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OPPORTUNITIES  
TO ACCELERATE  
**THE REDUCTION  
OF CHILDHOOD  
UNDERNUTRITION  
IN THE SAHEL**

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## SUMMARY

### Chronic high rates of childhood undernutrition in the Sahel have resulted in significant costs to human capital. What opportunities exist to accelerate the reduction of childhood undernutrition in this region?

This brief details the findings of research examining context-specific determinants of growth faltering and childhood undernutrition in five Sahel countries—Burkina Faso, Chad, Mali, Niger, and Senegal. Notably, this research underscores opportunities to strengthen nutrition action in the Sahel and,

consequently, build and sustain human capital in the region. We detail the determinants that have the largest associations with childhood undernutrition in the Sahel; examine our findings in the context of existing research; and provide recommendations to improve the effectiveness of nutrition action in this region.

#### 1

### Childhood Undernutrition and Growing Human Capital Costs in Sub-Saharan Africa

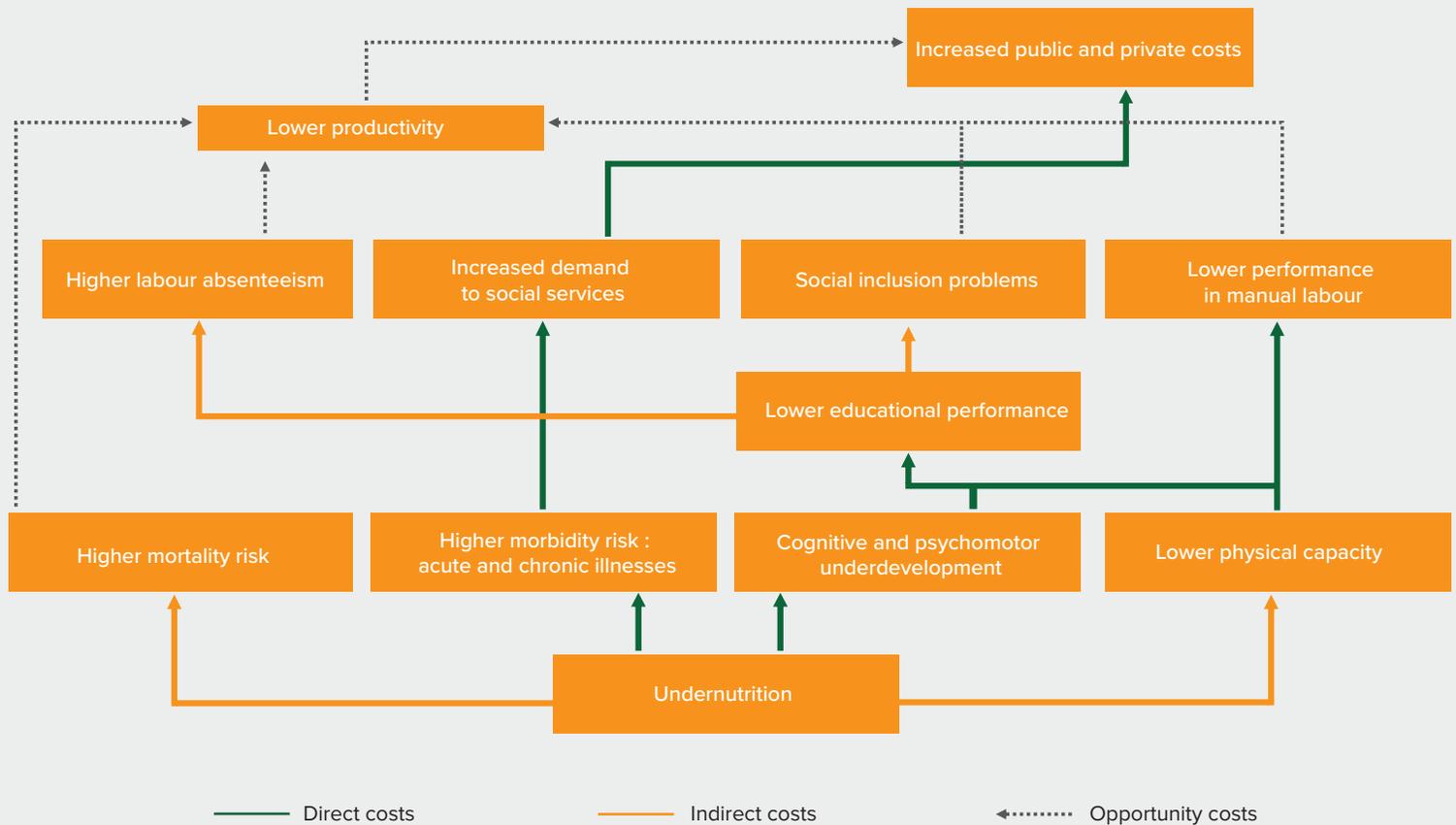
**Despite concerted efforts, the prevalence of childhood undernutrition remains high in Sub-Saharan Africa, costing countries up to US\$4.7 billion and 16.5 percent of GDP annually.**<sup>1</sup> The inadequate intake, absorption, or utilization of nutrients in childhood is associated with an increased risk of mortality and morbidity and impairments to cognitive and physical development.<sup>2</sup> This has resulted in significant health, education, and productivity costs at the individual, community, and country level (Figure 1). Individuals who were stunted (low height-for-age) in the first five years of life are more likely to have decreased educational attainment,

