Food and Agriculture Organization of the United Nations

2014

The State of Food and Agriculture 2014 *IN BRIEF*

Innovation in family farming

More than 500 million family farms manage the majority of the world's agricultural land and produce most of the world's food. We need family farms to ensure global food security, to care for and protect the natural environment and to end poverty, undernourishment and malnutrition. But these goals can be thoroughly achieved if public policies support family farms to become more productive and sustainable; in other words policies must support family farms to innovate within a system that recognizes their diversity and the complexity of the challenges faced.

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The State of Food and Agriculture 2014: Innovation in family farming analyses family farms and the role of innovation in ensuring global food security, poverty reduction and environmental sustainability. It argues that family farms must be supported to innovate in ways that promote sustainable intensification of production and improvements in rural livelihoods. Innovation is a process through which farmers improve their production and farm management practices. This may involve planting new crop varieties, combining traditional practices with new scientific knowledge, applying new integrated production and post-harvest practices or engaging with markets in new, more rewarding ways. But innovation requires more than action by farmers alone. The public sector – working with the private sector, civil society and farmers and their organizations – must create an innovation system that links these various actors, fosters the capacity of farmers and provides incentives for them to innovate.

Family farms are very diverse in terms of size, access to markets and household characteristics, so they have different needs from an innovation system. Their livelihoods are often complex, combining multiple natural-resource-based activities, such as raising crops and animals, fishing, and collecting forest products, as well as off-farm activities, including agricultural and non-agricultural enterprises and employment. Family farms depend on family members for management decisions and most of their workforce, so innovation involves gender and intergenerational considerations. Policies will be more effective if they are tailored to the specific circumstances of different types of farming households within their institutional and agro-ecological settings. Inclusive research systems, advisory services, producer organizations and cooperatives, as well as market institutions are essential.

The challenges of designing an innovation system for the twenty-first century are more complex than those faced at the time of the Green Revolution. The institutional framework is different due to a declining role of the public sector in agricultural innovation and the entry of new actors, such as private research companies and advisory services, as well as civil society organizations. At the same time, farmers are having to address globalization, increasingly complex value chains, pressures on natural resources, and climate change.

Family farms: size and distribution

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There are more than 570 million farms in the world. Although the notion of family farming is imprecise, most definitions refer to the type of management or ownership and the labour supply on the farm. More than 90 percent of farms are run by an individual or a family and rely primarily on family labour. According to these criteria, family farms are by far the most prevalent form of agriculture in the world. Estimates suggest that they occupy around 70 – 80 percent of farm land and produce more than 80 percent of the world's food in value terms.

The vast majority of the world's farms are small or very small, and in many lower-income countries farm sizes are becoming even smaller. Worldwide, farms of less than 1 hectare account for 72 percent of all farms but control only 8 percent of all agricultural land. Slightly larger farms between 1 and 2 hectares account for 12 percent of all farms and control 4 percent of the land, while farms in the range of 2 to 5 hectares account for 10 percent of all farms and control 7 percent of the land. In contrast, only 1 percent of all farms in the world are larger than 50 hectares, but these few farms control 65 percent of the world's agricultural land. Many of these large, and sometimes very large, farms are family-owned and operated.

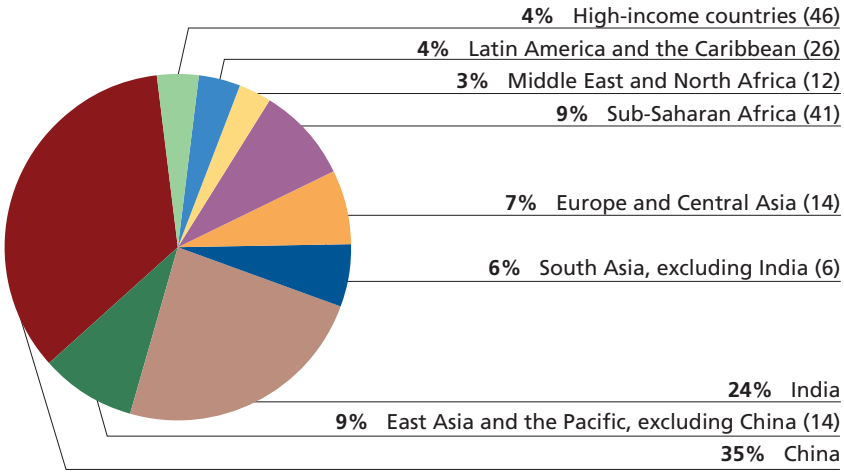
The highly skewed pattern of farm sizes at the global level largely reflects the dominance of very large farms in high-income and upper-middle-income countries and in countries where extensive livestock grazing is a dominant part of the agricultural system. Land is somewhat more evenly distributed in the low-and lower-middle-income countries where more than 95 percent of all farms are smaller than 5 hectares. These farms occupy almost three-quarters of all farm land in the low-income countries and almost two-thirds in the lower-middle income group. In contrast, farms larger than 50 hectares control only 2 percent and 11 percent, respectively, of the land in these income groups.

