The Importance of Timely Analyses for Decision-Making During a Period of Crisis

Speakers: Dr. Upendra Singh, Dr. Ousmane Badiane, James Thurlow
Moderator: Alejandro Valencia
Opening Remarks: Chris Hillbruner
Closing Remarks: Alan Tollervey
Speakers

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Impacts on Poverty and Food Security in Developing Countries

Xinshen Diao, Paul Dorosh, James Thurlow (IFPRI), and others
Overview

Series of country case studies

- Economywide modeling of world market shocks
- Simulate economic impacts and policy responses

Phased approach

1. Impact (vulnerability) assessment
2. Policy response analysis

For more information and detailed studies see IFPRI and Agrilinks websites
Shocks, Impacts and Outcomes

**Shocks accounted for in the analysis**

- Changes in *world prices* for food, fuels and fertilizers
- Effect of higher fertilizer prices on *fertilizer use* in the current cropping season (≈ 1-year time horizon)

**Determinants of impacts**

- What is the share of the affected commodities in total trade?
- How important are imports in local markets and across supply chains?
- Are commodities a large part of consumer baskets?
- How much fertilizer was used before the crisis, and how sensitive is fertilizer demand to rising prices?

**Outcomes reported**

- **Economy:** National and agri-food system GDP
- **Population:** Poverty and food security (i.e., hunger and diet quality)
Poverty Expands

**Poverty**: Is household consumption below the poverty line? ($1.90 a day)

**Poverty increases in all countries**
- Additional 27.1 million poor people across 19 countries

**Most people falling into poverty are in rural areas** *(73%)*
- Fertilizer prices most important for rural poverty (vs. fuel prices for urban)

**Poor population**: Contribution of world price changes to rising poverty across 19 countries

### Impact of world price changes on national poverty headcount rate (%-point)

<table>
<thead>
<tr>
<th>Country</th>
<th>Food prices</th>
<th>Fertilizer prices</th>
<th>Fuel prices</th>
<th>Increase in poor population (1000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>3.3%</td>
<td></td>
<td></td>
<td>5,078</td>
</tr>
<tr>
<td>Cambodia</td>
<td>2.4%</td>
<td></td>
<td></td>
<td>390</td>
</tr>
<tr>
<td>DRC</td>
<td>1.3%</td>
<td></td>
<td></td>
<td>1,118</td>
</tr>
<tr>
<td>Egypt</td>
<td>1.8%</td>
<td></td>
<td></td>
<td>1,763</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>3.2%</td>
<td></td>
<td></td>
<td>3,568</td>
</tr>
<tr>
<td>Ghana</td>
<td>0.6%</td>
<td></td>
<td></td>
<td>153</td>
</tr>
<tr>
<td>Kenya</td>
<td>2.6%</td>
<td></td>
<td></td>
<td>1,411</td>
</tr>
<tr>
<td>Mali</td>
<td>3.3%</td>
<td></td>
<td></td>
<td>702</td>
</tr>
<tr>
<td>Malawi</td>
<td>2.4%</td>
<td></td>
<td></td>
<td>442</td>
</tr>
<tr>
<td>Myanmar</td>
<td></td>
<td></td>
<td></td>
<td>4,099</td>
</tr>
<tr>
<td>Niger</td>
<td>0.9%</td>
<td></td>
<td></td>
<td>209</td>
</tr>
<tr>
<td>Nigeria</td>
<td>0.9%</td>
<td></td>
<td></td>
<td>1,783</td>
</tr>
<tr>
<td>Nepal</td>
<td></td>
<td></td>
<td></td>
<td>1,272</td>
</tr>
<tr>
<td>Philippines</td>
<td></td>
<td></td>
<td></td>
<td>485</td>
</tr>
<tr>
<td>Rwanda</td>
<td></td>
<td></td>
<td></td>
<td>419</td>
</tr>
<tr>
<td>Senegal</td>
<td></td>
<td></td>
<td></td>
<td>1,241</td>
</tr>
<tr>
<td>Tanzania</td>
<td></td>
<td></td>
<td></td>
<td>388</td>
</tr>
<tr>
<td>Uganda</td>
<td></td>
<td></td>
<td></td>
<td>159</td>
</tr>
<tr>
<td>Zambia</td>
<td></td>
<td></td>
<td></td>
<td>2,441</td>
</tr>
</tbody>
</table>

