



AKADEMIYA

The Expertise We Need. The Africa We Want.

COUNTRY POLICY INSIGHTS

Lessons for Climate Vulnerability & Market Shocks in Senegal

Layih Butake

INTRODUCTION

Our work at AKADEMIYA2063 covers a wide range of development issues. These interventions leverage research and analysis to directly support action on the ground, improve implementation of programs and strategies at national, regional, and continental levels, and inform response and recovery strategies in the face of crises and shocks. Such analysis covers several countries and workstreams, spanning climate adaptation and mitigation, nutrition, resilience, trade, as well as agrifood industrialization.

Periodically, we pause to take stock of our research findings for each given workstream and synthesize lessons from the analysis for a given country. This approach is in keeping with our efforts to ease and broaden access to the findings and their use in policy formulation and execution.

This catalogue revisits some of our main research series of relevance to Senegal's development efforts. Covering our Ukraine Crisis Brief Series and COVID-19 Bulletins, both created to provide analyses to respond to shocks of different natures, research on the Comprehensive Action for Climate Change Initiative (CACCI) Field Notes, as well as our Nutrient-Smart Processing and Trade (NSPT) reports, and the Africa Agriculture Watch (AAGWa) Crop Production Forecasts Briefs, we summarize key findings from each series, with policy lessons for decision-makers and development practitioners.



UKRAINE CRISIS AND AFRICAN ECONOMIES

In 2022, AKADEMIYA2063 responded swiftly to the Russia-Ukraine conflict by conducting research to analyze the ramifications of the crisis on African economies. Hinged upon data, analytics, and past crisis patterns, the Ukraine Crisis Brief Series explores the economic and socio-economic impacts of global market disruptions induced by the Russia-Ukraine conflict. The in-depth analysis primarily tackles (1) the effects of global market disruptions on country terms of trade, the resulting impacts on economic growth and employment, as well as the poverty and food security effects, (2) the sectoral effects of the crisis, covering disruptions in the wheat, vegetable oils, and fertilizer sectors and their effects on incomes, inflation, and food security, and (3) the transmission of global commodity price shocks to domestic markets, underscoring opportunities to expand regional trade. These research findings are published on AKADEMIYA2063's [Ukraine Crisis Portal](#).



Income and Food Security Effects of Global Wheat Trade Disruptions

This analysis examined the effects of the disruption of global wheat prices on gross incomes, general food price inflation, and food consumption levels among selected African countries. The results indicated negative income effects among rural and urban households across all countries in the sample. In Senegal, rural households faced a relatively stronger decline in food consumption than their urban neighbors, with 2024 wheat prices predicted to continue to rise for all household groups.

Policy lessons: *The effects of the shocks are not uniform across all populations. Varying impacts on urban and rural households, as well as income categories, necessitate localized policy interventions tailored to the affected populations.*





Contagion and Exposure of African Countries to Global Wheat Trade Disruptions

This brief provided an overview of the level of exposure of African countries to the global trade and market for wheat, a value chain that was severely impacted by the crisis. Most African countries (41 out of 54) rely on imports to satisfy their domestic needs for wheat. Among these, 12 countries were greatly exposed due to their high dependence on wheat imports from Ukraine, Belarus, and Russia. Senegal was among the countries with direct exposure to the effects of the Ukraine-Russia conflict due to high levels of wheat imports (over 50%).

Policy lessons: Cross-border trade plays a critical role in spreading shocks from global markets; therefore, coordinating responses around cross-border trade must be part of the solution. Working across borders will be much more effective in responding to trade shocks than resorting to restriction measures.



Poverty and Food Security Effects of Commodity Market Disruptions

This brief assessed the effects of global commodity market disruptions on inflation, household incomes, and food security outcomes in selected African countries. In Senegal, a much stronger decline in household incomes in the face of slight decreases in the cost of food resulted in worsening food security situations among rural and urban households. The country showed negative inflationary pressures, although at relatively low levels, with poverty rates continuing to climb past 2024, although at overall more modest levels.