Exactly what can be considered a small farm – below 0.5 or 1 hectare, or some other size – will depend on agro-ecological and socio-economic conditions, and their economic viability will depend on market opportunities and policy choices. Below a certain level, a farm may be too small to constitute the main means of support for a family. In this case, agriculture may make an important contribution to a family's livelihood and food security, but other sources of income through off-farm employment, transfers or remittances are necessary to ensure the family lives a decent life. On the other hand, many small or medium-sized family farms in the low- and middle-income countries could make a greater contribution to global food security and rural poverty alleviation, depending on their productive potential, access to markets and capacity to innovate. Through a supportive agricultural innovation system these farms could help transform world agriculture.

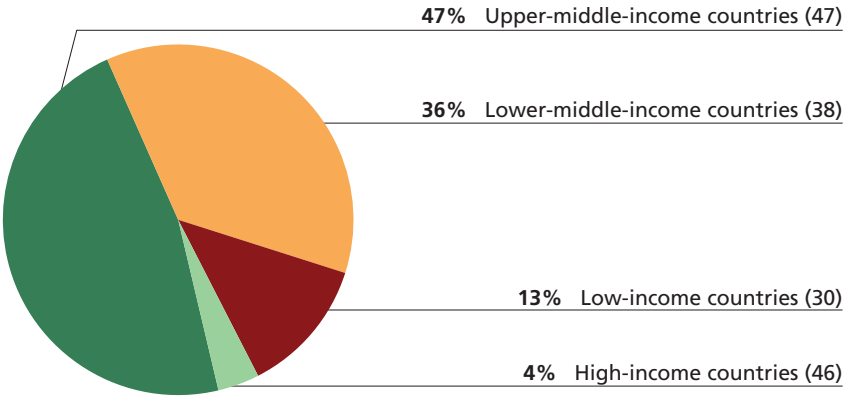
Note: Assessing the number of farms and family farms as well as land distribution throughout the world is difficult because of the absence of systematic and comparable data for all countries. Estimates presented here are based on agricultural censuses for different time periods and different countries, and are intended to provide indications of orders of magnitude rather than exact numbers.

Shares of the world's farms, by region, income group and size

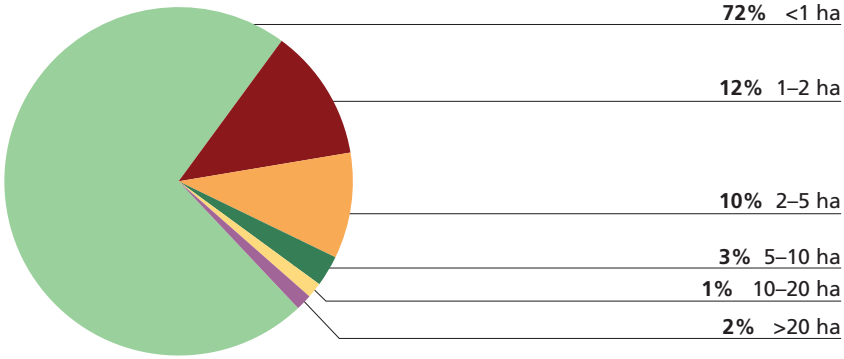
Share of farms by region, country or group



Share of farms, by income group



Share of farms, by land size class



Note: The first two panels are based on a sample of 161 countries, which account for almost 570 million farms; the number of countries included is shown in parentheses. The third panel shows farms by farm size covering a total of about 460 million farms in 111 countries.
Source: FAO.

Family farms, food security and poverty

In most countries, small and medium-sized farms tend to have higher agricultural crop yields per hectare than larger farms because they manage resources and use labour more intensively. This means that the share of small and medium-sized farms in national food production is likely to be even larger than the share of land they manage.