**Poverty**: Contribution of world price changes to rising poverty across 19 countries

37% Food prices
27% Fertilizer prices
36% Fuel prices
Hunger Worsens

**Hunger**: Is household calorie consumption below min. threshold? (FAO)

**Number of undernourished people rises in all countries**
- Additional 24.1 million undernourished people across the 19 countries

**Food prices more important for undernourishment than poverty**
- Fertilizer prices remain as important for poverty and hunger

**Undernourished people**: Contribution of world price changes to worsening hunger across 19 countries

- Food prices
- Fertilizer prices
- Fuel prices

<table>
<thead>
<tr>
<th>Country</th>
<th>Increase in undernourished population (1000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>3,715</td>
</tr>
<tr>
<td>Cambodia</td>
<td>212</td>
</tr>
<tr>
<td>DRC</td>
<td>1,082</td>
</tr>
<tr>
<td>Egypt</td>
<td>1,829</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>2,336</td>
</tr>
<tr>
<td>Ghana</td>
<td>74</td>
</tr>
<tr>
<td>Kenya</td>
<td>1,093</td>
</tr>
<tr>
<td>Mali</td>
<td>261</td>
</tr>
<tr>
<td>Malawi</td>
<td>804</td>
</tr>
<tr>
<td>Myanmar</td>
<td>995</td>
</tr>
<tr>
<td>Niger</td>
<td>97</td>
</tr>
<tr>
<td>Nigeria</td>
<td>2,948</td>
</tr>
<tr>
<td>Nepal</td>
<td>1,229</td>
</tr>
<tr>
<td>Philippines</td>
<td>293</td>
</tr>
<tr>
<td>Rwanda</td>
<td>479</td>
</tr>
<tr>
<td>Senegal</td>
<td>1,169</td>
</tr>
<tr>
<td>Tanzania</td>
<td>355</td>
</tr>
<tr>
<td>Uganda</td>
<td>144</td>
</tr>
<tr>
<td>Zambia</td>
<td>2,492</td>
</tr>
</tbody>
</table>

Impact of world price changes on prevalence of undernourishment (%-point)
# Diets Deteriorate

**Diet quality:** Does household consumption meet recommended levels across six major food groups? *(EAT-Lancet)*

**Diet quality worsens for many households**
- Individuals become deprived in at least one additional food group
- 103.9 million people’s diets deteriorate across 19 countries

**Higher food prices drive most of the deterioration in diets**
- Higher edible oil and cereal prices increase the cost of a recommended diet