Policy lessons: Trade shocks will have longer-term effects on income and poverty. Therefore, safety nets should be designed to be more sophisticated and sustainable, better targeting affected communities and providing protection beyond the year of the crisis.





Growth and Employment Effects of Global Market Disruptions

The analysis addressed the impact of the combined effects of changes in global commodity prices on the rate of economic growth and employment creation over a three-year period in selected African countries. Assuming no further shocks, global prices were projected to return slowly to baseline trends in 2023 and 2024, and imports were projected to start to recover by 2024 for most countries. For Senegal, the difference in import and export price changes was less dramatic, indicating a less severe deterioration of terms of trade.

Policy lessons: Global trade shocks have major macroeconomic effects. Response mechanisms should include interventions to minimize exchange rate, growth, and employment effects, while trying to mitigate the immediate short-term effects among vulnerable households.



Agricultural Productivity and Growth Effects of Fertilizer Sector Disruptions

This brief predicted that African countries were expected to face significant price increases for all fertilizer types in 2022, with only modest downward corrections in 2023 and 2024. It also indicated that high fertilizer prices were anticipated to prevail across African countries in the near future. Fertilizer use is concentrated among just a few crops, with no more than two crops accounting for the bulk of consumption. Shares of the top two fertilizer-using crops, usually industrial and export crops, could be as high as 98% (Malawi), reaching 62% in Senegal. In Senegal, oilseeds and the vegetable sector are the main users of fertilizer.

Policy lessons: Industrial and export crops typically have the advantage of established private sector-driven supply chains. Leveraging such distribution channels could yield shorter-term responses at a larger scale while simultaneously addressing the more complex needs around smallholders and food crop sectors. This approach will minimize broader economy-wide ramifications of the fertilizer crisis.



COVID-19 CRISIS

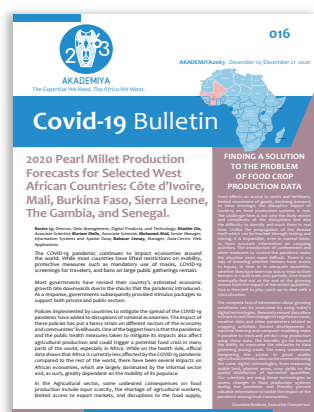
In 2020, AKADEMIYA2063 conducted research to analyze the effects of COVID-19 on food and nutrition security, vulnerable communities, and economies of African countries. The analysis was organized along four workstreams: (1) Mapping community vulnerability to identify potential major hot spots, (2) Tracking staple foods price changes and their impact on food and nutrition security, (3) Food production systems disruption and effects on communities and the national economy, and (4) Global trade disruption and the effects on economic growth and livelihoods. [Learn more.](#)

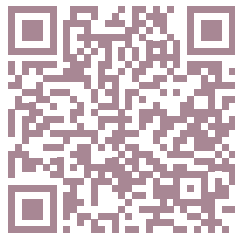


Pearl Millet Production Forecasts in Times of Crisis for Selected West African Countries

The research indicated that the highest production levels were expected in western Senegal, northern Gambia, western and central Mali, and western and northern Burkina Faso. On average, the findings suggested better millet production for the 2020 season compared to 2017 for Senegal and Burkina Faso. Projected millet production in 2020 in Burkina Faso and Senegal showed a progression of 22.7% and 2.6%, respectively, while other countries showed a decline.

Policy lessons: The effectiveness of responding to shocks depends greatly on the availability of timely and accurate data. Investing in future infrastructure and capacities for timely data, including foresight, will be crucial in times of increasingly frequent shocks of different natures.

