Building Innovative Tools

IFPRI's track record of strengthening food policy around the globe is due in no small part to innovation—particularly the development of novel models, methodologies, and tools for analysis and the development and use of leading-edge platforms for sharing data.

Over its 40 years of researching the many critical issues affecting food security, the International Food Policy Research Institute (IFPRI) has created a number of innovative models, mapping tools, indexes, and interactive databases that help improve the ways policy options are understood, discussed, and implemented. All of these tools and data are freely accessible to users around the world.

Economic Models for Foresight and Strategy

IFPRI has been engaged in food demand-and-supply projections since its inception in 1975. One of the Institute's most ambitious efforts is the International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT)—a global partial equilibrium model that was developed in the early 1990s by IFPRI researchers and colleagues from Japan. The model examines alternative future scenarios for global food supply, demand, trade, prices, and food security and comprises a network of linked economic, water, and crop models that covers 159 countries, 320 food production units, and 44 agricultural commodities. IMPACT is integral to the Global Futures & Strategic Foresight project, which is designed to improve agricultural productivity and environmental sustainability, particularly in developing countries. According to an independent assessment, evidence of the influence IMPACT has had includes the demand it has generated for analyses and projections from a number of organizations and its use in advocacy and preparation of policy briefs for ministers. The assessment described it as "a valuable international public good."

Developed to study trade policy scenarios, the Modeling International Relationships in Applied General Equilibrium (MIRAGE) is a multicountry, multisector dynamic model, developed by IFPRI researchers and colleagues at the Centre d'Etudes Prospectives et d'Informations Internationales in Paris. Used to assess bilateral and multilateral trade agreements, it provides a rich set of indicators that allows measuring the impact of policy changes.

According to an independent assessment, the MIRAGE-Biofuels work has helped clarify the trade-offs among renewable fuels, indirect land use changes, and greenhouse gas emissions and produced a renewable fuels baseline for the European Union that has informed the debate on its biofuels policy. The MIRAGE Trade Analysis work has responded to the need for analyses that reflected the interests of developing countries in the Doha Round of the World Trade Organization negotiations, which developing countries did not have the capacity to perform for themselves.

Understanding how different sectors of an economy—for instance, companies, farms, households, and investors—interact with each other is key to understanding the spending patterns of a country. A Social Accounting Matrix (SAM) provides a picture of a country or region's economy by showing the circular flow of income and expenditure, usually for a given year. SAMs are integral to computable general equilibrium models, which are tools of empirical economic analysis used by policy analysts around the world. IFPRI researchers have contributed dozens of widely used country SAMs, including SAMs for Nigeria, Iraq, Vietnam, Pakistan, India, Yemen, China, Peru, Zimbabwe, and Mexico.

Launched in 2011, the African Growth and Development Policy (AGRODEP) Modeling Consortium serves, via its website, as a repository for state-of-the-art economic models developed for members, as well as a data portal. AGRODEP also provides training to researchers who perform science-based research that will enable them to formulate sound and effective policies.

Websites and Web Portals

Along with the University of Minnesota, IFPRI developed and coordinates HarvestChoice, a program that generates information to inform strategic investments in agriculture in order to improve the well-being of the poor in Africa south of the Sahara (SSA). Each of its knowledge products is designed to target the needs of investors and policymakers. The program mines data from global databases, academic literature, household surveys, and agriculture censuses, and, using cropping system and economic models, statistical analyses, and geospatial tools, harmonizes the data into a standardized, geotagged database. Researchers who visit harvestchoice.org can download datasets; summarize agricultural and household indicators by region, domain, or commodity; explore data maps of SSA; and extract and map data using a suite of online tools. For example, MAPPR, a spatial visualization and analysis tool, offers access to over 400 layers of spatially explicit, agriculture-related indicators for SSA. Another tool, TABLR, lets users build their own data tables based on the same indicators in MAPPR.

