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The effect of meeting NDP III targets for water and sanitation on child malnutrition in Uganda

Taylor Hanna, Linda Nakato, Paul Lakuma

Executive Summary

Child malnutrition is an important issue in Uganda and is not distributed equally across the country. This Policy Note uses the International Futures (IFs) model to forecast the future of child malnutrition in Uganda at a regional level. The Note then explores the effect of meeting national targets on safe water and sanitation access, as defined in Uganda's Third National Development Plan (NDP III), on child malnutrition.

The rate of child malnutrition, as a percent of children, has fallen below 10% and is expected to reduce to below 7% by 2030 in a 'most likely' Current Path scenario. However, this reduction has not kept pace with population growth. More children in Uganda are malnourished today than were in 2017, and that number is not expected to fall until after 2030. Child malnutrition rates are highest in Karamoja, where over 21% of children are malnourished, while the greatest number of children malnourished live in West Nile (98,000), followed by Tooro, Karamoja, and Busoga. While the number of children malnourished in West Nile and Karamoja is expected to dip below 50,000 by 2050, it is expected to grow in Bunyoro, which will be home to the largest number of malnourished children by the same year.

By meeting NDP III targets on water and sanitation access, the WASH Improvement scenario reduces rates and headcounts of child malnutrition across the country by 2030 (1.6 percentage points, or 180,000 children relative to the Current Path) and eliminates child malnutrition at a country level by 2043. Water and sanitation improvements are most powerful in regions like West Nile and Tooro, where not only is malnutrition high but access rates are relatively low.

By both reducing malnutrition and risk of communicable disease, the WASH Improvement scenario also saves lives. It achieves the SDG 3 target for neonatal mortality by 2032, two years earlier than projected, and saves the lives of more than 23,000 children in Uganda by 2030 and over 120,000 by midcentury.

While child malnutrition is a multifaceted issue and requires policies addressing all of its causes, improvements in water and sanitation infrastructure throughout the country can have an important and lasting effect on children's lives and wellbeing.

Introduction

Child malnutrition remains a critical concern in Uganda. Almost 3 in 10 children between 6 to 59 months are stunted, four percent are wasted, and 11 percent are underweight (UBOS & ICF International, 2018). While most districts in the country experience high child malnutrition, there is a divide between urban and rural areas and between northern and southern districts. Children in rural areas and the northern part of Uganda experience more malnutrition when compared to children who reside in urban areas or the southern part of the country (World Food Programme, 2019). At a regional level, Tooro region has the highest percentage (40.6%) of stunted children, closely followed by Bugisu region (36%) and Karamoja region (35.2%) as of 2016. Concerning wasting children, the West-Nile region has the highest percentage, with 10.4%, closely followed

by the Karamoja region, with 10%. Finally, Karamoja region has the highest percentage of underweight children (25.8%), closely followed by West-Nile (16.7%) and Acholi with 15.4%.

Malnutrition at early ages has long-term implications and is associated with reduced schooling, lower earnings and economic productivity, and lower birthweight for children of mothers who experienced malnutrition as children (Alderman et al., 2006; Victora et al., 2011). With a population of 42.8 million people by June 2021, growing at a rate of 3% per annum (NPC, 2021), Uganda is home to one of Africa's fastest-growing populations. It is also among the youngest, with over 45 percent of the population younger than 15 (NPC, 2021). Uganda is in the early stages of its demographic transition, and the burden of malnutrition impacts the country's ability to reap benefits from the changing demographics. Moreover,

with such a heavy regional dimension, addressing child malnutrition is an important step toward reducing inequities between regions and between rural and urban populations in Uganda.

Poor access to safe water and sanitation sources is an important factor contributing to child malnutrition, especially in developing regions (Huttlly et al., 1990; NB et al., 2017; van Cooten et al., 2019). Disease incidence related to water and sanitation prevents the proper retention of food passing through the digestive system, especially in young children (Brown et al., 2013). In Uganda, over 21% of households do not have access to improved water sources of drinking water (UBOS, 2021). Access varies widely across regions, from over 45% of households lacking access in Ankole, over 40% in Kigezi, and nearly 40% in Tooro, to just 1.2% of households in Kampala. Additionally, the lack of toilet facilities encourages open defecation, further exposing children to other diseases. Regions such as Karamoja (69.5% of households) and Acholi (27.6%) still practice open defecation.