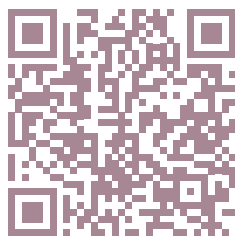




Impact of Trade Shocks on Growth & Poverty

This bulletin provides a comparative analysis of the growth and poverty effects of disruption in primary commodity markets in Ghana, Kenya, Nigeria, and Senegal during COVID. The study focused exclusively on the impact of the disruption in global commodity trade; that is, changes in global prices and market access. In Senegal, the crisis triggered an increase in import prices. Still, rising export prices also created opportunities in sectors such as gold-related products, fish products, coconut, and cashew nuts. The country could have benefitted from increased revenues had measures been taken to respond sufficiently to capture the rise in export prices.

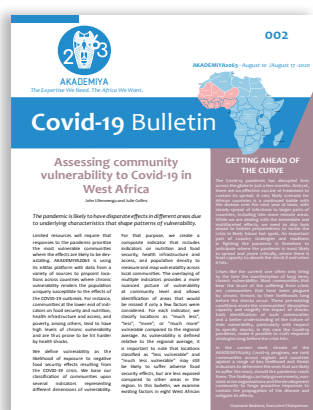
Policy lessons: Even during times of shocks and disruptions, countries must not lose sight of opportunities for gains to be realized. Measures that could have allowed certain export industries to continue to operate would have permitted countries to capture rising export prices amid the crisis.

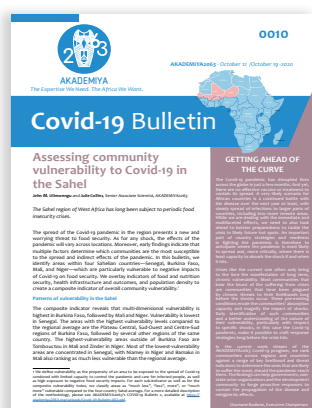


Assessing Community Vulnerability to COVID-19 in West Africa

This bulletin examined existing factors in eight West African countries. For that purpose, AKADEMIYA2063 created a composite indicator that covers nutrition and food security, health infrastructure and access, and population density to measure and map vulnerability across local communities. The overlaying of multiple dimensions provides a more nuanced picture of vulnerability at community level and allows identification of key drivers. For each dimension or driver of vulnerability, a scoring system was developed to classify each given location as “much less”, “less”, “more”, or “much more” vulnerable compared to the average.

Policy lessons: Policies to reduce vulnerability require a more nuanced understanding of the drivers of vulnerability. This, in turn, allows countries to work on identified key drivers during normal times to boost shock absorption capacity and use these same drivers as guidance for better intervention targeting during crises.

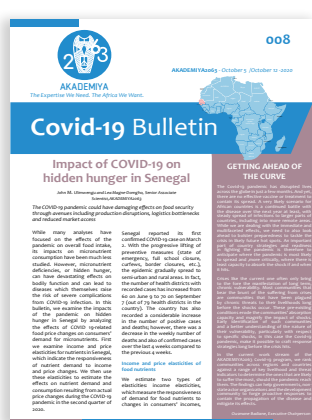




Assessing Community Vulnerability to COVID-19 in the Sahel

In this bulletin, the authors identified areas within four Sahelian countries—Senegal, Burkina Faso, Mali, and Niger—which were particularly vulnerable to the negative impacts of COVID-19 on food security. The study overlaid indicators of food and nutrition security, health infrastructure and outcomes, and population density to create a composite indicator of overall community vulnerability. Vulnerability was highest in Burkina Faso, with most of the lowest vulnerability areas concentrated in Senegal.

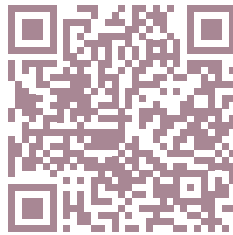
Policy lessons: Responding effectively to shocks requires a sound understanding of the patterns and nature of vulnerability at community level. Investing in the capacity to measure and map household and community level vulnerability in normal times allows for better response strategies in times of crises.



