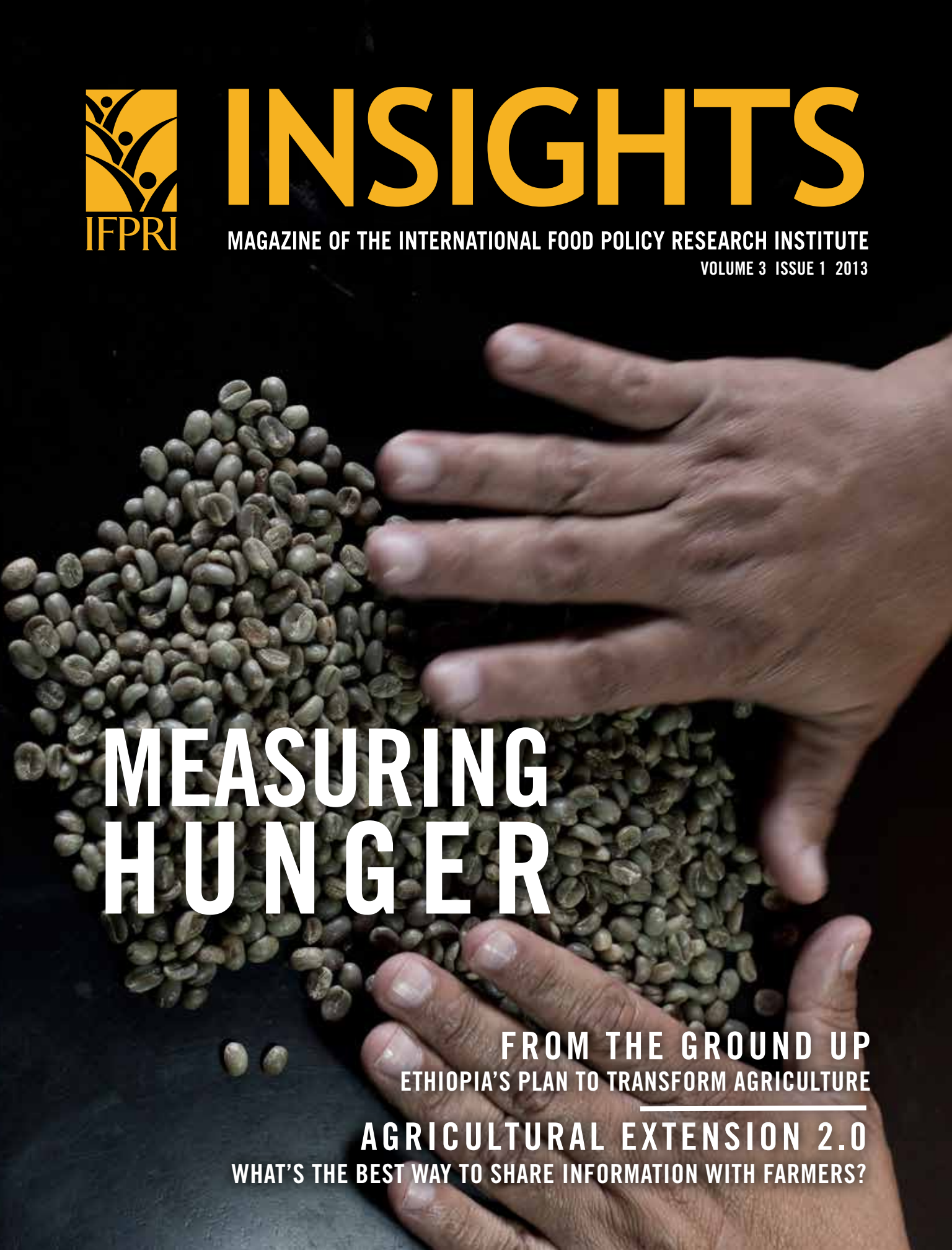

IFPRI

INSIGHTS

MAGAZINE OF THE INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

VOLUME 3 ISSUE 1 2013

MEASURING HUNGER

FROM THE GROUND UP

ETHIOPIA'S PLAN TO TRANSFORM AGRICULTURE

AGRICULTURAL EXTENSION 2.0

WHAT'S THE BEST WAY TO SHARE INFORMATION WITH FARMERS?

INSIGHTS

VOLUME 3 | ISSUE 1 | 2013

A central part of IFPRI's mission is to provide policy solutions for ending hunger and malnutrition. This mission implies that we know the size and scope of the hunger problem around the world. In fact, however, measuring hunger is fraught with difficulties. Do we simply count the calories available to a person or a household? How should we account for people who consume enough calories but too few vitamins and minerals? Some people require more calories and micronutrients because they are highly active or pregnant. How do we count them? What are the advantages and disadvantages of measuring hunger on a national scale compared with a household or individual scale?

These are some of the thorny questions addressed in the feature article of this issue of *INSIGHTS*, which also describes other important research happening at IFPRI. As always, we welcome your thoughts and comments.

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The International Food Policy Research Institute (IFPRI) was established in 1975 to identify and analyze national and international strategies and policies for meeting the food needs of the developing world on a sustainable basis, with particular emphasis on low-income countries and on the poorer groups in those countries. IFPRI is a member of the CGIAR Consortium.

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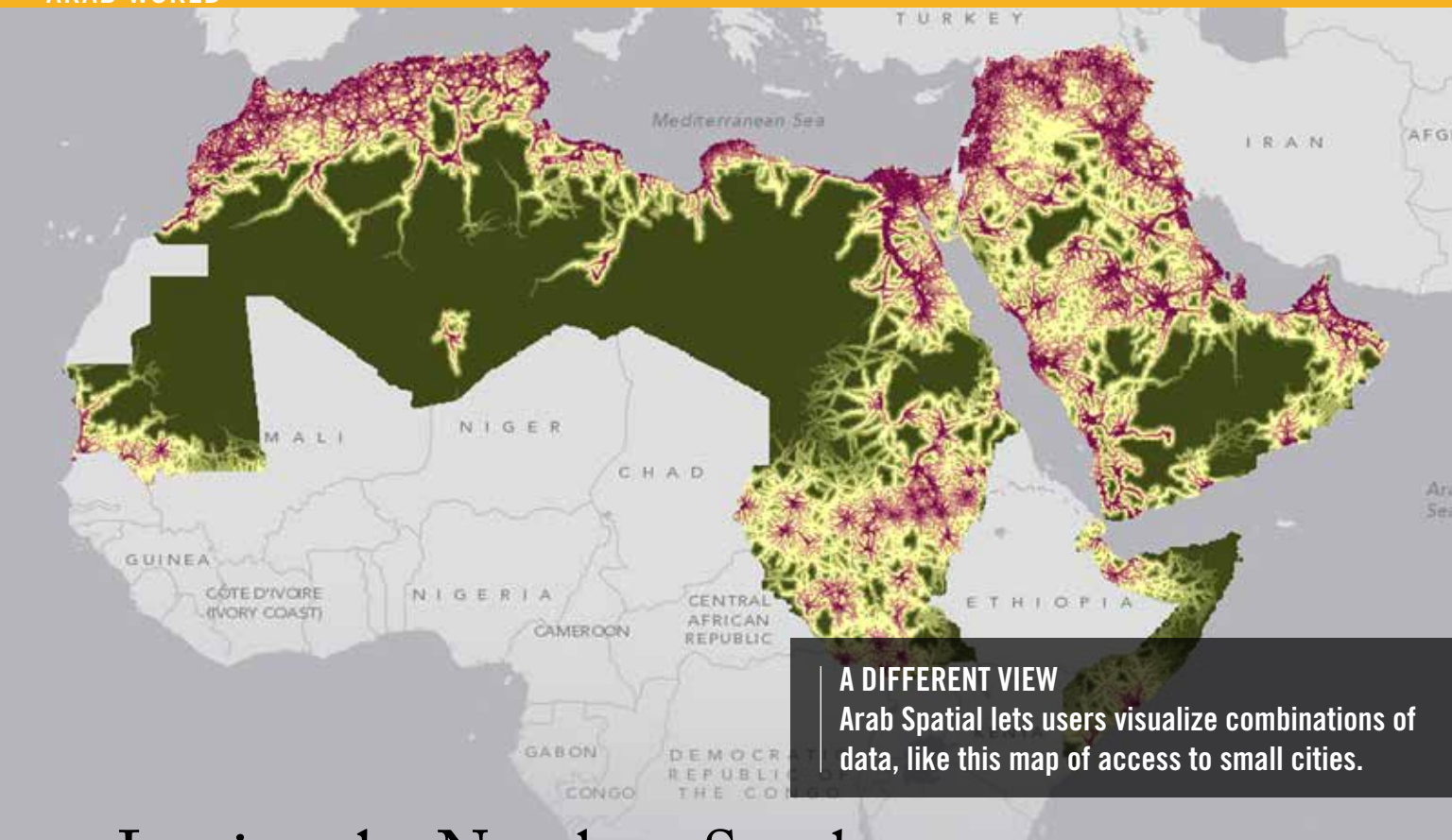
GADANI, PAKISTAN
Two workers take a short break while welding inside a ship's hull.

ARAB WORLD



A DIFFERENT VIEW
Arab Spatial lets users visualize combinations of data, like this map of access to small cities.

Letting the Numbers Speak

Arab Spatial website democratizes data

How many poor people live in Egypt? Morocco? Yemen? It's hard to say. Only about half of countries in the Middle East and North Africa make poverty figures publicly available, and the frequency and accuracy of those figures vary widely. The same goes for dozens of other development indicators. Arab Spatial, a new tool developed by IFPRI in conjunction with the International Fund for Agricultural Development and CGIAR, is designed to help fill the gap in development information on the region.