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**Diet deprivation:** Contribution of world price changes to deteriorating diets across 19 countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Food prices</th>
<th>Fertilizer prices</th>
<th>Fuel prices</th>
<th>People with more inadequate diets (1000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>20.2%</td>
<td>0.2%</td>
<td>0%</td>
<td>32,311</td>
</tr>
<tr>
<td>Cambodia</td>
<td>6.4%</td>
<td>0%</td>
<td>0%</td>
<td>973</td>
</tr>
<tr>
<td>DRC</td>
<td>2.8%</td>
<td>0%</td>
<td>0%</td>
<td>2,228</td>
</tr>
<tr>
<td>Egypt</td>
<td>18.0%</td>
<td>0.4%</td>
<td>0%</td>
<td>18,727</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>5.9%</td>
<td>0%</td>
<td>0%</td>
<td>5,239</td>
</tr>
<tr>
<td>Ghana</td>
<td>2.4%</td>
<td>0%</td>
<td>0%</td>
<td>662</td>
</tr>
<tr>
<td>Kenya</td>
<td>7.6%</td>
<td>0%</td>
<td>0%</td>
<td>3,441</td>
</tr>
<tr>
<td>Mali</td>
<td>2.0%</td>
<td>0%</td>
<td>0%</td>
<td>383</td>
</tr>
<tr>
<td>Malawi</td>
<td>1.4%</td>
<td>0%</td>
<td>0%</td>
<td>244</td>
</tr>
<tr>
<td>Myanmar</td>
<td>22.6%</td>
<td>0%</td>
<td>0%</td>
<td>9,783</td>
</tr>
<tr>
<td>Niger</td>
<td>3.4%</td>
<td>0%</td>
<td>0%</td>
<td>614</td>
</tr>
<tr>
<td>Nigeria</td>
<td>10.4%</td>
<td>0%</td>
<td>0%</td>
<td>16,797</td>
</tr>
<tr>
<td>Nepal</td>
<td>13.7%</td>
<td>0%</td>
<td>0%</td>
<td>3,841</td>
</tr>
<tr>
<td>Philippines</td>
<td>2.1%</td>
<td>0%</td>
<td>0%</td>
<td>1,037</td>
</tr>
<tr>
<td>Rwanda</td>
<td>8.9%</td>
<td>0%</td>
<td>0%</td>
<td>1,635</td>
</tr>
<tr>
<td>Senegal</td>
<td>12.0%</td>
<td>0%</td>
<td>0%</td>
<td>3,009</td>
</tr>
<tr>
<td>Tanzania</td>
<td>5.7%</td>
<td>0%</td>
<td>0%</td>
<td>512</td>
</tr>
<tr>
<td>Uganda</td>
<td>1.3%</td>
<td>0%</td>
<td>0%</td>
<td>213</td>
</tr>
<tr>
<td>Zambia</td>
<td>1.5%</td>
<td>0%</td>
<td>0%</td>
<td>2,220</td>
</tr>
</tbody>
</table>
Headlines

Impact analysis (presented today)

• Agri-food systems badly affected, but wide cross-country variation
• Large impacts on household welfare (esp. in rural areas)
• Rising world fertilizer prices drive the increase in poverty and hunger
• Rising world food prices drive the decline in diet quality

Policy analysis (IFPRI policy seminar in late-August)

• Cash transfers are most cost-effective at offsetting poverty impacts
• Fertilizer interventions are better at addressing hunger – food tax relief and subsidies are better at addressing deteriorating diets
• Short-term responses incur high fiscal costs – may prove unsustainable into 2023 (e.g., cash transfers, tax relief, input subsidies)
• Shifting to medium-term interventions may prove crucial if crisis continues (e.g., improving fertilizer supply chains and use efficiency)

Combined impacts across the 19 countries

- Poor population increases by 27 million people
- Undernourished population increases by 24 million people
- Diet quality deteriorates for 104 million people

For more information and detailed studies see IFPRI and Agrilinks websites
The Ukraine Crisis and African Economies: Impact on Most Exposed Countries

Ousmane Badiane\textsuperscript{a}, Ismael Fofana\textsuperscript{b}, and Leysa M. Sall\textsuperscript{c}

\textsuperscript{a) Executive Chairperson, AKADEMIYA2063}
\textsuperscript{b) Director, Capacity and Deployment, AKADEMIYA2063}
\textsuperscript{c) Senior Associate Scientist, AKADEMIYA2063}
The Ukraine Crisis and African Economies: Impact on Most Exposed Countries

• Global commodity market disruption
  – Changes in global commodity prices
  – Terms of trade effects
  – Growth and employment effects
  – Poverty and food security effects

• Period Covered
  – 2022
  – 2023
  – 2024
Impact of Ukraine crisis on global commodity prices

