

GAAP

Gender, Agriculture, & Assets Project

Led by IFPRI & ILRI

Edited by Agnes Quisumbing, Ruth Meinzen-Dick, Jemimah Njuki, and Nancy Johnson



GENDER, AGRICULTURE, AND ASSETS

Learning from Eight Agricultural Development Interventions in Africa and South Asia



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International Food Policy Research Institute
2033 K Street, NW
Washington, DC 20006-1002, USA
Telephone: +1-202-862-5600
www.ifpri.org

Project Manager: John Whitehead
Proofreaders: Pat Fowlkes and Sandra Yin
Cover design and book design: David Popham
Book layout: David Wu, DW Design

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Gender, Assets, and Agricultural Development Programs: A Conceptual Framework

Ruth Meinzen-Dick, Nancy Johnson, Agnes Quisumbing, Jemimah Njuki, Julia Behrman, Deborah Rubin, Amber Peterman, and Elizabeth Waithanji

ACCESS TO, CONTROL OVER, AND OWNERSHIP OF ASSETS ARE CRITICAL COMPONENTS OF WELL-BEING.

Assets can be used to generate income, as collateral for access to credit, and as stores of wealth. They can also be used to cope with shocks such as natural disasters or family health crises. Assets can also increase social status.

However, assets are unequally distributed, both between rich and poor and between men and women (Deere and Doss 2006). Asset distribution within the household influences individuals' bargaining power in the household, which in turn affects household and individual well-being, as reflected in food security, nutrition, and education.

This brief explores the potential linkages among gender, assets, and agricultural development projects in order to gain a better understanding of how agricultural development interventions are likely to impact the gendered distribution of assets.

ASSETS, INEQUALITIES, AND THE GENDER-ASSET GAP

Households and individuals can hold a range of tangible and intangible assets: (1) natural resource capital (land, water, trees), (2) physical capital (houses and vehicles), (3) human capital (education, knowledge, skills), (4) financial capital (savings, credit), (5) social capital (membership in organizations or groups), and (6) political capital (citizenship and participation). These assets provide means for people to earn a living, give individuals the capability to act (agency), and give meaning to people's lives (Bebbington 1999).

Men and women own and control different types of assets. This situation is recognized by the collective model of household decisionmaking, which allows for differences of opinion among household members regarding economic and other decisions. Unlike the unitary model that assumes that households are groups of individuals with the same preferences who fully pool their resources, the collective model acknowledges that when there is disagreement within a household, its resolution may depend on the bargaining power of individual household members. Sociocultural context and intra-household allocation rules determine who within the household has access to a particular resource and for what purpose.

GAAP CONCEPTUAL FRAMEWORK

The Gender, Agriculture, and Assets Project (GAAP) Conceptual Framework is an attempt to outline the pathways through which assets influence men's and women's participation in development programs and the way these programs impact men's and women's assets (Figure 1).

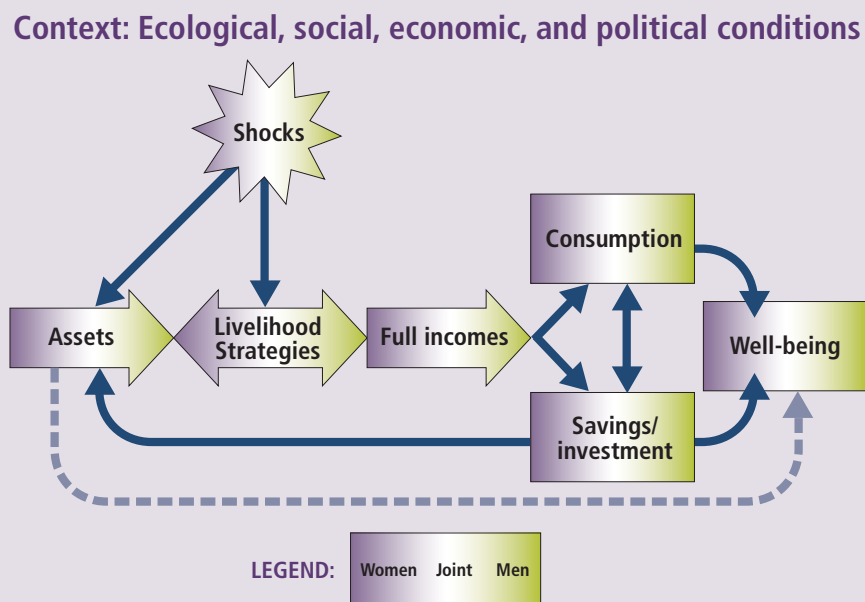
The GAAP framework shows the strong link between assets and well-being and the way gender relations influence the different ways men and women experience constraints and opportunities when building their asset stock. Each component below is shaded to remind readers that women and men often have separate assets and activities but that households can also have *joint* assets and activities.

The framework includes the following elements:

Context: Ecological, social, economic, and political conditions affect men and women differently. For example, in the environmental context, low rainfall may prove a greater constraint to women if they do not have irrigated fields and men do.

Assets: Access to and control over assets are key determinants of individual agency. Within a household some assets are held or used by women, some by men, and some jointly.

FIGURE 1 Schematic representation of a gendered livelihoods conceptual framework



Source: Authors.