Unreliable Data

In the Middle East and North Africa, development data are often unavailable, inaccessible, or incorrect. For example, Egypt's official measure of inequality indicates that income in Egypt is more equitably distributed than in Belgium or even Switzerland. You only have to walk through Cairo, however, to see the contradiction. "If we talk to experts, and more importantly, if we go to Egypt and look around, most people would thoroughly disagree with that number," says Clemens Breisinger, an IFPRI research fellow. "There's a strong need to improve the quality of data, and people's access to data, in the Arab world."

As the first online information storehouse for the Arab countries, the Arab Spatial website (www.arabspatial.org) is a pioneering tool that relates food security to development through more than 100 indicators at the national, regional, and pixel levels, often displayed as time-series data across the region. Data—which come from both government bodies in the region and international institutions—cover areas such as poverty, governance, public investment, trade, agriculture, and income for the 22 Arab countries. Arab Spatial welcomes new data contributors, and, as an open-source and open-access database, it can easily be updated and expanded as new data become available.

Connecting Data to Reality

Emphasizing the links between food security and development data, Arab Spatial allows users to create multilayered maps that connect the data to real-world images. "Our goal," says IFPRI Research Fellow Olivier Ecker, "is to promote data sharing among policymakers and researchers in the region that ultimately results in a better understanding of how to combat poverty and food insecurity."

Arab Spatial has particular relevance given the recent political and economic transitions spurred by the Arab Spring, explains Perrihan Al-Riffai, an IFPRI senior research analyst. The collaborative review and sharing of data could help promote effective policy design during a period of enormous change. "The general consensus in the region," she says, "is that new tools and new perspectives are necessary in order to move forward."

—Rebecca Harris Sullivan

Into the Fray

Is Europe's biofuel production good or bad for the environment?

Biofuels have been a hot topic for well over a decade, but a recent series of reports prepared for the European Commission by an IFPRI researcher has turned up the heat on the biofuel policy debate by calling into question the overall impact of biofuel production on greenhouse gas emissions.

In 2009 the European Union (EU) adopted a Renewable Energy Directive that requires member states to use renewable energy sources for 10 percent of their transport fuel needs by 2020. The dominant share of this fuel will come from first-generation biofuels, based on food crops such as rapeseed. At the Commission's request, IFPRI Senior Research Fellow David Laborde assessed the directive's impact on land use and greenhouse gas emissions.

Laborde's initial report in 2010 showed that the current EU mandate on biofuels would have limited positive effects on the environment and only moderate effects on food prices. But the part that generated the most attention claimed that the mandate would lead to changes in land use—that is, farmers would switch land into biofuel production, including previously unfarmed land—that could reduce the environmental gains of increased biofuel consumption. In a 2011 follow-up report, Laborde called for the EU to either limit the overall scope of its biofuel mandate or increase the required savings in greenhouse gas emissions for all biofuel crops to compensate for the emissions related to changes in land use.

Reining In Ambitious Mandates

In late 2011 the European Biodiesel Board, an association of biodiesel producers, expressed its displeasure in a press release: "It is consequently deplorable that the European Commission is currently grounding its assessment of the potential yet strongly debatable impact of [indirect land use changes] on biofuels' greenhouse gas emissions on the US–based IFPRI study." (For the record, IFPRI is an international organization.)

According to Laborde, his study used an advanced computational general equilibrium model to simulate economic scenarios and determine the most likely effects of different energy policies, including the current EU mandate on biofuels. "The main finding of the report is that we need to have a biofuel mandate that is not too ambitious," he says. "If you start to increase demand for biofuels beyond a certain point, negative effects will dominate. Why? Because you will use more and more land to produce biofuel, and it will increase emissions coming from deforestation."

Another important conclusion of his research, says Laborde, is that not all biofuels have the same environmental effects. "Using sugar to make biofuel is a good idea," he says. "Using wheat to make biofuel is not too good an idea. And using soybeans to make biodiesel is very bad." Laborde's reports found that biodiesel production in the EU generates more negative environmental results than ethanol production.

Debate Continues

As a result of the IFPRI reports and other recent studies on biofuels, the European Commission revised its proposal in late 2012 to include estimates of indirect land use changes in reporting the overall environmental effects of increased biofuel consumption. It also proposed placing a limit of 5 percent on the mandate for first-generation biofuel use. According to Laborde, the revised policies represent a step in the right direction. The end goal of any policy mandate, he argues, should be to increase energy savings, which will lead to greater use of more efficient forms of biofuel and more efficient processing technologies.

The proposal has now moved to the European Parliament. Researchers and policymakers alike are paying eager attention to the ongoing discussions, given that EU policies will have lasting effects not only on global markets, but also on policy frameworks for many other countries.

—Adrienne Chu and Pete Shelton

COMBUSTIBLE
Biofuels are the subject of intense debate in Europe.

AFRICA

Priced Out of the Market

Lack of competition keeps fertilizer prices high

African farmers would get higher yields if they used the right amount of fertilizer. Researchers know it, extension agents know it, and many farmers themselves know it. Yet, year after year, African farmers produce crops using an average of 10 times less fertilizer than farmers in Latin America and 20 times less than farmers in Asia. So why aren't African farmers using more fertilizer?

This question has many answers—among them infrastructure and distribution problems and misinformation—that are usually addressed at the regional or country level. But research by IFPRI Research Fellow Manuel Hernandez and Markets, Trade, and Institutions Division Director Maximo Torero highlights global factors affecting fertilizer use—including the high price of fertilizer. According to Hernandez and Torero, "One of the main structural reasons the price is too high is the market has too few players at the global level." In fact, the top five fertilizer-producing countries control more than half of the world's supply of the most commonly used fertilizers.

Competition Is Key

Hernandez and Torero hypothesized that this market concentration has allowed prices to remain artificially high, even after the prices of oil and other commodities have fallen and the food price crises of 2007–2008 and 2010 have died down. They ran simulations to test whether increasing competition in the fertilizer market would reduce prices. Their calculations showed that when competition increases by 10 percent, fertilizer prices fall by 8 percent in a conservative scenario and by 11 percent in a more optimistic scenario.

Though Hernandez and Torero recommend forming a Global Anti-Trust Unit, regulation at a global level is difficult to enforce. An increase in the number of fertilizer plants is more likely to bring change to the industry. "I think it's really the only option, and there is a need to resolve the market failures and constraints that keep this from happening," Torero says. Their study outlines a proposal to build nitrogen fertilizer plants in regions such as Africa and South Asia. Although these regions need affordable fertilizer and have the natural resources to produce it, private companies have little incentive to invest. Public-private partnerships and foreign investment will therefore be essential in meeting the up-front costs of building the plants.

High Demand, High Returns

Hernandez and Torero's proposal would increase global competition in the fertilizer industry and also bring the production of fertilizer closer to the farmers who use it, cutting transportation costs. Their simulations show that making fertilizer more affordable could give a significant bump to fertilizer use, leading to higher crop yields and bigger incomes for rural farmers. "Demand is huge," Torero says, "and the return could be huge."

—Adrienne Chu

MALAWI
Farmers stand in line for state-subsidized fertilizer.

Can Peer Pressure Pay Off?

Group payment schemes could help promote conservation

Environmentally friendly practices work best in a large area. Conserving a large swath of forest, for example, is more effective in protecting animals and biodiversity than maintaining smaller, separated areas of forest.

In agriculture the same concept applies. Certain farming practices, such as no-till farming or the use of cover crops, can reduce the amount of soil that runs off into the water supply and improve water quality—but only if contiguous blocks of farms over a large area adopt these practices.

To encourage farmers to join their neighbors in using environmentally sound practices, IFPRI Research Fellow Andrew Bell and Postdoctoral Fellow Paswel Marenya are studying a recent innovation called agglomeration payments—cash for farmers who put the conservation practice into effect, with a bonus for each neighbor who joins in. (Bell calls this the "Groupon effect," after the popular American online group coupon service.)

Everyone Benefits

Using economic modeling, Bell found that such payments could effectively persuade farmers to, for example, switch to no-till farming or maintain shrubbery on their farmland. "Benefits accrue as more people participate," Bell explains.

This approach may be more cost-effective than other conservation agriculture programs. By encouraging groups of farmers to work together on soil- and water-conserving agricultural practices, agglomeration payments can make existing funding for conservation agriculture more effective, as connected areas under adoption lead to enhanced benefits and as farmers themselves help in the work of scaling up by talking with their neighbors.

Bell's study shows that this approach could reduce the cost of monitoring and enforcing the conservation practices as well. The farmers themselves would be motivated to, first, encourage their neighbors to take on the new practice, and, second, ensure they keep at it.

Next Steps

Research on this approach is still in the beginning stages. "We need to understand exactly how these payments affect how farmers interact, and how they comply," he says. The next step is for Bell to run a pilot program or a set of experimental games with actual farmers. He will also do further modeling work to judge how farmers' adoption of these practices in various areas would affect soil runoff and water quality on a large scale. The pilot study and further modeling would allow him to make a link between program conditions, such as payments and incentives, and overall environmental benefits. Then, Bell says, "we can look for appropriate niches and find opportunities for scaling up."

—Marcia MacNeil

CONSERVATION AGRICULTURE
Group payments could help promote agroforestry, minimum tillage, and use of crop residues as ground cover.

CENTRAL AMERICA

Coffee Break Disease threatens coffee farmers' livelihoods in Central America

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HONDURAS
The top coffee-producing country in Central America, Honduras faces huge losses to its coffee crop.

Coffee yields in Central America are in a nosedive, thanks to a disease known as coffee rust. Caused by a fungus, coffee rust starts by attacking the leaves and can eventually kill the whole plant. According to the Food and Agriculture Organization of the United Nations, Honduras will be most severely affected in 2013, losing almost 180 million kilograms of coffee to the disease. Guatemala's coffee producers, also hard hit, declared an emergency in February. The disease has spread throughout Central America, where the total harvest could fall by 20 percent. Losses are expected to reach about US$600 million in value.