Impact of COVID-19 on Hidden Hunger in Senegal

This bulletin examined the pandemic's impacts on hidden hunger in Senegal by analyzing the effects of COVID-19-related food price changes on consumers' demand for micronutrients. First, our team measured micronutrient adequacy at household level across the country. It then evaluated income and price elasticities for nutrients, which indicate the responsiveness of nutrient demand to income and price changes. These elasticities were then used to estimate the effects on nutrient demand and consumption resulting from actual price changes during the pandemic.

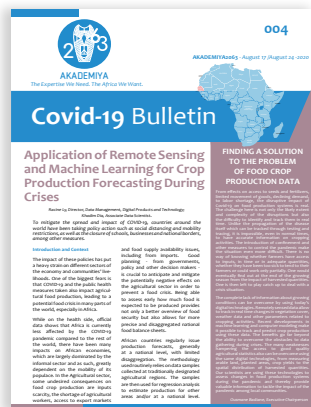
Policy lessons: Timely ex-ante assessment of impacts at the household level across communities, not just national averages, using a simple indicator such as nutrient intake can help significantly raise the effectiveness of crisis response interventions. Such understanding allows for better targeting response interventions and tracking the effects or success in returning communities to normalcy.



Application of Remote Sensing and Machine Learning for Crop Production Forecasting During Crises

In this bulletin, our approach emphasizes the use of remote-sensing and Artificial Intelligence (AI) to boost access to timely and high-quality data, including during crises. Based on the Africa Crop Production (AfCP) model developed by scientists at AKADEMIYA2063, this study applied machine learning techniques on satellite data to predict millet production in Senegal ahead of the harvest season. The model was applied to forecast the production of most food crop staples across Africa as the COVID-19 pandemic unfolded, to allow countries to anticipate and better target interventions that protect vulnerable groups and communities.

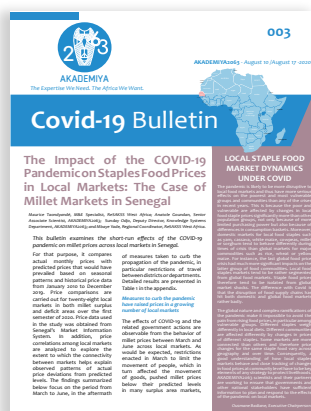
Policy lessons: African countries have the opportunity to invest in harnessing emerging technologies to bolster the continent's capacity to anticipate and prepare as shocks emerge. Well-targeted use of geospatial data and application of AI offer significant opportunities in this area.



The Impact of the COVID-19 Pandemic on Staples Food Prices in Local Markets: The Case of Millet Markets in Senegal

This bulletin examined the short-run effects of the COVID-19 pandemic on millet prices across local markets in Senegal. For that purpose, it compared actual monthly prices with predicted prices that would have prevailed based on usual seasonal patterns and historical price data. Price comparisons were carried out for twenty-eight local markets in both millet surplus and deficit areas. Disruption levels were highest in markets that were least connected to markets in other parts of the country.

Policy lessons: Policies and investments to improve the operation of local markets and promote the integration of staple food markets across the country would make a huge difference in reducing the intensity of shocks by spreading them across a wider network of markets and consumers, thus reducing the impacts on a given part of the country.



CACCI FIELD NOTES

AKADEMIYA2063 CACCI Field Notes are publications by AKADEMIYA2063 scientists and collaborators based on research conducted under the Comprehensive Action for Climate Change Initiative (CACCI) project. CACCI strives to help accelerate the implementation of Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs) by meeting the needs for data and analytics and supporting institutional and coordination capacities. In Africa, CACCI works closely with the African Union Commission, AKADEMIYA2063, the African Network of Agricultural Policy Research Institutes (ANAPRI), and climate stakeholders in selected countries to inform climate planning and strengthen capacities for evidence-based policymaking to advance progress toward climate goals.

Published on the AKADEMIYA2063 website (open-access), CACCI Field Notes provide broad and timely access to significant insights and

evidence from our ongoing research activities in the areas of climate adaptation and mitigation. The data made available through this publication series will provide evidence-based insights to practitioners and policymakers driving climate action in countries where the CACCI project is being implemented.