Livelihood Strategies: Individuals and households make decisions about how to invest in their assets to generate expected returns (income, food, and so on). These strategies depend heavily on contextual factors and on what assets are available. Within a household, men and women sometimes pursue different livelihood strategies and sometimes pursue joint livelihood strategies such as family farms or family businesses. In carrying out livelihood strategies some assets can be built or enhanced, as represented by the reverse arrow from “Livelihood Strategies” to “Assets” in Figure 1.

Shocks: Negative and positive shocks can be caused by weather, disease, conflicts, thefts, or even policy changes. Some shocks are specific to a household (the death of an income earner), some to individuals (divorce or abandonment), and still others affect entire regions. Men and women experience shocks differently depending on their roles and responsibilities. For example, human diseases are likely to have a disproportionately large effect on women, as women are often not only affected by their own illness and typically lower access to healthcare but are also responsible for caring for other sick family members. Men and women frequently have different abilities to withstand shocks, and their assets are often used differently to respond to shocks.

Full Incomes: Full income is the total value of products and services produced by the household members, some of which are consumed and others of which are traded or sold.

Household members differ in their contributions to household income and in their control over how that income is used. Often men and women spend money differently, with women spending a higher proportion of income they control on food, healthcare, and their children’s education.

Consumption & Savings: Savings are the balance of income that is not consumed. Both saving and consuming can affect asset accumulation or loss. If savings are used to buy land, those savings increase physical capital. Consumption of nutritious food, clean water, or adequate shelter contributes to human capital. Women’s, men’s, and joint income can be used for different types of investment. Even when a country legally allows women to own land, if most land in that country is held under a customary tenure regime where men dominate decisions, then women will be effectively excluded from this avenue of asset accumulation. In this case they are unable to invest in the same asset as men.

Well-Being: Measures of well-being range from those associated with consumption (education, food security) to those that are less tangible (self-esteem, empowerment, and status). Assets positively impact well-being by (1) increasing status and empowerment through asset ownership, (2) enabling different household members to pursue various livelihood strategies, (3) providing a buffer against shocks, and (4) strengthening household members’ positions in the household and the broader community.

The above framework leads to three gender-specific hypotheses:

1. Different types of assets enable different livelihood strategies, with a greater stock and diversity of assets being associated with more diverse livelihoods and better well-being outcomes.
2. Men and women use different types of assets to cope with different types of shocks.
3. Interventions that increase men's and women's stock of a particular asset improve the bargaining power of the individuals who control that asset.

GENDER, ASSETS, AND AGRICULTURAL DEVELOPMENT

To improve livelihood strategies, access to an asset such as land may be sufficient, but access alone is often not secure: control over assets will be important. The framework ultimately demonstrates why focusing on cash income (as many development interventions do) may not lead to a direct or even necessarily a positive effect on key development outcomes.

This framework can be used to inform the design and implementation of a range of policy and programmatic interventions. The eight projects that participated in GAAP used this framework to evaluate their projects' impact, working with researchers from IFPRI and ILRI and using both quantitative and qualitative methods.

The participating projects can be grouped into three broad categories:

- ▶ **Programs to increase the stock of agricultural assets and remove gender-specific barriers to building those assets.** Some programs attempt to stimulate agricultural productivity through asset transfers: land redistribution, irrigation development, providing livestock, and strengthening women's groups are all examples of this. Who controls those assets will be determined by how the program assigns rights and whether those rights can be defended against other competing claims. The intervention's impact on food production, income, or both will depend on who uses the assets in which livelihood strategy, which will depend on gender roles.
- ▶ **Interventions to increase returns to assets by strengthening market linkages.** Many agricultural value chain programs implemented by governments and non-governmental organizations aim to expand markets by linking smallholders to high-value markets. These programs could include building infrastructure, investment

in information and technology, or both. Participation in value chains is also gendered. Many factors influence who produces the product targeted by the value chain and who markets and who controls income from selling that product: the product type, market type, and location. Sometimes market access depends on other assets such as vehicles or communications equipment. Targeting women alone for market-oriented agricultural interventions may backfire; as women's enterprises increase in value, men may appropriate them. Working with both men and women and with multiple enterprises may secure women's participation and control over income by ensuring that men also benefit.

- ▶ **Innovations to reduce risk.** A growing number of agricultural development programs seek to address shocks, often through insurance, and these programs most often target men. Program designers should consider whether asset ownership is required to participate and whether these programs help to protect the assets of both men and women. For example, traditional crop insurance programs can protect only landholders, even though agricultural laborers suffer loss of employment when crops fail.

IMPLICATIONS FOR AGRICULTURAL PROGRAMS

This conceptual framework offers a starting point for examining how gender and assets influence household and individual well-being. It highlights how income is allocated between consumption and savings/investment, affecting the welfare of household members—both men and women—and asset accumulation or loss. The framework demonstrates that each component is gendered, allowing for men and women to have different assets, livelihood strategies, shocks, income, and consumption and investment. It also demonstrates how each of those elements can be at least partially shared within the household.

While we still need stronger evidence of how programs can reduce the gender asset gap, this framework can help practitioners understand these programs' impacts on key outcomes. Program designers and implementers can use the GAAP framework to examine how their interventions are gendered and likely to influence outcomes and long-term asset accumulation. The notes presented in this collection summarize the results of the partner projects that constitute the Gender, Agriculture, and Assets Project. Lessons learned from these eight projects show what project designers and practitioners can learn by applying a gender and assets lens to evaluating their agricultural development projects' impact on men's and women's assets, livelihoods, and well-being.

