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Child Undernutrition in Sudan: The Social and Economic Impact and Future Perspectives

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Abstract. The nutrition situation in Sudan is one of the worst in northeast Africa and it is characterized by persistently high levels of acute and chronic malnutrition that have increased over the last two decades. The underlying causes of malnutrition are multi-sectoral and are mainly due to inequalities, inadequate food practices, and limited access to healthcare services. Based on the report The Economic and Social Impacts of Child Undernutrition in Sudan, this study assesses the impact that malnutrition has on health, education, and productivity in Sudan. The country is estimated to have lost an equivalent of about 11.6 billion Sudanese pound (1 United States dollar = 55.3 Sudanese pound) in 2014, which represented 2.6% of the gross domestic product (GDP). Productivity-related losses contributed the largest costs at 1.5% of GDP followed by health and education sectors at 1.1% and 0.1%, respectively. In 2020, the outbreak of the COVID-19 pandemic further exposed the fragility of Sudan's health, social, and economic system. It is mandatory that all stakeholders address child nutrition as a main concern and stunting is incorporated in the center of the development agenda. In particular, the national development frameworks should be updated to ensure the reduction of the stunting prevalence and to put in place a comprehensive multi-sectoral nutrition policy, strategy, and plan of action.

INTRODUCTION

Sudan is classified as a lower- to middle-income country, although approximately 5.5 million people were food insecure in early 2018 and up from 3.8 million in 2017.[1] Half of Sudan's population consists of children; approximately 15 million Sudanese are younger than 18 years.

The nutrition situation in Sudan is one of the worst in northeast Africa, and it is characterized by persistently high levels of acute malnutrition and stunting that have increased over the last two decades.[2] It is estimated that the national prevalence of global acute malnutrition is 16.3% and severe acute malnutrition 4.5%, which are above the emergency threshold for intervention by the WHO standards.[2] Also chronic malnutrition reaches dramatic levels considering that the national rate is 38%, with 11 of 18 Sudanese states recording the stunting prevalence among children at above 40%.[1] One-third (33%) of children younger than 5 years are underweighted, two of five (38.2%) are stunted, and each sixth (16.3%) child younger than 5 years is wasted; this is a serious threat to public health and limits educational achievements and opportunities for economic development.[3] Indeed, the concept of "children at risk" in Africa relates to the greatest risks to children's health including exposure to HIV, malaria, tuberculosis, and malnutrition.[4] The underlying causes of malnutrition are multi-sectoral and are mainly due to poor behavioral practices of food utilization, poor infant feeding and caring practices, inadequate clean drinking water and sanitation facilities, food insecurity, diseases, limited access to healthcare services, poor maternal and childcare practices, and illiteracy.[5] In addition, the secession of South Sudan, the regional and national conflicts and displacement, weather-related crises, low agricultural productivity, and structural poverty have stifled development and made Sudan one of the most food-insecure countries in the world. Indeed, underweight prevalence increased from 27% in 2006 to 29.7% in 2010, and by 2014, this rate increased further to 33%.[6] Finally, the COVID-19 pandemic further exacerbated the situation owing to its direct effects on health and consequent allocation of significant funds in combating the virus at the expense of other sectors.[7]

At the time of writing, 2.2 million children younger than 5 years are stunted, and it makes Sudan one of the 14 countries where 80% of the world's stunted children live.[3] It is well-known that stunting is associated with higher susceptibility to diseases and impaired brain development, consequently resulting in lasting and impaired mental functioning.[8] Furthermore, adults who were stunted as children earn a lower income (on average, 22% less), which further exacerbates deprivation.

The Sudan transition government is putting in place a high level of aspiration and commitment toward the agenda of welfare and sustainable development of Sudanese's people, specifically toward young generations. The report on The Economic and Social Impacts of Child Undernutrition in Sudan is part of a wider regional study on the Cost of Hunger in Africa (COHA). Using this report, we consider the impact that malnutrition has on health, education, and productivity, and we outline possible future perspectives.

METHODS

The COHA study is led by the African Union Commission and New Partnership for Africa's Development Planning and Coordinating Agency and supported by the United Nations Economic Commission for Latin America and the Caribbean and the UN World Food Programme. Cost of Hunger in Africa is a multi-country study aimed at estimating the economic and social impacts of child undernutrition in Africa. The COHA model is used to estimate the additional cases of morbidity, mortality, school repetitions, and dropouts and reduced physical capacity that can be associated with a person's undernutrition status before the age of 5 years. To estimate these social impacts for a single year, the model focuses on the current population, identifies the percentage of the population who were undernourished before the age of 5 years, and then estimates the associated negative impacts experienced by the population in the current year. Cost of Hunger in Africa–Sudan started in November

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2018 using this information and the data provided by the Sudan National Implementation Team; the model estimates the associated economic losses incurred by the economy in health, education, and potential productivity in a single year. The reference year used in the analysis of the study model is 2014. During the process, the required data for the study have been collected from national data sources, including Multiple Indicator Cluster Survey 2014, the Sudan Household Survey 2014; Sudan National Bureau of Statistics—economic survey and statistical abstracts —various years, Sudan Labour Force Survey, and Central Bank of Sudan 2014; primary data collected from public hospitals, and relevant data from international sources. The detailed method and formula used in results are fully described elsewhere.[9]

Ethics statement. The COHA study was approved by the National Council of Child Welfare Ethical Review Committee, and written informed consent was obtained for primary data collection.