A large proportion of family farmers with small landholdings also depend on other natural resources, especially forests, pastureland and fisheries. The intensive resource use on these farms may threaten sustainability of production. These small and medium-sized farms are central to global natural resource management and environmental sustainability as well as to food security.

While smaller farms tend to achieve higher yields per hectare than larger farms, they produce less per worker. Labour productivity – or output per worker – is also much lower in low-income countries than in high-income countries. Increased labour productivity is a precondition for sustained income growth, so enabling farming families in low- and middle-income countries to raise their labour productivity is essential if we are to boost farm incomes and make inroads into reducing rural poverty.

Although smaller farms tend to have higher yields than larger farms within the same country, cross-country comparisons show that yields per hectare are much lower in poorer countries, where smaller farms are more prevalent, than in richer countries. This seeming paradox simply reflects the fact that yields in low-income countries are far lower, on average, than in richer countries and far lower than they could be if existing technologies and management practices were appropriately adapted and more widely adopted in low-income countries. Innovation aimed at increasing yields in developing countries could have significant impacts in terms of expanding agricultural production, increasing farm incomes and lowering food prices, thereby reducing poverty and enhancing food security by making food more affordable and accessible to both rural and urban populations.

The potential to improve labour productivity and yields can only be realized if family farmers are able to innovate. There are two main, but interrelated, pathways through which farmers' productivity may be increased: the development, adaptation and application of new technologies and farm management practices; and the wider application of existing technologies and practices. The first expands the potential for more productive use of existing resources by pushing out the production possibility frontier. The second allows farmers to achieve more of this potential.

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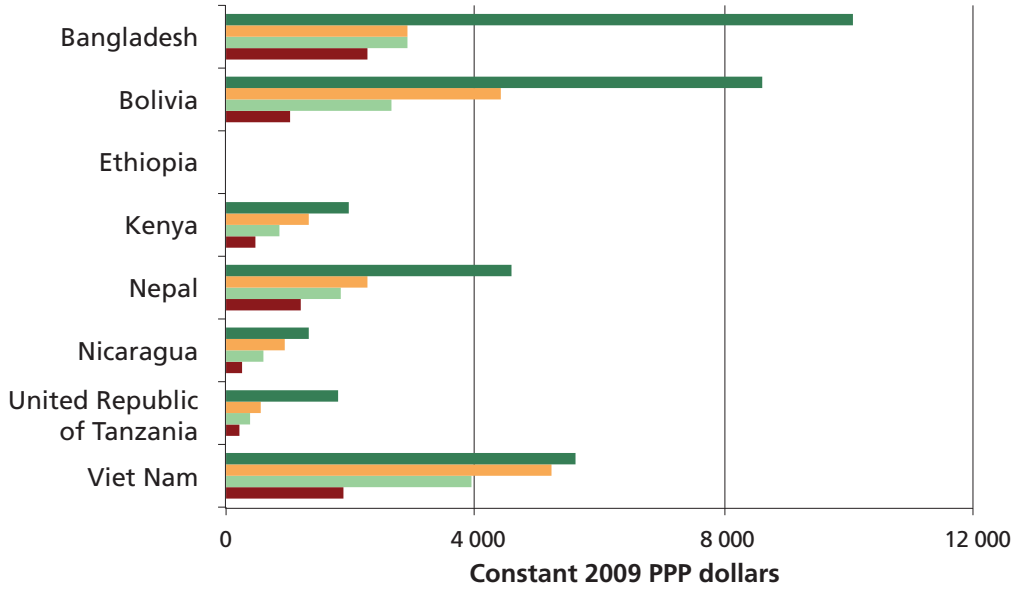
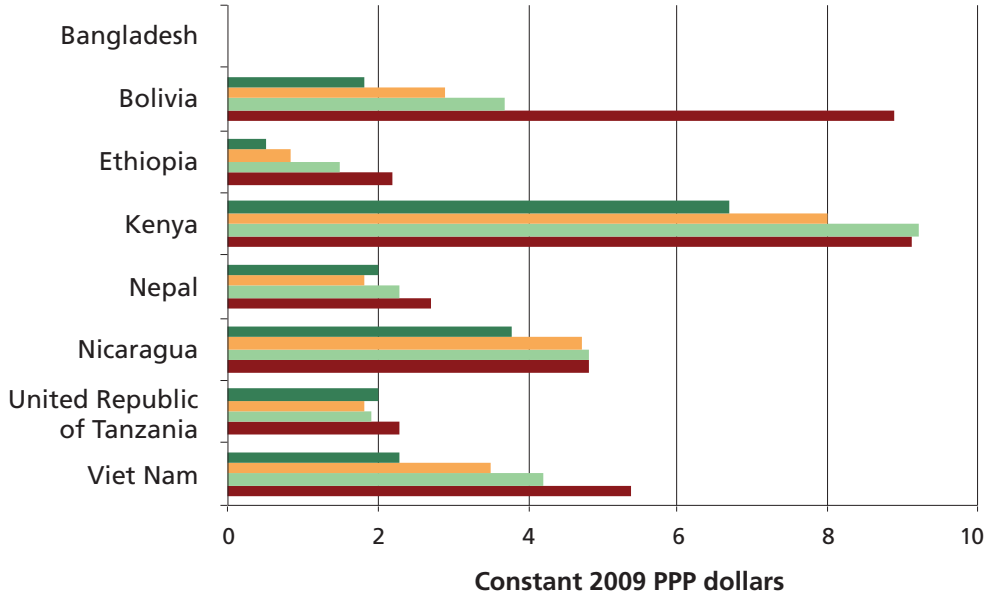
Land and labour productivity, by farm size