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Ruth Meinzen-Dick (r.meinzen-dick@cgiar.org) is a senior research fellow in the Environment and Production Technology Division of the International Food Policy Research Institute (IFPRI), Washington, DC. **Nancy Johnson** (n.johnson@cgiar.org) is a senior research fellow for the CGIAR Research Program on Agriculture for Nutrition and Health at IFPRI, Washington, DC. **Agnes Quisumbing** (a.quisumbing@cgiar.org) is a senior research fellow in the Poverty, Health, and Nutrition Division of IFPRI, Washington, DC. **Jemimah Njuki** (jemimah.njuki@gmail.com) was team leader for the poverty, gender and impact team at the International Livestock Research Institute (ILRI), Nairobi. She is currently senior program officer, Cultivate Africa's Future, at the International Development Research Centre, Nairobi. **Julia Behrman** (julia.behrman@gmail.com) was a research analyst in the Poverty, Health, and Nutrition Division of IFPRI, Washington, DC. She is currently a PhD candidate in sociology at New York University. **Deborah Rubin** (drubin@culturalpractice.com) is the co-director of Cultural Practice LLC, Bethesda, MD, US. **Amber Peterman** (amberpeterman@gmail.com) was a research fellow in the Poverty, Health, and Nutrition Division of IFPRI, Washington, DC. She is currently an independent consultant in Seattle. **Elizabeth Waithanji** (E.waithanji@cgiar.org) is a postdoctoral scientist at ILRI, Nairobi.

The Gender, Agriculture, and Assets Project (GAAP) aims to promote women's ownership and control of productive assets in developing countries by evaluating how well agricultural development projects improve men's and women's access to assets and identifying ways to reduce gender gaps. GAAP is jointly led by the International Food Policy Research Institute and the International Livestock Research Institute and receives funding from the Bill & Melinda Gates Foundation for 2010–2014. For further information on GAAP, see gaap.ifpri.info.

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Land

Can Microplots Contribute to Rural Households' Food Security? Evaluation of a Gender-Sensitive Land Allocation Program in West Bengal, India... **11**

Florence Santos, Diana Fletschner, Vivien Savath, and Amber Peterman

Can Microplots Contribute to Rural Households' Food Security? Evaluation of a Gender-Sensitive Land Allocation Program in West Bengal, India

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LANDESA SUPPORTS A MICRO-LAND OWNERSHIP PROGRAM FOR INDIA'S LANDLESS AGRICULTURAL LABORERS that strives to reduce poverty through improved homestead development in the state of West Bengal, India.

The program works through the state government and local communities to purchase and allocate small plots of land; this includes the granting of land titles, with an emphasis on joint titling in households with married couples. The program also provides assistance with housing and basic inputs and capacity building in homestead food production and promotes local development through investment in infrastructure.

Despite India's rapid economic gains over the last two decades, as much as one third of its population lives on less than \$1.25 a day (purchasing power parity) (World Bank 2010). Moreover, a large part of its population continues to suffer from hunger and malnutrition despite the unprecedented availability of high-quality food products. In 2013, India was estimated to have the largest number of malnourished children in the world (India, Planning Commission 2013).

For many households, having secure access to a small plot of land on which to live, grow a vegetable garden, plant trees, raise livestock, and perhaps run a small business could mean stable access to more food and to a more nutritious diet. Many of the rural poor, however, work as agricultural laborers and have no land of their own. In total, some 20 million rural households are landless, even though agriculture is their main livelihood (Landesa 2011).

This study evaluates one Indian program designed to reduce poverty by providing land and land titles to those without them. The evaluation is the result of collaboration between Landesa, a nongovernmental organization focused on land legislation and programming among poor populations, and the Gender, Agriculture, and Assets Project (GAAP). The

research examines how land ownership and joint titling affect households' tenure security, agricultural investments, and food security and women's involvement in food and agricultural decisionmaking—outcomes that when enhanced are expected to lead to increased household food production and long-term food security.

INTERVENTION AND STUDY SITE

West Bengal is widely recognized as one of the most progressive states in India in its commitment to giving land to agricultural laborers. Such "land-to-the-tiller" reforms are particularly urgent in this state, where the problem of hunger was rated as "alarming" by the International Food Policy Research Institute's 2008 India State Hunger Index. The state government addressed the hunger problem in 2006 by establishing a microplot allocation program to provide agricultural laborer households that are landless with a plot between 0.04 and 0.06 of a hectare in size for shelter and small-scale agriculture.

The Nijo Griha, Nijo Bhumi—"My Home, My Land"—program (NGNB), which is the immediate successor to a related homestead allocation program launched

in 2006 known as the Cultivation and Dwelling Plot Allotment Scheme, is based on the belief that a small plot of land, if of sufficient quality, can, with appropriate support, sustain a household by providing it with both shelter and a means to meet its basic food needs. These plots are expected to enhance households' ability to access government services, agricultural inputs, and financial resources, thereby enhancing income, reducing vulnerability, and improving food security.

