children who reported fever in last 2 weeks) among underweight children and the prevalence among non-underweight children differentiated by age groups.
Hazard ratio of child mortality associated with underweight	Estimated at 2.86, based on calculations by Acosta C., Martinez R. (2013) from Robert E. Black et al., "Maternal and child undernutrition: global and regional exposures and health consequences," The Lancet 371, No. 9608, 2008, doi: 10.1016/S0140-6736(07)61690-0)
Hazard ratio for child mortality associated with stunting	Estimated at 2.33, based on calculations by Acosta C., Martinez R. (2013) from Robert E. Black et al., "Maternal and child undernutrition: global and regional exposures and health consequences," The Lancet 371, No. 9608, 2008, doi:10.1016/S0140-6736(07)61690-0
Education Data	
Enrolment by grade in Primary	Lesotho. Ministry of Education. Education Statistics Report 2014 (Page 17)
Enrolment by grade in Secondary	Lesotho. Ministry of Education. Education Statistics Report 2014 (Page 37- 40)
Number of passes by grade	Calculated by grade by the Ministry of Education with data for 2014. The promotion rates/completion rates for primary and high school were taken from the Ministry of Education's Statistics, The values for Primary = 71.8%, and Secondary = 68.5 % were considered as the completion rate
Number of population repeating grades, by grade	Calculated by grade by the Ministry of Education with data for Education Statistics Report 2014 (Page 31, and Page 49, Table 22) and the rates were applied to the same year enrolment data by grade level.

Indicator	Data and Sources
Annual private/public cost per student/year, by educational level	Estimated based on the data from Education Experts from the Ministry of Education private and public public cost. Primary education – public cost: LSL 3,521; cost to families: LSL 2,420. Junior high school – public cost LSL 4,567; JHS – cost to families: LSL 4,370; Senior high school – public cost: 4,570; cost to families: LSL 3,134.
Relative risk of grade repetition associated with stunting	Estimated at 1.35, based on calculations from Cebu Longitudinal Health and Nutrition Survey, with support from Melissa C. Daniels
Relative risk of dropping out associated with stunting	Estimated at 1.61, based on calculations from Cebu Longitudinal Health and Nutrition Survey, with support from Melissa C. Daniels

Annex III. Brief Description the Data Collection and Validation Process

The Cost of Hunger in Lesotho was kicked off in May, 2016, at the back of a capacity development workshop held in Maseru for the National Implementation Team. The workshop was led by World Food Programme, Africa Office, based in Addis Ababa. This was then followed by another regional training in Maputo in July 2016 where the National Implementation Team was exposed to indepth methodological and analytical processes during this joint Economic Commission of Latin America and the Caribbean and World Food Programme session. The work-plan to implement the study in Lesotho was also developed.

The data collection process which was led by the members of the National Implementation Team, was followed by a deleanation of responsibilities among the specialists. The NIT team was led by the Ministry of Development Planning and coordinated by Food and Nutrition Coordinating Office (based under the Prime Minister's Office). Other memebers of the team include representatives from Ministry of Finance, Bureau of statistics, Ministry of Health (Planning and Family Health), Ministry of Social Development, Ministry of Agriculture and Food Security (Nutrition Department), Ministry of Education and Training (ECCD), National University of Lesotho (Nutrition Department Research), UNICEF Lesotho and WFP Lesotho.

To analyze the costs on health, secondary data as well as primary data was the source of information. The secondary data analyzed was from Demographic Household Survey (DHS) of 2014 and Lesotho Central Drug Store, Mafeteng Hospital in Mafeteng District and Leribe Referral Hospital in Leribe District. In addition, primary data was collected by conducting surveys and interviews with health specialists in the aforementioned health facilities. These questionnaires included a template on medical inputs per pathology, created on the basis of WHO guidelines, in order to assess which medical inputs are used and which are not used, or which additional medical inputs are given to the patients by respective pathology. Subsequently the costs of these medical inputs are estimated on the basis of the hospital records. Primary data collection using questionnaires helps to derive and calculate the amount of time each staff member dedicates to a certain pathology. Based on the hospital records the unit costs of attention is accordingly calculated by taking into account the individual salary of each staff member involved and the time they spend on a pathology case. Finally, the hospital records also formed the basis to estimate the cost of a hospital beds which was thereafter calculated by dividing the annual overhead costs (which consists of the operational costs such as water, electricity, gas and staff) of the hospital by the annual number of in-patients.

A similar process was carried-out to obtain the data on labour productivity. In Lesotho, the Integrated Labour Force Survey (ILFS) was used. This survey provides information about the size, composition and the characteristics of the labour force. The survey also captures information on economic activity status of the population, unemployment, underemployment and occupational characteristics of the employed. These estimations from the data are made using the members of working age, 15-64, considering their educational level. In the case of the data set for Lesotho, the data set provided limited information which associated age, education level and expenditure. In this sense, the missing values were estimated based on the averages computed from the available data.

In September 2016, the Lesotho government organized a national validation workshop in Maseru. The purpose of the workshop was for the NIT to share initial findings of the study and confirm that they truly reflected the status. This assured ownership of the results of the Cost of Hunger in Africa - Lesotho study and also began to make recommendations. This validation workshop was organized by the Government of Lesotho in collaboration with the AUC and WFP.

The final report of the Cost of Hunger in Lesotho was submitted officially by the African Union Commission and accepted by the Government of Lesotho in October 2016.

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