Child malnutrition is a complex and multifaceted problem, and other contributing factors include early motherhood, poor childcare practices, including child feeding practices, and repeated childhood infections (USAID, 2021). But the evidence suggests that interventions in improving access to water and sanitation, especially permanent and lasting solutions, have a significant impact on lowering the burden of child malnutrition (Bekele et al., 2020; Pickering & Davis, 2012).

Given this background, it is prudent to ask the following: What would improvements in Water, Sanitation, and Hygiene (WASH) services mean for child malnutrition? What regions benefit more from such improvements in WASH services? This policy note examines the effect of investments in WASH services on child malnutrition and infant mortality, delving deeper into regional disparities and how different investments yield impact at the sub-national level. In so doing, the policy note contributes evidence of how the country can achieve its NDP III targets regarding the reduction of malnutrition.

Methodology

We use the International Futures (IFs) tool for this analysis. IFs is an open-source integrated assessment modeling platform that allows for historical data analysis and scenario analysis for 186 countries. IFs represent integrated relationships across 12 core systems: agriculture, demographics, economics, education, energy, environment, finance, governance, health, infrastructure, international politics, and technology. All systems and modules

within IFs are connected dynamically so that changes in one system lead to changes across all others.

IFs is often used at a country level but can also be modified to represent development at 'subnational' units within countries, such as states or provinces. This project uses a modified version of the IFs model, which represents 135 districts in Uganda. Previously IFs has been used at a district level in Uganda to estimate and forecast GDP (Rafa et al., 2017), poverty (Rafa, Moyer, et al., 2018), and educational attainment (Kwasi et al., 2022; Rafa, Bremer, et al., 2018). For this project, we will focus on results at the 15-region level.

For this project, we assess and compare two scenarios:

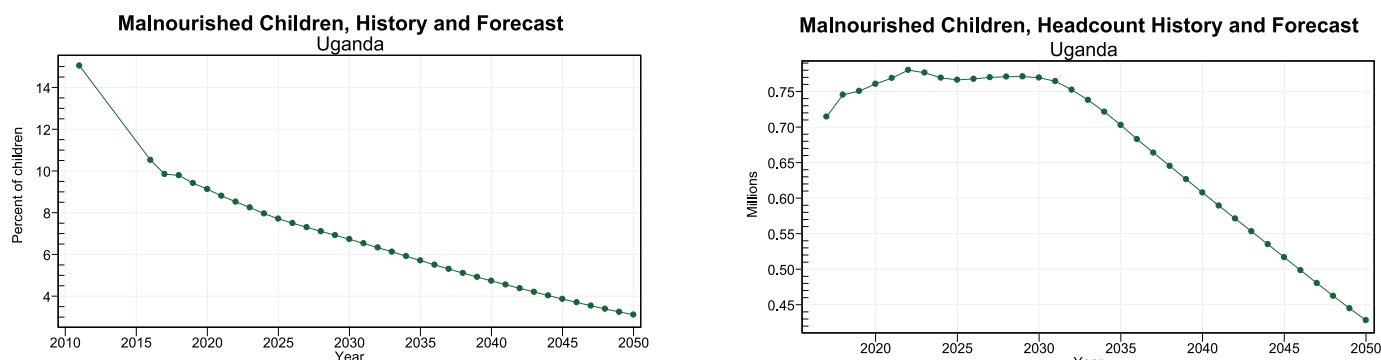
- (1) The *Current Path* scenario is a business-as-usual 'most likely' development course. It simulates dynamic changes related to expected economic and demographic growth and development over time, but it does not assume any major policy transformations or shocks. The *Current Path* accounts for the economic and education shocks experienced as a result of the COVID-19 pandemic.
- (2) The *WASH Improvement* scenario simulates an improvement in access to safe water and improved sanitation in line with targets set by the National Planning Authority (NPA, 2020) in the Third National Development Plan (NDPIII). It increases the access rate of the population to improved sanitation to over 50% by 2030. NDPIII sets a target for 45% coverage by 2025. While the country is not on track to meet this target, this scenario accelerates progress in a manner consistent with NDPIII and exceeds its goal by 2030. The scenario also increases access to safe water to 94% of the country's population. The NDPIII sets separate rural and urban access rate targets (85% and 100%, respectively). In order to arrive at a country-level target for the scenario, the rural and urban target rates were applied to the rural and urban portions of the population.