Likely causes for the outbreak include changing rainfall and temperature patterns, relatively old coffee plants, and lack of prevention efforts (many small-scale farmers lack knowledge about the appropriate use of fertilizers). No matter what the cause, says Maximo Torero, director of IFPRI's Markets, Trade, and Institutions Division, the coffee crisis demands careful responses to both the agronomic and human challenges.

Jobs at Risk

With harvests plummeting, coffee rust threatens to have serious consequences for the laborers who depend on income from the coffee farms. Some analysts believe that the disease will increase demand for labor for maintenance activities, but this effect will likely be outweighed by the decreased demand for labor owing to falling coffee production.

Laborers and small-scale coffee farmers who experience large drops in income will need to be linked to temporary labor programs, such as public works programs, or to existing transfer programs, says Torero. "These people can work," he points out. "They just need insurance to help them get by and smooth the shock to their income." Given the tight government budgets in Central American countries, these safety net measures should be targeted to the most vulnerable—a topic on which IFPRI has a large body of research.

Rebuilding the Coffee Sector

Restoring a healthy coffee industry in Central America will require carefully thought-out measures. As coffee rust kills off the coffee plants, plantations may need to replace much of their stock of plants. Fungicides can help control coffee rust, but when applied inappropriately, fungicides don't work and can even worsen environmental problems. "Use of fungicide needs to be matched with better training for farmers on how to use it correctly," says Torero, "and this won't happen quickly."

Some farmers, says Torero, may see the coffee rust outbreak as an opportunity to move away from growing coffee. This is not, however, a decision to be made hastily: "Conditions might not be appropriate for other crops, and farmers may need different skills to grow other crops," says Torero. "It takes time to make an adjustment like this."

A longer-term solution, he argues, will involve improving farm management to grow more resilient coffee plants and strengthening links to markets. Contract farming arrangements, for example, can help farmers improve their practices, reduce their crop's vulnerability, and keep the coffee flowing.

—Heidi Fritschel

Getting to Growth

Some forms of aid do more than others for economic growth

As traditional aid donor countries struggle with tight budgets, it's useful to ask which kinds of aid do the most to stimulate economic growth in recipient countries. Kamiljon Akramov, senior researcher in IFPRI's Development Strategy and Governance Division, examines this question in a recent book entitled *Foreign Aid Allocation, Governance, and Economic Growth* and an issue brief of the same name.

Akramov divides aid into three categories—economic, social, and other—and ranks each one's effectiveness for raising economic growth. According to his breakdown, economic aid includes assistance for production in areas like agriculture, manufacturing, and trade, as well as for the construction of energy, road, communications, and financial infrastructure. Social aid consists of investments in sectors such as education, healthcare, sanitation, and drinking water. "Other" represents mainly emergency aid, which he argues was never really intended to foster long-term economic growth. "Obviously these different categories of aid may be unlikely to impact economic growth in the same way," says Akramov.

Economic Aid Tops the List

Akramov found that economic aid generates the most immediate returns by generating growth in areas like agriculture and manufacturing. "This is important because increasing agricultural production may help to promote overall economic growth, reduce poverty, and improve food security in these countries," he says. An almost equal—but less immediate—return can be seen when aid is funneled toward infrastructure, which can bolster a country's capacity for production and reduce transaction costs for everyone along the value chain. Social aid, in areas like education, has the least impact on economic growth and makes a surprisingly limited contribution to human capital.

Why? Akramov recognizes that "social aid might affect economic growth by building additional human capital," but surmises that education is enticing only if students can expect to find better jobs after they graduate. Without the economy to support a strong labor market, the incentive to seek education goes out the window.

Growth Forgone?

From the early 1980s to the early 2000s, development aid moved away from investments in production and infrastructure—dropping almost 20 percent—and doubled in social interventions. The reasons are varied: agricultural failings made donors wary of investing in the sector, numerous crises required emergency responses, and geopolitical and commercial interests also played a role. Whatever the reason, Akramov's study suggests that this evolution resulted in aid with less economic impact. Simply put, he says, "sectoral allocation of aid matters. Donors have to take these factors into account in making decisions about aid allocation."

—Josh Heard

TANZANIA
Aid from the Swedish International Development Cooperation Agency helped connect this village to the national electricity grid.

OPEN DATA

Talking with Tariq Khokhar

Tariq Khokhar is the open data evangelist at the World Bank. In April 2010, the bank launched its open data initiative, making its development data publicly available for the first time.


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How do you hope people will make use of the bank's open data?

There are three big areas where open data is useful. One is transparency and accountability. Another is innovation and efficiency—doing existing things better or doing new things. Then there's participation—offering something to get people interested and the mechanisms to get involved.

The most interesting examples of use are the ones that you've never thought of. Our highest-resolution data sets have to do with operations—what we do, where. Some researchers at Aid Data here in the US took our project location data from Afghanistan, and then they took our evaluation data and mapped them together to see which projects are deemed successful and which are not. Then they overlaid a map of the spatial distribution of violence in Afghanistan. You'd think that in the areas where there's more violence, you'd have more unsatisfactory projects, and in the areas where there's less violence, you'd have more successful projects, right? The map paints almost the opposite view. It's a question that no one at the bank had really asked.

The Millennium Development Goals raised issues of measurement and data availability. How can open data help as we move beyond the MDGs?

We're in a very different place from where we were when the MDGs were set. Fifteen years ago, the only ways we really had to get reliable data on many of these issues was through sample surveys—household surveys done every five years, maybe patched with other surveys in the intervening time. Now even the US Centers for Disease Control uses Google Flu Trends—a system that uses aggregate Google search data to estimate flu activity—as a way of monitoring and predicting influenza outbreaks. We think you can use these sorts of approaches for measuring development-related data—whether it's using data from cell phone top-ups as a proxy for income shocks, or using key words in social media as a proxy for food shortages. In the next round of MDG-related data, the core of it will still be fairly traditional, but it's definitely going to be complemented by this stuff, which may not be super accurate, but it may be good enough to give us almost "real-time" indications as to what's going on.

What do you say to open data skeptics? Some people point out that open data can't solve every problem.

For me, it's shocking how much open data will improve things, but by no means is it going to improve everything. It's a necessary prerequisite for a lot of other things. Without basic data on a whole host of things, you can't build the mechanisms or the services that will get the real work done. The criticism is that the idea is oversold and that people will end up overprioritizing the easy bit—just releasing data—and they'll underprioritize the hard bit—incentivizing its use, getting smart about its applications, and translating what that data's telling us to do into action.

The other concern is that, if you're trying to reduce inequality and poverty through digital empowerment, you often end up empowering the people who are already a bit more empowered. The people who are unhappy in the first place can't get access to these things, and you can end up amplifying inequality. Unfortunately, there is evidence that that has happened, and we need to consider these problems from the outset.

Are we on the verge of a real shift in how we use data and statistics?

Absolutely, and in particular how it affects decisionmaking and policy targeting. In the United Kingdom and Canada, for example, you have well-controlled targeting of social welfare initiatives because you have tax returns and all kinds of other administrative information you can use. If you want to allocate this much money to these kinds of people, you know how to program that money—whereas in developing countries, you may have no idea how to do it. But the difference between having no idea and a rough idea is huge. You can do a lot with a rough idea, as soon as you've established some error bounds around it.

In the next 10 years, people will be making decisions with far more sophisticated statistics. People are going to realize that you can get quick data that has bigger errors or slower data that has smaller errors. As soon as you get comfortable with ideas like using "slow data" to make big corrections and "quick data" to fine-tune stuff, everything could become more responsive.

But politicians don't necessarily make good decisions just because they have good data.

That's another part of the open data story. It's no longer the case that decisionmakers have privileged access to information. If you're the decisionmaker and you have access to this data that you're supposed to make a decision on, it's one thing if only you have access to it, but if your entire citizenry has access to the same information, that's quite a different dynamic than what we've seen in the past. Decisionmakers will still ignore important issues—it's just one of those situations where open data are necessary but not sufficient for change—but advocacy and political pressure backed up by good data are going to make it harder for decisionmakers to ignore the issues citizens value.

Kid Power **Children deliver health and agriculture messages**

In many development programs, children are seen only as potential beneficiaries. An IFPRI research program in rural Peru, however, is studying how children themselves can be the catalysts for change.

The Happy Faces program explores how giving schoolchildren information can improve the health and welfare not only of children themselves, but of entire households. "The advantage of working with kids," says Maximo Torero, lead researcher and director of IFPRI's Markets, Trade, and Institutions Division, "is that kids have a higher level of education, and therefore it's easy to transfer information to them and from them to their parents." The project team hopes that by directly targeting kids, it can increase households' access to information.

From Kids to Parents

"Children have had a strong impact on marketing campaigns and other information dissemination strategies, such as a Thai anti-smoking campaign," says IFPRI Research Fellow Eduardo Maruyama. "But while children's influence on adult decisionmaking has been studied in other disciplines for a long time, the subject has remained largely unexplored in development economics until recently."

In the Peru project's first phase, researchers were curious to see if children change their own behavior in response to simple messages given to them at school. The team found that showing public service announcements—particularly those featuring well-known personalities like soccer players—increased children's consumption of iron supplements. The results got researchers thinking. Getting complex public health messages to rural households can be difficult and costly, often involving door-to-door campaigns. "We thought, instead of going to about 100 households per village, what if we could use another way to disseminate information?" says Maruyama. "Going to schools is a much cheaper way to spread a message."

Getting the Message

The second phase of the project looked at whether children effectively transmit information to adults in their household, and whether those adults then change their own behavior and household decisions based on the new information.