Recognizing the pervasive additional constraints that women often face in accessing economic resources and the key role women can play in their households' well-being, the NGNB program gives priority to female-headed households and widows and explicitly stipulates that land titles issued to households with both male and female adults should be jointly titled to the primary male and female (West Bengal, Land & Land Reforms Department 2006). Landesa has provided technical support since 2009 to West Bengal's Land & Land Reforms Department in piloting changes to the NGNB program, identifying best practices, and scaling it up to reach 100,000 households.

STUDY OBJECTIVES

Using mixed method data collected between 2010 and 2012, the resulting study assesses the NGNB's impact on outcomes such as households' tenure security and agricultural investments and women's involvement in food and agriculture decisionmaking.

OVERVIEW OF METHODOLOGY AND DATA COLLECTION

The study is based on analysis of quantitative and qualitative data. Quantitative data was gathered from 1,373 households from three districts (Coochbehar, Bankura, and Jalpaiguri) that were surveyed twice, first in 2010 or 2011 to form a baseline and then again in 2012. The sample includes 803 beneficiary households that, at the time of the baseline survey, had received their homestead plots and obtained their land titles but had not yet moved to their new plots, plus 570 households that made it to the list of NGNB-eligible households but were not selected as beneficiaries of the program and can therefore act as a control group.

Qualitative information was purposely gathered in a single district—Coochbehar—to gain an in-depth perspective on a specific locality. This information was collected in 2012 by relying on three complementary tools: 12 key informant interviews with village-, block-, and district-level officials responsible for implementing the program; 11 life-history interviews with program beneficiaries; and 8 focus group discussions with beneficiaries and with eligible non-beneficiaries.

RESULTS

Even after a relatively short period of time, the NGNB program shows very encouraging results: respondents perceive NGNB plots as more secure; NGNB beneficiary households are more likely to access credit for agriculture and to invest in agricultural improvements; and women in NGNB beneficiary households are more likely to participate in food and agricultural decisions. Some notable examples of these NGNB benefits are as follows:

- ▶ Women in NGNB-beneficiary households are 8 percent less likely to report being concerned about having to vacate their plots compared to women in non-NGNB households and 18 percent more likely to report that they expected their households to have retained access to and control over their plots five years later compared to women in non-NGNB households.
- ▶ The average NGNB household is 12 percent more likely than a non-NGNB household to report having taken out a loan from a formal bank since 2009 and 88 percent more likely to use a loan for agricultural purposes.
- ▶ During the year before the survey, NGNB households were 11 percent more likely to have used fertilizer or pesticides; 11 percent more likely to have used seedlings, seeds, or stems; and 7 percent more likely to have hired tools, machines, or other agricultural equipment than eligible households that did not become NGNB beneficiaries.
- ▶ Compared to their non-NGNB peers, women in NGNB households are 12 percent more likely to be involved in decisions to take loans from a Self-Help Group or microfinance institution, 12 percent more likely to be involved in decisions on whether to purchase productive assets; and 9 percent more likely to be involved in decisions related to purchasing and consuming food. Further, the share of the household land where they are involved in decisions on how to use the land, what to grow on it, and whether to sell produce from it increased by 15 percent, 14 percent, and 11 percent, respectively.

Two results are of particular relevance to those involved in designing, funding, and implementing land allocation programs. First, the tenure-security benefits associated with the NGNB program and the increased use of fertilizers, pesticides, seedlings, seeds, or stems by beneficiary households varies by plot size. On average, respondents perceived NGNB plots as more secure than non-NGNB plots; however, the perceived tenure security varies by plot size. While tenure security is nearly equal between NGNB and non-NGNB plots when plots are 0.004–0.008 hectares (or the Indian land unit of 1-2 decimals), NGNB beneficiaries who received plots of 0.04 hectares (or 10 decimals) can experi-

ence between a 10 percent and 30 percent improvement in their perceptions of tenure security. Similarly, our results predict a 10 percent increase in households' investments in fertilizers, pesticides, seedlings, seeds, or grafted stems if the NGNB plot is of 0.04 hectares in size but almost no increase for NGNB plots that are between 0.004–0.008 hectares in size.

Second, including women's names on the land titles has additional benefits for NGNB households: it significantly contributes to women's perceptions of increased tenure security and to women's involvement in food and agriculture decisionmaking. Tenure security outcomes improve up to 10 percent among beneficiaries when women's names are included on the land documents. Additionally, when their names are on the land titles, NGNB-beneficiary women are 14 percent, 15 percent, and 13 percent more likely to participate in decisions about taking loans, purchasing productive assets, and purchasing and consuming food, respectively. Finally, NGNB women with land documents under their names have a say over a larger share of their households' land when it comes to decisions on how to use the land, what to grow on it, and whether or not to sell the produce from it.

Despite NGNB's noteworthy impact on outcomes that can contribute to future food security, we cannot identify statistically significant NGNB effects on households' current food security. On average, NGNB-eligible households are just as likely to be food secure regardless of whether they became program beneficiaries. We repeated the analysis to explore whether the program had an effect on the diversity of their diet, their consumption of proteins, and how food was allocated within the household. However, there was no statistical difference in any of these cases.