AKADEMIYA2063's work under the CACCI project contributes to the provision of technical expertise to strengthen national, regional, and continental capacity for the implementation of NDCs and NAPs.

AKADEMIYA2063 is committed to supporting African countries in their efforts against climate change through provision of data and analytics using the latest available technologies.

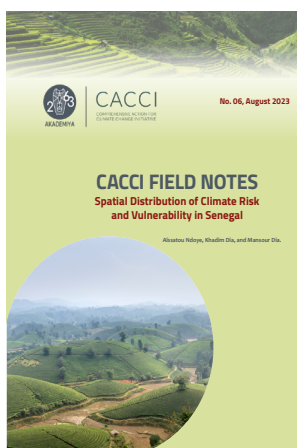
CACCI is supported by the U.S. Agency for International Development (USAID). [Learn more.](#)



Spatial Distribution of Climate Risk and Vulnerability in Senegal

Climate variability continues to be a major phenomenon in the Sahel region and Senegal in particular. In the face of more intense and frequent climate shocks, understanding the scale and drivers of climate vulnerability at the community level is critical to developing an effective agenda for adaptation and mitigation and protecting livelihoods among the most vulnerable. This report applies a methodology to measure the overall levels of vulnerability at the household level, which is then disaggregated to highlight the roles of exposure to, intensity of, and adaptive capacity of communities with respect to shocks as contributing factors. The results show differentiated patterns of vulnerability and related drivers across the country.

Policy lessons: *Fostering resilience to climate change will require various instruments targeting the factors driving exposure, sensitivity, and capacity to adapt to climate shocks. As these vary across communities and geographic areas, such differentiated community-focused resilience policies offer the best chance for success.*





Integrated Results Framework for Climate Change Programs and Policies in Senegal

Country ambitions in climate mitigation and adaptation are reflected in documents such as NDCs and NAPs, where countries put forward their objectives in more general and generic terms. Clarification and quantification of these ambitions to ensure measurement and trackability are paramount in guiding government actions for greater effectiveness. This Field Note proposes a methodology to develop an integrated results framework across a range of policy and strategy documents with indicators and metrics that allow to coherently measure and track shared goals, targets, inputs, and milestones.

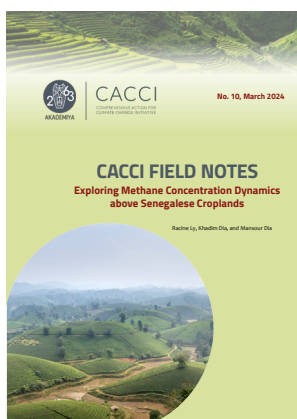
Policy lessons: Ensuring greater coherence and consistency across the policy space is critical to greater effectiveness in general, but it is even more crucial in the complex space of climate change. Such frameworks can play a crucial role in enhancing the efficacy and effectiveness of government actions by reducing tradeoffs, redundancies, and contradictions.



Exploring Methane Concentration Dynamics above Senegalese Croplands

Measuring and tracking greenhouse gas emissions (GHG) is critical to forging effective mitigation policies and strategies. It will also be essential for the development of and participation in carbon finance markets. This Field Note focuses on methane as an example and studies the dynamics of its concentration above croplands and along the growing season. The assessment provides a better understanding of methane concentration dynamics, which can allow Senegal to design effective mitigation strategies and targeted interventions to manage and reduce methane emissions.

Policy lessons: It is possible and necessary to develop policies and capacities that enable African countries to measure and track GHG emissions across land use and activities so as to produce more reliable carbon accounting, which is fundamental to mitigation and climate finance ambitions.