Children received lessons on diagnosing and preventing cysticercosis, an infection spread by tapeworms in raw or undercooked pork. The disease is endemic in rural areas of the northern coast of Peru and is the leading cause of adult-onset epilepsy in much of the developing world. Although many people are aware of the link between household livestock and cysticercosis, they often don't know that the disease can lead to seizures and death or that contamination can be reduced by proper hand washing. In collaboration with the Cysticercosis Working Group in Peru, project researchers launched a community health campaign involving posters and free access to testing and treatment.

At the same time, they used games, slideshows, and other visual aids to teach schoolchildren about the importance of testing for and preventing cysticercosis.

The results show that children talked with their parents about what they had learned, and in turn these adults demanded more testing than did the adults who received only the community health campaign. This growing demand could lead to a fall in the levels of infected livestock and could substantially improve cysticercosis prevention.

Now Happy Faces is in its third phase, in which children are shown simple Internet messages that teach low-cost solutions to common agricultural problems found in their households' plots. "If children pass on these messages to their parents," says Torero, "they could play a vital role in resolving these problems and in improving their family's agricultural productivity and nutrition at a very small cost."

—Sara Gustafson

PERU
The Happy Faces project uses visual aids and other tools to transmit health messages to schoolchildren.

FROM FIELD TO TABLE

ASIAN SUPPLY CHAINS ARE NO LONGER A WEAK LINK

Robert Kiener

Sleepy. Stagnant. Outdated. For years, these were the terms many experts used to describe Asia's food supply chains. "When we went to workshops and conferences in Asia," says IFPRI Senior Research Fellow Bart Minten, "people would repeat the conventional wisdom without any empirical backup. But when we went to the field and talked to farmers and traders, often a different picture would emerge."

The conventional wisdom goes like this: A typical Asian food supply chain is short, as farmers generally supply their crops to their own villages or local areas. Farmers are commonly victimized by local village traders who loan farmers money and set rapacious crop prices. These food supply chains, so crucial to Asia, which is home to more than two-thirds of the world's poor and malnourished, are fragmented, inefficient, and bogged down by the use of outdated technology.

Not so, according to a new book from IFPRI and the Asian Development Bank (ADB). *The Quiet Revolution in Staple Food Value Chains*, by Thomas Reardon, Kevin Chen, Bart Minten, and Lourdes Adriano, examines domestic rice and potato value chains between the farm gate and the consumer in regions that serve large urban centers in Bangladesh, China, and India. After surveying more than 3,500 farmers, traders, millers, storage facilities, and retailers in the three countries, the authors found that many staple food chains throughout Asia have been dramatically transformed and modernized.

Surprisingly Dynamic

Indeed, the authors were so impressed with the rapid transformations they discovered that, as IFPRI Senior Research Fellow Kevin Chen explains, "we termed those changes a 'quiet revolution.'"

Instead of limiting their research to the farm sector or the retail sector, the authors focused on the entire supply chain for rice and potatoes—two important staple crops.

"There's been very little research on these entire supply chains in the past," says Reardon, a professor in Michigan State University's Department of Agricultural, Food, and Resource Economics, a visiting IFPRI research fellow, and 1000 Talents Program Scholar at the Renmin University of China. "We found them to be surprisingly dynamic."

Among other things, the researchers found that supply chains have become more efficient. Many links, or actors, in the supply chain have been eliminated. "There's been a kind of disintermediation in the chain," explains Reardon. For example, the role of the "loan shark" village trader has largely disappeared. Rice mills and cold storage facilities now deal directly with farmers. The study also found that, as chains have become more efficient and improvements have been made in transportation and cold storage facilities, wastage has declined. In many regions wastage in rice has dropped to only 1–2 percent and in potatoes, to 6–7 percent, compared with estimates of 30–40 percent under the older systems.

In addition, supply chain facilities have been modernized. For example, the study's authors found an "exciting" rise in modern cold storage facilities, especially in India, followed by Bangladesh and China. They point to Agra, India, where only 5 percent of the potatoes, the country's main vegetable crop, were going into cold storage in 1990; now 80 percent are. This change has extended the supply season, raised prices for producers, and reduced prices for consumers for this basic staple. Rice-milling facilities have been similarly upgraded, especially in China, with similar results.

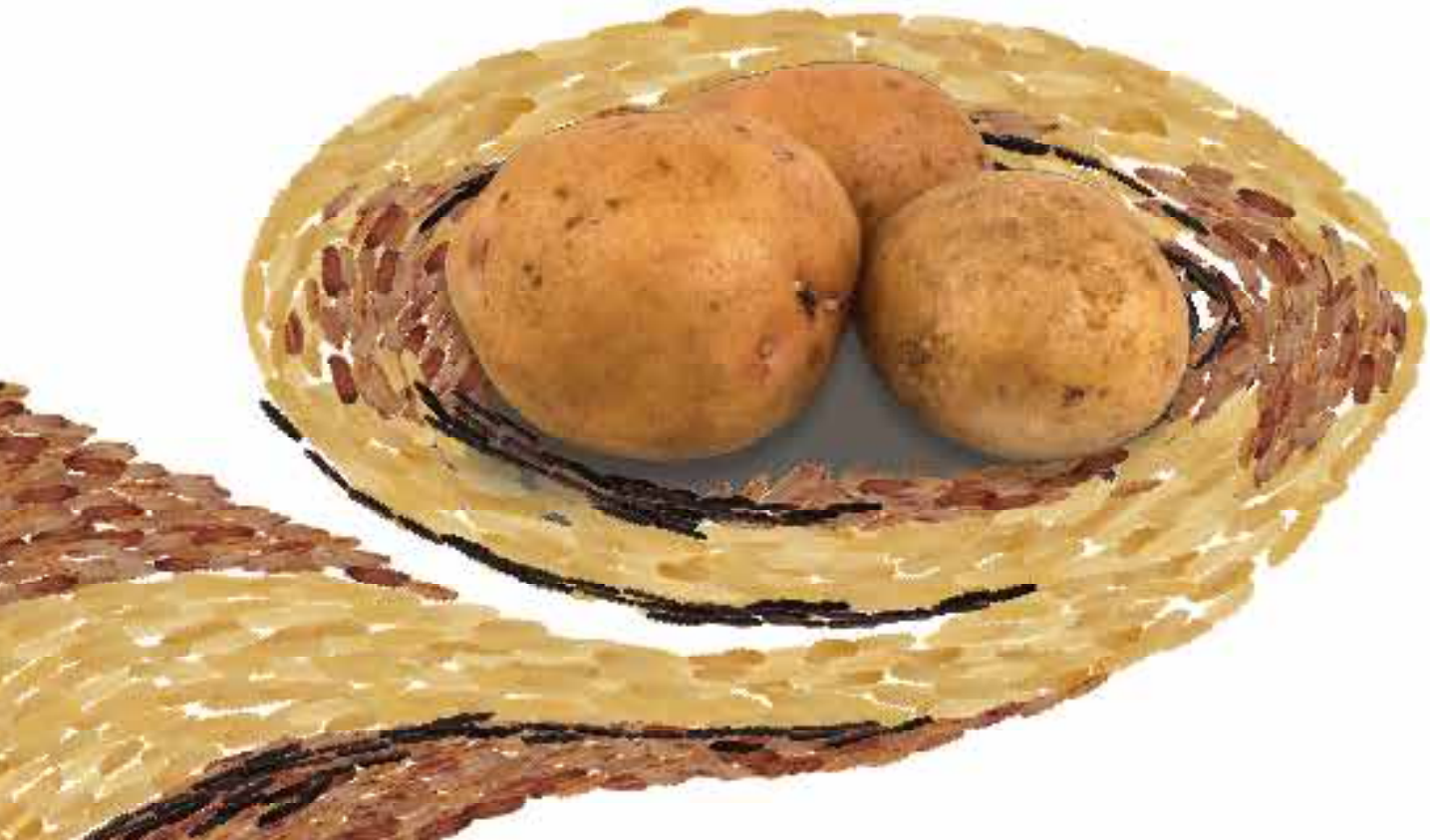
And farmers themselves have changed. The myth of Asian farms as millions of tiny semi-subsistence operations is outdated. Thanks to the increasing use of insecticides, fertilizers, irrigation, and mechanization, much of the farming sector has been transformed, and many farmers now sell most or all of their products to rural and urban supply chains. Supply chains have expanded in size—some even stretch across a country—offering farmers a larger market. Explains Reardon, "These commercialized small or medium-sized farms should now be seen as small businesses."

A Role for Government?

The study also explored the role of government in these transformations. On the one hand, at certain points the government must step out of the way. In India, for example, deregulation in the rice-milling sector led to an increase in private investment and technological improvements. Similar surges took place in Bangladesh and China after the government deregulated the rice wholesale market and rice-processing sectors.

On the other hand, government investments in agricultural research and development, roads, the power grid, the communications network, and other areas were essential to, as Reardon says, "make this transformation click."

"One of the reasons for launching this study," says Lourdes Adriano, practice leader in agriculture, food security, and rural development at ADB, "was to quantify what is really going on and improve the information available to policymakers and others." While the dramatic changes described in the book are good news for hungry millions in Bangladesh, China, and India, the real challenge is to take the lessons learned, adapt them, and spread them throughout the region.



AGRICULTURAL EXTENSION 2.0

WHAT'S THE BEST WAY TO SHARE INFORMATION WITH FARMERS?

Rebecca Harris Sullivan

Agricultural extension isn't what it used to be. Extension once meant a one-way flow of information from researchers to farmers through government extension agents. During the 20th century, this model led to booming production of staple grains in the industrialized countries and South Asia. Now, though, the model is breaking down in many countries, and governments and farmers are experimenting with new ways of demanding and delivering agricultural information.

