The Social and Economic Impact of Child Undernutrition in Namibia

THE COST OF HUNGER IN AFRICA | COHA

SOCIAL AND ECONOMIC IMPACT OF CHILD UNDERNUTRITION

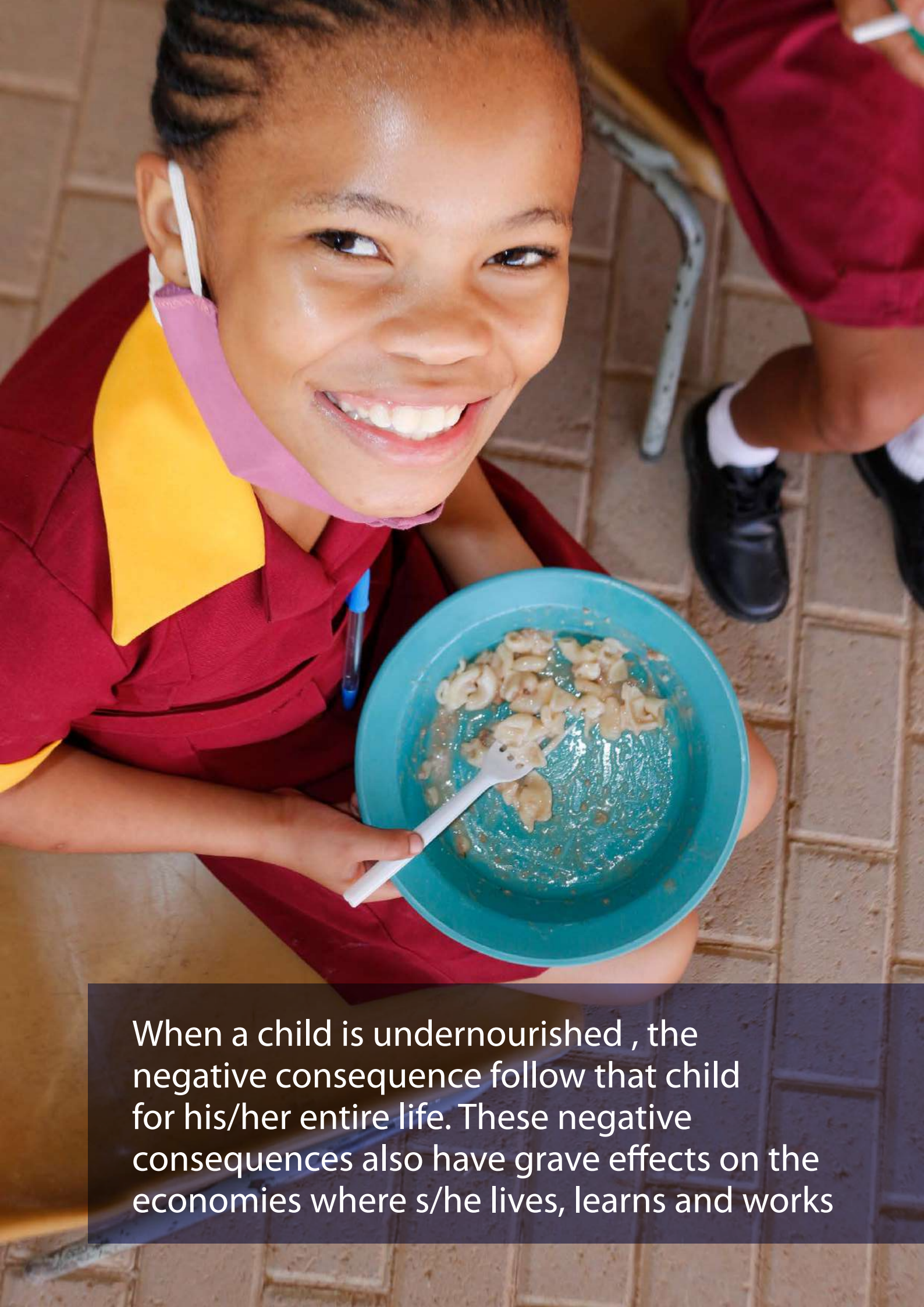
NAMIBIA

Implemented by

The Social and Economic Impact of Child Undernutrition in Namibia

World Food Programme

ECLAC



When a child is undernourished , the negative consequence 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 Namibia Cost of Hunger in Africa (COHA) Report

Over the past years, worldwide stunting have decreased by quarter globally from 2000 to 2018. But it rose in all sub-regions of Sub-Saharan Africa in part due to poor diets. Despite an overall good picture of economic growth for the continent before the COVID 19 pandemic, some Africans are being left behind.

Namibia has made significant progress in improving child health outcomes as evidenced by reduction in infant and under-five mortality. However, there has been slow progress in reducing malnutrition. The country has made an improvement in reducing stunting in children; however, stunting rates still remain unacceptably high at 34.4 percent among children under five years, which is an indication that chronic food and nutrition insecurity are still prevalent.

Chronic child malnutrition affects children under five years, affect the productivity of the country and has an impact throughout people's lives. Hence Chronic child malnutrition can no longer be considered a sectoral issue, as both its causes and solutions are linked to social policies across numerous sectors. It requires active interventions from health, education, social protection and social infrastructure perspectives.

Malnutrition goes beyond a lack of food consumption and refers to an unhealthy condition that develops when your body does not get enough of the vitamins, minerals and other nutrients it needs to function properly. It can occur when you don't eat enough food or you are not eating enough healthy food.

Hence, understanding the magnitude, the severity and the spread of cost of hunger and malnutrition is the first important step in addressing social evil that threatens the unity of families and communities in our country. Indeed malnutrition is a multidimensional phenomenon and therefore there is no single solution to address it; however, I am convinced that it can be addressed through domestic policies and localised and targeted programmes and projects.

It worth noting that, undernutrition deprives children of necessary nutrients during the most critical period of their growth, with both mental and physical consequences that are irreversible and permanent. It impact on economic progress and imposes additional costs on society, with added pressure on the education and health system.

Children suffering from undernutrition begin life with terrible handicap, with higher probabilities of dying in the first days of life than those born with adequate weight and size. They are also more vulnerable to infections, which reduce their appetite, prolong their undernutrition and inhibit growth.

Thus, we can clearly point out that in addition to the social problems involved in child undernutrition, there are adverse economic consequences, these costs are not limited to the life cycle of each individual, but affect that person's children who will also be more vulnerable. This is how undernutrition and poverty are continued.

This study comes at an important time for Namibia. Now more than ever, it is evident that malnutrition, in all its forms, needs to be addressed as a national priority. This analysis is demonstrating that Namibia has been able to make important progress in reducing the number of stunted, but more still need to be done to improve the prevailing situation.

The study findings have clearly shown that adequate nutrition is critical for one's physical and intellectual development. It is in this context that we are determined as a government that we need to strengthen institutional and human capacities for effective delivery of nutrition services. We equally note the importance of statistics in terms of health data systems and consistent and recent health and demographic surveys.

I would like to thank all various institutions that were involved in producing this report, special thanks go to World Food Programme (WFP), Namibia; FAO, UNDP, UNICEF and GIZ Namibia for providing financial and technical support. I further thank the African Union Commission (AUC) with technical leadership from World Food Program- Africa Office (WFP) that supported and led the study at the continental level.

It is my hope that the findings in this report will inspire all stakeholders to expedite the implementation of programmes to ensure that child under nutrition is reduced and help the children under five break the vicious cycle of hunger, poverty, low human capital development and low economic growth.

Obeth Mbuipaha Kandjoze

Director General of the National Planning Commission

Acknowledgements

The Cost of Hunger in Africa (COHA) Namibia Report on estimating the economic and social effects of child undernutrition has been prepared collaboratively by Government Ministries, Departments and Agencies, and Development Partners. It was prepared in line with Resolution 898 in which African Ministers of Finance, Planning and Economic Development reaffirmed the importance of undertaking the COHA study in African countries.

This initiative was made possible by the institutional leadership provided to this project by H. E. Moussa Faki Mahamat, Chairperson of the African Union Commission (AUC); Dr Ibrahim Mayaki, Executive Secretary, NEPAD; Ms Alicia Barcena, Executive Secretary, ECLAC; and H.E. Mr David Beasley, Executive Director, WFP. The implementation of the agreement was coordinated by H.E Mrs Amira Elfadil Mohammed Elfadil, Commissioner for Africa Union Commission Department of Health ,Humanitarian and social affair to the of the COHA study was undertaken by a joint steering committee led by Dr Margareth Agama-Anyetei from AUC.

We are grateful to the many individuals and institutions whose support and commitment made this study a reality and wish to take this opportunity to thank all of them for their immense contributions. This study involved a lot of financial and technical resources, without which the study would not have been possible. The lead role taken by National Planning Commission (NPC) is highly recognised for spearheading the launching of the study. Through a National Implementation Team, the National Planning Commission (NPC) chaired the coordination and implementation of the study co-chaired by the United Nations World Food Programme (WFP) in collaboration with Ministry of Health and Social Services (MoHSS), Ministry of Education Arts and Cultures (MoEAC), Ministry of Agriculture, Water and Land Reform (MAWLR), Namibia Statistics Agency (NSA), and development partners including German Society for International Co-operation (GIZ), United Nations International Children's Emergency Fund (UNICEF) and Food and Agricultural Organisation (FAO).

Sincere gratitude goes to Mr Sylvester Mbangu, Chief National Advice (NIT Chair) and Dr George Fedha, Country Director and Mr Elvis Odeke the Head of Programme World Food Programme (WFP) in Namibia (NIT CO-Chair) for their leadership, advice and direction. Special appreciation is extended to the COHA national coordinators, Mrs. Lihongeni Mulama (National Development Advisor- NPC) and Mrs Gloria Kamwi (Deputy Head of Programme - WFP). The Report would not have been possible without the advice and support of numerous staff who took part in the whole report cycle from training, providing data, primary data collection and other data collation working sessions and validation of the data, hosting consultations, data analysis, providing comments and advice and report writing. We would like to thank them for sharing their expertise and time. A special thank you is extended to the University of Namibia School of Pharmacy students who supported to collect primary data for the Health Protocol.

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Acronyms

ADFNS	Africa Day for Food and Nutrition Security
ADS	Acute Diarrheal Syndrome
ALN	African Leaders for Nutrition
ANC	Antenatal Care
ARI	Acute Respiratory Infection
ARNS	Africa Regional Nutrition Strategy
ATFFND	African Task Force for Food and Nutrition Development
ATYS-VMD	Africa Ten Year Strategy for the Reduction of Vitamin and Mineral Deficiencies
AU	African Union
AUC	African Union Commission
CAADP	The Comprehensive Africa Agriculture Development Programme
CAPMAS	Central Agency for Public Mobilization and Statistics
CEN-SAD	Community of Sahel-Saharan States
COHA	Cost of Hunger in Africa
COMESA	Common Market for Eastern and Southern Africa
DHS	Demographic and Health Survey
DRNCD	Diet-related non-communicable diseases
ECCAS	Economic Community of Central African States
ECD	Early Childhood Development
ECLAC	Economic Commission for Latin America and the Caribbean
ECOWAS	Economic Community of West African States
EMIS	Education Management Information System
FAO	Food and Agriculture Organisation
FY	Financial Year
GDP	Gross Domestic Product
GNI	Gross National Income
GIZ	German Society for International Co-operation
HGSFP	Home Grown School Feeding Programme
HPSI	Health Promoting School Initiative
ICU	Intensive Care Unit
IFAD	International Fund for Agricultural Development
IGAD	Intergovernmental Authority for Development
ILO	International Labour Organisation
IMR	Infant Mortality Rate
IUGR	Intra Uterine Growth Retardation
IYCFP	Infant and Young Children Feeding Practice
LAC	Latin America and the Caribbean
LBW	Low Birth Weight
LFPR	Labour Force Participation Rate
MAWLR	Ministry of Agriculture, Water and Land Reform

MDGs	Millennium Development Goals
MGEPESW	Ministry of Gender Equality, Poverty Eradication and Social Welfare
MLIEC	Ministry of Labour, Industrial Relations and Employment Creation
MoEAC	Ministry of Education, Arts and Culture
MoHSS	Ministry of Health and Social Services
NACS	Nutrition Assessment Counselling and Support
NAD	Namibian Dollars
NDHS	Namibia Demographic and Health Survey
NDP	National Development Plan
NEPAD	The New Partnership for Africa's Development
NER	Net Enrolment Ratio
NHIES	Namibia Household Income and Expenditure Survey
NIT	National Implementation Team
NPCA	NEPAD Planning and Coordinating Agency
NPC	National Planning Commission
NSA	Namibia Statistics Agency
OECD	Organisation for Economic Cooperation and Development
PANI	Pan-African Nutrition Initiative
PNC	Postnatal Care
P4P	Purchase for Progress
PPP	Public Private Partnership
REACH	Renewed Efforts Against Child Hunger
SADC	Southern African Development Community
SDGs	Sustainable Development Goals
SUN	Scaling Up Nutrition
UMA	Union du Maghreb Arabe
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNDESA	United Nations Department of Economic and Social Affairs
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USD	United States of America Dollar
WAP	Working Age Population
WFP	World Food Programme
WHO	World Health Organisation

Preface

Child undernutrition is one of the major challenges facing the world today, with the African continent facing the highest prevalence of child undernutrition. In a bid to curb the challenge, the African Ministers of Finance, Planning and Economic Development made a declaration, commonly known as Resolution 898, which underscored the importance of undertaking the COHA Study in African Countries in 2012. In 2014, the African Heads of State and Government made a commitment commonly known as the "Malabo Declaration" on Nutrition Security for Inclusive Economic Growth and Sustainable Development in Africa, where they called on governments to scale up implementation of the Cost of Hunger study in Africa study continent-wide.

Consequently Namibia 5th National Development Plan (NDP5) 2017/18 – 2021/22 and several National Policies such as the Harambee Prosperity Plan II give prominence to reducing undernutrition and overweight. Namibia is also party to several international development blueprints including the global Sustainable Development Goals (SDGs) which endeavour to address child undernutrition by 2030, African Regional Nutrition Strategy (2015 – 2025), Africa Agenda 2063 and the World Health Assembly Targets for nutrition all of which aimed to address child undernutrition. Although there has been some improvement in the reduction of malnutrition in the country over the past decade, child undernutrition remains a persistent threat to the lives of Namibian children, particularly the under five-year olds. Evidence shows that malnutrition during childhood and pregnancy has many adverse consequences for child survival, development and long-term well-being. It is evident that investing in nutrition is judicious and beneficial as it improves health, by reducing morbidity and mortality, school performance, cognitive development and physical work capacity, which in turn, leads to increased productivity, socio-economic growth and development, and poverty reduction.

Not withstanding these initiatives, child undernutrition remains a persistent threat to the lives of Namibian children, particularly those under five years. Evidence shows that malnutrition in childhood and pregnancy has many adverse consequences for child survival and long-term well-being. This results to far-reaching consequences for human capital, labour productivity, and is a major obstacle in the attainment of the overall goal of economic development. Cognizant of the burden of child undernutrition in terms of monetary loss and loss in the Gross Domestic Product (GDP) and well-being of Namibian citizens, the Government committed to undertake a study to estimate the economic and social effects of child undernutrition, the COHA in Africa: A Namibia Study. The study was undertaken by Government Ministries, Government Agencies including the National Planning and Commission (NPC), the Namibia Statistics Agency (NSA), Ministry of Health and Social Services (MoHSS), Ministry of Education, Arts and Culture (MoEAC), Ministry of Labour, Industrial Relations and Employment Creation (MLIEC); Ministry of Agricultural, Water and Land Reforms (MAWLR); including other Ministries in collaboration with various development partners, including World Food Programme (WFP), United Nations Children's Fund (UNICEF), Food and Agriculture Organization FAO, United Nation Development Programme UNDP, GIZ Namibia and several other stakeholders representing the interest of the Government.

The specific objectives of undertaking the COHA Namibian Study included estimating the social and economic impacts of child undernutrition, generating policy evidence to justify the need for increased investment in nutrition, and recommending actions to inform human capital development that will help bolster implementation of Namibia's NDP, the Harambee Prosperity Plan and other commitments. The findings of the Study give policy insights that shall be key in the development and/or revision of key policies and strategies geared towards reducing child undernutrition in Namibia. The Government, our respective ministries, are fully committed to the implementation of the recommendations of this Study.

Executive Summary

The COHA is an African Union Commission (AUC) led initiative through which countries are able to estimate the social and economic impact of child undernutrition in a given year. About 16 countries are initially participating in the study. Namibia is part of the phase VI countries.

The COHA study shows that undernutrition among children is a social issue but affects the whole economy, because countries are losing significant sums of money as a result of current and past cases of child undernutrition. It is with this background that in March 2012, a regional COHA study was presented to African Ministers of Finance, Planning and Economic Development, in Addis Ababa, Ethiopia. From this meeting the Ministers issued a resolution confirming the importance of the study and recommending that the COHA study be replicated across African countries.

The COHA study in Namibia is led by the NPC with support from the MoHSS; MoEAC, MAWLR, NSA; development partners namely; World Food Programme- Namibia; FAO, UNICEF and GIZ Namibia. At continental level, the COHA project is led by the African Union Commission (AUC) with technical leadership from the World Food Programme - Africa Office (WFP).

During the process, all data for the study were collected from national data sources including the Namibia Demographic and Health Survey (NDHS) 2013; National Accounts Abstracts from various years, Namibia Household Income and Expenditure Survey (NHIES) 2015/2016, National Accounts 2018; and primary data collected from selected public hospitals, and relevant data from international sources (WHO and UNDESA).

Methodology

The COHA model is used to estimate the additional cases of morbidity, mortality, school repetitions, school dropouts and reduced physical capacity that can be directly associated with undernutrition in children under the age of five years. In order to estimate these social impacts for a single year, the model focuses on the current[1] population, identifies the percentage of that population who were undernourished before the age of five years, and then estimates the associated negative impacts experienced by the population in the study year. Using this information and economic data provided by the National Implementation Team (NIT), the model then estimates the associated economic losses incurred by the economy in health, education, and in potential productivity in a single year which is 2016 (base year).

Trends in Child Stunting

The current levels of child undernutrition illustrate the continuing challenges to reduce child hunger. It is estimated that 97,212 (30.3 percent) of the 321,176 children under the age of five years in Namibia were affected by stunting in 2016 and 62,944 children were underweight. This situation is especially critical for children between the ages of 12 and 23 months, where 30.3 percent of children are affected by stunting.

Namibia has made progress in reducing stunting in children; nevertheless, stunting rates remain high. It is estimated that 793,008 population, in the working-age population suffered from growth retardation before reaching the age of five years. In 2016, this represented 43.4 percent of the population aged 15-64 years who were in a disadvantaged position as compared to those who were not undernourished as children.

The Social and Economic Cost of Child Undernutrition in Namibia

Overall results show that Namibian dollars (NAD) 11.14 billion or USD 757.9 million were lost in the year 2016 as a result of child undernutrition. This is equivalent to 5.22 percent of GDP.

Undernourished children are more susceptible to recurring illness. Based on the differential probability analysis undertaken with NDHS data in Namibia, underweight children under 5 years of age had an increased risk of diarrhoea (increased risk equal to 5.4 percentage points), and an increased risk of respiratory infection (increased risk equal to 2.0 percentage points).

The study estimated that in 2016 Namibia had 182,379 incremental episodes of illness related to diseases associated with underweight, which incurred a cost of an estimated NAD 37 million or USD 2.5 million. Pathologies related to calorie and protein deficiencies and low birth weight associated with intrauterine growth restriction (IUGR), totalled more than 2,489

[1] The model set 2016 as the base year, given the availability of data for that year and in order to ensure the continuity of the study. As it is the most recent possible study year, it is referred to as "current" in this report.

episodes in 2016; and incurred a cost of an estimated NAD 516.6 million or USD 35.1 million. Most of these costs incurred were associated with the protocol required to bring an underweight child back to a proper nutritional status, which often requires therapeutic feeding. An important element to highlight is the particular costs generated by the treatment of low-birth-weight children. These cases represented 1.36 percent of all the episodes but generated 31.1 per cent of the total cost.

Stunted children have a higher-grade repetition rate, at 23.7 percent than non-stunted children, at 9.7 percent, with an overall repetition rate of 14 percent. This incremental rate generated 35,697 additional cases of grade repetition in 2016, in which the education system and families incurred a cost of NAD 294.27 million. The distribution of this cost varies depending on whether the child repeated grades in primary or secondary education.

Adults who suffered from stunting as children are less productive than non-stunted workers and are less able to contribute to the economy. 43.1 percent of the working age population is engaged in manual activities. This is an estimated 479,700 people who are engaged in manual activities, of whom 225,489 people were stunted as children. This represents an annual loss in potential income of NAD 410 million or USD 27.9 million equivalent to 2.8 percent of GDP.