Variation 2021/2022 Before Crisis
Variation 2021/2022 After Crisis

- Coal, Australia
- Crude oil, Brent
- Natural gas, Europe
- Natural gas, U.S.
- Liquefied natural gas, Japan
- Cocoa
- Coffee, Arabica
- Coffee, Robusta
- Tea, average
- Coconut oil
- Groundnut oil
- Palm oil
- Soybean meal
- Soybean oil
- Soybeans
- Barley
- Maize
- Rice, Thailand, 5% Wheat, U.S., HRW
- Bananas, U.S.
- Meat, beef
- Meat, chicken
- Oranges
- Shrimp
- Sugar, World
- Logs, Africa
- Logs, S.E. Asia
- Sawmwood, S.E. Asia
- Cotton A Index
- Rubber, RSS3
- Tobacco
- DAP
- Phosphate rock
- Potassium chloride
- TSP
- Urea, E. Europe
- Aluminum
- Copper
- Iron ore
- Lead
- Nickel
- Zinc
- Gold
- Silver
- Platinum

Energy
Agriculture
Beverages
Agriculture
Food
Oils and Meals
Agriculture
Food
Grains
Agriculture
Food
Other Food
Agriculture
Raw Materials
Timber
Agriculture
Raw Materials
Other Raw
Fertilizers
Metals and Minerals
Precious Metals
The Ukraine Crisis and African Economies
Terms of Trade Effects

- Export price index change
  - Less than 5 percentage points for most countries

- Import price index change
  - More than 15 percentage points for most countries
The Ukraine Crisis and African Economies Economywide Transmission Channels

Terms of Trade Effects

Changes in domestic prices of tradables (exported and importing competing goods) and non-tradable domestic goods, traditional staples included

Changes in demand and supply of goods; growth, employment

Changes in incomes, poverty and food consumption / security
The Ukraine Crisis and African Economies
Assessing Growth, Employment, Poverty and Income Effects

TWO SCENARIOS

**Baseline scenario:** No major changes in the economies’ trajectories, yielding growth, employment, poverty, and food consumption levels in the absence of the crisis for the period 2022-2024.

**Ukraine scenario:** Disruptions to the individual country economies resulting from the changes in global commodity markets and terms of trade effects.
**POSITIVE TERMS OF TRADE**

Benin, Ghana, Mozambique, Nigeria, South Africa

**NEGATIVE TERMS OF TRADE**

Kenya, Malawi, Senegal, Tanzania, Uganda
INFLATIONARY PRESSURES AND INCOME EFFECTS

**TOT+** Countries facing *improving* ToT

**TOT-** Countries facing *deteriorating* ToT

### Consumer Price Index

- **TOT+**
  - Benin: -0.2
  - Ghana: -0.5
  - Mozambique: 3.6
  - Nigeria: -0.3
  - South Africa: -0.5

- **TOT-**
  - Kenya: 1.1
  - Malawi: 2.4
  - Senegal: -0.6
  - Tanzania: 1.8
  - Uganda: 3.6

### Household Incomes

- **TOT+**
  - Benin: 0.9
  - Ghana: 0.8
  - Mozambique: -3.0
  - Nigeria: 1.4
  - South Africa: -0.8

- **TOT-**
  - Kenya: -5.0
  - Malawi: -4.5
  - Senegal: -4.4
  - Tanzania: -2.4
  - Uganda: -3.0
FOOD INFLATION AND CONSUMPTION EFFECTS

**TOT+** Countries facing **improving** ToT

**FOOD PRICE INDEX**

<table>
<thead>
<tr>
<th>Country</th>
<th>Food Price Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin</td>
<td>0.8</td>
</tr>
<tr>
<td>Ghana</td>
<td>2.3</td>
</tr>
<tr>
<td>Mozambique</td>
<td>3.7</td>
</tr>
<tr>
<td>Nigeria</td>
<td>0.5</td>
</tr>
<tr>
<td>South Africa</td>
<td>-0.5</td>
</tr>
</tbody>
</table>