NUTRIENT-SMART PROCESSING AND TRADE (NSPT)

The NSPT project by AKADEMIYA2063 aims to generate evidence to guide the formulation of policies and strategies to increase the capacity of food systems to provide sufficient nutritious food. With a focus on Rwanda and Senegal, the project addresses the contributions of domestic supply, local food processing sectors, and cross-border trade to ensure adequate nutrition levels. The researchers identify priority policies, strategies, and investments to enhance nutrition security through local production, processing technologies and practices, and trade opportunities. The findings are disseminated through thematic reports with data and recommendations to decision-makers. [Learn more.](#)



Hidden Hunger: A Global Problem With Local Solutions

We often equate and measure hunger in terms of caloric intake. However, as countries make progress in bridging the caloric intake gap, it is important to pay attention to a much more serious dimension of hunger: micronutrient adequacy. This study identifies nutrient adequacy gaps at household level through household consumption data, rather than relying on average national estimates. The authors estimate and map nutrient gaps at subnational levels, identify key food items supplying nutrients in each country, and estimate related income and price elasticities. The analysis suggests serious nutrient adequacy gaps in 12 countries, including Senegal. Nutrient adequacy differs not only between countries but within countries, demonstrating the importance of local-level interventions.

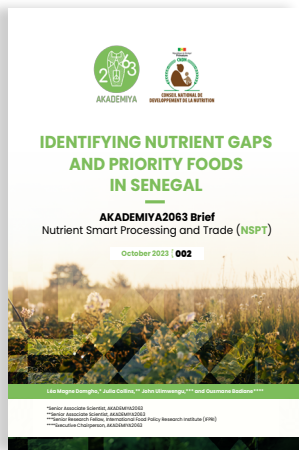
Policy lessons: Achieving better nutrition outcomes will require policies that target micronutrient inadequacy at the household level and across communities. Nutrition policies are not national-level policies, but should be guided by the differentiated nature of nutrient deficiency across communities, as well as within households.



Identifying Nutrient Gaps and Priority Foods in Senegal: Adequacy of Household Consumption

This brief describes results from the estimation and mapping of micronutrient intake at household level. The study covers calories, protein, and 11 micronutrients at household and community level across Senegal. It also identifies the main sources of food providing each micronutrient and evaluates the share of household budgets spent on each category. Finally, the study calculates income and price-related elasticities as determinants of micronutrient intake at household level, assessing how income and price changes affect micronutrient intake.

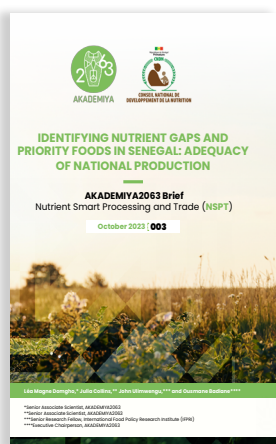
Policy lessons: Policies to improve nutrition outcomes can be rendered more effective if they focus on the most acute micronutrient deficiencies at household level among the most vulnerable communities. If targeted in the same manner, social safety nets, price subsidies, income transfers, or food distribution programs could also be designed to make the most contribution to nutrition outcomes.



Identifying Nutrient Gaps and Priority Foods in Senegal: Adequacy of National Production

Local production is a primary source of food consumption among the most vulnerable households and communities in any given country. Better quality and higher quantity of locally produced foods play a key role in combatting micronutrient deficiency among households and communities. This report quantifies and maps the supply and consumption of dozens of micronutrients at household level across Senegal. The findings show that supply adequacy does not necessarily translate into consumption adequacy.

Policy lessons: Better nutrition outcomes would require policies to boost production, trade, and food distribution, all combined to enhance micronutrient availability and access among households and communities.