"Extension has evolved," says Kristin Davis, IFPRI research fellow and executive secretary of the Global Forum for Rural Advisory Services (GFRAS). "The current systems are a lot more pluralistic—it's not just the government who's involved anymore, but also the agro-input sellers, the community development agents, and the NGOs." IFPRI researchers have undertaken a number of studies to assess how well these new approaches are working, and their results highlight the difficulties of adapting old systems to new conditions.

"IN DISARRAY"

Until recently, agricultural extension's popularity had waned. "IFPRI's work points to the fact that while extension is an important aspect of agricultural and rural development and productivity improvement, many governments have underinvested, and approaches to extension have not succeeded as well as expected," says IFPRI Senior Research Fellow David Spielman. A 2001 Food and Agriculture Organization report described extension services in developing countries as "failing," "moribund," and "in disarray or barely functioning at all." This critique can be traced back to the missteps of the training and visit model developed by the World Bank and promoted through the mid-1990s, says Davis. This approach involved a rather rigid one-size-fits-all system of training and visits to farmers by extension agents and was financially unsustainable. Suresh Babu, an IFPRI senior research fellow, says, "The blanket approach doesn't work, yet we keep making the same mistake."

It has become increasingly clear that extension must be more responsive to farmers' needs. That means pursuing a path of decentralization and rooting services in both research and local knowledge systems so that extension agents are better equipped to provide farmers with the latest innovations and critical information. According to Davis, a successful extension program is one that takes into account local conditions, local capacities, and the prevailing policy environment. "Successful extension has to go back to the farmer," she says. "We always have to see whose needs we are trying to meet and to make sure those people are empowered to make those demands."

NEW MODELS, OLD HABITS

Extension may be evolving, but many of the new models suffer from the pitfalls of their predecessors. Community-based extension is an approach designed to allow farmers at all income levels to express their needs and to make extension workers accountable to those farmers. But a 2010 study of community-based extension by longtime extension scholar Gershon Feder (currently chair of IFPRI's Publications Review Committee) and others points out that such extension programs can still end up serving mainly the richer and larger-scale farmers in a community. Poor farmers can be left behind.

In other cases, farmers know too little about the potential benefits of extension services to demand them. In 2008 the state of Tamil Nadu, India, opened a network of public-private agriclinics that offered, among other things, soil testing to farmers. By testing their soil, farmers could learn exactly how much and what kind of fertilizer to apply to their plots, potentially saving money and raising yields. When IFPRI researchers evaluated the program, they found that farmers were not interested in paying for the service—because they didn't understand how it could help them in the short run.

"WE'RE ASKING MORE OF EXTENSION WORKERS BECAUSE THE SOLUTIONS ARE GETTING MORE COMPLEX."

—David Spielman, IFPRI

The old top-down approach can be hard to shake. In the early 2000s few Chinese farmers had any contact with extension agents, so the country launched a pilot program to test a more inclusive agricultural extension system. The reforms succeeded in raising the availability and acceptance of extension services for farmers, but an IFPRI study showed that shifting to a bottom-up approach can be difficult to achieve and requires a strong commitment from local political leaders. Similarly, while Ethiopia has hired more than 45,000 extension agents in recent years, its top-down organizational structure inhibits responsiveness to the varying needs of different types of farmers. An IFPRI study by Spielman and others points out that Ethiopia will need to invest much more time, effort, and resources in changing the culture of its extension system.

Extension agents' lack of knowledge and skills can also be a roadblock. Despite Ethiopia's hiring spree, not all of its extension agents have the skills needed to provide farmers with high-quality services. "We're asking more of extension workers because the solutions are getting more complex," says Spielman. Raising yields and sustainably managing land and water can require farmers to radically change how they operate. And the scope of extension work grows by the day. "Agents are now expected to be supermen and superwomen," says Davis, "reaching out to farmer groups and linking them to markets, tackling resource management and pest control, and working on public health issues such as HIV/AIDS."

THE JURY IS OUT

The search for promising approaches continues. In India, IFPRI recently initiated a five-year research program that will help develop a locally appropriate, needs-based approach to improving extension services. "We are developing a methodology to discern farmers' informational needs so we can then identify what types of extension will best meet those needs," says Babu. The ultimate goal of the project is to create a think tank—focused specifically on agricultural institutional innovation—that would work with existing organizations to build capacity and spur the development of a viable extension system rooted in local realities. "Ideally," says Babu, "the approach could then be explored in other parts of the world, such as in South Asia and Africa."

The jury is still out on whether new approaches to extension will have a tangible impact on productivity. Still, the renewed focus on extension is timely and well deserved. "You can't have development or reduce poverty without extension," says Davis. "It's a very important player."

FROM THE GROUND UP

ETHIOPIA, ONE OF AFRICA'S poorest countries, is betting big on agriculture. The roots of this policy shift were sown during the 2007–2008 global food crisis, which jolted many countries into rethinking their food policies. In Ethiopia, it led then Prime Minister Meles Zenawi to launch a series of aggressive development goals—among them, to make agriculture the country's leading industry by 2015 and to become a middle-income country by 2025.

ETHIOPIA HAS A PLAN TO TRANSFORM AGRICULTURE

Sara Gustafson and Sarah McMullan

Photos courtesy of IFPRI and CIMMYT

Looking to Asia for Models

In 2009, at the prime minister's request, the Bill & Melinda Gates Foundation commissioned a series of consultations to identify bottlenecks in Ethiopia's agricultural system. In this process, IFPRI led several studies that closely examined eight subsectors within agriculture: seed systems, irrigation, soil fertility, agricultural extension programs, agricultural finance, and the value chains for livestock, pulses, and maize. After two years of working with Ethiopian researchers, international management consultants, and other CGIAR centers, IFPRI researchers produced a series of recommendations for speeding agricultural growth. Chief among these was the formation of an agency dedicated to removing the roadblocks to the transformation of Ethiopian agriculture. In December 2010, with the full support of then Prime Minister Meles Zenawi, the Ethiopian Agricultural Transformation Agency (ATA) was established with a federal regulation passed by the Ethiopian Council of Ministers.

The concept had been tried in Asia. Similar transformation units were established in Malaysia, South Korea, and Taiwan in the 1950s and 1960s. According to IFPRI Senior Research Fellow and Project Manager Shahid Rashid, they resulted in "incredible economic development in now-thriving Asian economies." Taiwan's Joint Commission for Rural Reconstruction in particular was a booming success: in just 15 years, without increasing the amount of land they cultivated, the country's farmers nearly doubled their agricultural output. Taiwan harnessed the profits from this agricultural growth to transform its industrial sector, eventually emerging as a developed economy.

Big-Picture Issues

The ATA's mission is simple but daunting—to transform Ethiopia's agricultural sector into a driving force for economic growth and development. The agency combines the analytical capacity of a research organization with the political and economic power of an implementing organization. Research partners such as IFPRI provide technical assistance and project management, while the agency's program directors and government representatives use the results to enact policies targeting agricultural bottlenecks at their source. The agency will focus on high-priority issues such as the need for intensive soil fertility treatments or for making high-quality inputs more affordable for smallholder farmers. "The ATA is not working on small issues," Rashid explains. "It is working on far-reaching, big-picture issues."

One such big-picture issue is soil health. IFPRI researchers have found that despite efforts to introduce modern inputs—such as fertilizers and improved seed varieties—Ethiopia's crop yields remain low, in part because the country's soils are depleted. To help create a strategy for improving soil fertility, the ATA launched a comprehensive soil-mapping project that will collect 16,000 soil samples across the country. When the national soil map is in place, farmers will be better able to identify the soil treatments needed to raise soil fertility and the crops that grow best in their region.

> "THE ATA IS NOT WORKING ON SMALL ISSUES. IT IS WORKING ON FAR-REACHING, BIG-PICTURE ISSUES."
>
> —*Shahid Rashid, IFPRI*

Support from the Top

Drawing heavily on other countries' experiences, the ATA team found three common factors for success: firm government commitment, strong financial support from both the government and large-scale donors, and a coordinated series of development projects that address both micro-level economic realities and macro-level economic goals. This combination, says Leonard Oruko, an IFPRI staff serving as the director of Monitoring, Learning, and Evaluation for the ATA, provides a "unique opportunity to make agricultural transformation happen."

While the research provides the meat of the ATA's policies, political commitment provides the backbone. The agency's political leadership takes the form of the powerful Transformation Council, chaired by the prime minister and bringing together other high-level officials. This structure means that research by IFPRI and its partners is presented directly to the people who can implement change. "A lot of solid research never gets attention because the key policymakers who need the information never see it," says Rashid. "Here the government is getting the research directly and taking immediate action." Although Meles, the driving force behind the ATA, died on August 20, 2012, Ethiopia's current prime minister, Haile Mariam Desalegn, and the political leadership have maintained the government's firm support for the agency.

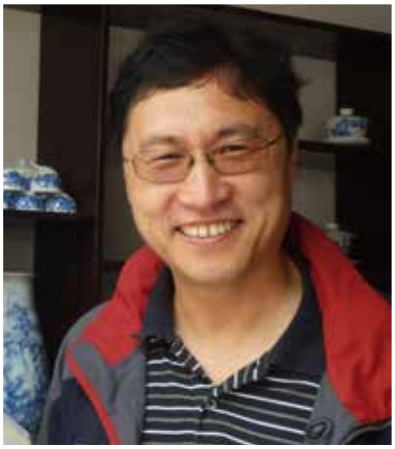
Financial Commitment

The ATA also enjoys a strong financial commitment from both the Ethiopian government and donor agencies. Ethiopia allocates more than 10 percent of its national budget to agriculture, whereas neighboring countries allocate only about 5 percent. Major donors, including the Bill & Melinda Gates Foundation and the US Agency for International Development, have provided a steady stream of funding for the agency's ambitious agenda. "This is the big difference in Ethiopia," says Rashid. "There's a high level of commitment from the government as well as from donors and development partners."