**FOOD CONSUMPTION**

<table>
<thead>
<tr>
<th>Country</th>
<th>Food Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin</td>
<td>0.2</td>
</tr>
<tr>
<td>Ghana</td>
<td>-0.4</td>
</tr>
<tr>
<td>Mozambique</td>
<td>-3.9</td>
</tr>
<tr>
<td>Nigeria</td>
<td>0.6</td>
</tr>
<tr>
<td>South Africa</td>
<td>-0.2</td>
</tr>
</tbody>
</table>

**TOT-** Countries facing **deteriorating** ToT

**FOOD PRICE INDEX**

<table>
<thead>
<tr>
<th>Country</th>
<th>Food Price Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenya</td>
<td>3.4</td>
</tr>
<tr>
<td>Malawi</td>
<td>2.2</td>
</tr>
<tr>
<td>Senegal</td>
<td>0.6</td>
</tr>
<tr>
<td>Tanzania</td>
<td>1.5</td>
</tr>
<tr>
<td>Uganda</td>
<td>3.7</td>
</tr>
</tbody>
</table>

**FOOD CONSUMPTION**

<table>
<thead>
<tr>
<th>Country</th>
<th>Food Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenya</td>
<td>-5.3</td>
</tr>
<tr>
<td>Malawi</td>
<td>-3.9</td>
</tr>
<tr>
<td>Senegal</td>
<td>-3.0</td>
</tr>
<tr>
<td>Tanzania</td>
<td>-2.8</td>
</tr>
<tr>
<td>Uganda</td>
<td>-3.9</td>
</tr>
</tbody>
</table>
POVERTY EFFECTS

**TOT+** Countries facing *improving* ToT

**TOT-** Countries facing *deteriorating* ToT

**POVERTY HEADCOUNT INDEX**

- Benin: -0.8
- Ghana: -0.7
- Mozambique: 1.6
- Nigeria: -1.2
- South Africa: 0.0

- Kenya: 3.9
- Malawi: 3.9
- Senegal: 2.4
- Tanzania: 0.6
- Uganda: 0.5
## Economywide Impact among Countries with Negative TOT Effects

### Trade Effects
- Decline in imports in 2022: issue of rising prices and domestic supply shortages
- Decline in exports: limited capacity to respond to rising prices to boost exports

### Growth Effects
- Significant contraction across the board in 2022
- Malawi goes into recession with a negative growth rate in 2022
- All economies to recover by 2024, except Uganda

### Employment Effects
- Loss of employment in 2022 in all countries
- No labor market recovery in Uganda, Kenya, and Malawi by 2024
- Employment rebounds in Senegal, Tanzania
- Pace of employment creation below prewar levels

### Poverty Effects
- Slower growth and employment create lead to increase in poverty rates in 2022
- Higher poverty rates continue into 2023, stabilizing in 2024 for Kenya and Malawi
- Tanzania only country to recover by 2024
- Rising rates continue in Senegal and Uganda past 20204
### Economywide Effect among Countries with **Negative TOT Effects**

<table>
<thead>
<tr>
<th>Inflationary Effects</th>
<th>Food Security Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>General and food price inflationary pressures, highest in Malawi, Uganda, Tanzania</td>
<td>Declining incomes, rising food price produce negative food security effects in Kenya, Malawi, Uganda and Tanzania</td>
</tr>
<tr>
<td>Mainly food price inflation in Kenya, Senegal in contrast sees lower inflationary pressures</td>
<td>Stronger income decline leads to worsening food security situation in Senegal, despite absence of food price inflation</td>
</tr>
</tbody>
</table>
## Economywide Effect among Countries with Positive Terms of Trade Effects

### Trade Effects
- Strong export expansion in Mozambique and Nigeria in 2023 and to a lesser extent in South Africa
- Nigeria is the only country with sustained export expansion going into 2024.