These results can be explained in two ways. First, the qualitative research highlighted that the plots allocated under the program were often of marginal quality, so many beneficiaries recounted the need to amend their soil and infill and level their new plots before the yard was cultivable. Second, not enough beneficiary households had moved to their new plots: NGNB's expected effects are predicated on households relocating to the plot and cultivating a backyard garden; however, only 25 percent of the beneficiaries in the survey sample had moved.



Diana Fletschner/Landesa

CONCLUSION AND POLICY IMPLICATIONS

The study findings suggest the following conclusions:

1. Homestead development programs can lay the foundation for long-term food security.
2. While microplots can enhance livelihoods, their potential benefits increase with the size of the plot and might be negligible if the plots are too small.
3. Beneficiaries' own investments in agriculture show significant upward trends as plot size increases.
4. Including women's names on the land documents can have the additional impact of improving women's tenure security and their ability to influence household decisions.
5. Homestead development programs should proactively address concurrent financial constraints or lack of available housing to enable households to fully benefit from and leverage the allocated plots.

As public and civil society actors in India continue to grapple with food security challenges, they must recognize and embrace the fact that these problems are complex and that addressing them requires integrated gender-sensitive approaches that, at a minimum, combine stronger land rights with adequate access to financial services, housing, extension services, and infrastructure support. A one-time, integrated, and well-executed homestead allocation and development program can lay the foundation for household and individual food security.

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Florence Santos (florences@landesa.org) is a research and evaluation specialist at Landesa, Seattle. *Diana Fletschner* (dianaf@landesa.org) is a senior gender expert and director of research at Landesa, Seattle. *Vivien Savath* (viviens@landesa.org) is a research and evaluation specialist at Landesa, Seattle. *Amber Peterman* (amberpeterman@gmail.com) was a research fellow in the Poverty, Health, and Nutrition Division of the International Food Policy Research Institute, Washington, DC. She is currently an independent consultant in Seattle.

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Livestock

How Do Intrahousehold Dynamics Change When Assets Are Transferred to Women? Evidence from BRAC’s “Targeting the Ultra Poor” Program in Bangladesh 17

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BRAC'S CHALLENGING THE FRONTIERS OF POVERTY REDUCTION TARGETING THE ULTRA POOR (CFPR-TUP) PROGRAM aims to assist the ultra poor in rural Bangladesh to rise out of extreme poverty and access mainstream development programming. CFPR-TUP Phase 2—the focus of the Gender, Agriculture, and Assets Project's study—operated from 2007 to 2011 in the poorest regions of Bangladesh. The program provided female members of ultra poor households with assets that could be maintained at home (primarily livestock such as cattle, goats, and poultry birds), as well as intensive training on how to use the assets for income-generating activities. Training subject matter included management practices and how to use improved technology.

Many development interventions transfer resources to households to reduce poverty. Given that individuals within households may not share identical preferences or pool resources, understanding the intrahousehold dynamics associated with resource transfers is important. Recent literature shows that women's control over resources—assets, in particular—may have important implications, including greater intrahousehold bargaining power for women and improvements in children's education, health, and nutrition. These findings have stimulated interest in targeting women for transfers of assets or other resources.

In Bangladesh, very poor households often lack both physical assets and skills. Sociocultural norms that favor female seclusion lead women to typically work within the homestead, while men work outside the home. Moreover, ultra poor households are often socially excluded and frequently do not qualify for group-based microfinance programs. In 2002, BRAC-Bangladesh initiated the Challenging the Frontiers of Poverty Reduction Targeting the Ultra Poor (CFPR-TUP) program, which is intended to assist ultra poor households by providing women with training and assets that could be maintained within the homestead.

Evidence shows CFPR-TUP caused significant improvements in household-level well-being (Bandiera et al. 2013; Krishna, Poghosyan, and Das 2012). However, little evidence exists on this program's—or any other targeted asset transfer's—intrahousehold implications. BRAC collaborated with the Gender, Agriculture, and Assets Project (GAAP) on a mixed-methods evaluation of CFPR-TUP that focused on intrahousehold impacts, including control over assets and roles in decisionmaking.

INTERVENTION AND STUDY SITE

The GAAP study drew on Phase 2 of CFPR-TUP, which ran from 2007 to 2011. Phase 2 was rolled out using an experimental design, allowing for rigorous evaluation of program impacts.

Analysis focused on the "Specially Targeted Ultra Poor" (STUP) package in Phase 2. STUP was allocated using a cluster-randomized control design. In each subdistrict with at least two branch offices, one branch office was randomly assigned to "treatment" and the other to "control." Eligible poor households were chosen in both treatment and

control areas, using community targeting and verification visits. In treatment areas, eligible households were selected as CFPR-TUP beneficiaries.

Women in beneficiary households received the following types of support from BRAC during Phase 2 of CFPR-TUP:

1. One or more productive assets (for example, cows, goats, chicken, ducks, or seeds) for income-generating activities on the homestead
2. Training on using the productive assets for income-generating activities
3. A small subsistence allowance
4. Close supervision from program staff

While the program designated women as responsible for maintaining the assets, its focus was on the household as an aggregate unit. No requirements were specified for women's role in making decisions related to the assets (for example, selling or renting them or using generated income).

STUDY OBJECTIVES

The GAAP study's aim was to explore how CFPR-TUP affected intrahousehold dynamics in beneficiary households, including men's and women's ownership of and control over various assets (the transferred asset, as well as other assets) and roles in intrahousehold decisionmaking. It also aimed to understand men's and women's perceptions of these changes.