It is estimated that 47,547 people of working age were absent from the workforce in 2016 due to child mortality associated with undernutrition. This represents a 3.6 percent reduction in the workforce. Taking into account the productive levels of the population, by age and sector, the model estimated that in 2016, the economic losses (measured by working hours lost due to undernutrition-related child mortality) was NAD 2.48 billion or USD 169 million, which represented 1.2 percent of the country's GDP.

Analysis of Scenarios

In addition to calculating a retrospective cost for 2016, the model also can highlight potential savings, based on different scenarios. These scenarios are constructed based on the estimated net present value of the costs associated with undernutrition of the children born in each year, from 2016 to 2025. The methodology follows each group of children and, based on each scenario, estimates a progressive path towards its achievement.

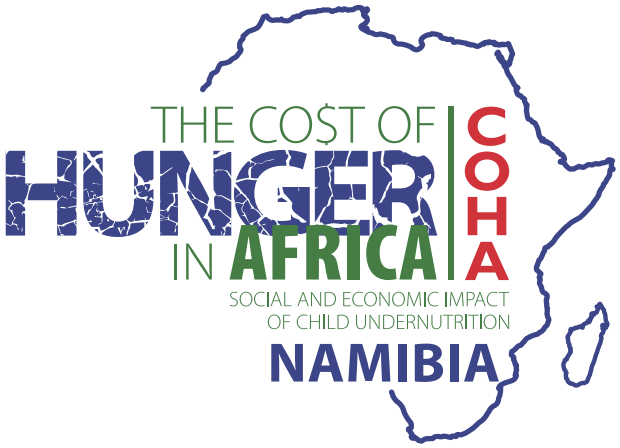
Table 1 Summary of analysis scenario[2]

Scenario	**Baseline:** The Cost of Inaction by 2025	**Scenario #1.** Halving Halving the Prevalence of Child Undernutrition by 2025	**Scenario #2** The The 'Goal' Scenario: "10% and 5% by 2025"
Description	Prevalence of stunted and underweight children stops at the level recorded in 2016 (30.3% and 19.6% respectively)	Prevalence of stunted children would be reduced to half of 2016 to 15.1% and Underweight 9.8%	Prevalence of stunted children is reduced to 10% and underweight children of less than five years of age, to 5%
Implications	No increase or decrease in percentage points, but an increase in total number of stunted children and higher burden on the society	A constant annual reduction of 1.7% points in the prevalence of stunting is required	A constant annual reduction 2.3% points in the prevalence of stunting is required
Estimated Change in period	Cost decrease of up to 13% by 2025 compared to the values in 2016	Cost decrease of up to 49% by 2025 compared to the values in 2016	Cost decrease of up to 57% by 2025 compared to the values in 2016
Annual Average Savings	none	**NAD 1.24 billion** USD 215.3 million	**NAD 3.01 billion** USD 522.4 million

[2] It is one of the commitments by the heads of state and government at the African Union summit in Malabo, Equatorial Guinea in June 2016. The Malabo declaration is a remarkable set of concrete agriculture goals to be attained by 2025.

Section 1

Introduction



Section I: Introduction

1.1. 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[3]. 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), Agenda 2030. 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 maximise 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 2016, 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.[4] 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[5], 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.[6] 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."[7] 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 prioritised in social budgets. Hence, efforts need to be scaled up to sensitise 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), Africa Day for Food and Nutrition Security (ADFNS), and 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.

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3 "World Economic Outlook Database October 2012. www.imf.org/external/pubs/ft/weo/2012/02/weodata/index.aspx.

4 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.

5 An Investment Framework for Meeting the Global Nutrition Target for Stunting/world Bank document

6 Copenhagen Consensus 2012. Top Economists Identify the Smartest Investments for Policy-Makers and Philanthropists. 14 May 2012. www.copenhagenconsensus.com/Default. aspx?ID=1637.

7 Idem.

Within the framework of the African Regional Nutrition Strategy (ARNS 2015–2025),[8] the objectives of the African Task Force on Food and Nutrition Development[9] 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 and supporting them to contextualise the study. 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.

1.2 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 28 years, 1990 to 2018. In Africa, the reported rate of stunted children has decreased from 42.1 percent in 1990 to 30 percent in 2018 (see Table 2). Nevertheless, over the same period, the absolute number of stunted children has increased from 46.4 million to 58.8[10] million. Southern Africa has the least proportion 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 40.7 percent of all stunted children on the continent.

Table 2 Estimated prevalence and number of stunted children under five years of age (moderate or severe), by United Nations region, 1990, 2010 and 2018.

Prevalence between 1990-2018 (in percent)				Number (millions)		
Region	**1990**	**2010**	**2018**	**1990**	**2010**	**2018**
Africa	42.1	33.6	30.0	46.4	56.0	58.8
Eastern Africa	51.9	39.8	35.2	19.2	23.5	24.0
Middle Africa	44.3	35.4	32.1	5.9	8.6	9.4
Northern Africa	28.0	19.9	18.3	6.1	4.8	5.0
Southern Africa	35.0	30.9	29.3	2.1	2.0	2.0
Western Africa	40.7	32.3	29.2	13.2	17.2	18.5

Source: United Nations Children's Fund, World Health Organisation, World Bank. UNICEF-WHO-World Bank joint child malnutrition estimate : UNICEF-WHO-World Bank (2019) 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 3) (FAO, WFP and IFAD, 2012).[11] Africa's share in the world's undernourished population has decreased from 35.5 percent in 1990 to 20.5 percent in 2017[12]. However, this alarming rate still calls for stronger efforts to improve food security and nutrition in the continent.

8 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 [international] 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 leads to improved nutrition outcomes, by providing guidance on strategic areas of focus.

9 African Union, "CAHM5 moves into gear with meeting on food and nutrition development", 14 April 2011, http://www.au.int/en/sites/default/files/task%20force%20on%20food%20and%20nutrition%20development.pdf

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

11 FAO, WFP and IFAD. 2018. The State of Food Insecurity in the World 2018. Economic growth is necessary but not sufficient to accelerate reduction of hunger and malnutrition. Rome: FAO

12 Ibid

Table 3 Number of underweight people by region, 1990 to 2017

Region	Prevalence in %	Number in Million	Prevalence in %	Number in Million
Africa	28.2	32.4	17.1	36.9
Asia	32.1	128.0	11.4	59.0
Latin America & Caribbean	7.6	4.3	6.1	1.4
Oceania	17.9	0.2	7.5	0.3

Source: United Nations Children's Fund, World Health Organisation, The World Bank. UNICEF-WHO-World Bank Joint Child Malnutrition Estimate.

The first Millennium Development Goal (MDG 1) called for the eradication of extreme poverty and hunger. Nutritional status of children under the age of five years 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 realising inclusive development. More specifically, the Sustainable Development Goal number 2 (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.

1.3 Mandate to Advocate for Nutrition in Africa

At the 4th 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 AU recognised the compelling evidence that vibrant economic growth in Africa has not translated into equitable social progress, particularly with regards 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 leading to the prioritisation of short-term investments in budget allocations. Furthermore, food security and response to emergency hunger situations often retain most of the attention associated to nutrition investments.

Recognising these challenges, the African Union Commission (AUC), strongly supported by WFP, NEPAD and other partners, proposed the development of the COHA study at the 5th 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)[13] 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.

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

Box 1 Extract from Resolution 898 (XLV) the Cost of Hunger in Africa: Social and Economic Impacts of Child Undernutrition

"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."

This mandate was a clear guideline for the AUC to integrate the COHA study into the advocacy efforts of the ARNS (2005-2015)[14] 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 AU Assembly in Malabo, Equatorial Guinea, from 26 to 27 June 2016, 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 Heads of State noted with concern that the results of the study on the Cost of Hunger in Africa (COHA) revealed the 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 participation in the study on the Cost of Hunger in Africa and Request the Commission, UNECA, WFP, UNICEF and other Development Partners to expedite the successful completion of the study, including wide dissemination of the results at country and regional levels.

1.4 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[15] 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[16] 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 mobilise stakeholders around nutrition in LAC and was considered by many to be state-of-the-art knowledge in this field.

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

15 "FHI 360 Profiles," FHI 360 Profiles, accessed September 27, 2013, http://fhi360profiles.org/.

16 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).

The development of the COHA model proved to be a good practice of South-South collaboration between two regional UN Economic Commissions. ECLAC, AUC and WFP Africa office 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 UN partners, namely WFP, UNICEF, the International Labour Organisation (ILO) and 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 for 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 were identified: the AUC Department of Social Affairs and the NEPAD Planning and Coordinating Agency led the initiative; ECA/ECLAC coordinated its implementation, while WFP and other partners supported the capacity building process, both at regional and country levels. Further, the following governing structures were established:

1. The Steering Committee/ATFFND: The high-level Steering Committee is chaired by the AUC. The Steering Committee is charged with convening partner organisations, 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 Africa office, worked through a small technical team, drawn from NEPAD, AUC, WFP, ECLAC and other relevant organisations, 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 reported to the Steering Committee and executed the study budget.

3. The National Implementation Team (NIT): The core implementation of the study was 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 and the National Statistics Institution. In certain situations, a broader reference group was also created to include other actors and United Nations agencies, such as WFP, UNICEF and WHO. The WFP country offices facilitated the process according to specific country situations and supported coordination of the NIT as required.

For the initial phase of the project, a number of criteria were agreed upon to select the initial countries. The requirements 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 AU 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 was also taken into account in the final selection of countries.

3. Socio-economic representation: Prevalence of poverty and under-nourishment 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. Eight of these countries, namely Egypt, Ethiopia, Eswatini, Uganda, Burkina Faso, Ghana, Malawi, and Rwanda have completed the study. Beyond the initial selection of countries studied, the study has been completed in Chad, Madagascar, Lesotho, the Democratic Republic of Congo, Mali, Niger, Kenya, Sudan and The Gambia.

1.5 Guiding Principles

Throughout the adaptation, implementation and utilisation 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:

1.5.1 National ownership of the process

One of the guiding principles in the development of the COHA study is to engage regional experts and policy makers 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 building, strong communication strategies and synergies with other on-going 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.

1.5.2 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 building 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 emphasised 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.

1.5.3 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 maximise contributions. To achieve this, strong efforts were made to link the COHA with relevant initiatives that contribute to reducing child undernutrition.

One of these initiatives is the Scaling-Up Nutrition (SUN) Movement. It 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 recognises 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.

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 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.

The African Leaders for Nutrition (ALN) initiative is another platform for high-level political engagement to advance nutrition in Africa. It is led by a group of ALN Champions, comprising current and former heads of state, finance ministers and eminent leaders with the power to catalyse and sustain high-level political leadership and commitment to end malnutrition in Africa. The Assembly of Heads of State and Governments of the African Union (AU) at the 30th Ordinary AU Summit, held in Addis Ababa, Ethiopia, on 31 January 2018, endorsed the ALN initiative.

With a special focus on the first 1,000 days of a child's life and the grey matter infrastructure, the initiative aims to influence and generate innovative investments towards nutrition and food security that will build a foundation for productive human capital in Africa.

1.5.4 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. Familiarise the team with the problems contributing to undernutrition and proven nutrition interventions.

2. Identify and categorise key actors.

3. Develop objectives for each actor.

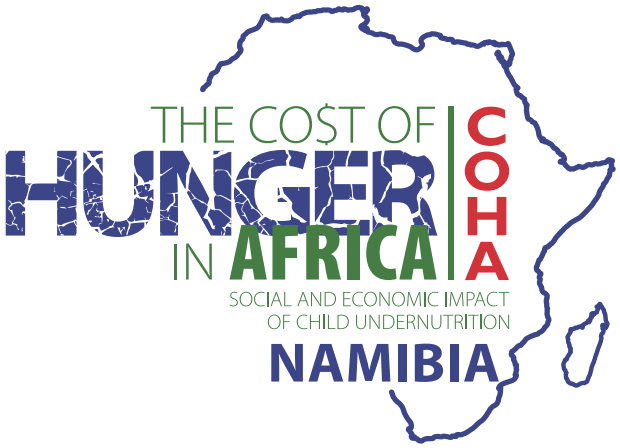
4. Produce information materials and brief stakeholders.

5. Adapt results and present them to target decision-makers; and follow up and provide support.

6. 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

Conceptual Framework and Methodology



Section II: Conceptual Framework and Methodology

2.1 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.

Box 2: Definition of terms

Chronic hunger: The status of people, whose food intake regularly provides less than their minimum energy requirements leading to undernutrition.[17]

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. [18]

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. [19]

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 household level. [20]

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. [21]

Nutrition security thus depends on a person's food security, as well as good health, a healthy environment, and good caring practices. Specifically, nutrition security can be described as, "appropriate quantity and combination of food, nutrition, health services and care taker's time needed to ensure adequate nutrition status for an active and healthy life at all times for all people." [22]

A direct and measurable consequence of a lack of nutrition security is low birth weight, 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 pre-school, school years or adult life. This is because the nutrient requirements and the needs are different for each stage. [23]

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17 "Hunger statistics", FAO Hunger Portal, Undernourishment or Chronic Hunger, FAO, accessed March 14, 2013, http://www.fao.org/hunger/ en/.

18 Ibid

19 Ibid

20 Ibid

21 WFP, VAM Standard analytical framework, World Food Programme, 2002.

22 USAID, USAID Commodities reference guide, Annex I: Definitions, January 2006, http://transition.usaid.gov/our_work/humanitarian_assistance/ ffp/crg/annex-I.htm.

23 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, Naciones Unidas, CEPAL, Social Development Division, Santiago De Chile, 2007.

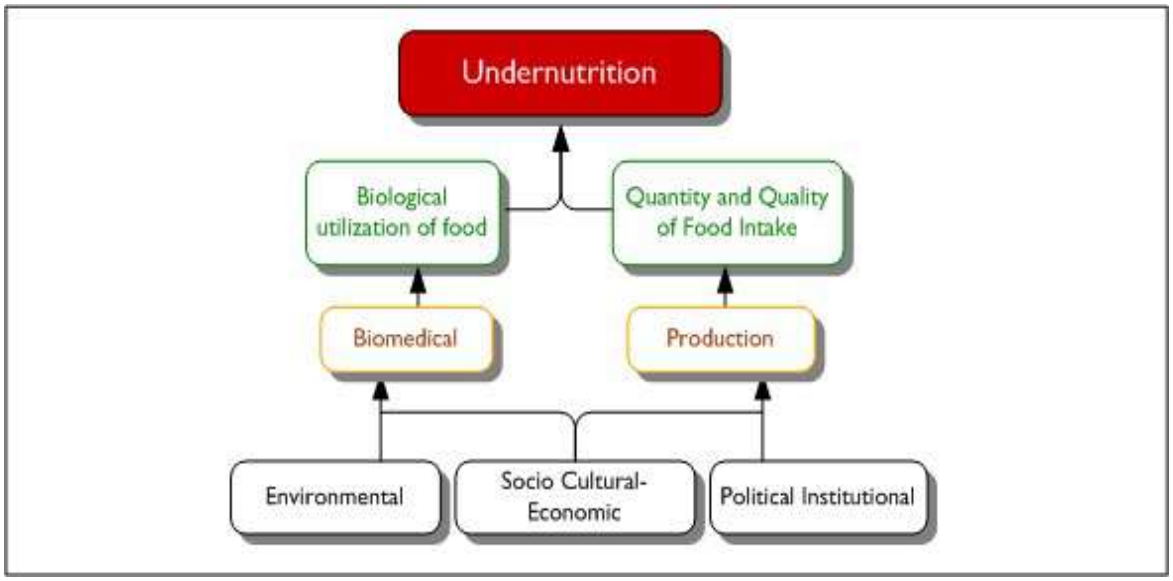
Below is the discussion of the central elements, considered in the Cost of Hunger model, to estimate the effects and costs of child undernutrition based on the concepts mentioned above, along with a brief description of the causes and consequences of undernutrition. The discussion also describes the dimension of analysis and the principal methodological aspects used to interpret the results. [24]

2.2 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), sociocultural-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. [25]

Each of these factors helps increase or decrease the likelihood of a person to suffer from undernutrition. 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 1: Causes of Malnutrition



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.[26]

One of the key considerations in assessing undernutrition is the environment. Environmental factors define the surroundings in which the subject and his or her family live, including the risks arising 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 sociocultural-economic determinants include elements associated with poverty and inequality, 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.

Production factors include those directly associated with the production and access to food by the population at risk. The availability and autonomy of each country's dietary energy supply depend directly on the characteristics of production processes, the degree to which they utilise natural resources and the extent to which these processes mitigate or aggravate environmental risks.

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24 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, Naciones Unidas, CEPAL, Social Development Division, Santiago De Chile, 2007.

25 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, biomedical factors take into account 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).

2.3 Consequences of undernutrition

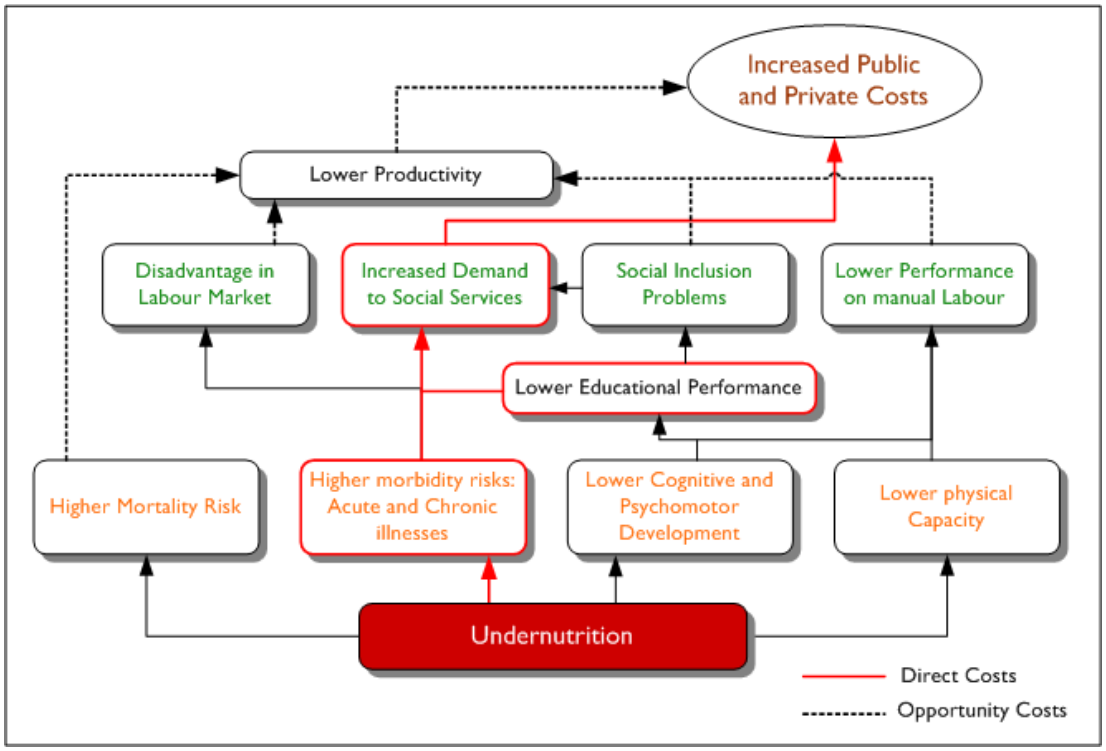
Child undernutrition has long-term negative effects on a person's life[27], most notably in the aspects of health, education, and productivity, quantifiable in costs and expenditures to the public and private sectors. Consequently, these effects exacerbate problems in social integration and increase or intensify poverty. A vicious cycle is perpetuated as vulnerability to undernutrition grows.

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.[28] 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.[29] 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.

Later in life, individuals may experience lower physical capacity in manual labour as a result of stunting.[30] 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 to the full adult potential.

Figure 2: Consequences of Undernutrition



Source: Modified from Rodrigo Martínez 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. [31]

27 Alderman H., et al., "Long-term consequences of early childhood malnutrition", FCND Discussion Paper No. 168, IFPRI, 2003.

28 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 Organisation 78, No. 2000.

29 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.

30 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.

Each of the negative impacts in health, education, and productivity, described above, leads to a social, as well as an economic, loss to the individual or the society.

Thus, the total cost of undernutrition (TC^U) is 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 (TC^U), the function can be written as:

$$TCU = f(HC^U, EC^U, PC^U) \quad (1)$$

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) that 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:

$$HC^U = f(HSC^U, IHC^U) \quad (2)$$

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:

$$EC^U = f(ESC^U, IEC^U) \quad (3)$$

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:

$$PC^U = f(ELC^U, MLC^U, MMC^U) \quad (4)$$

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.