Findings

The current path of child malnutrition in Uganda

The rate of child malnutrition¹ has improved steadily over the past few decades, halving from over 20% of children under five in 1995² to under 10% by 2017 (Figure 1). We expect this to continue to fall gradually to below 7% by 2030 and near 3% by 2050. However, the number of malnourished children has not been falling similarly due to population growth. We estimate that more children are malnourished today than were in 2017. Along the Current Path, this number will not fall significantly until after 2030, when 770,000 children will still be malnourished.

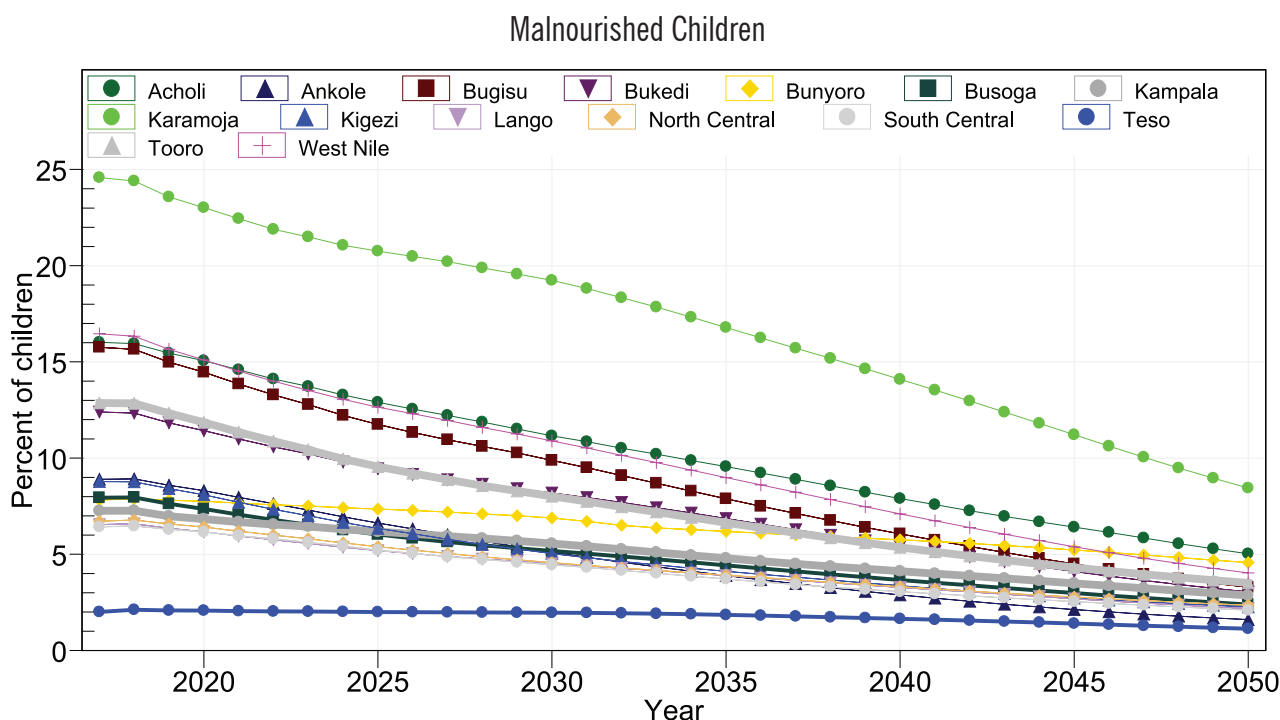
Figure 1 Percent and headcount (in millions) of malnourished children in Uganda along the *Current Path*



Source: IFs 7.83 Uganda Subnational.

There is a strong regional dimension to child malnutrition in Uganda. Roughly one-third of malnourished children live in Northern regions. In Karamoja, the region with the highest child malnutrition rate, over 1 in 5 children is malnourished (Figure 2). And in three other regions (West Nile, Acholi, and Bugisu), that figure is more than 1 in 7. Along the *Current Path*, rates of child malnutrition are expected to fall in all regions, but only gradually. By 2030, regions are just expected to reduce child malnutrition by between 0 and 3.5 percentage points. By 2050, 8 out of the 15 regions are projected to bring rates of child malnutrition to below 3%, but Karamoja lags behind, with a projected 8% of children under five malnourished.