Over the years, there has been growing demand for credible information and analysis for the design and implementation of agriculture-led development strategies to increase economic growth and reduce poverty in SSA. As a result, in 2006 the Comprehensive Africa Agriculture Development Programme established the Regional Strategic Analysis and Knowledge Support System (ReSAKSS), which is facilitated by IFPRI. ReSAKSS provides data and analytical and knowledge products to facilitate benchmarking, review, and mutual learning processes and to create tools to help in the design, implementation, monitoring, and evaluation of rural development. In 2015, the program introduced the ReSAKSS Mapping Tool, an interactive map that lets the user compare more than 30 indicators on Africa's agricultural development progress across subregions and countries.

IFPRI developed and facilitates the Food Security Portal (FSP), an open-access project that encompasses a global research-based monitoring and capacity-strengthening device for successful identification and implementation of the appropriate policy actions in response to food crises. The FSP is designed to pool information in structured ways and ensure data quality, timeliness, and relevance, as well as the opportunity for collaboration among policymakers, development professionals, and researchers. Following on the success of the initial FSP, in 2015 IFPRI launched region-specific Food Security Portals: the India Food Security Portal, the Spanish-language Food Security Portal for Central America and the Caribbean, and the Africa south of the Sahara Food Security Portal.

Statistical Indexes

One of IFPRI's best-known indexes is the Global Hunger Index (GHI), published annually since 2006 in cooperation with Welthungerhilfe and Concern Worldwide. The index monitors the incidence of hunger in various developing countries based on weighted indicators. For the 2015 GHI, a new, improved formula was introduced that is based on four, rather than three, indicators: undernourishment, child mortality, and, replacing child underweight, child stunting and child wasting. This change reflects the latest thinking on the most suitable indicators for measuring child under-

nutrition. In 2008, the India State Hunger Index was created to calculate hunger and malnutrition at the regional level in India. The index was calculated for 17 states and covers more than 95 percent of the population. The success of the GHI has helped popularize the use of indexes by many organizations interested in food-related issues—including The Economist's Global Food Security Index and the Hunger and Nutrition Commitment Index (HANCI).

If the GHI has proven the value of aggregating data, the Women's Empowerment in Agricultural Index (WEAI) demonstrates the value in disaggregating a commonly used unit of analysis: the household. The United States Agency for International Development asked IFPRI to create the WEAI as a diagnostic for monitoring and evaluating the 19 countries of the Feed the Future program, the Obama administration's signature agricultural development program.

Piloted in conjunction with the Oxford Poverty and Human Development Initiative in 2011–2012, this index provides the first-ever comprehensive and standardized measure of (1) women's empowerment in agriculture (production, resources, income, leadership, and time use) and (2) gender parity in empowerment within the household. Developing country governments, such as the Bangladesh Ministry of Agriculture, have begun to design their own interventions to close empowerment gaps identified by the WEAI. Over 30 additional researchers or development organizations have adopted or adapted the WEAI to improve their understanding of the relationship between agriculture and women's status.

Biofortification is a strategy that seeks to reduce human micronutrient deficiencies—vitamin A, zinc, or iron—by developing and disseminating food crops that contain high levels of micronutrients. HarvestPlus—a part of the CGIAR Research Program on Agriculture, Nutrition and Health (A4NH), which is led by IFPRI, developed the Biofortification Priority Index (BPI) in 2015 to help stakeholders assess for which crop and in which country their investments would have the greatest impact on reducing micronutrient deficiencies. The BPI ranks seven staple crops according to their suitability for biofortification investment in 127 countries in Africa, Asia, and the Latin America and Caribbean region. The seven micronutrient-rich crops are iron beans, iron pearl millet, vitamin A cassava, vitamin A maize, vitamin A sweet potato, zinc rice, and zinc wheat.