2.4 Dimensions of analysis

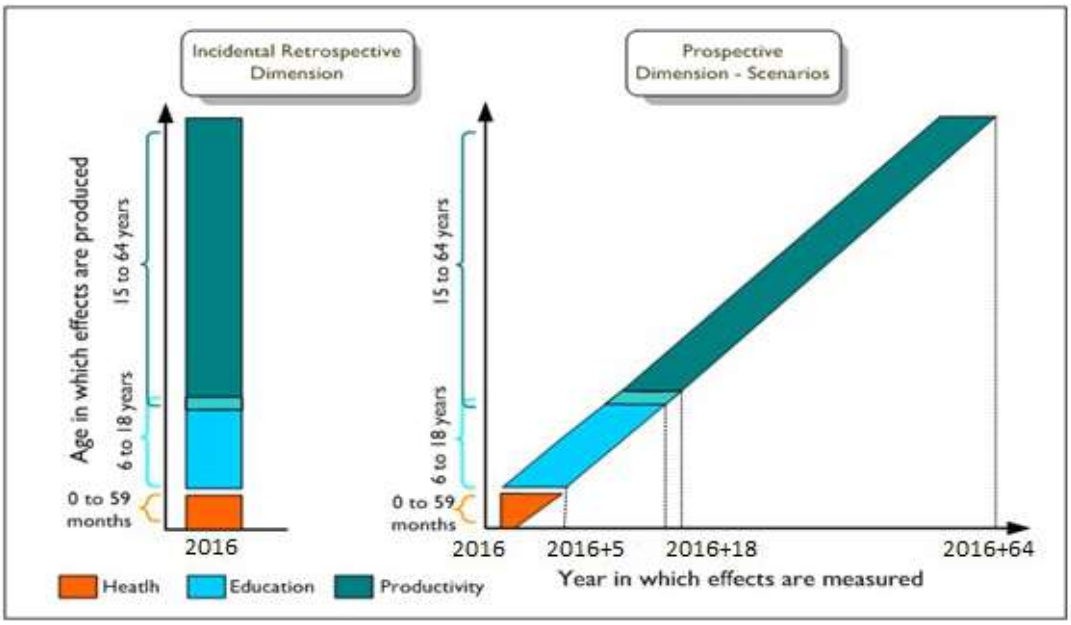
Considering that a country's undernutrition situation and the consequences thereof reflect a specific epidemiological and nutritional transition process, a comprehensive analysis involves estimates of the current situation extrapolated from previous transitional stages as well as estimates of the future 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 has been developed to estimate the costs arising from the consequences of child undernutrition in health, education and productivity:

- *Incidental retrospective* 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 pre-school 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.

- *Prospective or potential savings dimension.* This dimension focuses on children under five years of age 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 3, the incidental retrospective dimension includes the social and economic consequences of undernutrition in a specific year (for the purposes of this report, 2016 was set as the base year) for cohorts that have been affected (0 to 4 years of age for health, 6 to 18 years of age for education and 15 to 64 years of age 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 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. .[32]

2.5 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 pre-schooler, i.e., those aged 0 to 59 months.[33] 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 sub-cohorts (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 birth weight (LBW) due to intrauterine growth restriction (IUGR, defined as a weight below the tenth percentile for gestational age) is estimated. For the pre-school stage, moderate and severe stunting categories (weight-for-height scores below -2 standard deviations) are used, with reference, where possible, to the World Health Organisation (WHO) distribution for comparison purpose.[34]

32

33 In the original design, the idea of analysing 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.

34 In the estimation of stunting, a complementary analysis is done based on NCHS Standard in order to estimate the relative risk of lower productivity.

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 to 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.

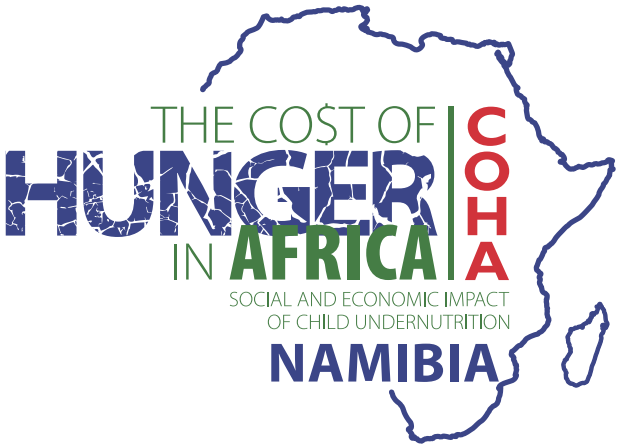
To estimate the costs for the incidental retrospective dimension, the values occurring in the year of analysis are totalled based on estimates of differential risks undergone by the different cohorts of the population. In the prospective analysis on the other hand, a future cost flow is estimated and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

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


Flora

III Section

Socio-Economic Background



Section III: Socio-Economic Background

3.1 Brief introduction

Namibia is located in Southern Africa bordering Angola and Zambia to the north, Zimbabwe and Botswana to the east and South Africa to the south. Namibia gained Independence on 21 March 1990. The country is among others known for her macro-economic and political stability, free press, regards for human rights and the independence of the judiciary. Namibia had a population of 2.4 million people in 2018[35] with an estimated population growth rate of 1.9 percent per annum. The country has the third lowest population density after Greenland and Mongolia. Namibia is characterised by a youthful population resulting in an age dependency ratio of 69.0 in 2018, down from 71.0 in 2012. The dependency ratio for the age group up to 14 years stood at 61.7, while for those over the age of 65 years at 7.2.

Despite major progress, 17.4 percent of households were classified as being poor and 10.7 percent as being severely poor in 2016. The Gini coefficient improved only slightly from 0.600 (2003/04) to 0.576 in 2015/16 reflecting the prevailing high degree of inequality.

Table 4: Socio-economic Indicators, 2011-2020

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Nominal GDP [USD] Billion	12.4	12.8	12.2	12.4	11.4	10.7	12.9	13.7	12.5	10.6
Nominal GNI [USD] Billion	11.9	12.3	12.1	12.4	11.4	10.5	12.6	13.2	12.2	10.5
GDP per capita [USD]	5,790	5,953	5,542	5,554	5,016	4,613	5,438	5,663	5,081	4,246
GNI per capita[USD]	5,634	5,715	5,527	5,522	5,008	4,523	5,339	5,454	4,956	4,194
GDP Growth %	5.1	5.1	5.6	6.1	4.3	0.0	-1.0	1.1	-0.6	-8.5
Inflation %	5.0	6.7	5.6	5.4	3.4	6.7	6.2	4.3	3.7	2.2
Dependency ratio %		71.0	72.6	69.7		69.1		69.0		
Gini Coefficient			59.7		57.6					

Source: Namibia Statistics Agency, 2021, Annual National Accounts 2020 – Authors own calculation of USD values based on average annual exchange rates from South African Reserve Bank
Namibia Statistics Agency, various years, Labour Force Survey Report
Namibia Statistics Agency, Namibia Household Income and Expenditure Survey 2015/16 Report

3.2 Gross Domestic Product and Gross National Income

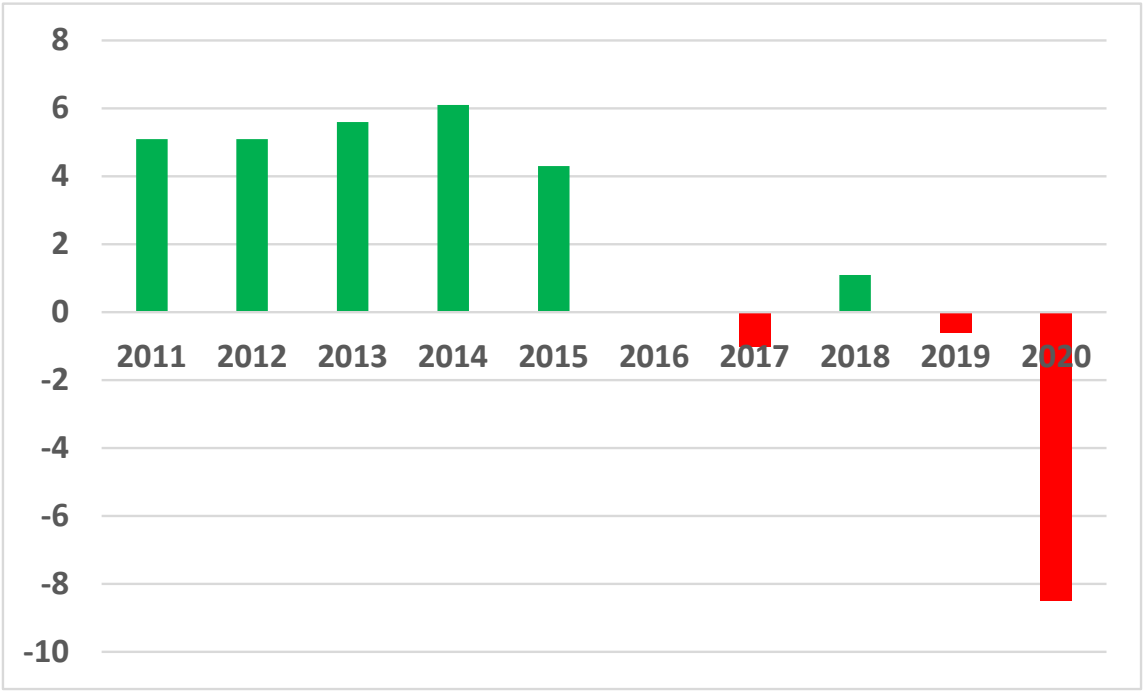
Since Independence until 2016 the Namibian economy showed positive growth rates except for a contraction by 1.6 percent in 1993. The nominal Gross Domestic Product (GDP) increased to Namibia dollar (NAD)157.7 billion in 2016, which is equivalent to USD 10.7 billion. However, various factors contributed to a decline in economic activities since 2016 resulting in an economic contraction during three of the four years even though nominal GDP rose further to NAD 174.8 billion (USD 10.6 billion) in 2020. Gross National Income (GNI) remained slightly below GDP at NAD 154.6 billion and NAD 172.7 billion in 2016 and 2020 respectively, which was equivalent to USD 10.5 billion in both years. Strong economic

35 Namibia Statistics Agency, 2018, Labour Force Survey 2018 Report

growth during the first half of the past decade was based among others on private investment in new mining developments, construction of shopping malls and residential houses as well as tourism facilities combined with public investment into transport infrastructure and office space. A slump in revenue since 2016 forced Government to cut in particular capital expenditure, while major private sector came to an end, which led to eventually negative growth rates. These trends were corroborated in 2020 by the Covid-19 pandemic and resultant lockdowns. Namibia experienced the worst economic contraction in 2020 with 8.5 percent.

Since economic growth rates exceeded population growth during most years since Independence, per capita income increased and Namibia moved upward from a low-income country to an upper middle-income country in 2013. However, the sluggish economic growth since 2016 led to a decline in real GDP per capita from NAD 64,023 (2015) to NAD 52,902 in 2020.

Figure 4: GDP Growth rates from 2011 to 2020, in percent



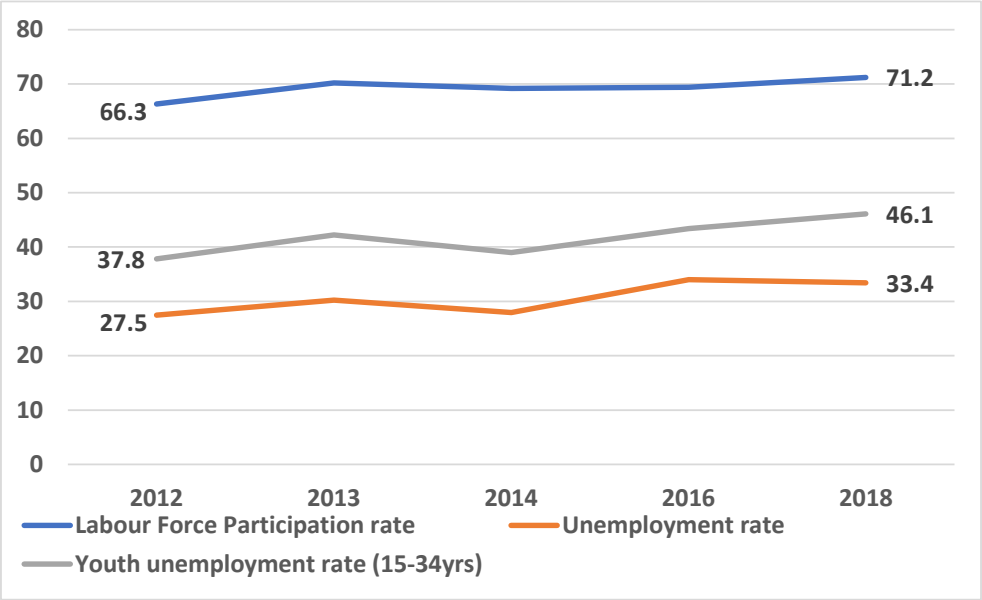
Source: NSA, various years, Annual National Accounts

The employment-to-population ratio, also referred to as employment absorption ratio, rose by 1.6 percentage points in 2016 to 47.4 percent in 2018. The absorption ratio was higher for males (49.6 percent) than for females (45.3 percent). The agricultural and fisheries sector provided employment for 23.0 percent of all employed in 2018 representing an improvement from 20.1 percent in 2016, but remained below a high of 31.4 percent in 2013. The hospitality sector, accommodation and restaurants, advanced to the second largest employer (11.4 percent) closely followed by the wholesale and retail trade sector (11.1 percent).

Despite robust economic growth between 2011 and 2016, unemployment increased from 27.5 percent to 34.0 percent largely due to consecutive droughts, which resulted in job losses in the agricultural, mainly subsistence agricultural, sector. The unemployment rate dropped slightly to 33.4 percent in 2018. Unemployment is closely related to educational attainment. While 32.7 percent of those with junior secondary education as the highest level of education were unemployed in 2016, only 6.5 percent of those holding a university degree or even 1.1 percent with a Master degree or PhD were without work. The youth is particularly hard hit by unemployment. 70.4 percent of young people in the age group 15 to 19 years of age were not employed in 2016 and 43.4 percent in the age group 15 to 34 years. The situation improved slightly for the first category to 69.9 percent in 2018, but worsened for all youth up to 34 years to 46.1 percent.

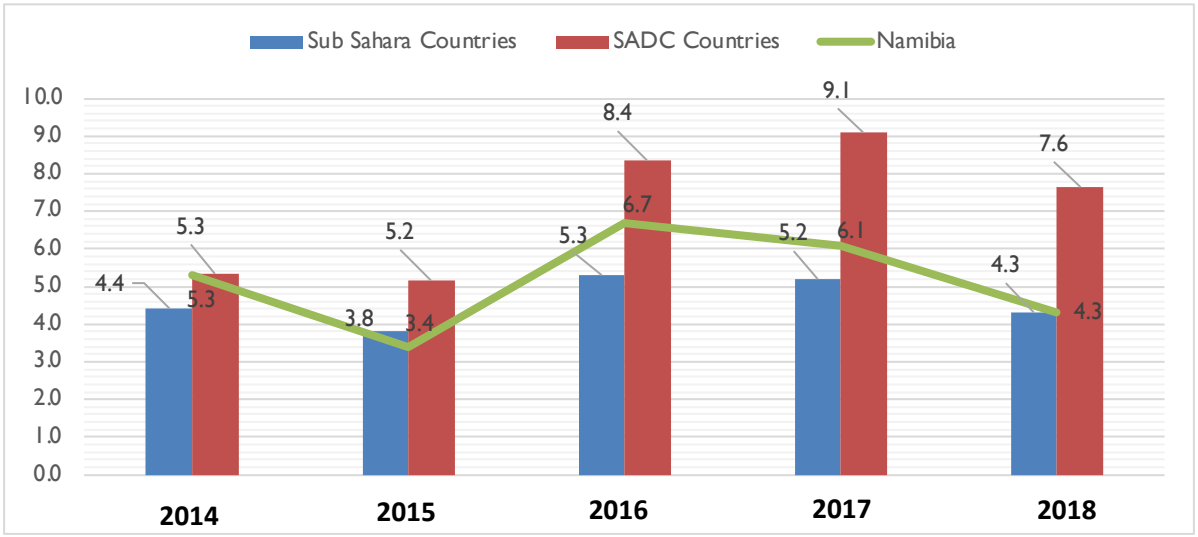
On a more positive note, the Labour Force Participation Rate (LFPR) has over the years increased from 66.3 percent to 71.2 percent in 2018.

Figure 5: Labour force trends 2012 to 2018, in percent



Source: NSA, various years, Labour Force Survey reports Source.

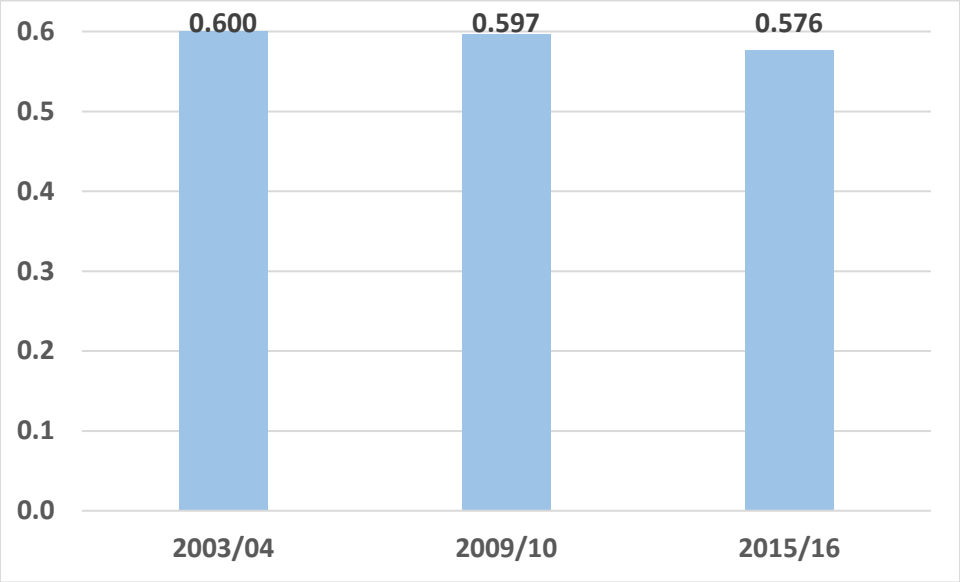
Namibia has recorded an annual inflation rate of 4.9 percent on average between 2011 and 2020, which is below the SADC average. The highest inflation rate of 6.7 percent was recorded in 2012 and in the base year 2016, while the lowest inflation rate was recorded in 2020.



Source: Author's own estimation using National Accounts data

Despite strong economic growth over the years and an extensive social safety net inequality remains one of the highest in the world implying that economic growth has not benefitted everyone equally. The Gini coefficient that ranges between zero (complete equality) and one (complete inequality) improved only marginally from 0.60 (2003/04) to 0.58 in 2015/16.

Figure 7: Gini coefficient for 2003/04 to 2015/16



Source: NSA, various years, Namibia Household Income and Expenditure Survey reports.

Education continues to absorb the highest share of budget allocation accounting for a combined 25.7 percent in the Financial Year (FY) 2020/21 with 20.7 percent allocated to basic education, arts and culture and 5.0 percent to higher education, training and innovation. Allocations in the FY2020/21 amounted to some 10 percent of GDP. The health sector has been one of the other Government priorities in terms of budgetary allocation ranking second or third among the votes. It received some 11 percent of the total budget in 2020/21 equalling some 4.6 percent of GDP.

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3.2.1 Inequality and Poverty Rates

As briefly described above (Table 4, Figure 7) Namibia is characterised by a high degree of income inequality. Income inequality has among others regional components as well as gender components. Male-headed households tend to be more unequal than female-headed households. The Gini coefficient for male-headed households decreased from 0.671 in 1993/94 to 0.589 in 2015/16 while it declined slightly for female-headed households from 0.547 to 0.544, Income inequality is reflected in the annual consumption per capita that ranges between NAD 4,194 for the 25% of households with the lowest consumption and NAD 322,808 for the 2 percent of households with the highest per capita consumption.