decreased future wages, and poor health outcomes in adulthood.<sup>3</sup>

**In Sub-Saharan Africa, the Sahel region bears one of the highest burdens of childhood undernutrition and its associated impact on human capital.**<sup>4</sup> The prevalence of stunting in children under five ranges from 17.9 percent in Senegal to 37.8 percent in Chad. The prevalence of wasting ranges from 8.1 percent in Senegal and Burkina Faso to 13.9 percent in Chad. Although progress has been made, the six Sahel countries are currently not on track to meet the childhood stunting and wasting Global Nutrition Targets by 2030.



**FIGURE 1. Cost of Hunger in Africa Framework of Consequences of Undernutrition**



Source: Adapted from African Union Commission, UN Economic Commission for Africa, and UN World Food Programme. 2014. "The Cost of Hunger in Africa: Social and Economic Impact of Child Undernutrition in Egypt, Ethiopia, Swaziland and Uganda." Addis Ababa: UN Economic Commission for Africa.

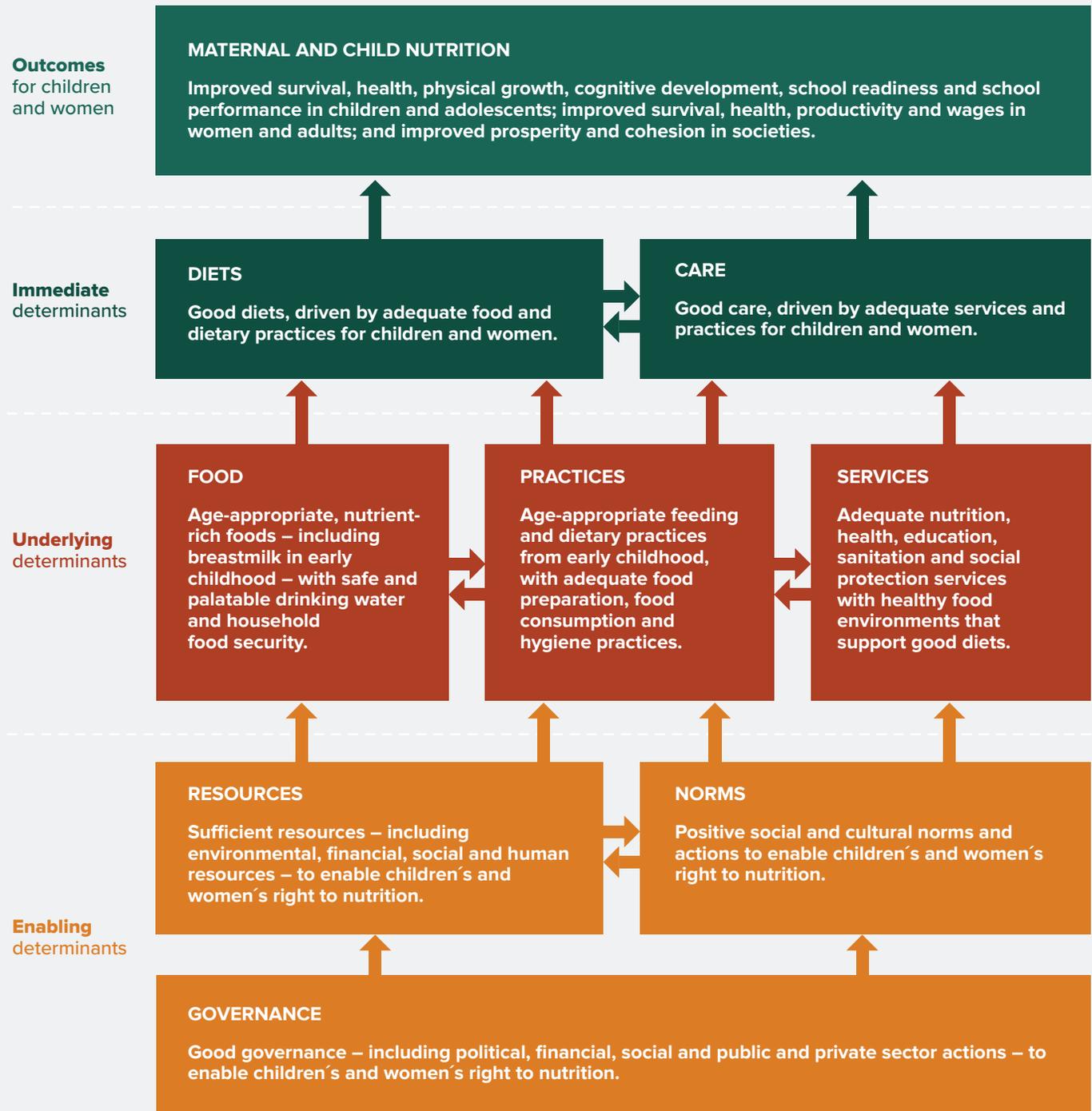
## 2

## Reducing Childhood Undernutrition: Building and Sustaining Human Capital

**The effective reduction of childhood undernutrition and growing costs to human capital in the Sahel requires the identification of context-specific determinants which can be integrated into nutrition action.** The UNICEF conceptual framework on the determinants of maternal and child nutrition broadly categorizes the determinants of undernutrition according to the level of impact (Figure 2). Within each category and level of determinants, many potential factors may impact the likelihood of one or more forms of childhood undernutrition. Additionally, and importantly, the statistical significance and ranking of individual risk factors are context-specific—varying within and across populations.

**This brief analyzes the findings and policy implications of research examining the determinants of childhood undernutrition and growth faltering specific to the Sahel, with an additional focus on factors that have not been examined in detail.