AI for Earth Grantee Profile
Mercy Lung'aho
Nutrition Early Warning System (NEWS)

Summary

Dr. Mercy Lung'aho and the International Center for Tropical Agriculture are tackling the issue of chronic malnutrition in sub-Saharan Africa with NEWS, a Microsoft AI-powered diagnostic model designed to predict and prevent a nutrition crisis before it occurs. NEWS will aggregate and analyze satellite imagery and traditional data, such as rainfall, temperature, and vegetation health, to help predict the nutritive value of crops. Insights from NEWS will then help inform interventions to boost nutrition in sub-Saharan Africa.

Using AI to prevent malnutrition in sub-Saharan Africa

Since at least the 1970s, food crises have been striking sub-Saharan Africa with depressing frequency. These bouts of extreme hunger and famine often require complex and costly international responses and leave millions of people facing chronic malnutrition and death. Women and young children are particularly vulnerable to malnutrition.

In children, the primary result of chronic malnutrition is stunted growth, that is, severely reduced height-for-age relative to their growth potential. According to UNICEF, between 2000 and 2017, the number of stunted children under five worldwide declined from 198 million to 151 million. At the same time, however, those numbers have increased at an alarming rate in West and Central Africa—from 22.8 million to 28.9 million.

> In Sub-Saharan Africa, around 40 percent of children under the age of 5 suffer from stunted growth.

Stunting has been found to have a series of adverse long-term effects on those who survive childhood. It is negatively associated with brain development, adult health, economic productivity, and income levels in adults. In fact, good nutrition is widely accepted as a requirement for economic growth. According to the Global Nutrition Report, for every dollar invested in nutrition, a country can get 16 dollars in return.

Yet, despite the incentive for governments, donors, and research institutions to focus on improving nutrition outcomes in developing countries, the response to food crises is mostly reactive today. Agencies such as UNICEF and the World Health Organization (WHO) have developed nutrition frameworks, yet many of the core

indicators can only help detect a crisis *after* it has taken hold—exposing vulnerable populations to repeated bouts of malnutrition.

Building an intelligent nutrition framework in the cloud

Dr. Mercy Lung'aho, a nutritionist and research scientist at the International Center for Tropical Agriculture (CIAT), is tackling the issue of chronic malnutrition in Africa with an AI-powered diagnostic model designed to predict and prevent a nutrition crisis before it occurs. The Nutrition Early Warning System ([NEWS](#)) is currently in the inception phase and will be built on Microsoft Azure through a grant provided by the Microsoft AI for Earth program.

NEWS will aggregate and analyze satellite imagery and traditional data, such as rainfall, temperature, and vegetation health, to help predict the nutritive value of crops. Insights from NEWS will then help inform interventions to boost nutrition in sub-Saharan Africa.

The project team is currently developing a comprehensive framework for nutrition resilience, based on previous nutrition frameworks such as those developed by UNICEF and the WHO. The team will assess each of these frameworks and identify the most sensitive indicators. This framework will dictate the data that will be fed into the NEWS algorithms. The team will then develop, optimize, and validate the algorithms for nutrition resilience using Microsoft Azure and AI tools.

> # Microsoft Azure is helping Dr. Lung'aho and her team at CIAT train nutrition resilience models faster and with more confidence.

Microsoft Azure offers the artificial intelligence and machine learning capabilities to perform the deep reinforcement learning needed to train NEWS. And by developing NEWS on Azure, the project will benefit from higher processing power and speed—helping to train the models faster and with more confidence. With these tools and technology being based in the cloud, NEWS can be quickly updated with new data and adapt strategies based on the latest information.

Enabling decision-makers to act proactively—and with confidence

Phase one of the NEWS initiative is a five-year project in nine focal countries, based on an assessment of vulnerability and selected to ensure regional balance. These nine—including Mali, Sudan, Zimbabwe, Nigeria, Kenya, Malawi, Senegal, Rwanda, and Botswana—will form the pilot phase of NEWS and represent each of the regions of sub-Saharan Africa across three levels of vulnerability.

The principal beneficiaries of NEWS will be vulnerable populations in Africa, especially women and children under age five, receiving support through governments; institutions such as the African Development Bank (AfDB); and investment partners such as the Big Win Foundation, the Bill and Melinda Gates Foundation, and the Dangote Foundation. By improving the probability of accurate growth forecasts, NEWS will help these governments and agencies confidently act on early warnings for nutrition needs with increased certainty of a return on investments and impact.

Moving forward

Eventually, the data collected by NEWS will help better define the problem of malnutrition in Africa and diagnose its root causes. For sure, the nutrition community must standardize the collection and monitoring of nutrition data and use trusted evidence to make informed decisions and develop effective policies and guidelines. NEWS will be both a tool and a platform to enable timely collection of data and improve its analysis and use, helping organizations to design more targeted interventions and track progress in real time.

Longer term, NEWS will target vulnerable populations globally. Dr. Lung'aho also hopes that the NEWS project will amplify how cloud-based initiatives can be done well in Africa, leading to increased confidence in the cloud and streamlined data gathering across Africa into a common cloud-based database.

About Dr. Mercy Lung'aho and CIAT

Dr. Mercy Lung'aho is a nutritionist and research scientist at the International Center for Tropical Agriculture (CIAT). CIAT's mission is to reduce hunger and poverty and improve human nutrition in the tropics through research aimed at increasing the eco-efficiency of agriculture. Dr. Lung'aho's research is mainly in the field of nutrition-sensitive agricultural programming. Her focus is on improving the health and well-being of women and children in low-income communities by improving their nutritional status. Dr. Lung'aho's work includes research on iron deficiency and stunted growth. This research investigation seeks ways to optimize how healthy population outcomes are linked to agricultural production and value chains. Her research on beans in developing countries includes the HarvestPlus project, where she coordinated the biofortified bean efficacy trial in Rwanda.

Resources

Websites
CIAT home site
Mercy Lung'aho's page on the CGIAR site

Publications

Mercy Lung'aho. "A New Approach to End Malnutrition in Africa." World Policy Institute. July 18, 2017. https://worldpolicy.org/2017/07/18/a-new-approach-to-end-malnutrition-in-africa/

Good NEWS for the Fight Against Malnutrition: Using Big Data and Machine Learning to Power a Nutrition Early Warning System (NEWS) for Africa. CIAT. May 16, 2017. https://cgspace.cgiar.org/bitstream/handle/10568/81198/ciat_news_051617.pdf

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Anna Short. "Follow the Trend: Machine Learning in the Fight Against Malnutrition." Foodtank. December 2018. https://foodtank.com/news/2018/12/getting-ahead-of-malnutrition-through-big-data/