Ethiopia is still well known as the site of past famines and food shortages, but the ATA aims to leave that history behind and create an agricultural success story (see the infographic on pages 24–25 on how far Ethiopia has already come). The agricultural growth spurred by the ATA could translate into growth in other sectors and help transform Ethiopia into a developed country that can serve as a template for the region. "Investment must expand beyond agriculture to ensure well-rounded development," says Rashid, "but a strong agricultural sector is the first step."

"THESE VILLAGES ARE MY LABORATORY"

Xiaobo Zhang takes to the road to study the realities of life in rural China.



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Adrienne Chu

On one of his trips to rural China, Senior Research Fellow Xiaobo Zhang came across something he didn't expect to see: the construction of a spacious two-story house. It seemed out of place among the village's other homes, which were small with no heat or indoor plumbing. When Zhang asked one villager why he was building this large house, the man responded, "I must make sure my house is taller than my neighbors'." A bigger house meant that the matchmaker would bring more potential candidates for a wife for his son. And in a country where men of marrying age far outnumber women, finding a wife has become a serious competition—so serious that the man donated blood twice a week to earn extra money for construction materials.

Bridge to the Past

Every year, Zhang travels to rural China to talk to villagers and get ideas for research. He goes in the dead of winter, traveling slick roads to stay with villagers in their cramped, spartan homes. These conditions could not be farther away from life at IFPRI, where Zhang has an office overlooking the hustle and bustle of K Street in Washington, DC. But for him the conditions of rural China are familiar territory.

"I have firsthand experience with poverty and the socialist regime," says Zhang. "I didn't see a banana or seafood until I was 10 years old. We basically ate no meat all year except for the Chinese New Year." By his 10th birthday, Zhang had logged hundreds of hours working in the fields in Liu Jiazhuang Village in Hebei Province in northeastern China as part of a collective farm.

Some people would choose to forget such a life. But through his research, Zhang has created a bridge that connects not only his past and his present, but also the social, institutional, and economic motivations behind people's choices. "I just ask villagers, 'What's a major problem in your daily life?'" Zhang says. "I treat these villages as my laboratory."

What he sees on the ground sometimes flies in the face of conventional wisdom. For example, Chinese households save at a very high rate compared with other countries, and their savings have increased rapidly, but standard economic theory has not been able to explain why. When Zhang investigated, he found the motivation for saving so much money was not a mystery; it was the same reason men were building large houses in remote areas. The bigger the bank account, the better a man's chances of winning a wife. With Professor Shang-jin Wei of Columbia University, he has written a series of papers to empirically test this hypothesis.

Bottom-Up Research

Zhang was introduced to his bottom-up approach to research at Cornell University. His math skills took him to Nankai University in China, where he discovered a love of economics. But Chinese schools did not teach "Western" economics. After four years as a lecturer, Zhang decided he could not stay in China if he wanted to advance his career. While he was a student at Cornell, he applied and was accepted for an internship at IFPRI. He repeated the internship the next year. Then, when future director general Shenggen Fan was looking for a research assistant, he called Zhang. "Xiaobo has always tried to learn from reality, not just from books," says Fan.

After graduating from Cornell, Zhang became an IFPRI postdoctoral fellow and eventually a senior research fellow.

Zhang's current research was inspired by a conversation he had with two teachers in a rural village. The lack of qualified teachers in rural areas causes the students there to fall behind their urban peers, putting them at a disadvantage in the job market. Zhang is investigating solutions to this problem, including bringing retired educators from coastal regions to teach in rural villages. "I learn tremendously from doing fieldwork," says Zhang. "This is where I really get to know people's concerns."

MEASURING HUNGER

HOW MANY PEOPLE IN THE WORLD ARE GOING HUNGRY? IT'S A COMPLICATED QUESTION.

Jennifer Weeks

In 2010 the UN Food and Agriculture Organization (FAO) announced a stark fact: because of the global food price crisis, the number of people going hungry had spiked to more than 1 billion. The agency launched an online petition for action with the header "1 billion people live in chronic hunger and I'm mad as hell" and hung a banner bearing that message on its Rome headquarters building.

The number sounded right. With food prices going straight up, it seemed likely that hunger among poor people was rising too. But soon another story started to emerge. Gallup polls of people in developing countries did not show a steep rise in the number of people reporting themselves as hungry. Experts questioned FAO's number, and even the staff at FAO knew they needed to overhaul their data and methods.

In 2012, the agency issued drastically revised hunger assessments. According to its new estimates, there was no spike in hunger during the global food crisis, or at least none that it could measure using the tools available. Instead, it appears that the number of hungry people had been on a slow decline for two decades, reaching about 870 million in 2010.

Counting the number of hungry people is a lot harder than it sounds, and FAO is not the only organization that struggles with it. IFPRI and other institutions have also tried to gauge global hunger. The task raises difficult questions about exactly who is eating what in a wide variety of settings. The challenges vary depending on the scale of the question: Are you most interested in knowing about hunger in a country, a district, a village, a household, or a person? Accurate measurements can help development agencies and political leaders understand trends, direct aid to where it is most needed, design more effective programs, and assess whether interventions to reduce hunger are working—but meeting these different goals can require different approaches to measuring hunger.

RETHINKING THE NUMBERS

How did the FAO get from 1 billion to 870 million hungry? To make its annual estimates of people who are undernourished, FAO draws on population data from United Nations agencies. Individual countries supply data on how much food is available there, based on their own calculations of the quantity of major food commodities they produce, import, and export. For many countries, nationally representative surveys supply additional information about the amount of food households acquire. Based on all of these figures, FAO calculates how many people in a country cannot get access to a minimum calorie threshold.

But problems crop up. Up-to-date, accurate data from these various sources are often unavailable. It can, for example, be difficult to get accurate measurements of a country's grain inventories. People responding to surveys may fail to mention food that is wasted, given away, or bought outside the home. Even population

"IF WE WERE ONLY MEASURING IN DEVELOPED COUNTRIES, DATA WOULD BE LESS OF A PROBLEM, BUT IT'S VERY PARTIAL IN MOST DEVELOPING COUNTRIES."

—Carlo Cafiero, FAO

data sometimes turn out to be skewed. In some cases, therefore, FAO must use estimates to fill the gaps and calculate a percentage of undernourishment.

"If we were only measuring in developed countries, data would be less of a problem, but it's very partial in most developing countries," says Carlo Cafiero, who leads the FAO Statistics Division team that prepared the measurements of global undernourishment. "We want to make assessments that are consistent across countries and provide insights into the most important questions."

When its 2010 estimates came into question, FAO launched a two-year consultation process to see how it could improve them. By 2012 FAO had updated its data on food supplies. Deeply revised population assessments were available—Bangladesh's population was revised downward significantly, for example. The agency got more accurate data on people's physical stature, which affects people's calorie requirements. It also estimated the amount of food lost during food retailing. "Recognizing the difference between total food supply and the amount that reaches households is a major new factor," says Cafiero. Finally, it revised its methods for estimating figures where data were missing.

Nonetheless, says Cafiero, "we recognize that the ability to measure food insecurity is still limited." FAO's effort to improve its indicator of food insecurity is ongoing. And even if FAO's new figures are more accurate, critics say they provide only limited insights into food insecurity. "The revised FAO indicator takes into account households' access to food and calories but still does not measure access by individual household members, and more important, does not measure any aspects of dietary quality, such as access to diverse diets and micronutrient-rich foods," says Marie Ruel, director of IFPRI's Poverty, Health, and Nutrition Division.

Still, the national and global figures from FAO serve a purpose. For example, its national measures of undernourishment are one standard by which countries are judged against Millennium Development Goal 1, which concerns extreme poverty and hunger. "FAO is a global organization that provides overall policy guidance to national governments on general trends, not on specific actions," says Calestous Juma, a professor of international development at the Harvard Kennedy School of Government.

BEYOND CALORIES

Other measures of hunger, such as IFPRI's Global Hunger Index, come at the problem slightly differently. A precursor to the index was born in the late 1990s, when Doris Wiesmann was a graduate student at the University of Bonn's Center for Development Research. Joachim von Braun, then a professor at the university and later director general of IFPRI, asked Wiesmann to develop a nutrition index that would reflect not just calorie deficits, but broader aspects and consequences of food insecurity. She constructed an index by combining three indicators: FAO's measure of undernourishment, the World Health Organization's data on underweight among children under age five, and UNICEF's data on mortality among children under age five. Wiesmann's Nutrition Index represented an attempt to measure food insecurity and its consequences, focusing on the most devastating losses for countries—losses in lives and nutrition and in the future potential of children. Several years later, when Wiesmann joined IFPRI as a postdoctoral fellow, the Nutrition Index became the Global Hunger Index. IFPRI, along with the German NGO Welthungerhilfe and the Irish aid organization Concern Worldwide, now issues the index annually.

"CALORIES ARE JUST ONE DIMENSION OF FOOD SECURITY. PEOPLE NEED MORE THAN CALORIES FOR PHYSICAL AND COGNITIVE DEVELOPMENT AND REPRODUCTION."

—Olivier Ecker, IFPRI

PREVALENCE OF UNDERNOURISHMENT

Each year FAO presents data on the prevalence of undernourishment—that is, the percentage of people in a population who consume too few calories. This is the indicator used to measure countries' progress in achieving Millennium Development Goal 1.