Value of agricultural production per hectare



Value of agricultural production per worker day



1st quartile | 2nd quartile | 3rd quartile | 4th quartile

Notes: Land productivity is measured as the value of agricultural production (constant 2009 PPP dollars) per hectare of agricultural land. Labour productivity is the value of agricultural production (constant 2009 PPP dollars) per worker day, with workers including a measure of hired labour as well as household labour for all countries except Viet Nam, where no information was available on hired labour. The estimates of labour productivity are more appropriate for analysis by farm size within each country, rather than for cross-country analysis, because the method for estimating labour days varies from one survey to the next, based on the data available.
Source: FAO.

Innovation systems for family farming

Innovation happens when individuals and groups adopt new ideas, technologies or processes that, when successful, spread through communities and societies. The process is complex, involving many actors, and it cannot function in a vacuum. It is furthered by the presence of an effective innovation system. Among other things, an agricultural innovation system includes the general enabling economic and institutional environment required by all farmers. Other key components are research and advisory services and effective agricultural producers' organizations. Innovation often builds on and adjusts local knowledge and traditional systems in combination with new sources of knowledge from formal research systems.

One fundamental driver for all innovators – including family farmers – is access to markets that reward their enterprise. Farmers with access to markets, including local markets, for their produce – whether it be food staples or cash crops – have a strong incentive to innovate. Technologies help farmers to enter the market by allowing them to produce marketable surpluses. Innovation and markets depend on, and reinforce, each other. However, investments in physical and institutional market infrastructure are essential to allow farmers to access markets both for their produce and for inputs. Efficient producers' organizations and cooperatives can also play a key role in helping farmers link to input and output markets.

Because family farms are so diverse in terms of size, access to markets and other characteristics, general policy prescriptions are unlikely to meet the needs of all of them. Public support for innovation should take into consideration the specific structure of family farming in each country and setting, as well as the policy objectives for the sector.

Some family farmers manage large commercial enterprises and require little from the public sector beyond agricultural research to ensure long-term production potential and the enabling environment and infrastructure that all farmers need to be productive, although they may require regulation, support and incentives to become more sustainable. Other, very small, family farms engage in markets primarily as net food buyers. They produce food as an essential part of their survival strategy, but they often face unfavourable policy environments and have inadequate means to make farming a commercially viable enterprise.

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Many such farmers supplement both income and nutrition from other parts of the landscape, through forests, pastures and fisheries and from off-farm employment. For these farmers, diversification and risk spreading through these and other livelihood strategies will be necessary. While agriculture and agricultural innovation can improve livelihoods, they are unlikely to be the primary means of lifting this group of farmers out of poverty. Helping such farmers escape poverty will require broad-based efforts, including overall rural development policies and effective social protection. In between these two extremes are the millions of small and medium-sized family farms that have the potential to become economically viable and environmentally sustainable enterprises. Many of these farms are not well integrated into effective innovation systems and lack the capacity or incentives to innovate.