### Growth Effects
- Slowdown in Ghana, Mozambique and South Africa, unlike Benin and Nigeria which experience no contraction in 2022
- Improvement in TOT boosts growth across this group of countries in 2023 and 2024
- Stronger response of Mozambique and Nigeria

### Employment Effects
- Stronger labor market expansion in Mozambique and Nigeria
- Benin and Ghana experience the least labor market expansion
- Faster pace of employment creation in Mozambique and Nigeria post 2022.

### Poverty Effects
- Stronger decline in poverty rates in Benin and Nigeria vs Ghana and South Africa
- Mozambique is only country with rising poverty rate
## Economywide Effects among Countries with Positive TOT Effects

### Inflationary Effects
- General and food price inflation in Mozambique
- Mainly food price inflation in Ghana and Benin
- Mainly rural area inflation in Benin and Nigeria
- Low general and food inflation in South Africa

### Food Security Effects
- Higher household incomes and moderate inflation lead to slightly better food security effects in Nigeria, Ghana, Benin and South Africa
- Marked food security deterioration in Mozambique

## Lessons from Mozambique vs Benin Cases

<table>
<thead>
<tr>
<th>Mozambique</th>
<th>Benin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly concentrated exports from low labor intensity sectors;</td>
<td>Cotton among leading export sectors gaining from positive TOT</td>
</tr>
<tr>
<td>Narrowly distributed employment and income effects</td>
<td>Labor intensive smallholder crop</td>
</tr>
<tr>
<td>Negative the poverty and food security effect</td>
<td>Broader based growth, employment and income effects</td>
</tr>
<tr>
<td>Positive TOT, growth and income effects not spread wide enough</td>
<td>Stronger poverty outcomes</td>
</tr>
</tbody>
</table>
The Ukraine Crisis and African Economies
Differences in TOT and economywide effects

**POSITIVE TOT**

**NEGATIVE POVERTY/FOOD SECURITY**
- Mozambique
  - Positive growth and employment
  - Negative poverty / food security effects

**POSITIVE POVERTY/FOOD SECURITY**
- Benin, Ghana, Nigeria, South Africa
  - Positive growth and employment
  - Positive poverty / food security effects

**NEGATIVE TOT**

**LATE RECOVERY AFTER 2024**
- Kenya, Malawi, Uganda
  - Negative growth and employment
  - Negative poverty / food security effects

**EARLY RECOVERY BY 2024**
- Senegal, Tanzania
  - Negative growth and employment
  - Negative poverty / food security effects
THE UKRAINE CRISIS AND AFRICAN ECONOMIES SERIES

- Exposure and Contagion
- Fertilizer Sector Disruptions
- Vegetable Oils Sector Disruptions
- Wheat Trade Disruptions
- Regional Trade Opportunities
- Local Food Markets Contagion

Disaggregation for better targeting

- Countries by Terms of Trade effects
- Low vs higher income households
- Urban vs Rural households
- Farm vs non-farm households
Thank You

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The Importance of Timely Analyses for Decision-Making During a Period of Crisis:

Improving Fertilizer (and Nutrient) Use Efficiency

Upendra Singh, Latha Nagarajan (IFDC)
Improving Fertilizer (and Nutrient) Use Efficiency

Use of data and decision support tools (DSTs) to address improved fertilizer (and nutrient) use efficiency (FUE) through proven, scalable soil fertility technologies, and management practices for sustainable crop yields

Outcomes:

Improved fertilizer (and nutrient) use efficiency for better

– crop yields and income
– environment
– less wastage and optimization of resources

Achieving 4Rs within the given limitations is the key

– Produce more with less

4Rs
• Right Source
• Right Rate
• Right Time
• Right Place
Fertilizer Use Efficiency (FUE)

• Increase in production per unit of fertilizer applied (food security, economics)
  \[
  \frac{\text{Increase in yield (kg/ha)}}{\text{Fertilizer applied (kg/ha)}} \quad \text{or} \quad \frac{\text{Value generated ($)}}{\text{Costs incurred ($)}}
  \]

• Increased fertilizer utilization by crop (nutritional security, environmental)
  => soil health benefits

How it can be improved?