RESULTS

The results on the health cost of undernutrition and related diseases are reported in Table 1. The main diseases associated with undernutrition in children include higher risk of anemia, diarrhea, and respiratory infections. It is estimated that these additional cases of illness are costly to the health system and families (63% and 37%, respectively). Undernourished children are also at higher risk of dying, and 37.7% of all child mortality cases in Sudan are associated with undernutrition.

Studies of public policy in Sudan found limited significant changes in investment patterns in social services that reflected reallocations of devolved funds by poor municipalities to their highest local priorities. Because of the decentralization of responsibilities, local officials in these municipalities were more sensitive to the needs of the local population. However, the results were not the same throughout the country. In some municipalities, decentralization merely strengthened the power of local elites, solidified client–patron relationships, and increased corruption.

From an educational point of view, in Sudan in 2014, enrollment rates were relatively high, with more than 70% enrollment in primary education and more than 42% enrollment in secondary education. Based on official information provided by the Ministry of Education, 218,533 children repeated grades in 2014. Using data on increased risk of repetition among stunted students, the model estimates that the repetition rate for stunted children was 5.4%, whereas the repetition rate for non-stunted children was 2.2%. Thus, given the proportion of stunted students, the model estimates that 63,215 students, or 28.9% of all repetitions in 2014, were associated with stunting. Repetitions are costly both to the family of the student (92.6 million of Sudanese pound [SDG]) and to the education system (47.5 million of SDG). Stunted students are also more likely to drop out of school, and according to available data and taking into account the relative risks associated with the consequences of stunting on educational performance, there is an important gap in school completion between those who suffered from stunting as children and those with a healthy childhood. In fact, the model estimates that from the current working age population aged 15–64 years, 45.7% of those who were stunted as a child (and presently of working age) completed primary school compared with 81% of those who were never stunted.

Finally, the COAH analyzed the differential impact of undernutrition of a person's productivity based on the type of labor. For nonmanual activities, the analysis considered the consequences of lower schooling levels in income-earning capacity in the labor market, whereas for manual activities, the analysis was based on the average productivity loss due to lower physical capacity. Activities fall mainly in agriculture, forestry, and fisheries subsectors, which employ over 67% of Sudan population. The study showed that workers with reduced height tend to have less lean mass and are less productive in activities than those who have never been affected by growth delays. The model estimated that 7,273,629 people in Sudan are involved in activities, of which 3,235,340 suffered chronic childhood malnutrition. This represents an annual loss in potential income of more than 655.9 SDG (113.7 million U.S. dollar [USD]), an equivalent to 0.15 of gross domestic product (GDP), due to lower productivity. Table 2 reports the losses in potential productivity associated with stunting by age-group in manual work. Moreover, it is estimated that 1,077,671 (5.2% of the total working age population) people are absent from the workforce because of mortality associated with undernutrition. Considering the current productive levels of the population, by age and sector of labor, the model estimates that the economic impact of working hours lost due to mortality is 5.1 billion SDG, which represented 1.2% of the country GDP of 2014. The total losses in productivity of 2014 are estimated at approximately 10.3 billion USD, which is equivalent to 1.5% of Sudan's GDP. The income differential in labor, due to the lower physical and cognitive capacity of people who suffered from growth retardation as children, represents 9.5% of the total costs. Considering the health, education, and productivity sectors analyzed, the annual costs associated with child undernutrition are estimated at about 2 billion USD, which is equivalent to 2.6% of GDP (Table 3).

TABLE 1
Results on the health cost of undernutrition and related diseases

Pathology	% Of episode	% Of cost	Cost (million Sudanese pounds)	Cost (million U.S. dollars)
Undernutrition	65.3	67.8	3,130.5	542.7
Low birth weight	10.6	15.1	696.8	120.8
Acute diarrheal syndrome	13.6	9	415.6	72
Anemia	8	6	276.5	47.9
Acute respiratory infection	2.2	1.9	88.8	15.4
Fever/malaria	0.3	0.2	7.8	1.3
Total	100	100	4,616	800.1

DISCUSSION

One of the challenges facing child causes in Sudan is how to activate and develop the strategies, policies, and plans to accompany the social, economic, and the cultural changes. A clear road map in the framework of a comprehensive vision for the child rights as a human right cause is needed. Achieving this will likely lead to a positive situation for children and creates a world they are worthy of, a world that helps maintain a permanent development to meet their rights in all fields and to help in crystallizing a concept that is built on the principle of

TABLE 2
Losses in potential productivity associated with stunting by age-group

Age-group (years)	Population working in manual works stunted as children	Income losses	
		Millions Sudanese pounds	Million U.S. dollars
15–19	704,377	141	24.4
20–24	620,769	122.2	21.21
25–29	506,879	89.5	15.5
30–34	354,875	66	11.4
35–39	300,960	58.7	10.2
40–44	254,563	58.7	10.2
45–49	188,383	44.7	7.7
50–54	128,889	33.1	5.7
55–59	111,726	29.4	5.1
60–64	63,920	12.6	2.2
Total	3,235,340	655.9	113.7
% Gross Domestic Product		0.15	

right and not only on the need: the main pillar of it is the child as a human being.