GLOBAL HUNGER INDEX

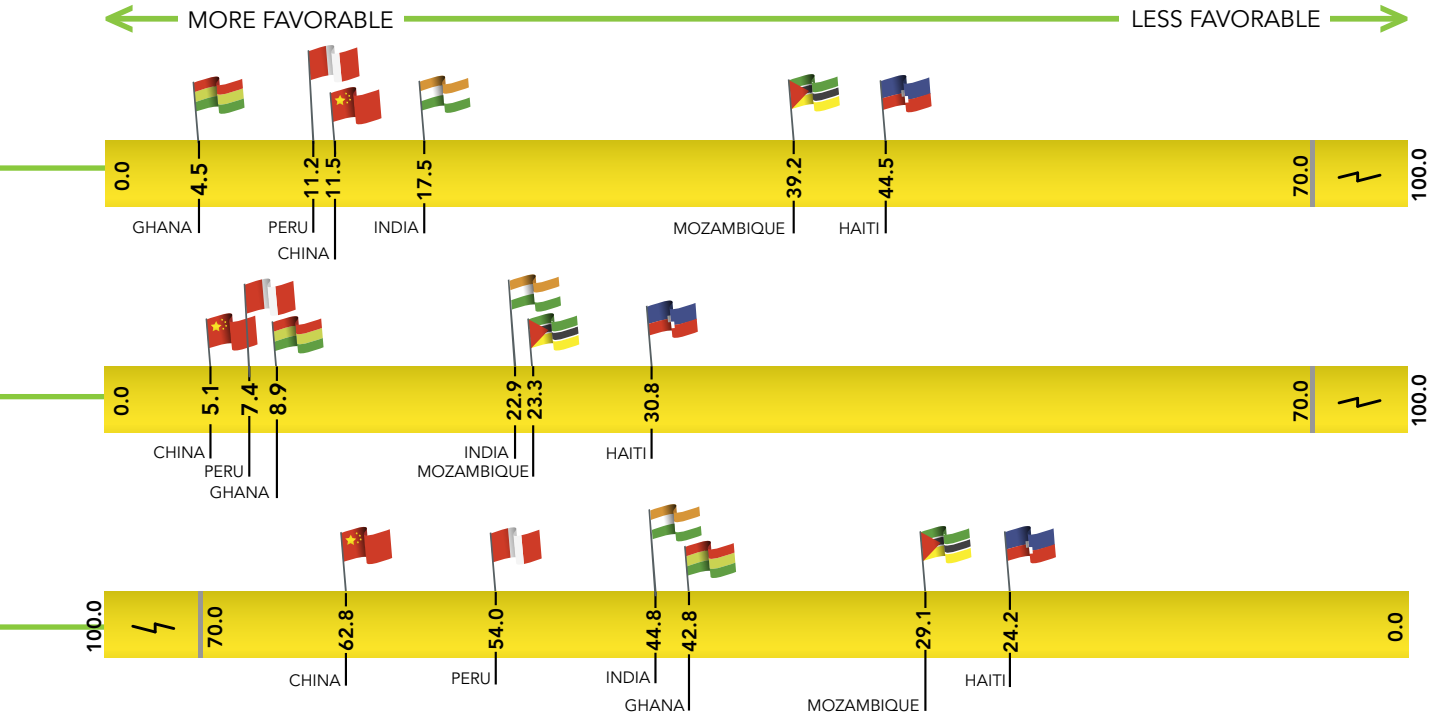
IFPRI's GHI combines the FAO undernourishment indicator with two other indicators of the effects of undernutrition on children, who are particularly vulnerable: child underweight and child mortality. This captures some of the multidimensional nature of hunger.

GLOBAL FOOD SECURITY INDEX

This index, produced by the Economist Intelligence Unit and sponsored by DuPont, takes a broader look at overall food security by combining indicators of food affordability, availability, and quality. It helps identify gaps in countries' food security networks.

THREE MEASURES OF HUNGER

Because these three national-level measures reflect different aspects of hunger and food security, the relative values for different countries can vary from measure to measure. The three measures—all on a scale of 0 to 100—also suggest different types of policy approaches to reducing hunger and improving food security.



Because the Global Hunger Index ranks countries on a 100-point scale, with zero as the best score (no hunger) and 100 as the worst, it's easy to compare how well countries are performing on addressing hunger. "Indexes of this type can be powerful tools for advocacy when used in international country rankings," says Wiesmann, now a consultant based in Germany. Indeed, the Global Hunger Index has been widely used to put pressure on policymakers to do more to fight hunger.

Still, like all indexes, it simplifies a complex problem. And although the Global Hunger Index does offer a more multidimensional view of food insecurity, it is only as accurate and up-to-date as the data on which it is based. Given the time lags that affect all of the source data, it is definitely a picture of the recent past, not of current hunger and undernutrition. Conducting surveys takes time and costs money. Nonetheless, according to Klaus von Grebmer, IFPRI research fellow emeritus, the technology exists to get more accurate and up-to-date data: "At a time when data handling has become much easier, the main obstacles to providing this information in a more timely way are lack of political will and lack of funding."

DIVERSITY ON THE PLATE

A fuller measure of food insecurity, however, would include not just how many calories people are eating, but also how many essential nutrients—such as vitamin A and iron—they are getting. "Calories are just one dimension of food security. People need more than calories for physical and cognitive development and reproduction," says IFPRI Research Fellow Olivier Ecker. "If you look at nutrition indicators, you have physical indicators that can reflect positive and negative shocks and longer-term developments, though they are often not up-to-date or available in combination with key economic indicators." Analysts are looking for indicators that provide useful information about specific situations, such as the short-term impacts of economic shocks, and they want more finely grained data that go beyond national averages to give more detail.

Ecker and IFPRI Research Fellow Derek Headey recently reviewed various possible indicators of food security and concluded that measuring the diversity of people's diets is the most promising way to improve food security measurements. It is relatively easy to measure dietary diversity: surveyors count the different foods or food groups people eat and can weight them according to their nutritional value and the frequency with which they are consumed.

The diversity of people's diets is highly correlated with certain nutrition indicators, such as people's intakes of calories and micronutrients, and even—though less strongly—with indicators of chronic malnutri-

tion. And dietary diversity is a useful measure of the impact of economic shocks. "It matches what we know happens when income falls: people reduce the diversity of their diets," says Ecker. During economic crises families may not reduce their total caloric intake immediately, but they save money by consuming fewer expensive, highly nutritious foods like vegetables, eggs, and meat.

But how many different foods should a person actually eat? "Diets vary quite a bit around the world and are more diverse in some regions than in others, so defining universal thresholds has failed so far," says Ecker. The best approach, he believes, may be to develop a standard set of food and nutrition security indicators—rather than one index that incorporates several indicators—for various target groups, such as women of reproductive age and preschool children. Among the set of indicators should be dietary diversity.

AREN'T WE ALREADY DOING THAT?

Even if we have better ideas about what kind of information to collect, the problem of how to collect it remains. If we can't survey everyone in the world about his or her food consumption, a next-best option is to conduct large-scale surveys that would be nationally or regionally representative. Currently, only the Philippines conducts a nationally representative survey of individuals' food consumption over the past 24 hours every five years. These 24-hour recall surveys are considered one of the best ways of assessing individuals' food consumption. "They are very costly and require a high level of technical skill and expertise," says Wiesmann, "but they also provide unique information that is not available from other methods."

But the World Bank and other agencies do conduct frequent large-scale household surveys of people in developing countries, points out IFPRI Senior Research Fellow Jack Fiedler. In fact, one study showed that in recent years 95 percent of the population in developing countries has been covered by at least one such survey. In many cases these household consumption and expenditure surveys are designed to gather information about poverty, not food and nutrition security—but to measure poverty, they generally collect information on food consumption and expenditures too. The question is how well do they currently do so, and how much they might be improved if they were repurposed with this intention.

Fiedler works for IFPRI's HarvestPlus program, which supports the breeding of more nutrients into staple food crops. He is interested in knowing not only where people suffer from food and nutrition insecurity, but also which foods people regularly eat that might be suitable vehicles for biofortification. "Food policymakers in many countries have been making a lot of guesses about household consumption patterns and food sources, but household consumption surveys can ask people what they ate, how they got it, and what goods are commercially traded at local markets," says Fiedler.

Hunger agencies, he says, should look for more opportunities to partner with the agencies that administer household consumption and expenditure surveys and increase their focus on food consumption and nutrition. Household consumption and expenditure surveys are already typically conducted in most countries every three to five years. Questions about dietary diversity and frequency, of the type described by Ecker, can already be addressed using household consumption and expenditure surveys, and other questions could be added to help researchers better estimate the nutritional needs of a household. Are there any pregnant or lactating women? Are there any children under age one? Is anyone suffering from illness? How are foods combined and prepared? In addition, the cost of analyzing households' nutrient availability from such secondary data sources is about 2 percent of the cost of collecting primary data in a typical 24-hour recall survey. "Affordability is a huge issue," says Fiedler.

Ecker also points out that using such surveys to reach out to fewer people more frequently—once or even twice a year—would provide valuable information on the effects of seasonal variation and shocks, such as weather events or price changes, on people's food and nutrition security.

DRILLING DOWN

As researchers make greater use of household surveys to measure hunger, they will need to consider how to determine the food and nutrition security of each individual within the household. "Individuals go hungry and suffer malnutrition, not households or aggregates," says Christopher Barrett, a professor of economics and agriculture at Cornell University. For example, in recent years researchers have found increasing instances of the "double burden of malnutrition," in which the same household contains adults who are overnourished (eat too many calories) and children who are undernourished (eat too few calories or nutrients).

"Even when large household surveys collect info on children, this information is typically aggregated up to the household level," says IFPRI Senior Research Fellow Agnes Quisumbing. "Economics has assumed for a long time that households behave as a single unit and that households are all that matters. But

individuals are the ones making decisions." Although nutritionists collect information on nutritional status at the individual level, the data aren't always reported in the most useful way. Information on nutritional status reported according to specific age-sex categories would capture food and nutrition security more effectively than looking at average household consumption, Quisumbing argues.