Figure 2 Percent of children malnourished by region along the *Current Path*

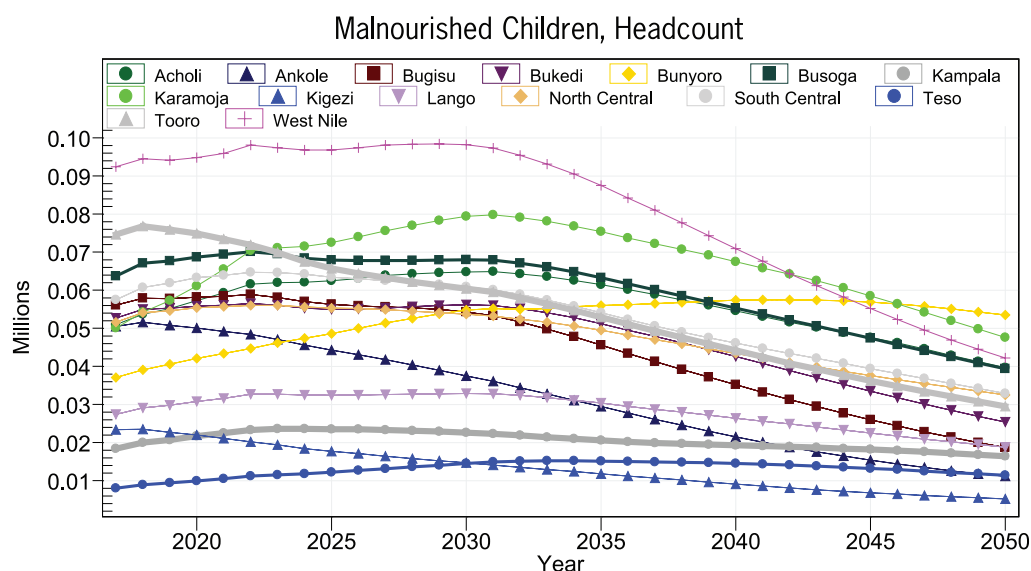


Source: IFs 7.83 Uganda Subnational.

- 1 In the IFs model and in all results that follow, child malnutrition refers to the percent of children younger than 5 who have a weight-for-age that is less than two standard deviations below the standard. Data are initialized based on Uganda Demographic and Health Surveys in 2011 and 2016.
- 2 From IFs 790 IP3, 186 version.

Figure 3 shows projected patterns of the headcount of malnourished children across regions. The West Nile region is home to the most malnourished children by number, at an estimated 98,000 in 2022. This is followed by Tooro, Karamoja, and Busoga, all with roughly 70,000. Over the coming decade, in the *Current Path*, while the count of malnourished children is expected to fall in some regions (Ankole, Kigezi, Tooro), in many others, it will remain relatively flat (Busoga, West Nile) or even rise (Karamoja, Bunyoro) due to demographic changes.

Figure 3 Headcount of children malnourished by region along the *Current Path*



Source: IFs 7.83 Uganda Subnational.

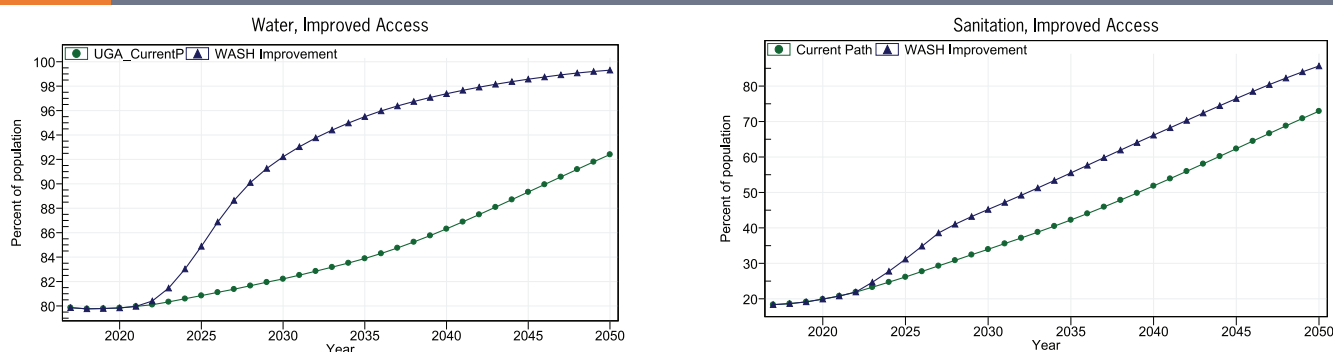
To tackle child malnutrition, it is important to recognize declining rates of malnutrition may obscure growth in the actual number of malnourished children, especially in rapidly growing and underdeveloped regions.