Public efforts to promote innovation in agriculture for family farms must focus on providing inclusive research, advisory services, market institutions and infrastructure that the private sector is typically unable to provide. For example, applied agricultural research for crops, livestock species and management practices of importance to smallholders are public goods and should be a priority. A supportive environment for producer organizations and other community-based organizations can also help promote innovation among family farms.

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Promoting sustainable productivity on family farms

Demand for food is growing while land and water resources are becoming ever more scarce and degraded. Climate change will make these challenges yet more difficult. Over the coming decades, farmers need to produce significantly larger amounts of food, mostly on land already in production. The large gaps between actual and potential yields for major crops show that there is significant scope for increased production through productivity growth on family farms. This can be achieved by developing new technologies and practices or through overcoming barriers and constraints to the adaptation and adoption of existing technologies and practices. Overcoming poverty in low- and middle-income countries also means boosting labour productivity through innovation on family farms as well as providing farming families with other opportunities for employment.

It is not enough to produce more. If societies are to flourish in the long term, they must produce sustainably. The past paradigm of input-intensive production cannot meet the challenge. Productivity growth must be achieved through sustainable intensification. That means, inter alia, conserving, protecting and enhancing natural resources and ecosystems, improving the livelihoods and well-being of people and social groups and bolstering their resilience – especially to climate change and volatile markets.

The world must rely on family farms to grow the food it needs and to do so sustainably. For this to happen, family farmers must have the knowledge and economic and policy incentives they need to provide key environmental services, including watershed protection, biodiversity conservation and carbon sequestration.

Overcoming barriers to sustainable farming

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Smaller family farms tend to rely on tried and trusted methods because one wrong decision can jeopardize an entire growing season; but they readily adopt new technologies and practices that they perceive to be beneficial in their specific circumstances. Nevertheless, several obstacles often stand in the way of farmers adopting innovative practices that combine productivity increases with preservation and improvement of natural resources. Key impediments include the absence of physical and marketing infrastructure, financial and risk management instruments, and secure property rights.

Farmers often face high initial costs and long pay-off periods when making improvements. This can prove to be a prohibitive disincentive, especially in the absence of secure land rights and of access to financing and credit. Farmers are also unlikely to undertake costly activities and practices that generate public goods (such as environmental conservation) without compensation or local collective action. Furthermore, improved farm practices and technologies often only work well in the agro-ecological and social contexts for which they were designed, and if solutions are not adapted to local conditions, this can be a serious impediment to adoption.

Local institutions, such as producers' organizations, cooperatives and other community-based organizations, have a key role to play in overcoming some of these barriers. The effective functioning of local institutions and their coordination with the public and private sectors and with farmers themselves, both men and women, can determine whether or not small family farms can introduce innovative, sustainable improvements suited to their needs and local conditions.

Agricultural research and development – focusing on family farms

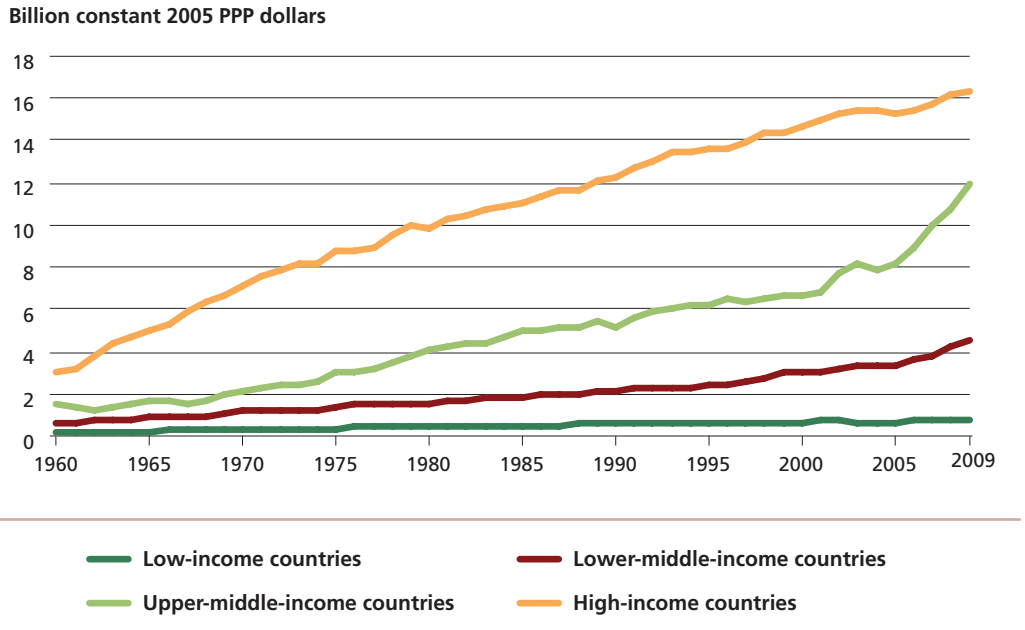
Investing in agricultural research and development (R&D) is important for boosting agricultural productivity, preserving the environment and eradicating poverty and hunger. A large body of evidence confirms that there are high returns to public investments in agricultural R&D. In many countries such investment is currently insufficient. Private-sector research is increasingly important, especially in high-income countries, but it cannot replace public research. Much agricultural research can be considered a public good, where the benefits of the knowledge generated cannot be appropriated by a private company and is therefore unlikely to attract the private sector. Returns to agricultural R&D often take a long time to materialize and, in addition, research is cumulative, with results building up over time. In this context, a continuous long-term public commitment to agricultural research is fundamental. Innovative forms of more short-term financing can help, but stable institutional funding is needed to maintain a core long-term research capacity.