• Short, medium and long term
  – Data and Decision Support Tools (DSTs)
  – Existing management practices / technology solutions promoting soil fertility and health
Data and Decision Support Tools (DSTs)

Data:
Fertilizer **market transparency and information** for quick and informed decisions (Fertilizer supply, demand)

DSTs:
Science, evidence-based data, and DSTs can identify management scenarios and their outcomes for specific land and cropping/grazing systems.

• Utilize data on soil properties, hydrology, topography, weather, and land capability classification to assess the suitability of a given land

• Data when combined with modeling, can assist in short-term tactical decisions; determine the long-term productivity and sustainability of a given practice.
Data to Support FUE
Short to medium term needs on fertilizer markets data

Africafertilizer.Org

MAKING FERTILIZER INFORMATION IN AFRICA AVAILABLE TO ALL

Since 2009, AfricaFertilizer.org coordinates partnerships and data-sharing mechanisms that provides

- Fertilizer statistics - production, trade, consumption, prices, production capacities and fertilizer use per crop.
- Fertilizer market intelligence, fertilizer policies and regulations, subsidy programs, business and product directories, publications, news.

Africafertilizerwatch.org (COVID and Ukraine war crisis – Dashboard)

https://africafertilizerwatch.org/#/en

Dashboard tracks regional and country-specific impacts in SSA from global fertilizer prices, limited supplier inventory, and affordability at the farmer level.
Data and Decision Support Tools (DSTs) to Support FUE

The Decision Support System for Agrotechnology Transfer (DSSAT)

https://dssat.net/

- Dynamic crop growth simulation models for over 42 crops.
- Utilities and apps for weather, soil, genetic, crop management, and observational experimental data
- DSSAT Foundation/Univ of Florida/IFDC
  - > than 30 years by researchers, educators, consultants, extension agents, growers, private industry, policy and decision makers in > 174 countries
- Examples of DSSAT use for short term decision making
  - Gates/IFDC: SSA fertilizer blend options
  - IFDC: Albania fertilizer versus grain imports
Integrated Soil Health & Land Use Management Framework by USAID – SOILS Consortium

GOAL: Practical, profitable, scale-appropriate soil and land use management technologies and recommendations for productive farming systems

APPROACH
Generate Hyper-localized, Targeted, Digital Soil Fertility and Land Use Recommendations

GIS/Map Based information
- Soil
- Climate
- Vegetation
- Et al.

Focus countries
- Ethiopia
- Niger

OUTCOMES

- Guide targeting of soil health and land management innovations for integrated systems involving – crop, livestock, fodder, and biomass

- Validated soil fertility technologies and good agricultural practices for optimal economic returns

Focus countries
- Ethiopia
- Niger

Land Potential Knowledge System (LandPKS)
https://landpotential.org/mobile-app/

• iSDA SoilGrids maps https://www.isda-africa.com/isdasoil/

• ISRIC data and maps on hydrology to correlate land-soil-water and crop recommendations.

On-site information
- Soil texture
- Soil PH
- Slope
- Plant cover
- Past management
- Et al.
DSTs to Support FUE

• A decision support tool (DST) to promote site specific, targeted fertilizer recommendations that improves FUE and reduces loss

• USAID funded BRFS-SOILS Consortium, in partnership with ISIRIC (The World Soil Information), NL and USDA-University of Colorado (LandPKS)

• Current DSTs for Ethiopia focuses on
  – Woreda level and at the farmer-plot (point) level to make site specific fertilizer recommendations
Planner Level e.g. Ethiopia (woreda level)

<table>
<thead>
<tr>
<th>Country</th>
<th>Woreda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethiopia</td>
<td>Anderacha</td>
</tr>
</tbody>
</table>

**AoI:** Click map

<table>
<thead>
<tr>
<th>Crop</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>High</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fertilizer type</th>
<th>finances</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
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</tbody>
</table>