** The most recent Demographic and Health Survey data, collected between 2010 and 2018, were assessed for five Sahel countries—Burkina Faso, Chad, Mali, Niger, and Senegal. The sample population included almost 37,000 children under five. Multilevel regression models were used to examine the association between childhood undernutrition and child, parental, and household-level factors.

**FIGURE 2.** UNICEF Conceptual Framework of Maternal and Child Nutrition



### 3 Findings: Determinants of Childhood Undernutrition and Growth Faltering in the Sahel

In our representative sample of children under five in five Sahel countries, level of maternal education, exposure to household air pollution (HAP), and recent child illness had the largest associations with growth faltering and childhood undernutrition (Table 1). Children with mothers with less than a primary school level of education were three times more likely to be stunted (low height-for-age) than children with mothers who had above a secondary school level of education. In comparison to children living in households cooking primarily with clean fuels, children living in households cooking primarily with biomass fuels were 2.65 times more likely to be stunted. The likelihood of concurrent stunting and wasting (low weight-for-height) was

1.6 times higher in children who recently suffered from diarrhea and 1.5 times higher in children who recently had a fever.

In the Sahel, the association between childhood undernutrition and exposure to HAP from biomass cooking fuels was larger than that with water and sanitation. Although the likelihood of stunting in children exposed to high levels of HAP was three times that of children exposed to low levels of HAP, the association between improved sanitation and/or drinking water sources and childhood undernutrition was small. The likelihood of undernutrition was 1.1 times higher in children who lived in households with unimproved sanitation facilities or drinking water sources.