All countries need a certain level of domestic research capacity because technologies and practices can rarely be imported without some adaptation to local agro-ecological conditions.

However, countries need to consider carefully what research strategy is best suited to their specific needs and capacities. Some countries, particularly those with too few funds to run strong national research programmes, may need to focus on adapting the results of international research to conditions at home. Others, with bigger research budgets, may also want to devote resources to more basic research. The establishment of international partnerships and a careful division of labour between international research with broader applications and national research geared to domestic needs is a priority. There is also scope for South–South cooperation between large countries with major public research programmes and countries with less national research capacity facing similar agro-ecological conditions.

Research that meets the needs of family farms in their specific agro-ecological and social conditions is essential. Combining farmer-led innovation and traditional knowledge with formal research can contribute to sustainable productivity. Involving family farmers in defining research agendas and engaging them in participatory research efforts can improve the relevance of research for them. This may include working closely with producers' organizations and creating incentives for researchers and research organizations to interact with family farms and their different members, including women and youth, and to undertake research tailored to their specific circumstances and needs.

Public expenditures on agricultural R&D, by income group



Note: Data exclude countries in Eastern Europe and the former Soviet Union.
Source: FAO.

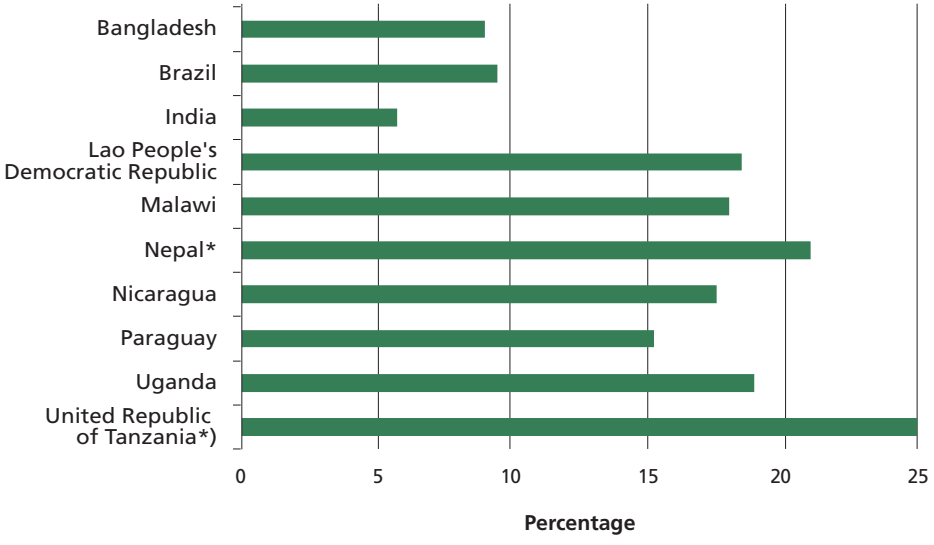
Promoting inclusive rural advisory services

While investments in agricultural R&D are needed in order to expand the potential for sustainable production, sharing knowledge about technologies and innovative practices among family farmers is perhaps even more important for closing existing gaps in agricultural productivity and sustainability between developing and developed countries. Agricultural extension and advisory services are critical for this challenge, but far too many farmers, and especially women, do not have regular access to such services. Modern extension features many different kinds of advisory services as well as service providers from the public, private and non-profit sectors. While there is no standard model for delivery of extension services, governments, private businesses, universities, NGOs, and producer organizations can play the role of service providers for different purposes and for different approaches. Strengthening the various types of service providers is an important component of promoting innovation.