Indicators and Databases

Employing primary surveys to collect data from government, higher education, nonprofits, and private agricultural research and development (R&D) agencies, Agricultural Science and Technology Indicators (ASTI), led by IFPRI, provides quantitative and qualitative information and trends regarding three critical dimensions of agricultural R&D in low- and middle-income countries: funding sources, spending levels and allocations, and human resource capacities (measured by numbers of researchers, broken down by degree, age, and gender). New in 2015 is ASTI's benchmarking tool that enables cross-country comparisons and rankings of key agricultural R&D spending and capacity indicators for countries in West Asia, North Africa, SSA, and Latin America and the Caribbean.

ASTI's data and analysis constitute an attractive and powerful decisionmaking resource. The program's outputs are often consulted in high-level meetings and contribute to the flagship publications of many organizations. Moreover many African countries have used ASTI data to justify more public support for agricultural R&D.

One of the most important tools for government interventions is public expenditure. And transparency in public spending allows governments to track, monitor, and evaluate the flows, efficiency, and impact of public resource allocation. A better understanding of the linkages between public expenditure and development can provide insights into poverty reduction strategies and key development goals. With this objective in mind, IFPRI has been compiling, since 2010, the Statistics of Public Expenditure for Economic Development (SPEED) database, which provides the most comprehensive and publicly available public expenditure information for 147 countries and 6 sectors on agriculture, education, health, defense, social protection, and transportation and communication. Data are now available for 1980 to 2010, making SPEED the most comprehensive open-access public expenditure database.

A unique new source of data on all forms of malnutrition is the Global Nutrition Report (GNR). In effect, it is a report card on the world's nutrition—globally, regionally, and country by country—and on efforts to improve it. GNR assesses countries' progress in meeting global nutrition targets established by the World Health Assembly and documents how well countries, aid donors, nongovernmental organizations, businesses, and others are meeting the commitments they made at the major Nutrition for Growth summit in 2013. With its wealth of data and deep analysis, GNR aims to improve accountability among the governments, institutions, businesses, and others whose actions affect people's nutrition. It is accompanied by extensive supplementary online data, including nutritional profiles for 193 countries, 6 regions, and 22 subregions.

Mapping

IFPRI has been involved in the creation of several mapping tools—from printed atlases to online interactives. The Institute worked closely with Ethiopia's Central Statistical Agency and the Ethiopian Development Research Institute to produce, in 2006, the Atlas of the Ethiopian Rural Economy, whose aim was to improve the understanding of the spatial dimensions of poverty and the opportunities for economic growth in the country. The Atlas is bilingual, with each page in Amharic and English.

In 2014, IFPRI published the Atlas of African Agriculture Research & Development, a multifaceted resource that highlights the ubiquitous nature of smallholder agriculture in Africa. Covering 30 topics, from agricultural R&D investments to wheat stem rust vulnerability, each map provides geospatial data and supporting text.

The Arab Spatial Development and Food Security Atlas is an interactive mapping and charting tool that lets users visualize, compare, and monitor a wide range of indicators on food and nutrition security, poverty, and development across the Middle East and North Africa region (MENA) at the national, subnational, and pixel levels. Since its inception in 2013, Arab Spatial's user community has grown to include more than 10,000 users. Various regional institutions use Arab Spatial and some feature it on their websites, including the Arab Forum for Environment and Development, American University of Beirut, the League of Arab States, and the United Nations Economic and Social Commission for Western Asia. Iraq, Palestine, and Yemen have their own country-specific versions of the tool, with Egypt and Lebanon to follow shortly.

Net-Map is an interview-based mapping tool that helps people understand, visualize, discuss, and improve situations in which many different actors influence outcomes. Net-Map helps players to determine which actors are involved in a given network, how they are linked, how influential they are, and what their goals are. This low-tech and low-cost tool is useful when working with rural community members with low formal education, as well as policymakers or international development actors.

Innovation as a Way of Life

The scope of IFPRI's research has evolved over the last 40 years and so have the types of innovative "tools of the trade" developed by IFPRI researchers. As the world now turns its focus to the work necessary to meet the Sustainable Development Goals, IFPRI will continue to innovate and develop new and better tools and techniques for conducting effective research and uncovering the evidence to help policymakers with their decisionmaking.

Resources

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