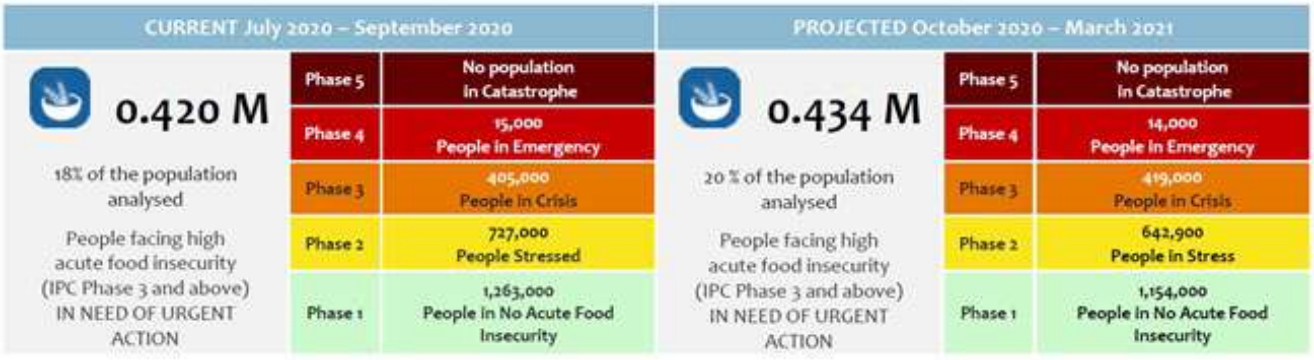
Table 6: Inequality and Poverty Rates

Indicator	2003/04	2009/10	2015/16
Gini coefficient	0.600	0.597	0.56
Food Poverty	11.0%	7.2%	6.1%
Poor households (incl. severely poor)	27.6%	19.5%	17.4%
Severely poor households	13.8%	9.6%	10.7%

Source: NSA, NHIES 2015/16,

Namibia uses the basic-needs approach to measure poverty. Three poverty lines are calculated, namely the food poverty line, the lower bound poverty line (NAD 389.30 per month) that separates the severely poor from the poor and the upper bound poverty line (NAD 520.80 per month)that separates the poor from the non-poor. Namibia has made progress in reducing poverty levels by 10 percentage points between 2003 and 2015. About 6.1 percent of the population are food poor (i.e., their total consumption expenditures are insufficient to meet their daily calorific requirement). This is a reduction of about five percentage points since 2003. A lack of adequate income to spend on food and basic needs results in inadequate access to food and nutrition for affected households.

Figure 8: Trends of food insecurity



Source: Office of the Prime Minister 2020,Namibia IPC Report

About 420,000 people (18% of the population) are facing high food insecurity (IPC Phase 3 or worse) and require urgent humanitarian action to reduce food gaps, protect and restore livelihoods and prevent acute malnutrition. Regions of Kunene, Erongo, Khomas, Ohangwena, Kavango West, Omaheke and Zambezi are classified in IPC Phase 3 (Crisis) while the remaining 7 regions are in IPC Phase 2 (Stressed). Amidst various shocks, fiscal contractions, COVID19, drought, locust evasions, animal diseases, the food insecurities is expected to worsen.

Table 7: Food insecurity over time

Year and month	Severely food insecure	Moderate insecure	Total
2016	6%	28%	34%
2017	3%	39%	42%
2018	-	-	-
2019	15%	28%	
2020	17%	30%	18%

Source: Vulnerability Assessment Report 2016-2020, Office of the Prime Minister

Over time, food insecurity declined from 34% recorded in 2016 to 18% in 2020. There are, however, pockets of insecurity in regions such as Kunene, Erongo, Khomas, Ohangwena, Kavango West, Omaheke and Zambezi that are classified in IPC Phase 3 (Crisis), while the remaining seven regions are in IPC Phase 2 (Stressed). The main drivers of this acute food insecurity are prolonged dry spells, flooding and loss of income due to impacts of Covid-19 on livelihoods. Government supported 798,384 food insecure people with drought relief in the FY2017/18 and 429,274 in 2019/20, to meet their food and nutrition needs[36].

[36] Republic of Namibia, 2020, Harambee Prosperity Plan – Final Report

Table 8: Main source of drinking water in percent of households

Source	2003/04	2015/16
Piped water	75.0	30.1
Boreholes/ protected wells	12.2	7.5
Stagnant water	7.6	0.8
Flowing water	4.8	2.1
Other sources	0.5	5.2

Sources: Central Bureau of Statistics, National Planning Commission, 2006, NHIES 2003/04; Namibia Statistics Agency, no date, NHIES 2016/17.

Inadequate access to safe water and poor sanitation are public health concerns because they create conditions conducive for the spread of diseases as the outbreak of Hepatitis E and currently the Covid-19 pandemic evidently demonstrate. 84.4 percent of households in Namibia had access to piped drinking water in 2016 representing an improvement of almost ten percentage points compared to 2003/04. The rural-urban migration, however, requires ongoing efforts to continuously upgrade and expand the provision of safe water to new, often informal, settlements.

Table 9: Main toilet facility in percent of households

Source	2003/04	2015/16
Flush toilet	36.7	44.7
Pit latrine	8.4	9.8
Bucket toilet	1.3	0.3
Bush/ no toilet	53.2	44.8

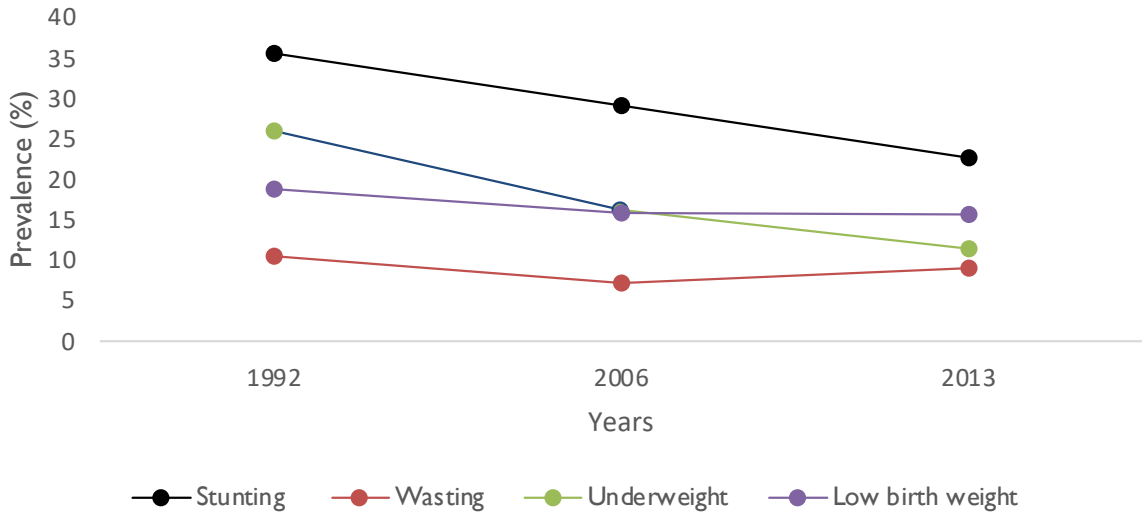
Sources: Ibid.

Less than half of the households in Namibia had access to safe sanitation (44.7 percent).The improvement by eight percentage points compared to 2003/04 covers a deterioration in urban areas, where access to safe sanitation declined from 74.5 percent to 70.2 percent due to the increase in informal settlements.

3.2.2 Health

There is insufficient data to assess the progress that Namibia has made towards achieving the target for stunting. However, the latest prevalence data shows that 23.7 percent of children under five years of age are affected (NDHS, 2013), which is an improvement by some five percentage points compared to 2006. This is lower than the average for the Africa region (29.1 percent).

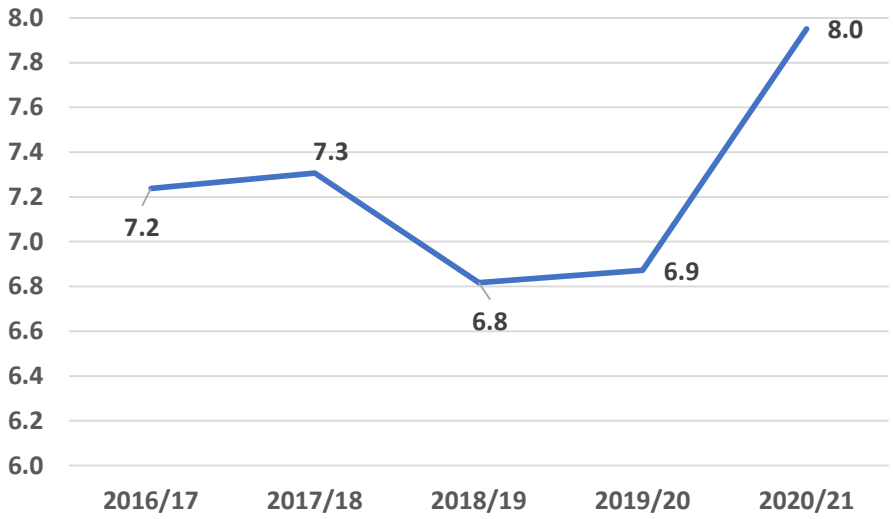
Figure 9: Trends in Nutrition Status of Children, 1993-2016 (in per cent)



Source: NDHS (1993. 1998, 2003, 2008/9 and 2013, WHO (1994, 1997, 2000, 2006, 2013)

The four indicators shown above in Figure 7 indicate stronger improvements in the rates of stunting and underweight, while the rates for wasting and low birth weight have not really improved significantly. The rate of wasting declined from 7.5 percent (2006) to 6.2 percent in 2013.

Figure 10: Allocation to the Ministry of Health in NAD billion, 2016/17 to 2020/21



Source: Ministry of Finance, various years, Estimates of Revenue and Expenditure

The Ministry of Health and Social Services received since Independence the second or third highest budgetary allocation after the Ministries of Education (basic and higher) competing with the Ministry of Defence for the second spot. Its allocation increased from NAD 7.2 billion in 2016/17 to NAD 8.0 billion in 2019/20 amounting to 12.5 percent and 11.0 percent of total expenditure.

3.2.3 Infant mortality rate, for SADC countries

Infant mortality rate (IMR) is the number of infants dying before reaching one year of age, per 1,000 live births in a given year. The IMR for Namibia is slightly better compared to other SADC countries. The average IMR for Namibia stood at 32.1 per 1,000 live birth in2013. Only Seychelles, Mauritius and South Africa had a better rating (see Table 10 below). The IMR for Namibia declined from 41.2 in 2007 and 39.7 in 2008.

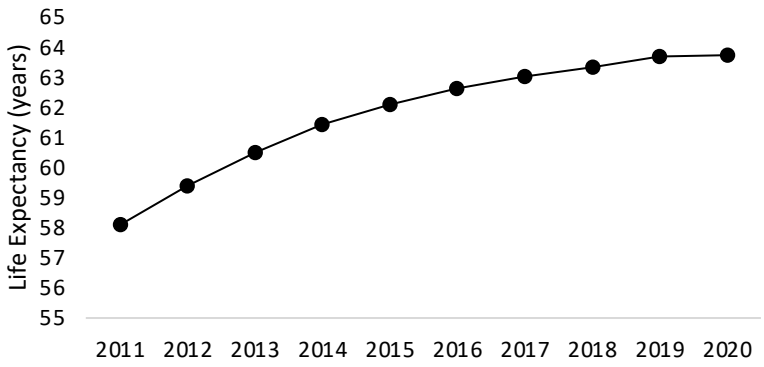
Table 10: Infant Mortality Rates for SADC countries over time

Country	2013	2014	2015	2016	2017	2018	Average
Angola	63.6	60.5	57.8	55.5	53.4	51.6	57.1
Botswana	34.8	34.5	33.2	32.3	30.8	30.0	32.6
Comoros	58.9	57.4	56.0	54.4	52.8	51.3	55.1
Congo (Democratic Republic of the)	77.9	75.9	73.9	71.9	70.0	68.2	73.0
Eswatini	54.0	52.8	47.9	46.3	45.5	43.0	48.3
Lesotho	73.0	71.3	71.2	70.3	68.8	65.7	70.1
Madagascar	42.6	41.6	40.8	39.9	39.1	38.2	40.4
Malawi	45.2	42.3	40.3	38.3	36.8	35.3	39.7
Mauritius	12.8	12.6	12.5	12.6	12.9	13.6	12.8
Mozambique	63.1	61.2	59.3	57.5	55.5	54.0	58.4
Namibia	35.3	34.4	33.5	30.6	29.7	29.0	32.1
Seychelles	12.5	12.6	12.7	12.7	12.6	12.4	12.6
South Africa	34.1	32.9	31.4	30.7	29.6	28.5	31.2
Tanzania (United Republic of)	43.9	43.0	41.9	40.6	38.8	37.6	41.0
Zambia	47.8	45.9	44.5	43.1	41.5	40.4	43.9
Zimbabwe	42.8	40.4	38.5	36.3	35.4	33.9	37.9

Source: UNDP Human Development Reports. http://hdr.undp.org/en/data#

Life expectancy is the number of years a new-born infant could expect to live if prevailing patterns of age-specific mortality rates at the time of birth stay the same throughout the infant's life. There has been a slight increase in the life expectancy in Namibia, recording above 60 since 2013 (World Bank, 2020).

Figure 11: Life expectancy in Namibia, 2011 to 2020



Source: The World Bank Reports. https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=NA

Being a sparsely populated country, Namibia encounters the challenges of great distances to health facilities (NPC, 2019). This leads to differences in terms of how the population is catered for. According to the NHIES 2015/16, 17.9 percent of households in Namibia have to travel a distance longer than 10 kilometres to the nearest health facility. Of those living in rural areas, 36.5 percent lived more than 10 kilometres from the nearest health facility. At a regional level, only 40.7 percent of people in Kavango West, 43.8 percent in Ohangwena, and 44.3 percent in Kunene lived within five kilometres of a heath facility. The accessibility of health facilities in particular in rural areas could explain why pregnant women opt not to travel to health facility for ante natal care visits, which in turn could be the reason for high maternal mortality rates.

Table 11: Maternal Mortality Ratio for SADC

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Angola	450	546	526	350	351	239	239	477	n.a.	n.a.
Botswana	163	189	148	183	143	149	129	129	129	129
Comoros	388	376	365	354	344	335	335	335	n.a.	n.a.
Democratic Republic of Congo	794	777	771	746	717	693	693	693	n.a.	n.a.
Eswatini	320	418	400	310	400	389	389	452	n.a.	n.a.
Lesotho	1155	1143	1143	1143	1143	1024	618	487	n.a.	n.a.
Madagascar	436	420	402	384	369	353	353	353	426	n.a.
Malawi	675	618	624	574	574	634	634	634	n.a.	n.a.
Mauritius	33	34	62	66	52	47	46	74	39	62
Mozambique	490	408	563	480	506	489	489	452	n.a.	n.a.
Namibia	200	315	299	130	273	265	265	265	n.a.	n.a.
Seychelles	133	0	0	64	0	188	n.a.	n.a.	n.a.	n.a.
South Africa	267	197	165	158	154	138	138	138	n.a.	n.a.
United Republic of Tanzania	454	454	432	432	432	432	556	556	556	556
Zambia	483	n.a.	n.a.	398	398	224	224	224	n.a.	n.a.
Zimbabwe	960	483	525	470	614	651	443	443	n.a.	n.a.

Source: SADC Demographic and Social statistics (2019), https://www.sadc.int/files/4816/1279/0669/SADC_SYB_2019_Print_version_V1.0.pdf

3.2.4 Infant and Young Children Feeding Practice (IYCFP)

According to UNICEF, children of different age groups are to be fed in different patterns in order for them to acquire all necessary nutrients and micronutrients needed for their growth and development. On average, more than 66 percent of the households are feeding the children as per UNICEF recommendations or better. All households in all regions are doing well in both provision of the correct number of meals to children and given more than four food groups at all mealtimes.

Table 12: Infant and young children feeding practice by region

		Minimum Acceptable Diet for Children		
		Yes	No	Total
Region Name	Khomas	69.60	30.40	100
	//Kharas	69.70	30.30	100
	Omaheke	57.60	42.40	100
	Otjozondjupa	64.00	36.00	100
	Omusati	63.50	36.50	100
	Ohangwena	67.70	32.30	100
	Oshana	55.80	44.20	100
	Oshikoto	60.00	40.00	100
	Kavango East	68.20	31.80	100
	Kavango West	82.10	17.90	100
	Zambezi	61.90	38.10	100
	Hardap	66.70	33.30	100
	Kunene	73.30	26.70	100

Good nutrition is a vital building block in the foundation of human health and development and is a driver for sustainable development. Good nutrition throughout the lifecycle is a prerequisite to good health, which adds quality to life and is at the core of a strong and productive society. The triple burden of malnutrition in Namibia is characterized by the coexistence of (i) undernutrition as manifested by stunting, wasting, underweight; (ii) micronutrient deficiencies; (iii) overweight and obesity including diet-related non-communicable diseases (DRNCD).

Table 13: Population and Child Undernutrition in Namibia, 2016

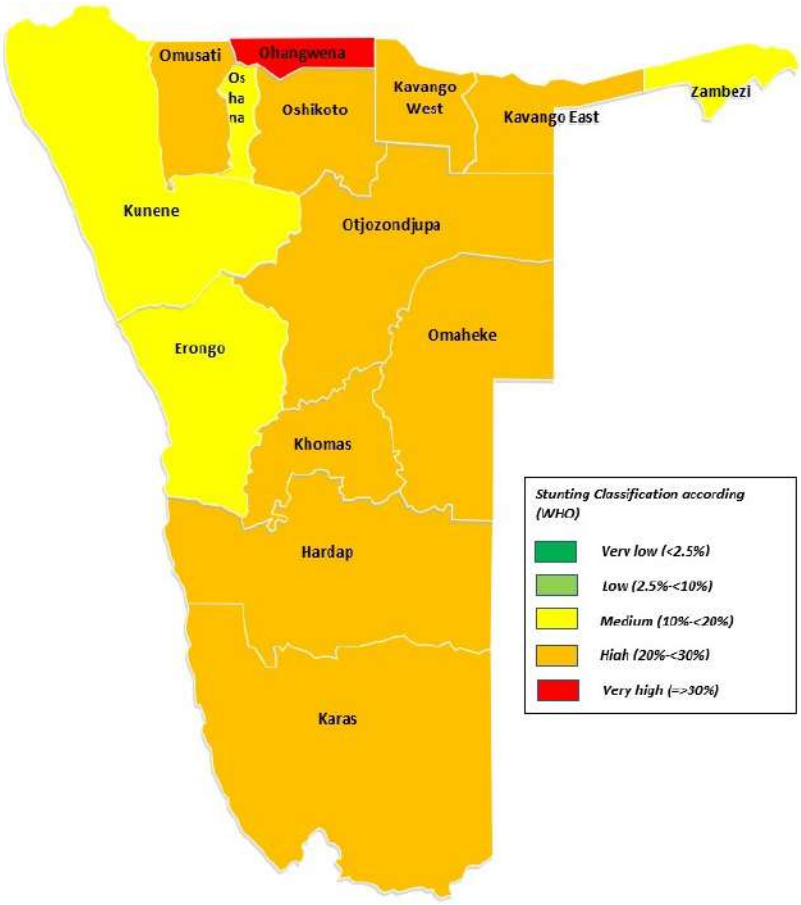
		Low Birth Weight		Underweight		Stunting	
Age groups	Population size (2016) a/	Population affected (2016)	Prevalence (2016)b	Population affected (2016)	Under-weight prevalence (2016)b/	Population affected (2016)	Stunting prevalence (2016)b/
Newborn (IUGR)a		5,566	8.0				
0 to 11 months	69,576			12,663	18.2%	14,611	21.0%
12 to 23 months	66,470			13,626	20.5%	23,730	35.7%
24 to 59 months	185,130			36,656	19.8%	58,871	31.8%
Total	321,176	5,566	8.0%	62,945	30.3%	97,212	30.3%

Source: Estimated based on NDHS surveys 2013 and demographic projections

a./ In a given year, the new-born population is the same as the 0-11 month's age group.

b/ Estimated on the basis of the equation of De Onis et al, 2003.20

Figure 1.3: Map of distribution of stunting in Namibia based on 2016 revised WHO/UNICEF classification thresholds (NDHS 2013)



3.2.5 Education

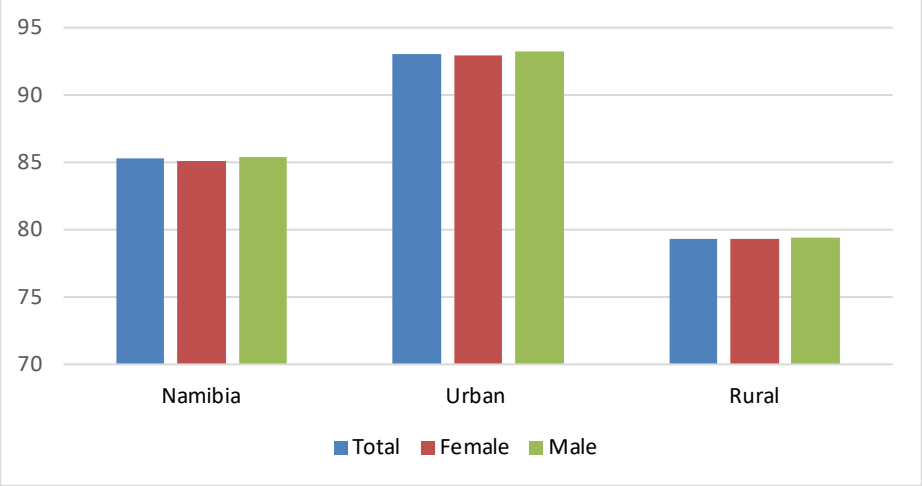
3.2.5.1 Education Expenditure

Education has always received the largest budgetary allocation, exceeding at least 20 percent of total expenditure, if not 25 percent. The Ministry of Education, Arts and Culture received NAD 12.9 billion in the FY2016/17 and NAD 14.2 billion in 2020/21, while the Ministry of Higher Education, Training and Innovation was allocated NAD 2.7 billion and NAD 3.3 billion respectively. These allocations represented 22.4 percent and 4.7 percent in the FY2016/17 and 15.9 percent and 5.3 percent respectively in FY202021.