OVERVIEW OF METHODOLOGY AND DATA COLLECTION

The study included quantitative and qualitative elements. The quantitative assessment of CFPR-TUP's impacts on beneficiary households drew on the program's experimental design. As part of previous research, BRAC's Research and Evaluation Division (RED) had collected—in 2007 (baseline), 2009, and 2011—socioeconomic and health data on a large sample of eligible households across treatment and control areas. In 2012, RED partnered with GAAP to collect an additional round of data on the same households, this time regarding intrahousehold dynamics. Modules covered gender-disaggregated asset ownership and control, as well as decisionmaking. Of the 7,953 households interviewed in 2007, 6,066 households were successfully re-interviewed in the 2012 follow-up round. For impact evaluation, it was assumed that because the CFPR-TUP's treatment was randomly assigned, intrahousehold dynamics were very similar across treatment and control groups prior to the program. Therefore, with adjustments made for attrition, the 2012 round of data could be used to estimate CFPR-TUP's causal impacts on intrahousehold dynamics.

The qualitative assessment was based on focus group discussions (FGDs) and in-depth interviews conducted in March–April 2011. Fifteen FGDs were conducted across treatment and control areas. The FGDs consisted of groups of women project participants, groups of project participants' male spouses, and groups of non-beneficiary women. In-depth interviews were conducted with participants from treatment branch offices. The qualitative work served two purposes. First, it informed the development of instruments for the 2012 quantitative survey. Second, it revealed norms on gendered patterns of asset ownership, as well as beneficiary perceptions of project impacts (including impacts on control over assets and decisionmaking). Exploration of this second point allowed researchers to interpret the quantitative impacts in light of local context.

RESULTS

Analysis confirmed previous findings that CFPR-TUP significantly improved household-level well-being but showed new evidence of mixed effects on targeted women:

1. **CFPR-TUP significantly increased household ownership of livestock. The largest rise was in livestock owned by women (including cattle, typically thought to be "men's assets"), with corresponding increases in women's livestock control.**

Household ownership of livestock such as cattle, goats, and poultry significantly grew. While there was a rise in numbers of livestock owned solely by men, the largest increases were in livestock owned solely or jointly by women. This pattern included cattle, which sociocultural norms in Bangladesh tend to categorize as "men's assets." Women's voice in sole or joint decisionmaking relevant to livestock (for example, decisionmaking on buying or selling cattle) also increased.

These results, found in both quantitative and qualitative analysis, reflected that high-value livestock assets transferred to women remained in their ownership and control. This pattern represented one kind of transformation in gender roles.

2. **CFPR-TUP also increased household ownership of other assets. However, this rise generally translated into increased sole ownership by men. Women did experience increases in rights to use some assets, which they reported as increasing social capital.**

The program significantly increased household ownership of consumer durables, such as furniture, appliances, cooking instruments, and clothing. Women experienced increased access to these goods, and qualitative work indicated that access to consumer durables (such as suitable

clothing) positively influenced women's perceived social capital because they were no longer ashamed of their appearance. However, the rise in consumer durables generally translated into increased sole ownership by men.

Households' land ownership also grew significantly. This increase again translated into increased sole ownership of land by men. While women's rights to use homestead land and ponds rose slightly, the findings suggested that the program did not change the traditional norm of land being a "man's asset."

Similar patterns emerged for agricultural and non-agricultural productive assets (such as ploughs, choppers, bicycles, and rickshaws). Together, these results suggested that when beneficiary households mobilized resources to acquire new assets (as opposed to those CFPR-TUP directly transferred to them), these were typically owned solely by men.

3. CFPR-TUP shifted women's work inside the home and increased women's workloads, reducing their mobility. However, women reported preferring this outcome to the stigma of working outside the home. The program did not change the proportion of women working but caused more women to work inside the home and fewer to work outside the home. This pattern was consistent with the transferred assets (livestock) requiring maintenance at home. Qualitative research showed that women reported increased work hours, which, when combined with a shift to working inside the home, led to reduced mobility outside the home. However, qualitative research also indicated women preferred not to work outside the home, due to stigma.

4. CFPR-TUP decreased women's voice in a range of decisions. While their livestock ownership increased, women's decisionmaking power over their own income, purchases for themselves, and household budgeting were significantly reduced. These reductions in women's decisionmaking, taken together with increases in men's control over resources relative to women's, were consistent with theoretical models that relate individuals' bargaining power to relative resource control.

CONCLUSION AND POLICY IMPLICATIONS

This mixed-methods analysis of CFPR-TUP confirms previous findings that the program achieved its key aim of improving well-being at the household level but also presents new findings on mixed effects for targeted women. The program did significantly increase women's ownership and control of livestock, indicating transferred assets largely remained with women. This was the case even with cattle, which



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were typically considered "men's assets," suggesting a transformation in gender roles.

In most other tangible dimensions of asset ownership and decisionmaking, however, women tended not to benefit. Increases in household ownership of consumer durables, land, and productive assets translated into increased sole ownership by men, suggesting new assets acquired by beneficiary households were typically perceived as owned by men. Women's work shifted inside the home and their workload increased, both of which translated into reduced mobility. Women's decisionmaking power over their own income, purchases for themselves, and household budgeting were significantly reduced. These reductions in women's decisionmaking, taken together with overall increases in men's control over resources relative to women's, are consistent with theoretical models relating individuals' bargaining power to relative resource control.