**Base for recommendation**

<table>
<thead>
<tr>
<th>Yield efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBMIT</td>
</tr>
</tbody>
</table>
Farm(er) Level e.g Ethiopia: Hyper localization (point level)

Country: Ethiopia
Woreda: Anderacha
AoI: Click map
7.573469, 35.401954
Crop: Maize
Management: High

Hyper-Localization Tool
- Texture: txt
- Depth: txt
- etc
- SUBMIT
Technologies and Management Practices to improve FUE (short – medium- long term)

- **Fertilizer management practices (short to medium term)**
  - Micro dosing (MD)
  - Integrated Soil Fertility Management (ISFM)
  - Good Agricultural Practices (GAPs)

- **Technologies – available and scaled up (medium to long term)**
  - Urea/NPK briquettes (e.g. Bangladesh)
  - Balanced fertilizers – with secondary and micronutrients (SMEs) (fertilizer blends)
  - Enhanced Efficiency Fertilizers (EEFs)
Management practices to improve FUE: Integrated Soil Fertility Management (ISFM)

Soil fertility management practices that include fertilizer, organic inputs, and improved germplasm to maximize use efficiency of the applied nutrients and improving crop productivity

• **Increasing Productivity (Fertilizer Use Efficiency):**
  - Higher profitability
  - Better yield and biomass production
  - Reduced risk (greater climatic resilience)

• **Increasing Soil Organic Matter:**
  - Increased nutrient availability to crops, thus increases yield, income, and food security
  - Improved water and nutrient use efficiency – reduces losses and environmental pollution
  - Soil C sink => GHG mitigation

1.3% annual increase in crop grain yields with 0.4% annual increase in SOC stock

Sousanna et al, Soil Till Res, 2017
Technologies to Improve FUE
Urea deep placement (UDP)

Urea (briquettes) deep placement (UDP)

- Rice: Bangladesh
  - Productivity gains: 15-20% yield increase
  - Less urea use: 20-35% less
  - GHG savings from less use of urea
  - Lower N losses: runoff, volatilization
  - Lower nitrous oxide emission (GHG)

- Rice: Ghana
  - Productivity gains ~ 22% (Northern Ghana; Azumah et al, 2017)

- Maize: Ghana
  - Productivity gains > 18% (Northern Ghana)
Technologies to Improve FUE
Balanced Fertilization

- Balanced nutrition can be achieved through fertilizers, organic amendments, biofertilizers, and integrated use of these.
- Requires site-specific soil and management inputs (e.g., soil mapping, soil testing etc).

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Year</th>
<th>Year</th>
<th>Year</th>
<th>Year</th>
<th>Year</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balanced (S, Zn, B)</td>
<td>63.1a</td>
<td>66.2a</td>
<td>45.4a</td>
<td>48.4a</td>
<td>68.8a</td>
<td>70.4a</td>
</tr>
<tr>
<td>NPK-only</td>
<td>33.4c</td>
<td>35.9c</td>
<td>22.7c</td>
<td>23.2c</td>
<td>46.4d</td>
<td>45.2c</td>
</tr>
</tbody>
</table>

Balanced fertilization on maize with secondary and micronutrients for nutrient recovery efficiency (IFDC, Northern Ghana, 2020)
From a Fertilizer Perspective: do as much as can be done in 2022 (short), prepare for 2023 and beyond

Agronomic – produce more with less

- Increase nutrient use efficiency (NUE): blend locally balanced fertilizers, enhanced efficiency fertilizer products, fertilizer application and management practices - UDP/FDP, ISFM

- Promote massively 4Rs! (short- and long-term interest]

- Be strategic – target crops and value chains with best ROI

Markets – support fertilizer demand and use

- Increase fertilizer market transparency and information for quick and informed decisions (Fertilizer Watch and Dashboards)
Thank you
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Dr Jerry Glover (BRFS-USAID)

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Thank you!