Improving water and sanitation

Malnutrition can be attributed to a number of causes in Uganda, including the price and inaccessibility of food. Lack of access to high-quality water and sanitation is another important contributing factor.

In the *WASH Improvement* scenario, access to safe water and improved sanitation is rapidly increased over the next five years, resulting in meeting the target access rates defined by Uganda's Third National Development Plan (NDPIII) at a national level by 2030.

Figure 4 Scenario interventions in the *WASH Improvement* scenario, including increased access to improved water sources (left) and increased access to improved sanitation (right) as a percent of the population.



Source: IFs 7.83 Uganda Subnational.

This scenario results in nearly 6 million people gaining access to safe water, above those already expected to do so in the *Current Path*, by 2030, and over 8 million people gaining access to improved sanitation. At a country level, this scenario results in universal access to improved water sources (operationalized by access to over 97% of the population) by 2035.

Table 1 Child malnutrition (headcount in millions and as a percent of the population) in 2022, 2030, and 2050 across scenarios and for all regions in Uganda

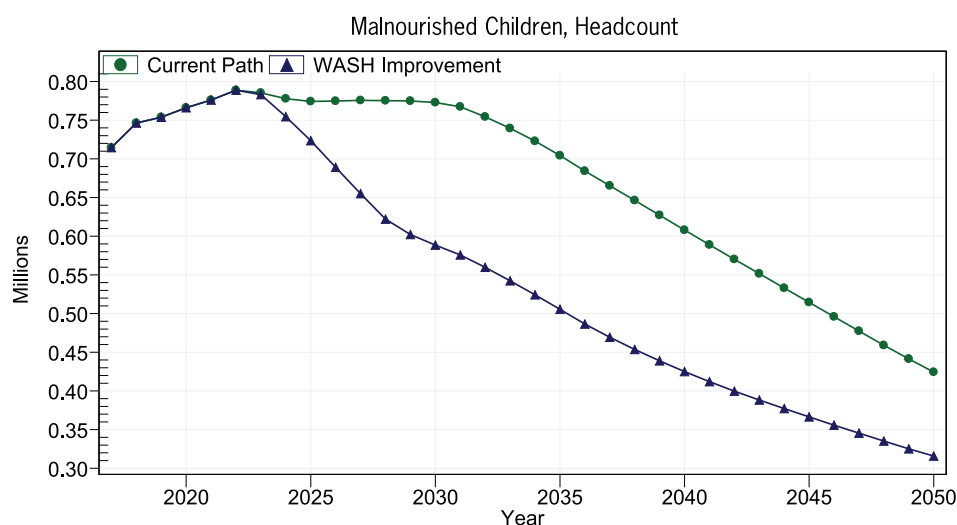
Region	2022		2030				2050			
	Headcount	Percent	Headcount		Percent		Headcount		Percent	
Scenario:			CP	WASH	CP	WASH	CP	WASH	CP	WASH
Acholi	62	14.1	65	50	11.2	8.7	40	28	5.0	3.6
Ankole	48	7.6	37	26	5.1	3.5	11	10	1.6	1.4
Bugisu	59	13.3	54	40	9.9	7.4	19	15	3.3	2.6
Bukedi	56	10.6	56	42	8.2	6.1	25	20	3.0	2.4
Bunyoro	45	7.6	55	46	6.9	5.8	53	38	4.6	3.3
Busoga	70	6.8	68	52	5.2	4.0	39	30	2.4	1.9
Kampala	23	6.6	23	18	5.6	4.5	16	12	2.9	2.0
Karamoja	70	21.9	79	69	19.2	16.7	48	35	8.4	6.3
Kigezi	20	7.3	15	11	5.0	3.7	5	4	2.3	1.8
Lango	33	5.8	33	24	4.5	3.3	19	14	2.2	1.7
North Central	56	6.0	54	39	4.6	3.3	33	25	2.4	1.8
South Central	65	5.8	61	44	4.5	3.2	33	24	2.1	1.5
Teso	11	2.0	14	11	2.0	1.5	11	8	1.1	0.8
Tooro	72	10.9	60	43	8.0	5.7	30	21	3.5	2.5
West Nile	98	14.0	98	72	10.9	8.0	42	32	4.0	3.1

Source: IFs 7.83 Uganda Subnational.