However, taking into account "intangible" benefits explored in qualitative work reveals more favorable results for women. Women report increased social capital, confidence, and skills, in part from increased access to consumer durables. They acknowledge increased workload and reduced mobility, but nevertheless report that they prefer to work inside the home due to the stigma associated with working outside the home. Indeed, qualitative analysis reveals that women measure project impacts largely by their intangible rewards (such as self-esteem, a contribution to the household, satisfaction in children's well-being, and social capital), rather than individual rights or material gains.

As a whole, the analysis shows that asset transfers targeted to women can increase women's ownership and control over the transferred asset, but may not necessarily improve women's relative bargaining position in the household. It also reveals that outcomes valued by women may depend on sociocultural context and are not always tangible. This last point highlights the complexity of assessing whether interventions improve "women's empowerment."

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Narayan Das (narayan.cd@brac.net) is a research fellow in the Research and Evaluation Division of BRAC, Dhaka, Bangladesh and is currently a PhD candidate in the Department of Agriculture and Resource Economics of the University of California, Berkeley, US. **Rabeya Yasmin** (rabeya.y@brac.net) is director of the Ultra Poor Programme and Urban Street Children Programme of BRAC, Dhaka, Bangladesh. **Jinnat Ara** (jinnat.a@brac.net) is a senior research associate in the Research and Evaluation Division of BRAC, Dhaka, Bangladesh. **Md. Kamruzzaman** (kamruzzaman.m@brac.net) is a research associate in the Research and Evaluation Division of BRAC, Dhaka, Bangladesh. **Peter Davis** (p.r.davis@sdri.org.uk) is the coordinator of and a research fellow at the Social Development Research Initiative (SDRI), Bath, UK. **Agnes Quisumbing** (a.quisumbing@cgiar.org) is a senior research fellow in the Poverty, Health, and Nutrition Division of the International Food Policy Research Institute (IFPRI), Washington, DC. **Shalini Roy** (s.roy@cgiar.org) is a postdoctoral fellow in the Poverty, Health, and Nutrition Division of IFPRI, Washington, DC.

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Can Dairy Value Chain Projects Change Gender Norms in Rural Bangladesh? Impacts on Assets, Gender Norms, and Time Use

Agnes Quisumbing, Shalini D. Roy, Jemimah Njuki, Kakuly Tanvin, and Elizabeth Waithanji

THE GOAL OF CARE-BANGLADESH'S STRENGTHENING THE DAIRY VALUE CHAIN PROJECT (SDVCP) IS TO improve the dairy-related incomes of 35,000 households in northwest Bangladesh. To achieve its goal, SDVCP addresses the major challenges to improving smallholder participation in the value chain, namely farmer mobilization and education, access to markets for their milk, and access to productivity-enhancing inputs. The project assists in the formation of dairy farmer groups as well as increasing women's participation in the dairy value chain, particularly in such nontraditional occupations as milk collectors and livestock health workers. The SDVCP evaluation looks at how both tangible and intangible assets may have changed, particularly for women, as an outcome of the intervention.

In Bangladesh the number of women in the agricultural labor force is increasing, although strong cultural norms encourage women's seclusion and undervalue their productive and reproductive labor. Women and men in Bangladesh have very different roles and responsibilities within the agricultural sector, particularly in regard to livestock. Women have limited decisionmaking ability—especially when it comes to marketing and control over income—and own few assets. Within this context, the nongovernmental organization (NGO) CARE-Bangladesh implemented a five-year program to increase incomes for poor households along the dairy value chain and increase employment opportunities, especially for women.

When value chain projects target households, men and women do not necessarily benefit equally. Growing empirical evidence shows that (1) individual men and women in households do not always pool resources or share the same preferences, (2) women's participation in local markets is often constrained because of their lack of access to transportation and social norms prohibiting women from traveling outside the home (Hill and Vignieri, forthcoming), and (3) when commodities traditionally under the control of women become commercialized, women's control over the income earned from them is weakened (Njuki et al. 2011).

This study by the Gender, Agriculture, and Assets Project (GAAP) uses a mixed-methods approach to analyze the impact of CARE's dairy value chain project on gender norms surrounding ownership and control over assets, on decision-making regarding dairy-related activities and milk distribution, and on women's mobility and time use.

INTERVENTION AND STUDY SITE

From October 2007 to December 2012 CARE-Bangladesh implemented a dairy value chain project to increase the incomes of 35,000 smallholder and landless milk-producer households and to increase employment opportunities for extremely poor households—and especially for women in those households. This project, known as the Strengthening the Dairy Value Chain Project (SDVCP) was implemented with support from the Bill & Melinda Gates Foundation (BMGF) in nine districts in northwestern Bangladesh.

The project sought to (1) improve milk collection systems in rural and remote areas, (2) improve access to inputs, markets, and services by mobilizing groups of poor farmers, producers, and *char* dwellers, (3) improve the artificial insemination network, (4) ensure access to quality services at the

producer level, and (5) improve the policy environment in the dairy sector.¹

To accomplish these objectives the SDVCP took two steps. First, it linked producers with service providers and with milk-chilling plants, informal sector sweet makers, or both. Second, it documented and disseminated efficient techniques and best practices. The project also supported the creation of dairy farmer associations, primarily among poor women who are smallholder dairy farmers.