Governments still have a strong role to play in the provision of agricultural advisory services. Like research, agricultural advisory services generate benefits for society that are greater than the value captured by individual farmers and commercial advisory service providers. These benefits – increased productivity, improved sustainability, lower food prices, poverty reduction, etc. – constitute public goods and call for the involvement of the public sector in the provision of agricultural advisory services. In particular, the public sector has a clear role in providing services to small family farms, especially in remote areas, who are unlikely to be reached by commercial service providers and who may have a strong need for neutral advice and information on suitable farming practices. Other areas include the provision of advisory services relating to more sustainable agricultural practices, or for climate change adaptation or mitigation through reduced greenhouse gas emissions or increased carbon sequestration. The public sector is also responsible for ensuring that the advisory services provided by the private sector and civil society are technically sound and socially and economically appropriate.

For rural advisory services to be relevant and have the necessary impact, the needs of different types of family farms as well as different household members in farming families need to be addressed. Engaging women and youth effectively and ensuring that they have access to advisory services that take into account their needs and constraints are central to ensuring effectiveness. Participatory approaches, e.g. farmer field schools in which farmers learn from other farmers, peer-learning mechanisms and knowledge-sharing activities, provide effective means for achieving these aims. More information and evidence is needed on experiences with different extension models and their effectiveness. Efforts to gather and share such information should be promoted at the national and international levels.

Share of farms accessing information through agricultural extension, most recent year



Note: *For Nepal and the United Republic of Tanzania, the share includes only farm households; non-household farm enterprises are excluded.
Source: FAO.

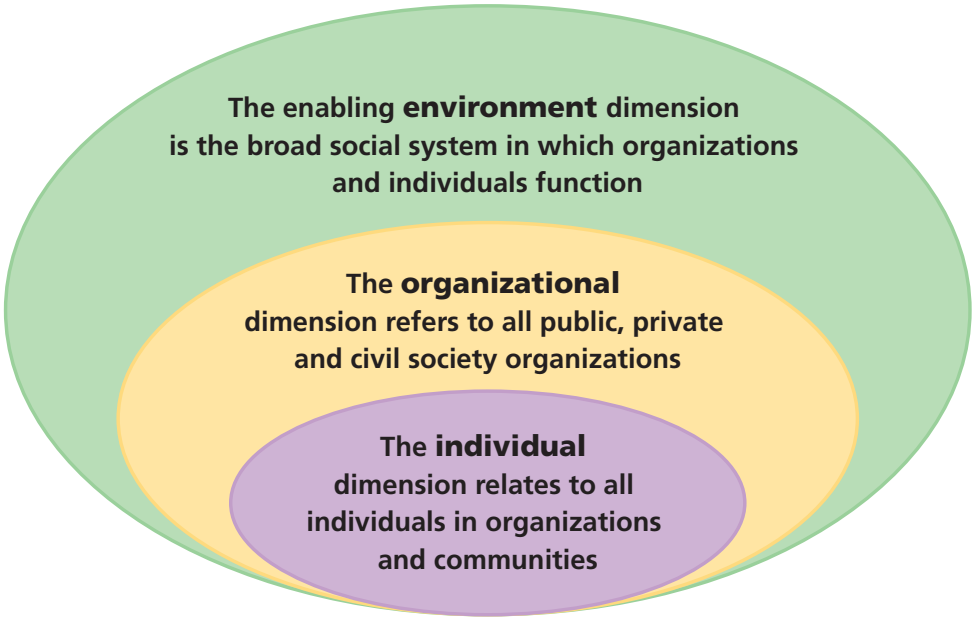
Developing capacity for innovation in family farming

Innovation presupposes a capacity to innovate at the individual, collective, national and international levels. The skills and capacities of individuals involved in all aspects of the agricultural innovation system – farmers, extension service providers, researchers, etc. – must be upgraded through education and training at all levels. Special attention needs to be given to women and girls based on their needs and roles in agriculture and rural livelihood strategies. A further focus must also be on youth in general, who tend to have a greater inclination to innovate than elder farmers and represent the future of agriculture. If youth perceive agriculture as a potential profession with scope for innovation, this can have major positive implications for the prospects for the sector.