"ECONOMICS HAS ASSUMED FOR A LONG TIME THAT HOUSEHOLDS BEHAVE AS A SINGLE UNIT AND THAT HOUSEHOLDS ARE ALL THAT MATTERS. BUT INDIVIDUALS ARE THE ONES MAKING DECISIONS."

—Agnes Quisumbing, IFPRI

Interviewing individuals costs more than interviewing just the head of the household, the typical practice, but Quisumbing believes the expense is justified. "You learn much more from asking individuals questions, such as why some people in the household are systematically less nourished than others," she says. However, it may complicate field logistics: interviewers may have to talk to men and women separately, or field teams of male and female interviewers.

OTHER YARDSTICKS

To measure a problem on the scale of world hunger, analysts inevitably have to trade off their desire for greater detail against the cost of getting more information. Experts broadly agree that FAO's national-level assessments only capture part of the problem, and that household or individual data provide clearer information about the scale and distribution of food insecurity.

But some are skeptical about calls for more data. "It's no small task to collect data every year on every country. There's no funding for it, and many countries can't do it for themselves," says IFPRI's Ruel. There is also confusion about what different indexes and indicators of food security mean and how they should be used. Ruel and IFPRI Research Fellow Jef Leroy are reviewing how well various indicators measure different aspects of food insecurity. "We want to clarify what indicators have been used, at what level they're most useful, which ones have been validated, and what they reflect so that we can provide guidance on which ones to use for what," says Ruel.

In the near term, more frequent household surveys with improved questions on food and nutrition would fill some existing gaps. And FAO is exploring the possibility of collaborating with the global polling firm Gallup to add a module about food insecurity to the Gallup World Poll, which conducts surveys in 160 countries. The poll could ask subjects whether they have gone hungry or had to skip meals over defined periods of time. If done properly, it would provide a fine-grained picture of food insecurity in virtually all countries in the world in a comparable way, and almost in real time. "This would be a real innovation for FAO," says Carlo Cafiero. "We've never had a budget to collect data directly—we do assist national statistical offices, trying to promote common standards, but we have always depended on data collected by others that take time to be processed and are highly heterogeneous in their quality across countries."

Cornell's Christopher Barrett has proposed another model: an international network of "sentinel sites" in the developing world that would produce regular household- and individual-level surveys tracking multiple food security indicators and using standardized survey protocols. There's a template: the US National Science Foundation's network of 26 sites around the world where researchers can study ecological health and environmental change. "NSF's network didn't pay dividends for ten years. But now it's essential to our understanding of key ecologies," says Barrett. Similarly, a network of sites focused on food security would be a costly investment but could yield major insights.

In the end, although the alarm about a spike in hunger in 2008–2009 may have been unwarranted, it had a useful outcome. Along with the food price increases and the food riots, the apparent rise in hunger helped refocus the world's attention on hunger and poverty—problems that remain serious. Better assessment of food and nutrition security could help lead to policies to ensure that all people are well fed and well nourished, although it will be complex and come with costs. "In some cases it might be easier to eliminate hunger than to measure it," says Calestous Juma, a professor of international development at the Harvard Kennedy School of Government. "But in the end, we would never know what had been achieved." And perhaps more important, we would not know how we achieve progress.

ETHIOPIA ON THE PATH FROM FAMINE TO FOOD SECURITY

HISTORY

1888–1892	1896	1929	1957–1958	1964–1966	1972–1974	1974	1978–1979	1982	1984–1985
Rinderpest decimates cattle population and leads to high human death toll.	Ethiopian army defeats Italian troops.	Ras Tafari proclaimed as Emperor Haile Selassie.	Rains fail in 1957. Locusts and human epidemic strike in 1958.	Poorly documented famine occurs.	Rains fail successively. 50% of livestock is lost in Tigray and Wollo.	Haile Selassie is deposed by the military. Mengistu Haile Mariam leads the Derg government.	Seasonal rains fail.	Seasonal rains come late.	Rains fail successively. Much livestock is lost.
2 MILLION			100,000	250,000	250,000				1 MILLION

SUCCESSES

INFRASTRUCTURE INVESTMENT

ELECTRICITY THOUSANDS OF KILOWATTS

331.5

737.7

PAVED ROADS THOUSANDS OF KILOMETERS

28.0

42.4

1991 2009

PRODUCTIVE SAFETY NET PROGRAMME

The PSNP delivers cash or food transfers to 7–8 million rural Ethiopians for six months of every year, either through public works or for free as direct support. It is the largest social protection program in Africa south of the Sahara, after South Africa, and the first to combine food and cash transfers.

POVERTY

PEOPLE LIVING ON LESS THAN $1.25 A DAY

61%

39%

1991 2009

UNDERNOURISHMENT

PEOPLE CONSUMING TOO FEW CALORIES

65%

45%

2000 2005

CALORIES CONSUMED PER DAY

URBAN AREAS

2,050

2,400

RURAL AREAS

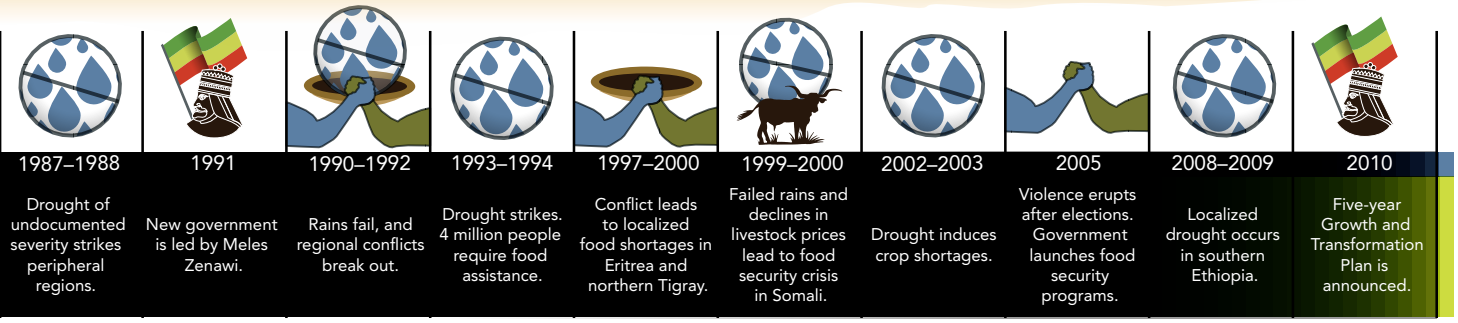
1,900

2,800

1994–1995 2004–2005

A new book, *Food and Agriculture in Ethiopia: Progress and Policy Challenges*, edited by IFPRI researchers Paul Dorosh and Shah
in the past two decades. Ethiopia has made major advances toward increasing growth and improving human well-being. Looking

Design: C.Hallowell/IFPRI. For full sources, see P. A. Dorosh and S. Rashid, *Food and Agriculture in Ethiopia: Progress and Policy Challenges* (Philadelphia: University of Pennsylvania Pres

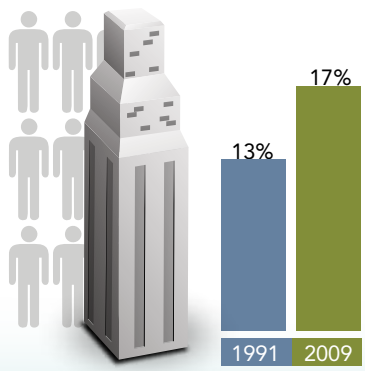


= 100,000 FAMINE DEATHS

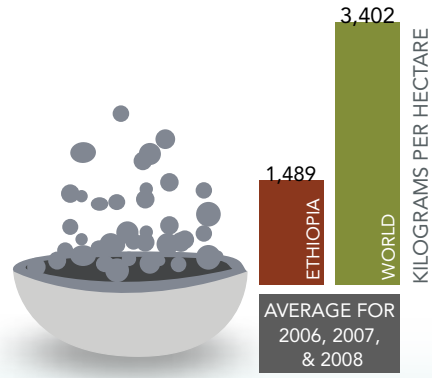
Drought is a fact of life that contributes to episodes of high food insecurity, but Ethiopia has greatly reduced drought-related deaths.

Ethiopia has made strong progress in increasing economic growth, building infrastructure, and reducing poverty—and modest progress in improving food security.

GROWTH



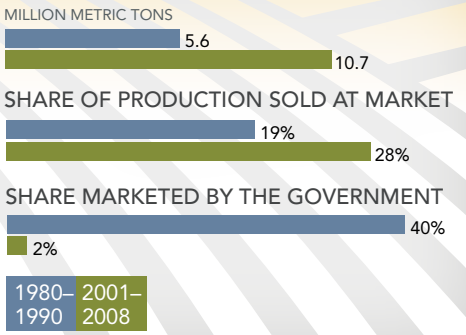
POPULATION IN URBAN AREAS



CEREAL YIELDS

While Ethiopia remains heavily rural and agricultural, its agricultural productivity is still extremely low.

CEREAL PRODUCED AND MARKETED



MOVING FORWARD: ETHIOPIA'S POLICY CHALLENGES

- SUSTAINING GROWTH IN CROP AND LIVESTOCK PRODUCTION
- INCREASING MARKET EFFICIENCY
- PROVIDING EFFECTIVE SAFETY NETS
- MAINTAINING MACROECONOMIC INCENTIVES AND STABILITY
- MANAGING THE RURAL-URBAN TRANSFORMATION

CHALLENGES

idur Rashid, presents evidence of the rapid political, economic, and agricultural changes that have taken place in Ethiopia ahead, it faces both challenges and opportunities.

s for the International Food Policy Research Institute, 2013).

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