The scenario of Sudan in 2014 highlighted a high historical trend of child undernutrition that, so far, continues with dramatic rates and consequences. The economic impact associated with child malnutrition, particularly underweight and stunted children, is significant with far-reaching consequences on health, education, and productivity.

The realization of this deficiency and the feeling of discontent about the method of the basic needs of children should lead to the adoption of a developmental method based on the principles of the international development criterion which were adopted by the international human rights and child rights instruments, something that can be led to the integration of all the social protection programs.

The COHA studies that have already been concluded in several African countries including Burkina Faso, Chad, Egypt, Ethiopia, Ghana, Lesotho, Madagascar, Malawi, Rwanda, Swaziland, Kenya, and Uganda shows estimated annual loss ranging from 1.9% to 16.5% of the GDP as a result of undernutrition. The results of the COHA in Sudan strongly suggest that for the country to achieve sustainable human and economic growth, special attention must be given to the early stages of life as the foundation of human capital. The results of the study are supported by a strong evidence base and a model of analysis specially adapted for Africa, which demonstrates the depth of the consequences of child undernutrition in health education and labor productivity. This study further quantified the potential gains of addressing child undernutrition as a priority. The findings of Sudan COHA study reaffirmed the results of COHA studies conducted in Africa, Latin America, and the Caribbean countries that undernutrition in children has significant impacts on the economy. The country is estimated to have lost an equivalent of about 11.6 billion SDG in 2014, which represents 2.6% of the GDP. Productivity-related losses contributed the largest costs at 1.5% of GDP followed by health and education sectors at 1.1% and 0.1%, respectively. The huge loss implies the need for concerted efforts to address this ongoing challenge.

In 2020, the outbreak of COVID-19 pandemic further exposed the fragility of Sudan health, social, and economic system. Moreover, considering that Sudan is also affected by the malaria burden and COVID-19 and malaria syndemic, healthcare systems and professionals will face an even greater challenge.[10]

However, beyond tackling the immediate concerns about health and food emergencies, the COVID-19 crisis may have some benefits offering the opportunity for a strong collective action toward building resilient food systems that enhance ecological sustainability and equitable outcomes.[9] Moreover, if the prevention measures forecasted for fighting COVID-19 are implemented, we could register a lower incidence of hygiene-linked diseases that still represent leading causes of death.[11] Regardless of the potential positive impact of COVID-19–related interventions and considering the critical and urgent situation Sudan is facing, it is mandatory that all stakeholders address child nutrition as a main concern and they put stunting in the center of the development agenda. In particular, the national development frameworks should be updated to ensure that the reduction in the stunting prevalence is an outcome indicator of the social and economic development policies, putting in place a comprehensive multi-sectoral nutrition policy, strategy, and plan of action, with strong political commitment and allocation of adequate resources for its implementation across all line ministries. Moreover, the delivery of nutrition services integrated with other essential services as antenatal and postnatal care should be promoted, focusing on positive health behavior and good practices. A key role could also be played by schools that can serve as a platform for behavior change communication for future generations through nutrition and health education, as well as for health checkups and screening.

Finally, since 2015, Sudan has been a member of Scaling Up Nutrition (SUN) Movement to: 1) enhance the government commitment improving people's nutritional status and well-being, 2) to promote an enabling political environment to improve harmonization between donors, 3) to support effective

TABLE 3
Summary of annual costs associated with child undernutrition

	Cost	Episodes	Cost (billion Sudanese pounds)	Cost (million U.S. dollars)	% Of gross domestic product
Health	Low birth weight and underweight	2,475,558	3.8	663.4	–
	Increased morbidity	768,685	0.8	136.7	–
	Total	3,244,243	4.6	800.1	1.03
Education	Increased repetition—primary	56,675	0.1	20.7	–
	Increased repetition—secondary	6,540	0.02	3.6	–
	Total	63,215	0.14	24.3	0.03
Productivity	Nonmanual activities	6,055,543	1	176.5	–
	Manual activities	3,235,340	0.7	113.7	–
	Mortality	1,077,671	5.2	900.8	–
	Total	10,368,554	6.9	1,191	1.53
Total cost		–	11.6	2015.5	2.6

actions aligned with national plans, and 4) to promote equity, equality, and nondiscrimination for all, with females at the center of efforts to scale up nutrition. Precisely, for its multisectorial and multidisciplinary composition, the SUN could be, if properly exploited, the added value in fighting malnutrition in a national, coherent, effective, integrated, culture-sensitive, and social determinant–driven manner.

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