Collective innovation capacity depends on effective networks and partnerships among the individuals and groups within the system. Producers' organizations and cooperatives are of particular importance. Strong, effective and inclusive organizations can facilitate the access of family farms to markets for inputs and outputs, to technologies and to financial services such as credit. They can serve as a vehicle for closer cooperation with national research institutes; provide extension and advisory services to their members; act as intermediaries between individual family farms and different information providers; and help small farmers gain a voice in policy-making to counter the often prevailing influence of larger, more powerful interests. Furthermore, family farmers who depend on other resources, such as forests, pastures and fisheries can benefit by linking with producer organizations within these sectors. Linking producer organizations across these sectors can further strengthen the case for clear tenure rights and better coordination between policies and service providers.

At national and international levels, the right environment and incentives for innovation are created by good governance and sound economic policies, secure property rights, market and other infrastructure, and a conducive regulatory framework. Governments must support the development of effective and representative producers' organizations and ensure that they participate in policy-making processes.

Capacity development at different levels



Source: FAO.

Key messages of the report

Family farms are part of the solution for achieving food security and sustainable rural development; the world's food security and environmental sustainability depend on the more than 500 million family farms that form the backbone of agriculture in most countries. Family farms represent more than nine out of ten farms in the world and can serve as a catalyst for sustained rural development. They are the stewards of the world's agricultural resources and the source of more than 80 percent of the world's food supply, but many of them are poor and food-insecure themselves. Innovation in family farming is urgently needed to lift farmers out of poverty and help the world achieve food security and sustainable agriculture.

Family farms are an extremely diverse group, and innovation systems must take this diversity into account. Innovation strategies for all family farms must consider their agro-ecological and socio-economic conditions and government policy objectives for the sector. Public efforts to promote agricultural innovation for small and medium-sized family farms should ensure that agricultural research, advisory services, market institutions and infrastructure are inclusive. Applied agricultural research for crops, livestock species and management practices of importance to these farms are public goods and should be a priority. A supportive environment for producers' and other community-based organizations can help promote innovation, through which small and medium-sized family farms could transform world agriculture.

The challenges facing agriculture and the institutional environment for agricultural innovation are far more complex than ever before; the world must create an innovation system that embraces this complexity. Agricultural innovation strategies must now focus not just on increasing yields but also on a more complex set of objectives, including preserving natural resources and raising rural incomes. They must also take into account today's complex policy and institutional environment for agriculture and the more pluralistic set of actors engaged in decision-making. An innovation system that facilitates and coordinates the activities of all stakeholders is essential.

Public investment in agricultural R&D and extension and advisory services should be increased and refocused to emphasize sustainable intensification and closing yield and labour productivity gaps. Agricultural research and advisory services generate public goods – productivity, improved sustainability, lower food prices, poverty reduction, etc. – calling for strong government involvement. R&D should focus on sustainable intensification, continuing to expand the production frontier but in sustainable ways, working at the system level and incorporating traditional knowledge. Extension and advisory services should focus on closing yield gaps and raising the labour productivity of small and medium-sized farmers. Partnering with producers' organizations can help ensure that R&D and extension services are inclusive and responsive to farmers' needs.

All family farmers need an enabling environment for innovation, including good governance, stable macroeconomic conditions, transparent legal and regulatory regimes, secure property rights, risk management tools and market infrastructure. Improved access to local or wider markets for inputs and outputs, including through government procurement from family farmers, can provide strong incentives for innovation, but farmers in remote areas and marginalized groups often face severe barriers. In addition, sustainable agricultural practices often have high start-up costs and long pay-off periods and farmers may need appropriate incentives to provide important environmental services. Effective local institutions, including farmers' organizations, combined with social protection programmes, can help overcome these barriers.

Capacity to innovate in family farming must be promoted at multiple levels. Individual innovation capacity must be developed through investment in education and training. Incentives are needed for the creation of networks and linkages that enable different actors in the innovation system – farmers, researchers, advisory service providers, value chain participants, etc. – to share information and work towards common objectives.

Effective and inclusive producers' organizations can support innovation by their members. Producers' organizations can assist their members in accessing markets and linking with other actors in the innovation system. They can also help family farms have a voice in policy-making.

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