Africa Agriculture Watch (AAgWa) Crop Production Forecasts



The crop production forecast brief series by AKADEMIYA2063's Africa Agriculture Watch (AAgWa) aims to provide more accurate and timely data on harvest and yields for ten major crops across nearly 50 African countries. The timeliness, wide availability, and easy access to this type of data allows stakeholders across the value chain to better plan and execute policy and business actions more efficiently. The data published in the briefs are generated through the Africa Crop Production (AfCP) model, an Artificial Intelligence (AI-based) model applied to remotely sensed geobiophysical data to produce estimates at pixel as well as administrative levels as early as the beginning of every growing season. [Learn more.](#)



AAgWa Country Forecasts

Crop Production Forecasts

Our latest releases on Senegal, covering rice, sorghum, groundnut, millet, and maize, provide insights on crop production forecasts for key staples across the country. They highlight areas with the highest and lowest predicted crop production to guide decision-making and crisis mitigation.



ABOUT AKADEMIYA2063

AKADEMIYA2063 is a pan-African non-profit research organization with headquarters in Kigali, Rwanda and a regional office in Dakar, Senegal.

Inspired by the ambitions of Agenda 2063 and grounded in the recognition of the central importance of strong knowledge and evidence systems, the vision of AKADEMIYA2063 is an Africa with the expertise we need for the Africa we want. This expertise must be responsive to the continent's needs for data and analysis to ensure high-quality policy design and execution. Inclusive, evidence-informed policymaking is key to meeting the continent's development aspirations, creating wealth, and changing livelihoods for the better.

AKADEMIYA2063's overall mission is to create, across Africa and led from its headquarters in Rwanda, state-of-the-art technical capacities to support the efforts by the Member States of the African Union to achieve the key goals of the African Union's Agenda 2063 of transforming national economies to boost growth and prosperity.

Following from its vision and mission, the main goal of AKADEMIYA2063 is to help meet Africa's needs at the continental, regional and national levels in terms of data, analytics, and mutual learning for the effective implementation of Agenda 2063 and the realization of its outcomes by a critical mass of countries. AKADEMIYA2063 strives to meet its goals through programs organized under five strategic areas—policy innovation, knowledge systems, capacity creation and deployment, operational support and data management, digital products, and technology—as well as partnerships and outreach activities. For more information, visit www.akademiya2063.org.



RESEARCH CAPACITY

AKADEMIYA2063 currently has a total of 53 staff members, 45% of whom are women, including 13 senior managers. With 26 scientists, including 16 PhD-level senior researchers, AKADEMIYA2063 provides expertise in economic modeling, remote sensing and machine learning applied to a range of areas including climate change, nutrition, and trade, monitoring and evaluation, knowledge management, and capacity strengthening. Our expertise also comprises the development of interactive data platforms.

Research scientists of AKADEMIYA2063 have extensive experience in conducting research across Africa on economic growth and transformation, agricultural development, agricultural trade and markets, nutrition, and resilience of agrifood systems.