3.2.5.2 Literacy and education

Literacy rate is the percentage of people aged five years and above who can read and write with understanding in at least one language. Literacy in Namibia is 85 percent for both sexes. It is similar for both males and female. However, it is higher in urban areas (93 percent) than in rural (79 percent).

Figure 14: Literacy rate for population age 5 years and above by sex and urban/rural



Source: EMIS 2018 report

3.2.5.3 Early Childhood Development

Early Childhood Development (ECD) is essential for the development of children. A well-developed child in early ages is likely to achieve higher levels of food security and economic independence as an adult. Educational attainment is known to be a critical step to stop the generational repetition of poverty. The Ministry of Gender Equality, Poverty Eradication and Social Welfare (MGEPESW) is responsible for ECD programmes covering 0 – 4 year old children. The rate of children not attending ECD was still alarmingly high (77.0 percent) in 2016 even though there was an improvement compared to 2011 (86.6 percent).

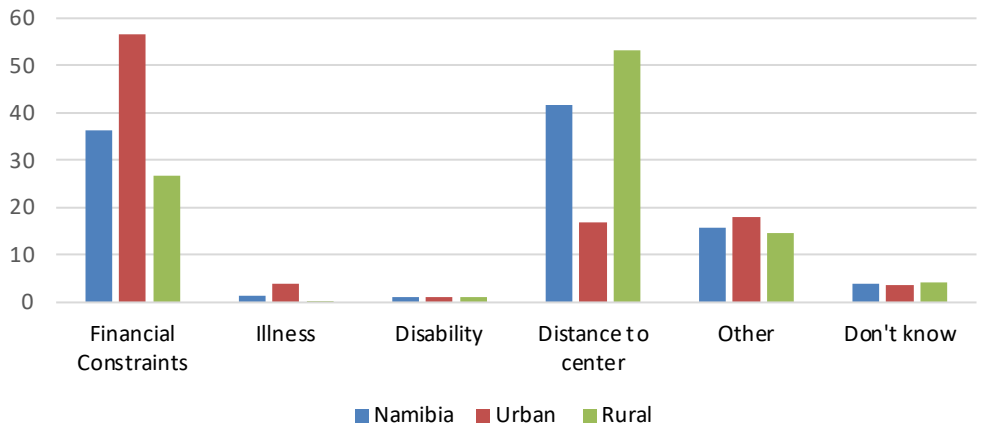
Table 15: Children Enrolled in ECD aged 0¬-4 years

	Total number of children	Attending ECD		Not Attending ECD	
		Number	Percent	Number	Percent
Census 2011	281,162	37,789	13.40%	243,373	86.60%
2016	321,925	74,061	23%	247,864	77%

Source: NPC policy brief: on increasing enrolments in early childhood development (ECD): how far have we come?

There are several reasons as to why parents may decide not to enrol their children for ECD, amongst others the distance to an ECD centre and financial constraints. These reasons are more prominent in some areas than others for example, the financial constraint is highest in urban areas while distance to centre in low. However, when looking at the rural areas financial constraints is lower than distance to centre.

Figure 15: Children 0 -4 years of age not attending ECD, by reason in percent



Source: NSA 2016 intercensal demographic survey

3.2.5.4 Pre-primary to grade 12

In Namibia, access to education is enshrined in the constitution, which might be the reason for the high enrolment rate. The constitution states, no child is allowed to leave school until they have completed primary school or are older than 16 years of age. Community members can therefore report households that have children falling into this category, but not attending school to the authorities. Enrolment rate is calculated by dividing the number of leaners per grade by the population in the specific age group that is expected to be in that grade. There are some Grades where the enrolment rate is more than 100 percent implying that some leaners do not fall in the age group for this Grade, but are usually older either because they have repeated grades or started school late. The enrolment rate in Figure 15 is high from Grade 1 and starts to drop below 100 percent from Grade 9 to 12.

Figure 16: Learners' enrolment by Grade in 2017

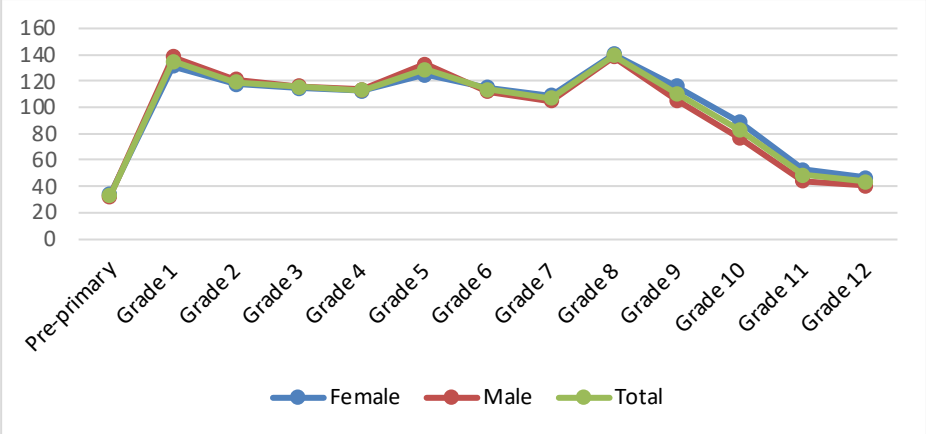


Table 16 below indicates the succession of leaners from Grade 1 to 11 from the year 2017 and promotion to the next grade in 2018. The promotion rate for most grades was above 75 percent except for Grade 8 (60.8 percent) and Grade 10 (59.4 percent). Similarly, the repetition rate was highest for grades 8, 4 and 1 respectively. For most grades, repetition rate is highest among male learners except for Grade 10 and 11 in which the repetition rate for female learners was higher.

Table 16: Promotion, repetition and school-leaving rates in grade 1 – 11 in 2017

Grade	Promotion Rates			Repetition Rates			School-Leaving Rates		
	Total	Females	Males	Total	Females	Males	Total	Females	Males
Average	**78.0%**	80.3%	75.8%	**15.9%**	14.1%	17.7%	**6.0%**	**5.5%**	**6.5%**
Grade 1	**77.8%**	81.3%	74.5%	**20.3%**	17.0%	23.4%	**1.9%**	1.7%	2.1%
Grade 2	**85.1%**	88.1%	82.3%	**14.2%**	11.4%	16.9%	**0.7%**	0.5%	0.8%
Grade 3	**86.3%**	89.2%	83.6%	**12.4%**	9.7%	15.0%	**1.3%**	1.2%	1.4%
Grade 4	**75.0%**	80.4%	70.1%	**22.3%**	17.8%	26.5%	**2.7%**	1.9%	3.4%
Grade 5	**78.3%**	81.4%	75.1%	**18.8%**	16.0%	21.5%	**3.0%**	2.6%	3.4%
Grade 6	**80.8%**	83.1%	78.6%	**15.2%**	13.2%	17.2%	**4.0%**	3.7%	4.2%
Grade 7	**84.0%**	86.3%	81.6%	**10.1%**	8.7%	11.5%	**6.0%**	5.0%	6.9%
Grade 8	**60.8%**	62.6%	59.0%	**29.3%**	28.1%	30.6%	**9.9%**	9.4%	10.4%
Grade 9	**76.2%**	76.7%	75.7%	**17.4%**	17.0%	17.8%	**6.4%**	6.3%	6.4%
Grade 10	**59.4%**	59.9%	58.9%	**10.9%**	11.8%	9.9%	**29.7%**	28.4%	31.2%
Grade 11	**94.7%**	95.0%	94.5%	**4.4%**	4.6%	4.2%	**0.8%**	0.4%	1.3%

Source: EMIS 2018 report

The following Table 17 shows the enrolment grade by age. There are pupils aged 25 years of age and above that are still in school, mostly in Grade 12.

Table 17: Age distribution by grade

Grade	Age																					
	Total	5 or less	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25 or more
Total	**736,836**	**8,502**	**43,303**	**59,831**	**60,274**	**60,042**	**60,784**	**57,533**	**55,861**	**54,691**	**50,892**	**48,254**	**44,901**	**41,614**	**36,163**	**23,540**	**14,512**	**7,883**	**4,395**	**2,106**	**983**	**772**
Pre-Primary	**43,448**	8,407	33,655	1,197	116	18	6	29	11	4	4	1	-	-	-	-	-	-	-	-	-	-
Grade 1	**85,937**	95	9,546	52,650	16,360	3,979	1,736	717	393	229	115	41	33	35	6	1	1	-	-	-	-	-
Grade 2	**75,887**	-	89	5,859	39,113	18,517	7,452	2,661	1,124	584	269	132	58	31	12	4	1	-	1	-	-	-
Grade 3	**71,837**	-	4	97	4,532	32,856	18,583	8,556	3,704	1,758	861	455	218	112	60	24	11	-	-	2	1	3
Grade 4	**77,144**	-	-	1	61	4,427	29,305	19,865	12,115	6,217	2,873	1,219	580	242	152	49	25	6	4	1	1	1
Grade 5	**67,337**	-	-	-	3	64	3,444	22,417	16,935	12,080	6,391	3,246	1,520	687	334	131	46	21	10	4	-	4
Grade 6	**59,470**	-	-	-	-	-	59	3,031	18,473	14,241	10,546	6,518	3,474	1,697	875	345	121	38	17	30	3	2
Grade 7	**53,107**	-	-	-	-	-	2	85	2,876	16,820	12,019	9,173	5,651	3,250	1,865	856	335	93	42	23	11	6
Grade 8	**59,946**	-	-	-	-	-	-	-	93	2,552	15,444	13,362	11,065	7,654	4,894	2,840	1,247	475	185	78	30	27
Grade 9	**45,926**	-	-	-	-	-	-	-	2	38	2,164	11,842	9,132	7,432	5,873	4,288	2,726	1,329	609	284	118	89
Grade 10	**45,369**	-	-	-	-	-	-	-	3	39	67	2,086	11,369	10,002	8,075	5,560	3,648	2,185	1,244	634	270	187
Grade 11	**25,780**	-	-	-	-	-	-	-	-	-	3	69	1,534	8,370	5,952	4,031	2,642	1,497	907	398	203	174
Grade 12	**23,653**	-	-	-	-	-	-	-	-	3	4	9	142	1,933	7,853	5,255	3,635	2,198	1,367	643	340	271
Other grades	**1,995**	-	9	27	89	181	197	172	132	146	132	101	125	169	212	156	74	41	9	9	6	8

EMIS: 2018 report

3.2.5.5 Teachers

The teacher to learner ratio stands at 25:1 meaning there are on average 25 leaners for every teacher. About 90 percent of teachers in 2018 were reported to have undergone formal teacher training.

Table 18: Number of teachers by qualification and training

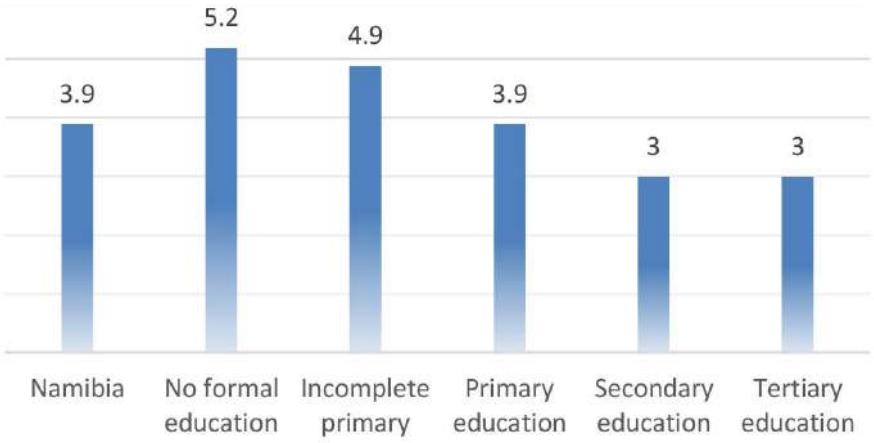
Qualification	Year						
	2012	2013	2014	2015	2016	2017	2018
Total – all teachers							
Total	**24,660**	**26,012**	**26,749**	**27,990**	**28,922**	**30,042**	**30,261**
Less than Grade 12	724	733	623	582	498	465	453
Grade 12 or Grade 12 plus 1 or 2 years' tertiary	3,365	2,727	3,436	3,843	4,585	4,767	4,307
Grade 12 plus 3 or more years' tertiary	20,571	22,552	22,690	23,566	23,839	24,810	25,501
Teachers without teacher training							
Total	**1,207**	**2,070**	**2,567**	**3,135**	**4,063**	**3,568**	**2,763**
Less than Grade 12	225	344	276	243	213	212	191
Grade 12 or Grade 12 plus 1 or 2 years' tertiary	863	1,536	2,103	2,569	2,920	3,123	2,379
Grade 12 plus 3 or more years' tertiary	119	190	188	323	930	233	193
Teachers with teacher training							
Total	**23,453**	**23,942**	**24,182**	**24,855**	**24,859**	**26,474**	**27,498**
Less than Grade 12	499	389	347	338	285	253	262
Grade 12 or Grade 12 plus 1 or 2 years' tertiary	2,502	1,191	1,333	1,274	1,665	1,644	1,928
Grade 12 plus 3 or more years' tertiary	20,452	22,362	22,502	23,243	22,909	24,577	25,308

Source: EMIS, 2018

3.2.5.6 Fertility rates VS level of education

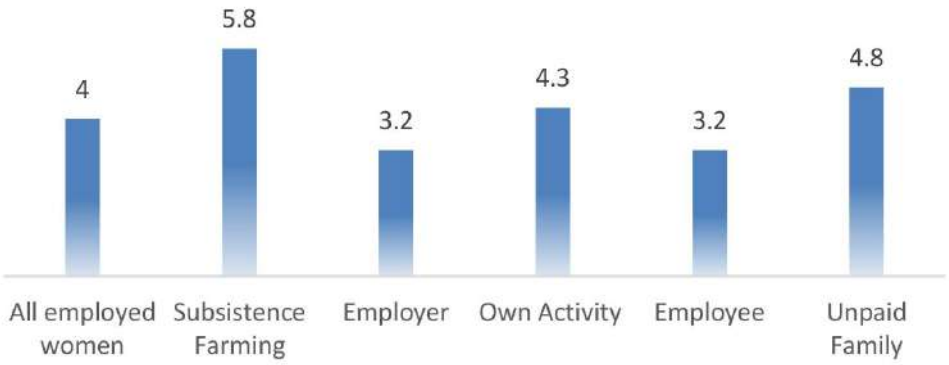
Fertility rate is the average number of children born to a woman during their reproductive years. According to the Census Fertility Report and NDHS, fertility decreases as the level of education increase for women between the ages of 15 – 49 years as shown in Figure 16 below. The average fertility rate for Namibia is 3.9 and highest among those that have no formal education.

Figure 17: Total Fertility Rate by level of education



Source: Namibia Statistics Agency 2011 Census Fertility Report

Figure 8: Total Fertility Rate by activity status



Data source: Namibia statistics agency 2011 Census Fertility Report

There is an indication that employment status has an influence on the number of children a woman have. Figure 8, shows the fertility rate by economic status for women aged 15 to 49. Women in subsistence farming and the unpaid family have the highest number of children, with a fertility rate of 5.8 and 4.8 respectively. While the employees have the lowest fertility rate of 3.2.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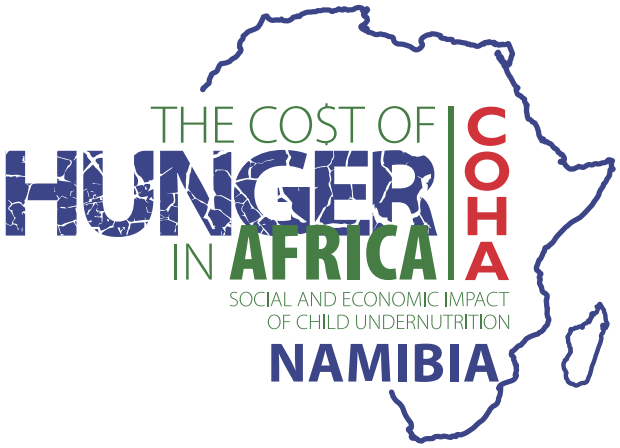
Section IV

Effects and Costs of Child Undernutrition



Section IV: Effects and Costs of Child Undernutrition

4.1 Brief introduction

Undernutrition is mainly characterised by wasting - a low weight-for-height -, stunting - low height-for-age and underweight - low weight-for-age. In early childhood, undernutrition has negative life-long and intergenerational consequences; undernourished children are more likely to require medical care as a result of undernutrition-related diseases and deficiencies.[37] This increases the burden on public social services and health costs incurred by the public and the affected families. Without proper care, underweight and wasting in children results in a higher risk of mortality.[38] During schooling years, stunted children are more likely to repeat grades and drop out of school,[39] thus reducing their income-earning capability later in life.[40] Furthermore, adults who were stunted as children are less likely to achieve their expected physical and cognitive development, thereby impacting on their productivity.[41]

4.2 Social and economic cost of child undernutrition in the health sector

Undernutrition at an early age predisposes children to higher morbidity and mortality risks.[42] 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 Birth Weight (LBW), underweight, anaemia, Acute Respiratory Infections (ARI), Acute Diarrheal Syndrome (ADS), and fever/malaria associated with undernutrition in children under the age of five.

4.2.1 Effects on Morbidity

The most direct effects of undernutrition are felt in individuals' health, as their vulnerability to both death and illness increases. Undernutrition makes certain pathologies more likely to occur and/or intensify. Based on the differential probability analysis undertaken with NDHS 2013 data, underweight children have 5.4 percent increased risk of diarrhoea compared to children who are not underweight. In addition, the risk of respiratory infection was 2.0 percent higher among underweight children compared to those who were not underweight. Further, the study estimated that in 2016, there were 182,379 incremental episodes of childhood illness related to underweight. In addition, pathologies related to underweight were 148,919 (98.4 percent) and low birth weight in intrauterine growth restriction (IUGR), totalled 2,489 (1.6 percent) episodes in 2016 see Table 19 below.

Table 19: Morbidities for children under-five associated with underweight, by pathology, 2016

Pathology	Number of Episodes	Distribution of Episodes
Diarrhoea	16,405	53.0%
ARI	504	1.6%
Malaria	1,243	4.0%
Anaemia	12,819	41.4%
Subtotal	**30,971**	
LBW	2,489	1.6%
Underweight	148,919	98.4%
Subtotal	**151,408**	
Total	**182,379**	

Source: Model estimations based on NDHS 2013, and demographic information

[37] Ramachandran P. and Gopalan H., "Undernutrition & risk of infections in preschool children", Indian J Med Res 130, November 2009, pp. 579-583

[38] 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

[39] H. Alderman, "Long-Term Consequences of Early Childhood Malnutrition," Oxford Economic Papers 58, no. 3 (May 03, 2006), doi:10.1093/oep /gpl008

[40] Ibidem

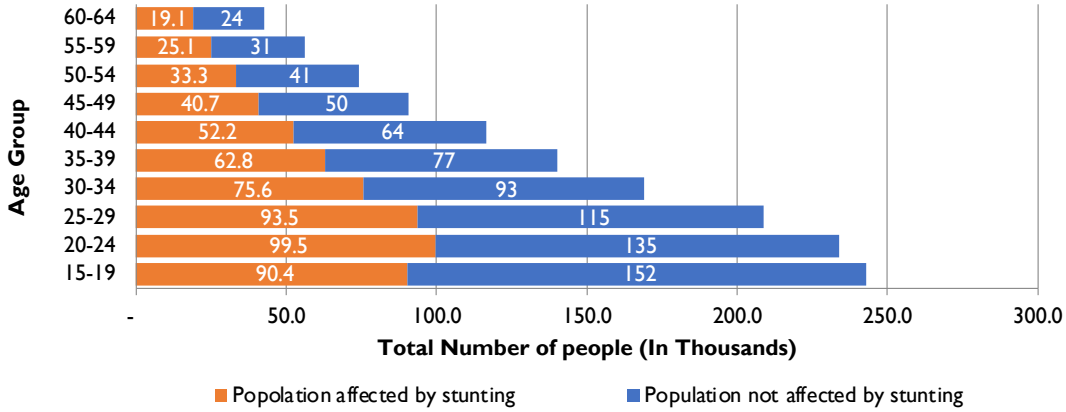
[41] Ibid.