**TABLE 1.** Ranking of Factors Associated with Child Undernutrition and Growth

	Stunting	Wasting	WaSt	HAZ	WHZ
Child Age	9	8		8	
Child Sex	4	4	3	4	7
Recent Cough			7		
Recent Diarrhea	3	5	3	3	2
Recent Fever		3	5		3
Number of Children	8			9	
Maternal Education	1	1	1	2	1
Maternal Employment	5	6	6	6	5
Paternal Employment					
HAP Exposure	2	2	2	1	4
Sanitation	5			4	
Drinking Water	7	7		6	6

Orange boxes signify the association was not statistically significant or that no association exists

1 indicates the largest association

HAP: Household Air Pollution

WaSt: Concurrent wasting and stunting

HAZ: Height-for-age z-score

WHZ: Weight-for-height z-score

There was a small but statistically significant association between childhood undernutrition and social issues of importance to the Sahel and similar regions. The likelihood of childhood undernutrition was lower in children with a mother

who was empowered in terms of decision-making abilities and perceptions of domestic violence. Additionally, child marriage and polygamy were associated with a slight increase in the likelihood of childhood undernutrition.

**Dietary diversity, a strong indicator of micronutrient status, was associated with childhood macronutrient undernutrition in the Sahel.** The likelihood of childhood stunting was 1.3 times higher in children between 6 and 23 months old whose diet did not meet the WHO minimum dietary diversity requirement—the daily consumption of food from five or more food groups.<sup>5</sup> The intertwined relationship between macronutrient and micronutrient undernutrition was further supported by a statistically significant association between childhood

undernutrition and childhood anemia—commonly the result of micronutrient deficiencies.<sup>6</sup>

**The statistical significance and magnitude of association between childhood undernutrition and child, parental, and household level factors varied within subpopulations.** The determinants of childhood undernutrition varied according to country, household wealth quintiles, urban or rural area of residence, child sex, and child age.

## 4

### Conclusions and Implications for Future Social Protection Operations in the Sahel

**First, our findings suggest a need to direct additional attention toward improving maternal socioeconomic status in the Sahel.** The importance of maternal socioeconomic status is extensively detailed in literature specific to low- and middle-income countries (LMICs) and, in particular, the Sahel.<sup>7,8,9</sup> Maternal socioeconomic status can impact child nutrition while the child is in utero and after birth. During pregnancy, maternal socioeconomic status can impact health-seeking behaviors and the quality of accessible healthcare services, disrupting in utero growth. After birth, maternal socioeconomic status can further impact child care and feeding practices, ultimately faltering postnatal growth.

**Social protection programs, particularly cash transfer interventions, are uniquely placed to improve maternal socioeconomic status in the Sahel.** Cash transfer programs can address financial, social, and cultural barriers to education. The provision of cash would address financial barriers to education. In settings where female children typically experience social and cultural barriers to education, accompanying behavioral change intervention measures can further encourage school attendance. Furthermore, and to encourage earlier improvements in child nutritional outcomes, accompanying behavioral change intervention measures should integrate messages about the impact pathways detailed above—clinically-recommended health-seeking behaviors and child care and feeding practices.

**Second, the findings of this research suggest that existing approaches seeking to improve child health in the Sahel may need to be strengthened.** Biomedical research has detailed the correlation between child health and nutritional status.<sup>10</sup> Common

illnesses or symptoms associated with undernutrition include anemia, diarrhea, respiratory infections, and fevers. Children who are ill normally experience decreased nutrient intake, difficulty absorbing nutrients, and increased biological demand for nutrients to ensure appropriate immune system functioning. This is compounded by the fact that undernutrition weakens immune system functioning, making children more vulnerable to infectious diseases and severe illness.

**Coordinated action between Social Protection and Health, Nutrition, and Population teams could improve child health outcomes in the Sahel.** First, and similarly to the above, behavioral change interventions can be introduced as accompanying measures of cash transfer programs to encourage clinically recommended health and nutrition practices. Second, basic healthcare services can be provided alongside social protection services. Third, the provision of cash transfers could be conditional on child health requirements. Evidence-based policy options to address poor child health include improving immunization rates, child care practices, health literacy, and health-seeking behavior among caregivers of young children. More long-term evidence-based policy solutions include improving household/community-level environmental conditions, which increase the likelihood of poor health, and improving the quality of healthcare services.