The *WASH Improvement* rapidly speeds up the reduction in child malnutrition in Uganda. By 2030 it reduces child malnutrition by 1.6 percentage points bringing over 180,000 children out of malnourishment by 2030 compared with the *Current Path*.

By reducing the rate of malnutrition, *WASH Improvement* effectively eliminates child malnutrition in Uganda (operationalized as bringing the rate below 3%) by 2043, eight years ahead of the *Current Path*.

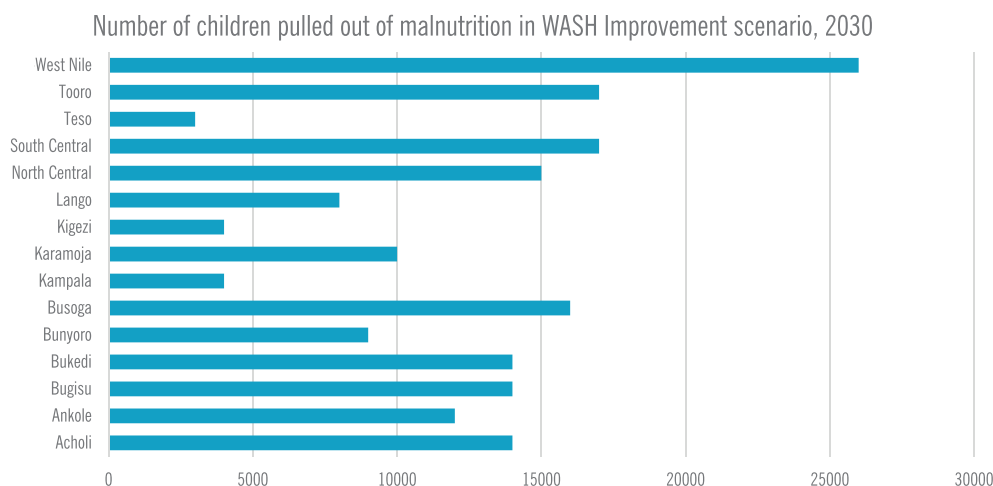
Figure 5 The headcount of children malnourished in Uganda in millions across the *Current Path* and *WASH Improvement* scenarios



Source: IFs 7.83 Uganda Subnational.

At a regional level, the *WASH Improvement* scenario pulls the most children out of malnutrition in West Nile –the region with the highest child malnutrition headcount. Improvements in water and sanitation are especially powerful in regions where malnutrition is high and water and sanitation access are relatively low, like West Nile and Tooro. On the other hand, Karamoja has the highest rate of child malnutrition but a relatively high level of access to improved water compared to other regions. As a result, the effect of the *WASH Improvement* scenario is not as great, though it still pulls 10,000 children out of malnutrition in the region by 2030.

Figure 6 Total children pulled out of malnutrition in the *WASH Improvement* scenario (the difference between the malnourished headcount in the *Current Path* and the *WASH Improvement* scenario) in 2030, by region