[42] Ramachandran P. and Gopalan H., "Undernutrition & risk of infections in preschool children", Indian J Med Res 130, November 2009, pp. 579-583

4.2.2 Stunting levels of the working age population

Undernutrition, in particular stunting in children, has a negative impact on their productivity at later stages in life.[43] Namibia has made progress in reducing stunting in children from a high of 38.2 percent to 30.4 percent over a 24 year period (1992-2016), nevertheless, stunting rates still remain high.[44] As illustrated in Figure 19, the model estimated that 592,252 adults in the working-age population suffered from growth retardation before reaching five years of age. In 2016 this represented 43.1 percent of the population aged 15-64 years who were in a disadvantaged position as compared to those who were not undernourished as children.

Figure 19: Working age population affected by childhood stunting, by age *(in thousands of people)*



Source: Model estimations based on demographic information and WHO/NCHS database.

4.2.3 Effects on mortality

Child undernutrition can lead to increased cases of mortality most often associated with incidences of diarrhoea, pneumonia and malaria.[45] 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 utilises relative risk factors[46] 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,[47] and historical nutrition information.

In the last five years alone, it is estimated that 12,711 child deaths in Namibia were directly associated with undernutrition. These deaths represent 22.6 percent of all child mortalities for this period. Thus, it is evident that undernutrition significantly exacerbates the rates of death among children and limits the country's capacity to achieve the SDGs, especially the goal to reduce child mortality.

Table 20: Impact of undernutrition on child mortality, Adjusted by survival rate, 1951-2016 *(in number of mortalities)*

Period	Number of child mortalities associated to undernutrition
1951-2000	47,547
2001-2010	10,883
2011-2016	12,711
Total	**71,141**

Source: Model estimations based on life tables provided by Namibia Statistic Agency (NSA)

43 Idem

44 Idem

45 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

46 Idem

47 Data provided by the Namibia Statistics Agency, http://www.un.org/esa/population/unpop.htm

These historical mortality rates will also have an impact on national productivity. The model estimates that an equivalent of 3.6 percent of the workforce in 2016 has been lost due to the impact of undernutrition in increasing child mortality rates. This represents 47,547 people who would have between 15-64 years old, and part of the working age population of the country.

4.2.4 Estimation of public and private health costs

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[48] that is often more costly than the monetary value and effort needed to prevent undernutrition. The economic cost of each episode is often increased by inefficiencies when such cases are treated without proper guidance from a health-care professional or due to lack of access to proper health services. These costs generate a significant important burden not just to the public sector but also to society as a whole.

It is estimated that 182,379 clinical episodes in Namibia in 2016 were associated with the higher risk present in underweight children. As indicated in Table 21, these episodes generated an estimated cost of NAD 517 million.

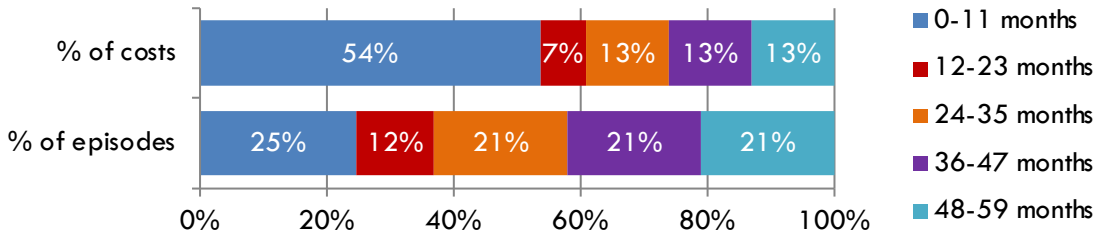
Table 21: Health costs of undernutrition-related pathologies, 2016

Pathology	% of episodes	% of cost	Cost millions of NAD	Cost in Millions USD
Underweight	81.1%	61.7%	319.0	21.7
Low birth weight (IUGR)	1.4%	31.1%	160.6	10.93
Acute diarrheal syndrome (ADS)	8.9%	3.4%	17.4	1.19
Acute respiratory infection (ARI)	1.3%	0.7%	3.8	0.26
Fever/Malaria	0.3%	0.2%	1.3	0.09
Anaemia	7.0%	2.8%	14.4	0.98
Total Cost	**100%**	**100%**	**516.6**	**35.1**

Source: Model estimations based on NDHS 2013

Most of these costs incurred were associated with the protocol required to bring an underweight child back to a proper nutritional status, which often requires therapeutic feeding.[49] An important element to highlight is the particular costs generated by the treatment of low birth weight children. These cases represented 1.4 percent of all the episodes but generated 31.1 percent of the total cost (Table 21). This is due to the special management protocol required by LBW children which often includes hospitalization and time in intensive care.[50]

Figure 20: Distribution of incremental episodes and costs of illness associated with undernutrition by age group



Source: Model estimations based on NDHS 2013, and demographic information

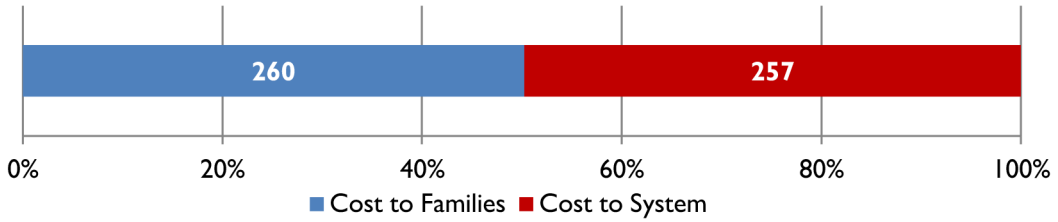
48 WHO, Management of severe malnutrition: a manual for physicians and other senior health workers ISBN 92 4 154511 9, NLM Classification: WD 101, 1999

49 According to primary data collected from health posts and hospitals in Namibia, a child with an LBW requires to stay in the health facility for a greater number of days than for other pathologies. This ultimately increases the cost of treatment.

50 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: http://www.thousanddays.org/

A large proportion of costs related to undernutrition are borne by families, as these children are often not provided with proper health care. Based on the information collected by the NIT, the model estimated that all these episodes presented receive proper health care. As explained in the methodology section of this report, medical costs incurred in a treatment facility are used as shadow costs to estimate the burden borne by families. Figure 21 summarizes the institutional (public system) and costs to caretakers of treating pathologies associated with undernutrition. In Namibia, it is estimated that families bear around 50 percent of the costs associated with undernutrition, while the cost to the health system was 50 percent.

Figure 21: Distribution of private and public costs (in percent and NAD million[51])



Although the families of undernourished children incur some of the health costs related to undernutrition, the burden of this phenomenon is still an important expenditure component in the public sector. In 2016, the annual estimated cost to the public sector was equivalent to 1.8 percent of the total budget allocated to health.[52] Overall, the economic impact of undernutrition in health-related aspects was equivalent to 3.6 percent of the GDP of that year.

4.3 Social and economic cost of child undernutrition in the education sector

There are many potential causes for repetition and dropout; however, there is substantive research that shows that students who were stunted before the age of five years are more likely to underperform in school[53] and thus leading to repetition and or dropout. The number of repetition and dropout cases considered in this section result from applying relative risk factors of repeating and dropping out (Daniel and Adair 2004) associated to stunted children to the information provided by the 2016 Education Management Information System (EMIS). The primary and secondary unit cost estimations are based on information provided by 2016 EMIS.

4.3.1 Effects on repetition

Children who suffered from undernutrition before five years of age are more likely to repeat grades, compared to those not afflicted by undernutrition.[54] In 2016, Net Enrolment Ratio (NER) was 88.2 percent for primary school and 48.2 percent for secondary school.[55]

Using data on increased risk of repetition among stunted students, the model estimated that the repetition rate for stunted children was 23.7 percent, while the repetition rate for non-stunted children was 9.7 percent. Thus, given the proportion of stunted students, the model estimates that 35,697 students or 80.4 percent of all repetitions in 2016 were associated with stunting.

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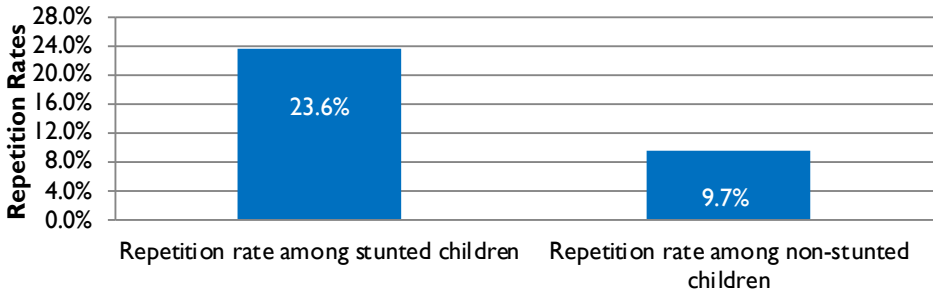
52 The 1,000 Days partnership promotes targeted action and investment to improve nutrition for mothers and children in the 1,000 days between a woman's pregnancy and her child's second birthday when better nutrition can have a life-changing impact on a child's future and help break the cycle of poverty.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

53 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, pp. 1439-1446, accessed September 11, 512012, www.Jn.nutrition.org.

54 Idem

55 Ministry of Education, Arts and Culture (EMIS 2016)

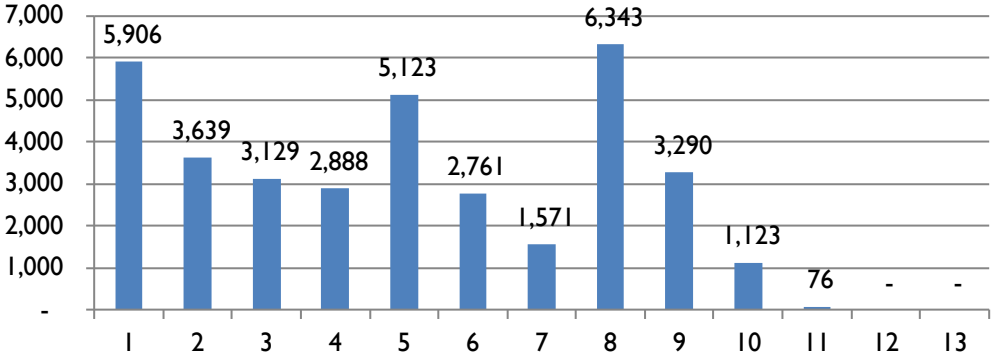
Figure 22: Repetition rates in education by nutritional status, 2016, (in percent)



Source: Estimations based on data from Ministry of Education.

As shown in Figure 23, most of these grade repetitions happen during the primary and preparatory school. There are far fewer children who repeat grades during secondary school. This is largely due to the fact that many underperforming students would have dropped out of school before reaching secondary education.

Figure 23: Grade repetition of stunted children by grade, 2016 (in numbers)



Source: Model estimation using data from 2016 EMIS 2016

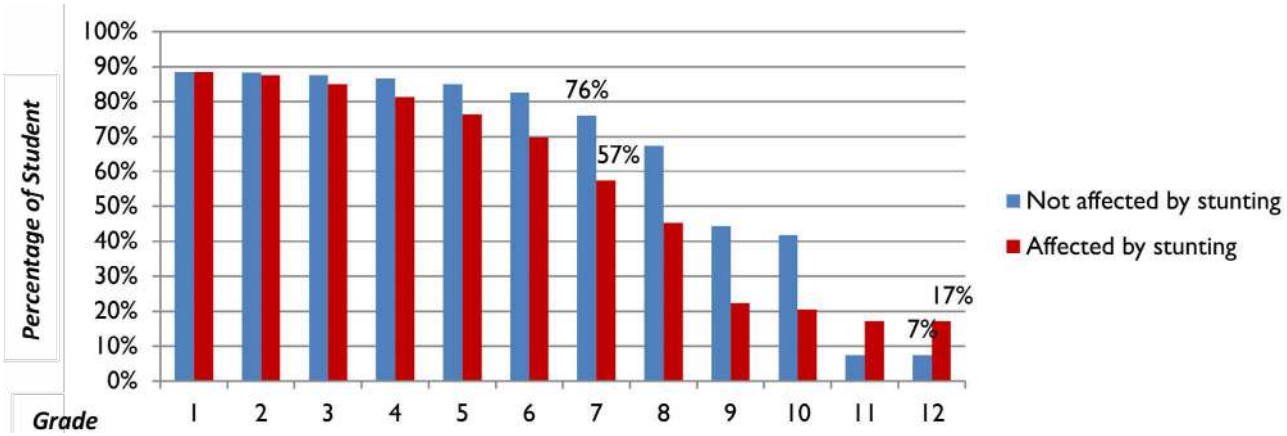
4.3.2 Effects on retention

Research shows that students who were stunted as children are more likely to drop out of school.[56] According to model estimates using data from the 2016 EMIS and taking into account relative risks relating to the consequences of stunting on education, it can be estimated that only 63.2 percent of stunted people (of working age) in Namibia completed primary school compared to 80.1 percent of those who were never stunted.

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 2016, the analysis focused 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.

56 Colclough, C., Rose, P. and Tembon, M. 2000. "Gender inequalities in primary schooling: The roles of poverty and adverse cultural practice." International Journal of Educational Development 20: 5-27.

Figure 24: Grade achievement by nutritional status, 2016 (in percent)



Source: Model estimation using data from 2016 Basic Education Statistical Booklet

4.3.3 Estimation of public and private education costs

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

In 2016, the estimated 35,697 students who repeated grades (and whose repetitions are considered to be associated with undernutrition) cost the economy an estimated NAD 2.94 billion. According to the 2016 EMIS, the largest proportion of repetitions occurred during primary school and the private education costs due to these repetitions far outweigh the public education costs. In primary education, the private budget covers 9.6 percent of the associated costs of repeating a year, whereas in secondary the burden on the private budget is decreased to 4 percent. In both cases, the public covers the largest proportion of the burden. Table 22 summarizes the public and private education costs associated with stunting.

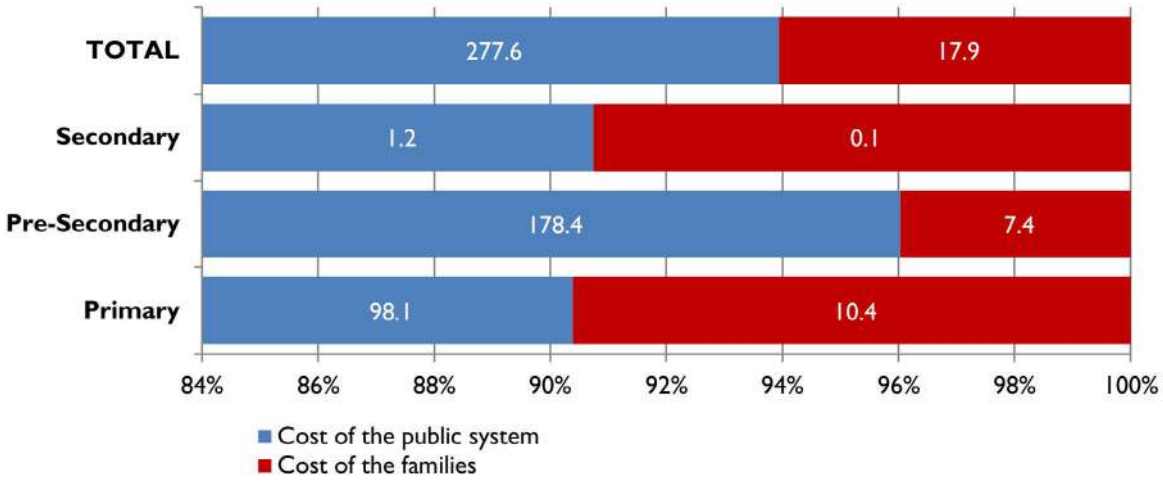
Table 22: Costs of grade repetitions associated with stunting, (in NAD million)

	Primary		Pre secondary		Secondary		Total	
	In (NAD)	In USD	In (NAD)	In USD	In (NAD)	In USD	In (NAD)	In USD
Number of repetitions associated with stunting	**23,446**		**12,326**		**76**		**35,848**	
Public Costs per student	4,185	284.7	14,469	984.3	15,277	1,039	33,848	2,308
Total Public Costs (in millions)	98.1	6.7	178.4	12.1	1.2	0.1	277.6	18.9
Private Costs per student	445	30.3	597.0	40.6	1,558.0	106.0	2,600	176.9
Total Private Costs (in millions)	10.4	0.7	7.4	0.5	0.1	0.0	17.9	1.2
Total Costs	108.6	7.4	185.7	12.6	1.3	0.1	295.5	20.1
% Social expenditure on education	**2.4%**							

Source: 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 and private budget. Of the overall costs, an estimated total of NAD 17.83 million (6.1 percent) are being covered by private budgets, while NAD 277.6 million (93.9 percent) is borne by the public education system. Nevertheless, the distribution of this cost varies depending on whether the child repeated grades in primary or secondary education.

Figure 25: Distribution of costs in education (In percent and NAD million



Source: Estimations based of data provided by NIT and the result from Data analysis result

4.4 Social and economic cost of child undernutrition in productivity

As described in the health section of the report, the model estimated that 43.1 percent of the working-age population in Namibia 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 approximately 592,252 people whose potential productivity is affected by undernutrition.

National productivity is significantly affected by historical rates of child undernutrition. Firstly, stunted children, on average, have achieved fewer years of schooling than non-stunted children.[57] In non-manual activities, higher academic achievement is directly correlated with higher income. 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] Finally, the population lost due to child mortality hinders economic growth, as they could have been healthy productive members of the society.

The model utilises historical nutritional information, in-country demographic projections, adjusted mortality rates, and data reported in the NDHS from 2013 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 2016.

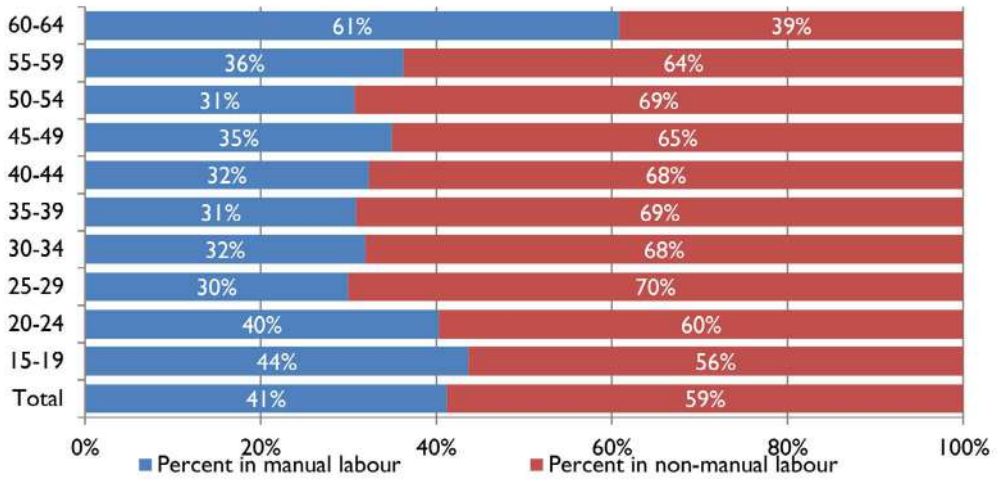
The distribution of the labour market is an important contextual element in determining the impact of undernutrition on national productivity. As shown in Figure 25, 41.2 percent of the working age population is engaged in manual activities. Across all the age cohorts the proportion of population engaging in manual labour is higher than the proportion of population engaging in non-manual labour. This proportion generally increases with age.