53

staff
members

26

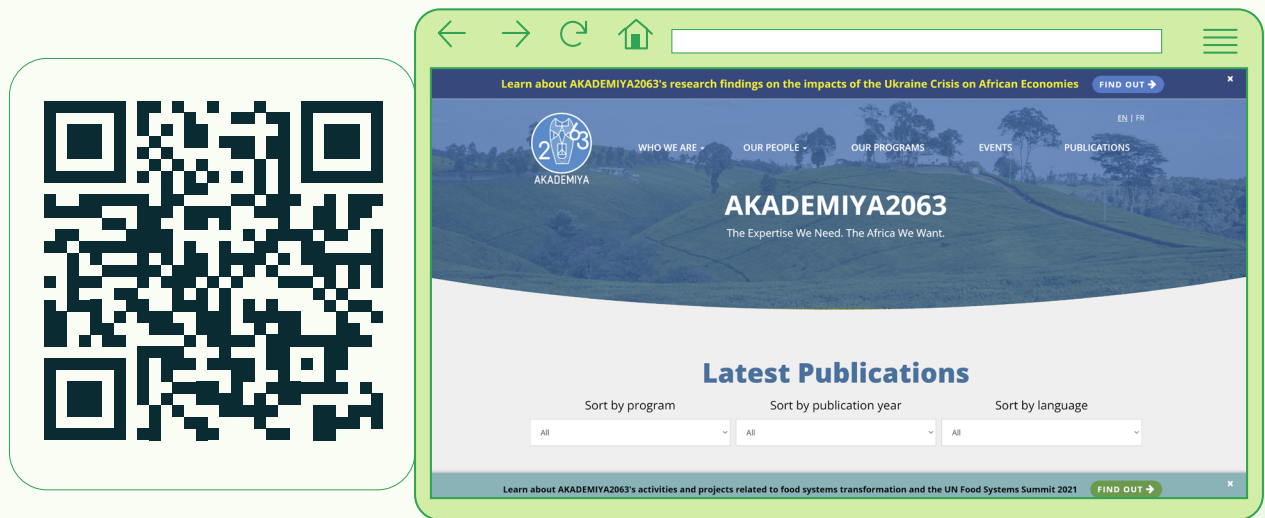
scientists

16

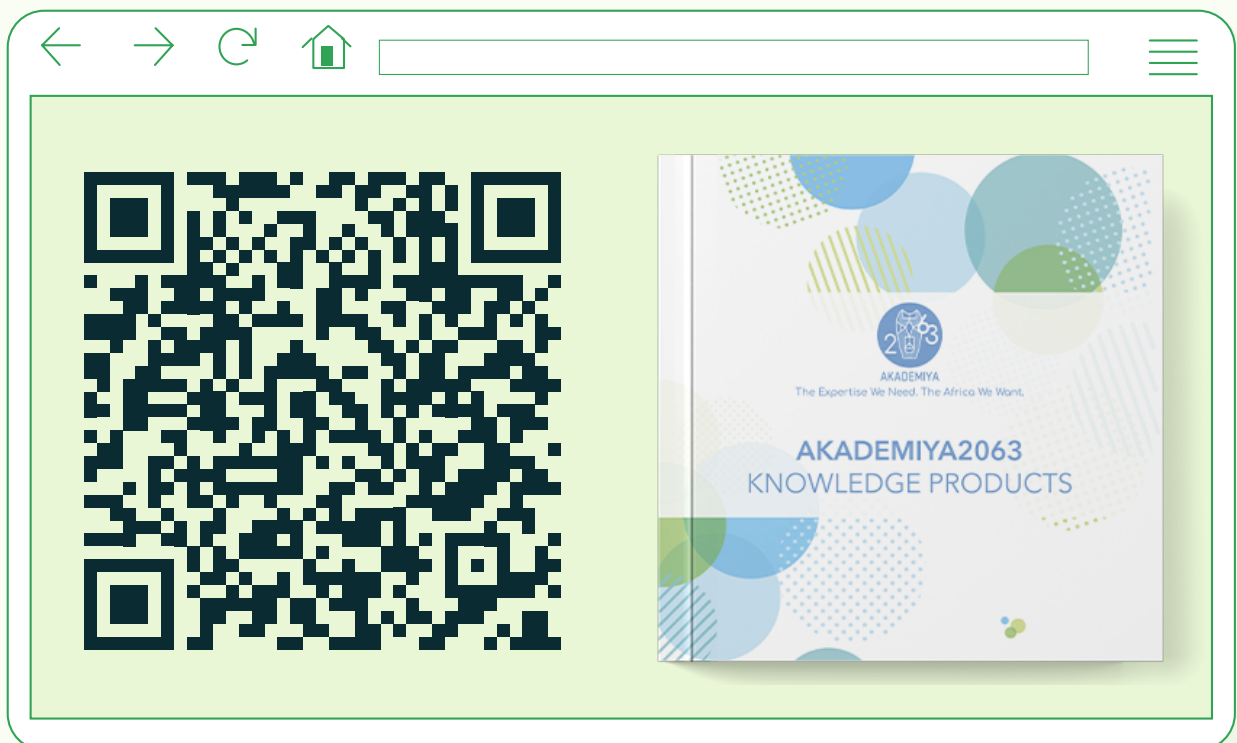
PhD-level senior
researchers



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