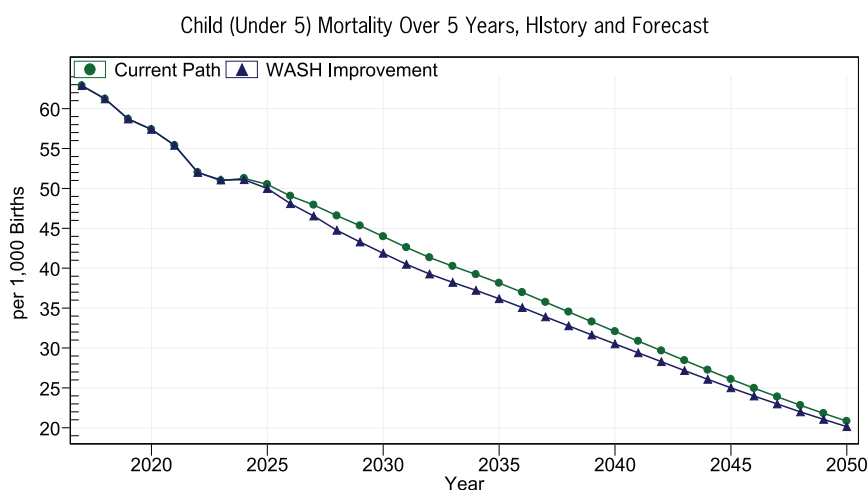
Source: IFs 7.83 Uganda Subnational

Moreover, by both reducing malnutrition and reducing water-borne diseases, improving water and sanitation infrastructure in Uganda saves lives. The *WASH Improvement* scenario leads to gradual improvements in both neonatal and child mortality at a country level.

WASH Improvement leads to a reduction in neonatal mortality that achieves the SDG 3 goal of a neonatal mortality rate below 12 deaths per 1,000 live births by 2032, two years ahead of the expected achievement in the *Current Path*.

It also reduces child (under-5) mortality from an estimated 44 deaths per 1,000 live births in the *Current Path* to 42 deaths per 1,000 live births in 2030. This is still far from the SDG 3 target of an under-five mortality rate below 25, which Uganda is not projected to achieve until after 2045.

Figure 7 Under-five mortality rate for Uganda (deaths per 1,000 live births) in the *Current Path* and *WASH Improvement* scenarios.



Source: IFs 7.83 Uganda Subnational

While the country is significantly further from achieving the under-five mortality rate and the *WASH Improvement* results in just a gradual improvement, that still results in saving the lives of more than 23,000 Ugandan children by 2030 and over 120,000 by 2050.

Conclusion and policy recommendations.

While Uganda has registered progress in reducing child malnutrition in its different forms, the country still grapples with the burden, which has far-reaching effects beyond childhood. Some contributing factors to this burden include poor access to safe water sources, poor sanitation facilities, early motherhood, poverty, and poor childcare practices. The child malnutrition burden varies by region, with the Northern regions experiencing a higher burden than the Southern regions.

This policy note investigates the effect of a policy push towards the NDP III targets of access to safe water and improved sanitation. In the most likely *Current Path* scenario, the national rate of child malnutrition is projected to fall below 7% by 2030. However, due to population growth, we forecast that the number of malnourished children in 2030 will be even higher than in 2017. At the regional level, already marginalized regions such as Karamoja, West Nile, Acholi, and Bugisu will continue to lag behind other regions. Regarding headcount, West Nile, Tooro, Karamoja, and Busoga have the highest number of malnourished children. In some regions, like Karamoja, that number is expected to grow over the coming decade.

The *WASH Improvement* scenario shows that improving access to safe water and sanitation significantly reduces child malnutrition, with over 180,000 children brought of malnutrition by 2030 compared to the *Current Path*. Regionally, the West Nile and Tooro regions reap the most benefits from the *WASH Improvement* scenario. Moreover, it pushes the country closer to meeting the SDG 3 targets on neonatal and child mortality.

The problem of child malnutrition is multifaceted and will require significant effort across many areas of development, including improving access to food and income. But this research shows that improving water and sanitation infrastructure can make real and lasting progress and is an essential component to any plan to combat hunger in Uganda.

The note proposes the following recommendations:

- Increase budget allocation towards providing safe water and improved sanitation conditions in line with the NDP III targets, especially for deprived areas like Karamoja and West Nile. This can be achieved by reprioritizing the national

budget towards welfare-enhancing sectors for the citizens, especially the children.

- Intensify partnerships with development partners like UNICEF, World Health Organization, etc., to ensure funding, especially for marginalized hard-to-reach communities like Karamoja. This will help mitigate the budget constraints that often inhibit the provision of adequate WASH services for the country. Moreover, the social-entrepreneurship model of service delivery can be adapted to provide WASH services cost-effectively and at a more friendly price.
- Utilize community-based grassroots associations like village savings and loan associations as channels for the delivery of WASH services. These associations are already conversant with prevailing local conditions and provide a cost-effective way to reach, especially the women responsible for ensuring that children have access to safe water and improved sanitation.

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