57 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, pp. 1439-1446, accessed September 11, 552012, Jn.nutrition.org

58 C. Nascimento et al., "Stunted Children gain Less Lean Body Mass and More Fat Mass than Their Non-stunted Counterparts: A Prospective Study. 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.

Figure 26: Manual and non-manual labour distribution by age, 2016 (in percent)



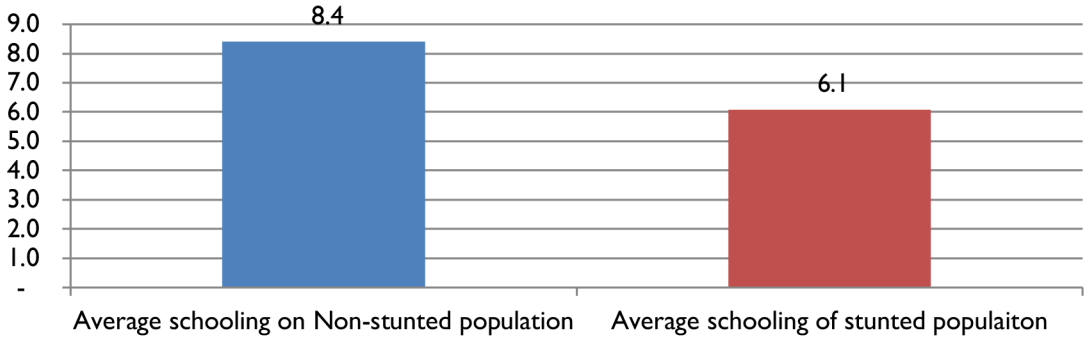
Source: Estimations based of data provided by NIT and the result from Data analysis result

4.4.1 Loss 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 learners who were adequately nourished as children.[60] 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.

NHIES 2015/16, and as shown in Figure 4.9, it is estimated that the educational gap between the stunted and non-stunted population is 2.3 years. It is important to note that over time there has been an improvement in the average years of schooling among the working population. Whereas the cohort from 60-64 years of age show an average level of school education of 5.5 years, the cohort aged 20-24 years shows an average of 9.1 years of education.

Figure 27: Average years of schooling for stunted and non-stunted population (in years of education)



Source: Estimations based of data provided by NIT and the result from Data analysis result.

The lower educational achievement of the stunted population has an impact on the expected level of income a person would earn as an adult.[61] As presented in table 23, the model estimates that 346,243 people engaged in non-manual activities suffered from childhood stunting. This represents 26.3 percent of the country's labour force that is currently less productive due to lower schooling levels associated to stunting. The estimated annual losses in productivity for this group are NAD 7.5 billion (USD 505.8 million) equivalent to 3.48 percent of the GDP in 2016.

60 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, pp. 1439–1446, accessed September 11, 592012, Jn.nutrition.org

61 Based on data obtained from : average education years estimated for the working age population across the different cohorts.

Table 23: Reduced income in Non-Manual activities due to stunting, 2016

Age in 2016	Population working in manual labour who were stunted as children	Income losses in manual labour	
		NAD million	USD million
15-19	52,381	348.6	23.7
20-24	56,894	585.9	39.9
25-29	57,929	986.0	67.1
30-34	46,086	989.7	67.3
35-39	39,258	1,109.1	75.4
40-44	30,429	911.2	62.0
45-49	23,409	835.2	56.8
50-54	19,710	710.4	48.3
55-59	13,456	680.1	46.3
60-64	6,691	279.6	19.0
Total	346,243	7,435.6	505.8
% GDP		**3.5%**	

Source: Namibia Statistics Agency 2016

4.4.2 Losses in manual activities

Manual activities are mainly observed in the agricultural, forestry and fishing subsectors, employing more than 66 percent of the Namibian population. Research shows that stunted workers engaged in manual activities tend to have less lean body mass [62] and are more likely to be less productive in manual activities than those who were never affected by growth retardation.[63]

The model estimated that 479,700 people in Namibia are engaged in manual activities, of which 225,489 were stunted as children. This represented an annual loss in potential income of NAD 410 Million (USD 27.9 million), equivalent to 2.8 percent of the GDP in 2016 due to lower productivity.

Table 24: Losses in potential productivity in manual labour due to stunting, 2016.

Age in 2016	Population working in manual labour who were stunted as children	Income losses in manual labour	
		millions of [NAD.]	millions of USD
15-19	40,732	26.8	1.8
20-24	42,216	41.7	2.8
25-29	29,975	40.3	2.7
30-34	25,255	42.2	2.9
35-39	20,769	41.1	2.8
40-44	18,336	46.4	3.2
45-49	15,156	43.1	2.9
50-54	11,329	33.1	2.3
55-59	9,824	42.1	2.9
60-64	11,895	53.3	3.6
Total	225,489	410.0	27.9

Source: Namibia statistics agency 2016

62 C. Nascimento et al., Stunted Children gain Less Lean Body Mass and More Fat Mass than Their Non-stunted Counterparts: A Prospective Study. Sao Paulo: Federal University of Sao Paulo, 2004.

63 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 631991, doi: 10.1111/j.1468-0084.1991.mp53001004.x.

4.4.3 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.[64] The model estimated that 47,547 people of working age were absent from Namibia's workforce in 2016 due to child mortality associated with undernutrition. This represents a 3.6 percent reduction in the current workforce.

Considering the productive levels of the population, by their age and sector of labour, the model estimated that in 2016, the economic losses (measured by working hours lost due to undernutrition-related child mortality) were NAD 2.48 billion or 169 million USD, which represented 1.2 percent of the country's GDP.

Table 25: Losses in potential productivity due to mortality associated with undernutrition, 2016

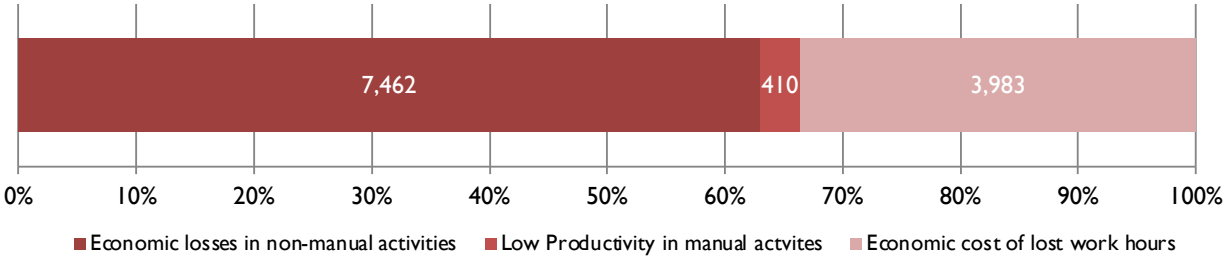
Age in 2016	Working Hours Lost due to Higher mortality of underweight children	Income losses due to mortality	
	(in millions of hours)	NAD million	USD million
15-19	5,517	94.58	6.43
20-24	6,385	168.60	11.47
25-29	6,486	236.78	16.11
30-34	5,577	237.77	16.17
35-39	5,323	280.94	19.11
40-44	4,524	263.29	17.91
45-49	4,291	304.42	20.71
50-54	3,809	332.64	22.63
55-59	3,003	327.33	22.27
60-64	2,633	238.51	16.23
Total	**47,547**	**2,484.85**	**169.04**
% GDP		**1.2%**	

Source: Namibia Statistics Agency 2016

4.4.4 Overall Productivity Losses

The total losses in productivity for 2016 are estimated at approximately NAD 10.3 billion (USD 702.8 million), which is equivalent to 4.8 percent of Namibia's GDP. As presented in Figure 27, the largest share of productivity loss is attributed to reduced productivity in non-manual activities due to undernutrition-related mortality which represents 62.7 percent of the total cost. The lost working hours represent 24.1 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 3.5 percent of the total costs.

Figure 28: Distribution of losses in productivity (in percent and NAD million)



Source: Authors computations

64 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

4.5 Summary of Effects and Costs

The methodology is used to analyse the impact of child undernutrition in different stages of the life cycle, without generating overlaps. As a result, the individual sectoral costs can be aggregated to establish a total social and economic cost of child undernutrition.

For Namibia, the total losses associated with undernutrition are estimated at NAD 11.14 billion or USD 757.9 billion for the year 2016. These losses are equivalent to 5.22 percent of GDP of that year. The highest element in this cost is the loss in potential productivity as a result of undernutrition-related mortalities.

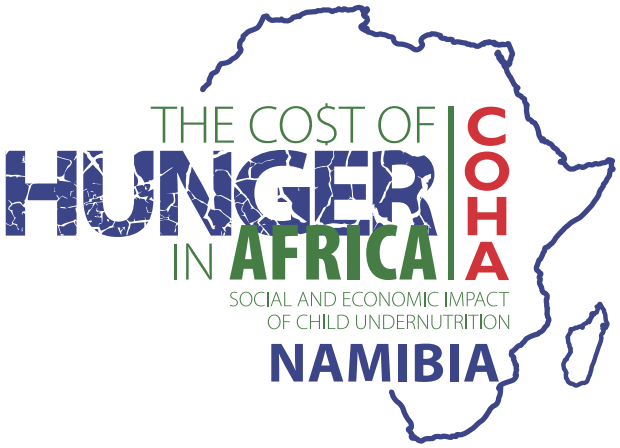
Table 26: Summary of Costs, 2016

	Episodes	Cost in Millions of NAD	Cost in Millions of USD	Percentage of GDP
Heath Costs				
LBW and Underweight	151,408	479.6	32.6	
Increased Morbidity	30,971	37.0	2.5	
Total for Health	**182,379**	**516.6**	**35.1**	**0.24**
Education Costs				
Increased Repetition - Primary	23,350	108.1	7.4	
Augmentation des Redoublements-Collège	12,272	184.9	12.6	
Increased Repetition - Lycée	76	1.3	0.1	
Total for Education	**35,697**	**294**	**20.0**	**0.14%**
Productivity Costs				
Lower Productivity - Non-Manual Activities	346,243	7,435.6	505.8	
Lower Productivity - Manual Activities	225,489	410.0	27.9	
Lower Productivity - Mortality	47,547	2,484.9	169.0	
Total for Productivity	**619,278**	**10,330.5**	**702.8**	**4.84%**
TOTAL COSTS (Millions)		**11,141.3**	**757.9**	
Total GDP %			**5.22%**	

Source: Model estimations

Section V

Analysis of Scenarios



Section V: Analysis of Scenarios

The previous chapter4 showed the social and economic costs that affected Namibia in 2016 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, more than one out of every five children under the age of five years in Namibia 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 losses in productivity that Namibian 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 the 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 2016 – 2025 and 2016 – 2030. 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:

Baseline: The Cost of Inaction. Progress in reduction of stunting and underweight child stops.

For the baseline, the progress of reduction of the prevalence of undernutrition stops at the levels achieved in 2016. 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.

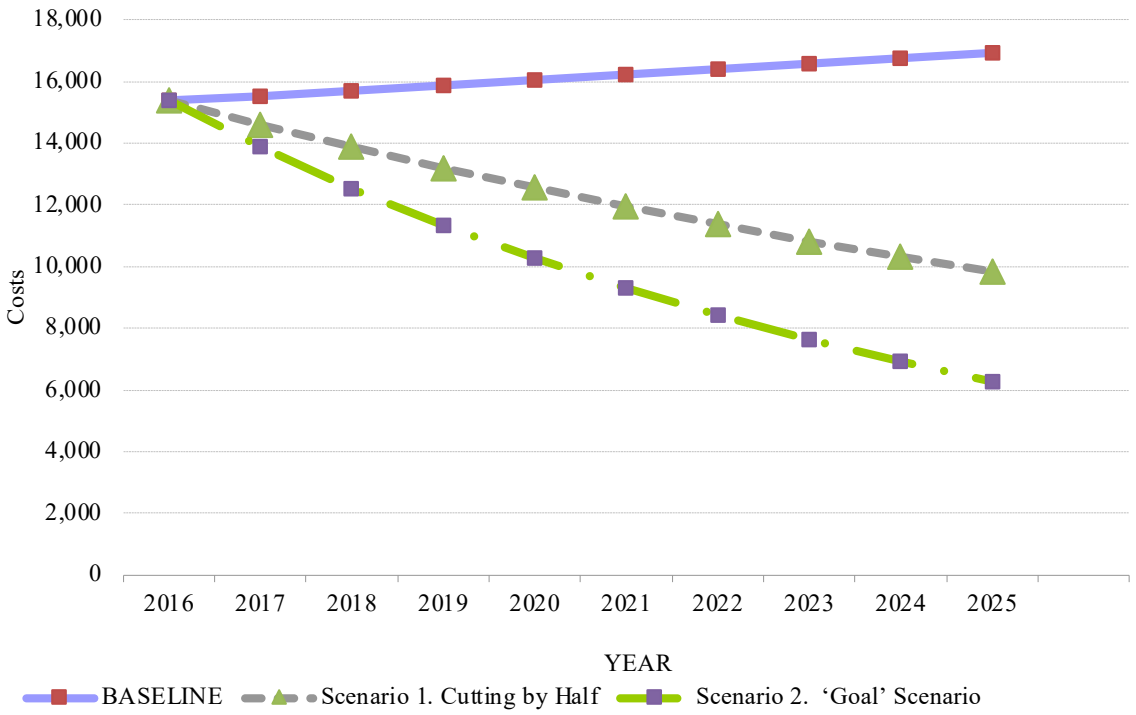
Scenario #1: Cutting by half the prevalence of child undernutrition by 2025.

In this scenario, the prevalence of underweight and stunted children would be reduced to half of the 2016 values corresponding to the reference year. In the case of Namibia this would mean a constant reduction of 1.7 percentage points annually in the stunting rate from 30.3 percent (estimate for 2016) to 15.1 percent in 2025. A strong effort has to be carried-out to complete this scenario that would require a revision of the effectiveness of on-going interventions for the reduction of stunting.

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

In 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 2.3 percentage points annual reduction for a period of 10 years, from 2016 to 2025.

Figure 29: Trends of estimated costs of child undernutrition, 2016 to 2025, NAD million



In the baseline, where the progress of reduction of child undernutrition would stop at the levels of 2016, the total cost would decrease by 13 percent, from NAD 2.5 billion to NAD 2.2 billion, during the period leading to 2025. Similarly, in the Scenario 1, in which a reduction by half of the current prevalence is achieved, the total cost would reduce by 49 percent to NAD 1.3 billion. In the case of the Goal Scenario on the other hand, there would be a 57 percent reduction in the estimated total costs, amounting to NAD 1.1 billion.

Table 27: Estimated total costs of child undernutrition by scenario, 2016, in NAD million

	Scenarios for the Year 2025			
	2016	Baseline. The Cost of Inaction	S1. Cutting by Half	S2. Goal Scenario
Heath Costs				
Increased Morbidity	101	102	53	15
Education Cost				
Increased Grade Repetition	14.9.	13.5	9.1	0.7
Productivity Costs				
Lower Productivity in Non-Manual Activities	2,174	1,889	1,100	946
Lower Productivity in Manual Activities	120	121	72	60
Lower Productivity due to Mortality	107	63	61	61
Total Costs	2,517	2,188	1,295	1,083
Percentage Change from Baseline		13%	49%	57%

Source: Model estimations

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 the national productivity.

As presented in Table 28, cutting undernutrition by half by 2025 would represent a reduction in costs of over NAD 14.9 billion, equivalent to USD 1.0 billion for the period of nine years from 2016 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 NAD 1,7 billion or USD 113 million per year. In the case of the Goal Scenario, the savings would increase to NAD 36.2 billion or USD 2.5 billion, which represent a simple average of NAD 4.0 billion or USD 273 million per year.

Table 28: Estimated savings for each scenario, 2016, in NAD million

	Cutting Undernutrition by Half by 2025		Goal Scenario 2025	
	NAD in Million	USD in Million	NAD in Million	USD in Million
Heath Costs				
Reduced Morbidity	641	43.63	881	59.92
Education Costs				
Reduced Grade Repetition	102	6.91	157	10.66
Productivity Costs				
Higher Productivity in Non-Manual Activities	14,030	954.39	21,041.0	1,431.39
Higher Productivity in Manual Activities	127	8.66	726.0	49.38
Total Savings	**14,900.0**	**1,014.00**	**36,044**	**2,519.97**
Average Annual Savings	1,242.0	84.50	3086.97	210.0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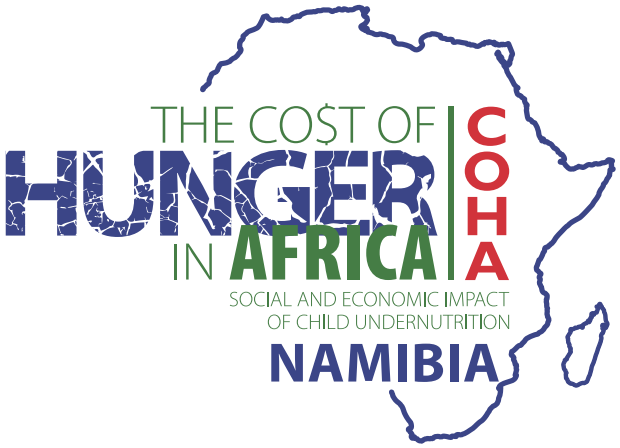
Section VI

Conclusion and Recommendations



Section VI: Conclusion and Recommendations

6.1 Conclusions

The economic impact associated with underweight and stunting in children is quite significant and has far reaching effects on productivity, health and education. The COHA studies that have already been concluded in Burkina Faso, Chad, Egypt, Eswatini, Ethiopia, Ghana, Lesotho, Madagascar, Malawi, Rwanda and Uganda show that these economies suffered an estimated annual loss ranging from 1.9 percent to 16.5 percent of Gross Domestic Product as a result of child undernutrition.

Child undernutrition increases the risk of morbidity and mortality; affects school attendance, performance, grade repetition; and overall economic productivity in the long term. The findings of COHA in Namibia reaffirmed the results of similar studies in Africa, Latin America, and the Caribbean that undernutrition in children has a significant impact on the economy. Namibia is estimated to have lost an equivalent of about NAD 12.7 billion in 2016, which represented 8.0 per cent of GDP. Productivity, health, and education losses were estimated at NAD 11. 9 billion, NAD 516.6 million and NAD 296 million respectively. The opportunity costs in productivity alone represented 7.2 percent of GDP in 2016, followed by health and education at 0.3 percent and 0.2 percent, respectively. In recognition of ongoing efforts, there is need to eradicate undernutrition through three broad avenues encompassing enhanced implementation of programmes, multi-sectoral coordination, and resource mobilisation.

6.2 Recommendations towards eradicating undernutrition

In recognition of ongoing efforts, there is need to eradicate undernutrition mainly through three broad avenues; Health, Education and Agriculture. However, supportive initiatives are required, such as:

There is need to strengthen and synergise multi-sectoral approaches in tackling undernutrition in Namibia.

Advocacy is an important key result area if a good nutrition outcome is to be achieved in Namibia. Political commitment and prioritisation of nutrition at national, regional and local government levels should be key to the establishment of nutrition-specific budget lines at national, regional and local government level budgets.

6.2.1 Agriculture

- ✓ Promote and raise awareness for the need of producing a wider range of fruits and vegetable in school and household gardens in communal, commercial as well as peri-urban and urban areas to increase accessibility and affordability of nutritious food. Investigate the use of semi-purified water from water reclamation plants for peri-urban and urban horticulture.
- ✓ Review policies and legislation to unlock the economic and agricultural potential of communal land through increased investment.
- ✓ Improve output from Green Schemes through PPP and broaden the range of horticultural produce farmed at Green Schemes.
- ✓ Increase agricultural yields through extension services such as tractors, implements and seeds as well as the promotion of climate-smart agriculture, Conservation Tillage and other adaptation measures.
- ✓ Strengthen research into post-harvest losses and implement mitigating measures.
- ✓ Increase youth participation in income-generating horticulture activities to ease access to affordable and nutritious food and to reduce unemployment and poverty.
- ✓ Strengthen systems and capacities to enhance evidence generation and monitoring for agriculture productivity and nutrition, including conducting periodic agricultural surveys to monitor nutrition-based agriculture at household level.
- ✓ Increase investments in and budget allocation to agriculture (ten percent) in-line with the Malabo commitment.