**Furthermore, given the high prevalence of childhood anemia in the Sahel and its well-documented association with child health, there may be a need to strengthen or broaden the reach of policies addressing micronutrient deficiencies.** In addition

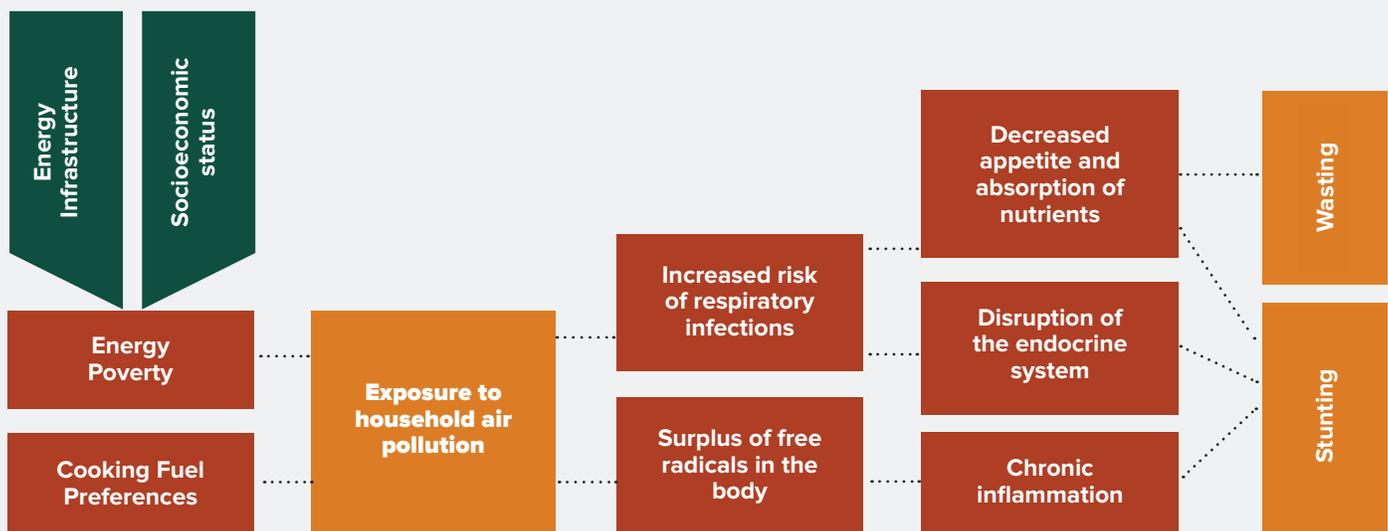
to the association between micronutrient deficiencies and child health, it is important to note that a growing body of research demonstrates that present undernutrition is a risk factor for future undernutrition—pertaining to both micronutrient and macronutrient undernutrition.<sup>11</sup> Social protection programs can improve child micronutrient status through the provision of in-kind transfers to vulnerable households. This includes micronutrient supplements, food supplements such as lipid-based nutrient supplements, and/or fortified food.

**Third, our findings indicate an opportunity to strengthen nutrition action in the Sahel by including interventions that address the high prevalence of solid fuel use and child exposure to pollutants.** This reflects a growing body of evidence demonstrating an association between exposure to HAP and childhood undernutrition in LMICs.<sup>12 13 14</sup> Evidence suggests the potential pathways through which exposure to household air pollution from solid cooking fuels could result in childhood undernutrition (Figure 3). Despite the high prevalence of solid fuel use in LMICs and extensive research highlighting the associated negative effects on maternal and child health, HAP has largely been excluded from nutrition research and policy.

**Multisectoral collaboration, particularly between Social Protection and Energy teams, could further minimize child exposure to HAP and increase the accessibility of improved cookstoves and cleaner cookfuels.** Cash or in-kind transfers could address financial barriers to accessing cleaner cookfuels and improved cookstoves, which emit fewer pollutants. Accompanying behavioral change intervention measures can be used to encourage the use of improved cookstoves and cleaner cookfuels and to encourage behavior that limits child exposure to pollutants. Behavioral interventions seeking to minimize child exposure to HAP should encourage caregivers to cook in a separate room/location from children and improve ventilation in households. Long-term solutions include improving the affordability of clean cooking fuels and energy infrastructure.

**Fourth and lastly, this research suggests differences in the determinants of child undernutrition across subpopulations.** This is in line with earlier evidence demonstrating that the statistical significance and magnitude of association vary within different contexts. In order to effectively address high rates of undernutrition in the Sahel, interventions must be specific to the populations of interest. Effective nutrition action may vary across and within countries.

**FIGURE 3.** Potential Biological Mechanisms for the Association between HAP and Child Undernutrition



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