6.2.2 Health

- ✓ Intensify deployment of Community Health Workers and conduct Targeted Outreach Programmes in particular in severely affected regions to identify malnourished children, pregnant and lactating women and adults for malnutrition treatment.
- ✓ Provide nutritional supplements to each pregnant woman in need at each ante- and postnatal visit to a clinic and package nutrition education messaging for Antenatal Care (ANC) and Postnatal Care (PNC) nutrition sessions. Such intervention will also incentivise regular visits to health facilities.
- ✓ Furthermore, combine nutrition-specific and nutrition-sensitive interventions, particularly those with strong health access and safety net components to effectively reduce stunting among children in the first 1,000 days of their lives.
- ✓ Promote Food and Nutrition research to have up-to-date information for informed decision making linked to a functional Early Warning Food and Nutrition Security Information System including the prioritisation of publishing the Namibia Demographic and Health Survey (NDHS) regularly to enhance monitoring and evaluation of child nutrition indicators.
- ✓ Strengthen the systems and the capacity for multisectoral actors in evidence generation for Food and Nutrition, including the capacity of the Namibia Vulnerability Assessment Committee and the establishment of a National Nutrition Database, to ensure effective monitoring of child under nutrition over time.
- ✓ Design and implement a systematic advocacy and targeted information, education and communication strategy for nutrition to promote and support healthy lifestyles and environments.
- ✓ Revise the Ministry of Health and Social Services Nutrition Guidelines for Prevention and Management of Diet-Related Non-Communicable Diseases.
- ✓ Strengthen Nutrition Assessment Counselling and Support (NACS) programme under the Primary Health Care Division of the Ministry of Health and Social Services. Improving budgetary allocation to health at both national and regional level for Nutrition sensitive and Nutrition specific programmes in the country.
- ✓ Strengthen community-led approaches to support household nutrition interventions focusing on maternal and child nutrition to enhance the monitoring of child growth and to support sustainable change in behaviours.
- ✓ Strengthen community-based workers service delivery platforms and the wider programme coverage and compliance as critical components of effective stunting reduction programmes.
- ✓ Undertake a detailed analysis of undernourished children that tracks affected populations from birth to university.

6.2.3 Education

- ✓ Accelerate the implementation of the Home Grown School Feeding Programme (HGSFP) to diversify school meals and improve learners' nutritional status. Extend the School Feeding Programme to ECDs and Secondary Schools.
- ✓ Accelerate the dissemination and implementation of the Food and Nutrition Security Policy.
- ✓ Promote nutritional awareness and intake of adequate, locally available and nutritious foods among school children and communities including strengthening interventions that are aimed at promoting healthy eating (hygiene and nutrition) at school (Need to align School health programs with the Health Promoting School Initiative - HPSI). This initiative should be closely coordinated with the MAWLR's promotion of school and community gardens.
- ✓ Strengthen the provision of supporting implementation requirements for the school feeding programme including adequate hygiene, adequate water and sanitation facilities, adequate kitchens and storage facilities and community commitment.

6.2.4 Resource mobilisation

There is need for all stakeholders to make deliberate efforts in mobilising resources for sustainable provision of food and nutrition as well as health services in view of reduced donor funding. However, the Ministry of Finance needs to take the lead in the following areas:Model the cost of hunger over several other years i.e over and beyond the study year for the present COHA study

- ✓ Introduce taxes on sugary drinks and salty snacks to encourage healthier diets.
- ✓ Develop the Public Private Partnership (PPP) framework for joint flagship food and nutrition interventions to accelerate implementation of key actions. The MAWLR will in close consultation with the MoF pursue PPPs for the existing Green Schemes.
- ✓ Develop an innovative financing strategy on nutrition and food security which will include private sector engagement. The additional resources should support not only an increased budgetary allocation but also human resource capacity development in nutrition, health, agriculture, education and other sectors. The resources should be allocated at all levels including constituency/community.

6.2.5 Coordination and implementation

- ✓ Ensure that the National Food and Nutrition Security council and its structures in the office of the Prime Minister as stipulated in the National Food and Nutrition Security Policy Implementation Framework are fully functional.
- ✓ Develop and implement a plan to implement the COHA study recommendations and develop a communication strategy.
- ✓ Model the cost of hunger over several other years i.e., over and beyond the study year for the present COHA study, include the cost of hunger attributed to maternal undernutrition and define the minimal resources to be allocated per child towards nutrition enhancement
- ✓ Strengthen national capacities to enable effective coordination of the implementation of multi-sectoral nutrition action plan.
- ✓ Monitor and evaluate the set targets of food and nutrition in affiliated global agreements and national plans and ensure accountably in the implementation of actions/ interventions spelt out in various frameworks.
- ✓ Strengthen political commitment and capacities towards prioritising nutrition at national and county level.


BANK OF NAMIBIA
200
200
200
Simple Payment Receipt
Payments
Total N$ 600.00

VII Section

Annexes

THE COST OF HUNGER IN AFRICA | COHA

SOCIAL AND ECONOMIC IMPACT OF CHILD UNDERNUTRITION

NAMIBIA

Section VII: Annexes

Annex 1 Glossary of Terms

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

2. **Average number of days required for Intensive Care Unit (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 hospitalisation:** 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 hospitalisation:** 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 hospitalisation:** 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 (Economic Commission of Latin America Countries - 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 utilised 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. Enrolment Rate =

(Enrolment of the population of age group at a level of education in school year)/(Population in age a that responds to level of education h in a school year) x 100

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

17. 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 utilisation at household level (FAO).

18. 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 World Food Programme (WFP).

19. Hunger: The status of persons, whose food intake regularly provides less than their minimum energy requirements, i.e., about 1,800 kcal per day. It is operationally expressed by the undernourishment indicator (FAO).

20. 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).

21. 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.

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

23. 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).

24. 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.

25. 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.

26. 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.

27. Proportion of episodes requiring hospitalisation: 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.

28. 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.

29. **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).

30. **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).

31. **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.

32. **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).

33. **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.

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

35. **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).

36. **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).

37. **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.

38. **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.

39. **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 Technical Notes on Methods and Assumptions

Index	Source
First Economic data	
Gross Domestic Product	International monetary fund data for 2016. Namibia Statistics office (Various), Economic Survey. i: Government Printer.
$US exchange rate	Bank of Namibia, www.bon.com.na index.php/exchange-rates/
Purchasing power parity	Bank of Namibia (2016) .Namibia National Statistics Agency
Social Expenditure	Namibia National Statistics office
Health Expenditure	World Health Organization. Statistical Abstract 2018 – KNBS
Education Expenditure	Ministry of education
Average transport cost (two public transportation tickets in urban areas in local currency)	
Minimum wage per hour	
Average wage per hour	
Annual Consumer price index	
Average income per years of schooling	
Annual average income related to productive work, manual intensive activities (Agriculture, Forestry, Fishery, Mining) by age	
Annual average income related to productive work, NON manual intensive activities (Excluding Agriculture, Forestry, Fishery, Mining) per years of schooling and age	Calculated based on xxxxxxxxxxxxxxxxxxxxxxxxxxx Module. -Based on four groups of educational categories. Note: For some years of schooling there are very few observations which may have biased the results for some age cohorts.
Average working hours per week	Calculated from xxxxxxxx data. Computed from xxxxxxxxx Labour Module. -Based on four groups of educational categories.
Annual worked hours per age group	Calculated from xxxxxxxxx data based on average working hour per week multiplied by number of weeks in the year. Computed from xxxxxxx Module. -Based on four groups of educational categories.
Employment rate	Calculated based on xxxxxxxxxxxxxxxxWindhock: Government Printer. (based on the 2015/16 Namibia Household Survey)
Second Demographic Data	
Volume of Births	CAPMAS, births and deaths bulletin. Namibia Household Survey 2015/16, NSA
Death rate	CAPMAS, births and deaths bulletin. Namibia Household Survey 2015/16, NSA
Distribution of workers by Manual and Non-Manual Labor per age group	Namibia Household Survey 2015/16,
Distribution of workers by educational status	Namibia Household Survey 2015/16,

Index	Source
Working age population (WAP) by educational level	Namibia Household Survey 2015/16,
Third Health Data	
Underweight prevalence for the year of analysis or last available.	Calculated from Namibia Demographic Health Survey data, 2005 and 2008. NDHS 2013, Hospitals, NHIS 2019 & WHO
Stunting prevalence for the year of analysis or last available.	Calculated from Namibia Demographic Health Survey data, 2005 and 2008. NDHS 2013, Hospitals, NHIS 2019 & WHO
Underweight prevalence of children under 5 years old	Calculated from Namibia Demographic Health Survey data, 2005 and 2008. NDHS 2013, Hospitals, NHIS 2019 & WHO
Underweight mode prevalence	Calculated from Namibia Demographic Health Survey data, NDHS 2013 and projection
Stunting prevalence of children under 5 years old	Calculated from Namibia Demographic Health Survey data, NDHS 2013 and projection
Stunting mode prevalence	Calculated from Namibia Demographic Health Survey data, NDHS 2013 and projection
Number of annual disease events (anaemia, ADS, ARI, Stunting, Underweight, Wasting) by Age group	Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016. The incidence rate for Diarrhea for 28 days -11 months is 6 incidents per child, 12-23 months is 6 incidents per child and 24 -59 months is 2 incidents per child. The incidence rate for Fever/malaria for 28 days -11 months is 1 incident per child, 12-23 months is 1 incident per child and 24 -59 months is 1 incident per child. The incidence rate for ARI for 28 days -11 months is 5 incidents per child, 12-23 months is 3 incidents per child and 24 -59 months is 1 incidents per child. The incidence rate for Underweight for 28 days -11 months is 2 incidents per child, 12-23 months is 2 incidents per child and 24 -59 months is 2 incidents per child. The incidence rate for Anaemia for 28 days -11 months is 2 incidents per child, 12-23 months is 3 incidents per child and 24 -59 months is 1 incidents per child.
Average number of primary care visits for each pathology (anaemia, ADS, ARI, Stunting, Underweight, Wasting) by Age group	Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016. The incidence rate for Diarrhea for 28 days -11 months is 6 incidents per child, 12-23 months is 6 incidents per child and 24 -59 months is 2 incidents per child. The incidence rate for Fever/malaria for 28 days -11 months is 1 incident per child, 12-23 months is 1 incident per child and 24 -59 months is 1 incident per child. The incidence rate for ARI for 28 days -11 months is 3 incidents per child, 12-23 months is 1 incidents per child and 24 -59 months is 1 incidents per child. The incidence rate for Underweight for 28 days -11 months is 3 incidents per child, 12-23 months is 1 incidents per child and 24 -59 months is 1 incidents per child. The incidence rate for Anaemia for 28 days -11 months is 2 incidents per child, 12-23 months is 3 incidents per child and 24 -59 months is 1 incidents per child.

Index	Source
Proportion of events of pathology (anaemia, ADS, ARI, Stunting, Underweight, Wasting) by Age group requiring hospitalization	Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016. Diarrhoea episodes between 28 days- 11 months20 percent, 12 -23 months 20 percent and 24-59 months is 20 percent. Fever/malaria episodes between 28 days- 11 months 30 percent, 12 -23 months 30 percent and 24-59 months is 100 percent. ARI episodes between 28 days- 11 months 30 percent, 12 -23 months 30 percent and 24-59 months is 30 percent. Underweight episodes between 28 days- 11 months 30 percent, 12 -23 months 30 percent and 24-59 months is 30 percent. Anaemia episodes between 28 days- 11 months 20 percent, 12 -23 months 20 percent and 24-59 months is 20 percent
Average number of days of hospital treatment for each event (anaemia, ADS, ARI, Stunting, Underweight, Wasting) by Age group	Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016. The average days for hospital treatment for Diarrhoea for 28 days -11 months is 7 days per child, 12-23 months is 7 days per child and 24 -59 months is 5 days per child The average days for hospital treatment for Fever/malaria for 28 days -11 months is 14 days per child, 12-23 months is 7 days per child and 24 -59 months is 7 days per child The average days for hospital treatment for ARI for 28 days -11 months is 14 days per child, 12-23 months is 7 days per child and 24 -59 months is 7 days per child The average days for hospital treatment for underweight for 28 days -11 months is 30 days per child, 12-23 months is 14 days per child and 24 -59 months is 7 days per child The average days for hospital treatment for for 28 days -11 months is 14 days per child, 12-23 months is 14 days per child and 24 -59 months is 7 days per child
Proportion of events of pathology (anaemia, ADS, ARI, Stunting, Underweight, Wasting) by Age group requiring intensive treatment (ICU)	Estimated by health specialists and experts through in-depth interview.
Average number of days of intensive treatment UTI / UCI for each event (anaemia, ADS, ARI, Stunting, Underweight, Wasting) by Age group	Estimated by health specialists and experts through in-depth interview.

Index	Source
Average waiting time spent at primary care attention (anaemia, ADS, ARI, Stunting, Underweight, Wasting) by Age group	Estimated by health specialists and experts through in-depth interview. Source: NIT's computation from Ministry of Health - Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016. Average waiting time for diarrhoea 28 days-11 months 2 hour, 12-23 months 2 hour, 24 -59 months 2 hour Average waiting time for Fever/Malaria 28 days-11 months 2 hour, 12-23 months 2 hour, 24 -59 months 2 hour Average waiting time for ARI 28 days-11 months 2 hour, 12-23 months 2 hour, 24 -59 months 2 hour Average waiting time for underweight 28 days-11 months 3 hour, 12-23 months 3 hour, 24 -5 months 3 hour Average waiting time for Anaemia 28 days-11 months 1 hours, 12-23 months 1 hours, 24 -5 months 1 hours
Daily hours lost due to hospitalization (anaemia, ADS, ARI, Stunting, Underweight, Wasting) by Age group	Estimated by health specialists and experts through in-depth interview. Source: NIT's computation from Ministry of Health - Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016. An average estimate of 8 hours was observed across all the pathological incidences
Average unit cost for attention in primary care by age group and pathology (anaemia, ADS, ARI, Stunting, Underweight, Wasting), for the year of analysis (x) in local currency,	Estimated by health specialists and experts through in-depth interview. Source: NIT's computation from Ministry of Health - Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016. Costs includes extra cost of care borne by the family Calculation of health cost includes; Consultation fee, cost of bed, cost of laboratory tests, cost of drugs as per MOH standard case management protocol,
Average cost of medical inputs for event in primary care by age group and pathology (anaemia, ADS, ARI, Stunting, Underweight, Wasting), for the year of analysis (x) in local currency,	Estimated by health specialists and experts through in-depth interview. Source: NIT's computation from Ministry of Health - Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016.
Average unit cost for attention in hospital by age group and pathology (anaemia, ADS, ARI, Stunting, Underweight, Wasting), for the year of analysis (x) in local currency,	Estimated by health specialists and experts through in-depth interview. Source: NIT's computation from Ministry of Health - Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016.
Average cost of medical inputs for event in hospital by age group and pathology (anaemia, ADS, ARI, Stunting, Underweight, Wasting), for the year of analysis (x) in local currency,	Estimated by health specialists and experts through in-depth interview. Source: NIT's computation from Ministry of Health - Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016.

Index	Source
Average unit cost for attention in hospital intensive care unit by age group and pathology (anaemia, ADS, ARI, Stunting, Underweight, Wasting), for the year of analysis (x) in local currency,	Estimated by health specialists and experts through in-depth interview. Source: NIT's computation from Ministry of Health - Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016.
Average cost of medical inputs for event in hospital intensive care unit by age group and pathology (anaemia, ADS, ARI, Stunting, Underweight, Wasting), for the year of analysis (x) in local currency,	Estimated by health specialists and experts through in-depth interview. Source: NIT's computation from Ministry of Health - Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016.
Average unit private cost by age group and pathology (anaemia, ADS, ARI, Stunting, Underweight, Wasting), for the year of analysis (x) in local currency,	Estimated by health specialists and experts through in-depth interview. Source: NIT's computation from Ministry of Health - Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016.
Average private cost of medical inputs for event by age group and pathology (anaemia, ADS, ARI, Stunting, Underweight, Wasting), for the year of analysis (x) in local currency,	Estimated by health specialists and experts through in-depth interview. Source: NIT's computation from Ministry of Health - Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016.
Percentage of low birth weight children	Namibia Demographic Health survey 2013, NDHS 2013, Hospitals in Windhoek NHIS 2016
Proportion of events of LBW requiring/access hospitalization	Estimated by health specialists and experts through in-depth interview. Source: NIT's computation from Ministry of Health - Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016.
Average number of days of hospital treatment	Estimated by health specialists and experts through in-depth interview. Source: NIT's computation from Ministry of Health - Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016.
Proportion of events of LBW requiring intensive treatment UTI / UCI	Estimated by health specialists and experts through in-depth interview.
Average number of days of intensive treatment	Estimated by health specialists and experts through in-depth interview.
Average waiting time (in hours) spent by an adult accompanying a child patient requiring hospitalization	Estimated by health specialists and experts through in-depth interview. Source: NIT's computation from Ministry of Health - Estimated by health specialists and experts through in-depth interview. Data source: 2018 Namibia Household survey, NDHS 2013, Hospital in Windhoek, NHIS 2016.

Index	Source
Education Data	
Initial enrolment by years of education	Data were obtained from Ministry of Education.
Final enrolment by years of education	Data were obtained from Ministry of Education.
Number of passes by years of education	Data were obtained from Ministry of Education.
Number of dropouts (rate) by years of education	Data were obtained from Ministry of Education.
Number of population repeating grades (rate) by years of education	Data were obtained from Ministry of Education.
Private cost per student / year by educational grade	Data were obtained from Namibia house hold Survey 2016
Total Number of students year 2009	Ministry of Education, Statistical Yearbook.
Public cost per student	Ministry of Education, Statistical Yearbook
Morbidity differential probability for anaemia among healthy versus underweight children by age groups.	Calculated from Namibia Demographic Health Survey data, 2016 and Namibia Integrated Budget Survey 2015/16.
Morbidity differential probability for ADS among healthy versus underweight children by age groups.	Calculated from Namibia Demographic Health Survey data, 2016
Morbidity differential probability for ARI among healthy versus underweight children by age groups.	Calculated from Namibia Demographic Health Survey data, 2016
Morbidity differential probability for anaemia among healthy versus stunted children by age groups.	Calculated from Namibia Demographic Health Survey data, 2016
Morbidity differential probability for ADS among healthy versus stunted children by age groups.	Calculated from Namibia Demographic Health Survey data, 2016
Morbidity differential probability for ARI among healthy versus stunted children by age groups.	Calculated from Namibia Demographic Health Survey data 2016.
Probability ratio of death between those who suffered from undernutrition	Calculated from Namibia Demographic Health Survey data 2016.
Probability ratio of death between those who suffered from stunting.	Calculated from Namibia Demographic Health Survey data 2016.
Higher Probability (relative risk) of stunted of repeating grades.	Calculated from Education Statistics Data 2016.
Higher Probability (relative risk) of stunted of dropping out.	Calculated from Education Statistics Data 2016.
Monthly hours worked.	Calculated based on Working hour average per week which was calculated from Namibia Demographic Survey data, 2016.
Average travel time for ambulatory care.	Calculated based on Working hour average per week which was calculated from Namibia Demographic Survey data, 2016.

Annex 3: Brief Description of COHA Data Collection Process

The data collection process was led by the members of the National Implementation Team. The process was initiated with a regional training held in Nairobi on 2 - 6 July, 2018. The NIT was introduced to COHA-Namibia and developed a work plan and assigned responsibilities among the specialists. During September 14th-19th, 2019 a workshop was held in Windhoek where the National Implementation Team was sensitised on the methodology and a work plan was developed to implement the COHA study in Namibia. For analysis, both primary and secondary data sources were utilised. For the health sector, the Namibia Demographic and Health Survey (NDHS) of 2013 and the hospital records of hospitals in Windhoek, Namibia, were used. 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 input is used and which not or which additional medical input per pathology in general is also given to the patient of the respective pathology. Subsequently, the costs of these medical inputs were estimated on the basis of the hospital records. The questionnaire was also used to calculate the amount of time each staff member dedicated to a certain case of pathology. Based on the hospital records the unit cost of attention was 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 bed which was 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 Namibia, the Namibia Household Income and Expenditure Survey is conducted every five years. This survey provides information related to income, expenditure, education among many other poverty and living condition related information. For analysing the COHA data on productivity, the main source of information was the Namibia Demographic and Health Survey from the Namibia Statics Agency (NDHS) carried out in 2013. To process the calculation, the data on household's expenditure was utilised, adjusting it to the adult equivalent factor, to obtain per capita estimations. These estimations were associated with the household members of working age, 15-64 years, considering their educational level. In the case of the Namibian data, the data set provided limited information that associated age, education level and expenditure. In this sense, the missing values were estimated based on the average of the available data. In June 2020, the NIT organised a validation and report writing workshop in Otjiwarongo. The purpose of the workshop was to validate the results of the Cost of Hunger in Namibia and produce recommendations for the future.

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The annual costs associated with child undernutrition in Namibia is estimated at USD 861.7 million (NAD 12.7 billion) which is equivalent to 5.94% of GDP

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