STUDY OBJECTIVES

A mixed-methods approach was used to analyze the SDVCP's impact on various gender outcomes. The study attempts to answer the following four questions:

1. Did the SDVCP increase asset ownership among men, women, or both? If so, ownership of which types of assets?
2. Did the program change gender norms regarding ownership and control of those assets?
3. Did households' participation in specific nodes of the dairy value chain change gender norms regarding decisionmaking within those nodes?
4. What were the tradeoffs and time costs involved in participation in this value chain project?

OVERVIEW OF METHODOLOGY AND DATA COLLECTION

CARE partnered with GAAP to undertake a study with both qualitative and quantitative components. The quantitative component compared data from beneficiary households and control groups to assess the project's outcomes for beneficiaries. The study drew from two sets of longitudinal survey data: a baseline survey conducted in 2008 and an endline survey conducted in 2012.

Both survey questionnaires—baseline and endline—collected information on land and assets, including landholding area and asset value and ownership. Respondents were asked about the number and kind of livestock they owned and their livestock and dairy care practices.

The qualitative component included focus group discussions (FGDs) in ten subdistricts in Rangpur and Bogra Districts. The groups were composed of beneficiaries purposively selected for the study. Eleven groups were interviewed, including seven groups of only women and four groups that

mixed women and men. The groups ranged from 14 to 30 participants. The FGD interview protocols consisted of three primary topic sections: (1) asset ownership, (2) access to resources, and (3) decisionmaking about dairy production and dairy-related income.

RESULTS

Impacts on Asset Ownership

While project participation did not appear to have changed the overall values of a household's asset portfolio, it did have significant impacts on particular assets' values. For example, the project increased the value of participant households' livestock assets. Because participant households owned cross-bred cattle that were more productive than other varieties, the cattle's value increased, even if the number of cattle owned did not. The project also increased agricultural and nonagricultural productive assets' value.

Land ownership did not significantly change. However, households expanded land under cultivation through renting and mortgaging. As a result, the amount of land in use increased over time in all treatment and control groups.

SDVCP participation increased the value of not only men's agricultural assets but also jointly held agricultural assets. The project did not have any impact on assets exclusively owned by women. However, given how skewed the distribution of assets was toward men, increases in jointly held assets were compelling evidence of a transition toward greater gender equity, even if joint ownership could not be equated to joint control over those assets.

Impacts on Women's Access to Credit, Mobility, and Human Capital

Participation in the SDVCP appeared to have reduced, relative to control groups, the proportion of participant women who took NGOs' loans. FGDs indicated that the source of credit had shifted: women said they were able to receive credit from alternative sources easily and preferred to raise money by saving rather than by borrowing with interest. Women also stated that men went through women to access credit from NGOs.

The project resulted in a greater proportion of SDVCP participants than control group members reporting that husbands and wives jointly decided whether wives could go by themselves to visit friends outside the community, to the bazaar, and to the cinema. SDVCP participants also would face no objections to a woman visiting friends outside the community or visiting the hospital if she could cover her own expenses (which may indicate that the woman would be able to mobilize the necessary financial resources).

¹ *Char* refers to remote areas of new land formed through a continual process of erosion and deposition associated with the major rivers that run through the country

Women’s mobility was essential for better linking smallholder dairy producers to markets. Results suggested that SDVCP participation increased women’s mobility by necessitating such mobility for training and participation in the project and by changing social norms. The project also improved smallholder linkages to dairy markets by increasing the proportion of households in which women participated in the decision to go to an agricultural input dealer or a milk collection point.

Possible spillover effects of women’s increased mobility on human capital should not be underestimated. Through training, women gained knowledge and skills and subsequently gained respect from (and improved their status among) their communities and families.

Impacts on Decisionmaking

Whether the project changed gendered patterns of decisionmaking surrounding dairy production, use, and sale remains to be seen. Results from the study’s quantitative component suggested that the program had negligible impacts on decisionmaking related to the buying, selling, and leasing of cows and dairy-related expenses. While the project seemed to shift decisionmaking regarding which type of livestock feed to use and where to purchase inputs and services, husbands generally made up the majority of decisionmakers in all groups and in all decision spheres. At the time of both the baseline and end-line surveys, men dominated decisionmaking within the household. Women’s decisionmaking, even in the areas in which they were trained through the program (vaccinations, artificial insemination, and so on), was also unaffected.

The study’s qualitative component revealed that women were the primary marketers of milk; they sold milk both from their homes and to collectors. While women sold milk, the study suggested that the *decision* to sell milk was still predominantly the husband’s. However women *did* decide whether and how to allocate milk for home consumption (for example, for children). Husbands’ decisions generally involved financial outlays or inflows, while wives’ decisions involved the allocation of milk that is not for sale.

SDVCP also appeared to have had an effect on household time and labor allocation. Adult women increased their time spent on dairy-related activities within the homestead, while adult men increased time spent on dairy-related activities outside the homestead. The increased allocation of adult women’s time to dairy activities came at the expense



Akram Ali/CARE Bangladesh SDVCP

of their time spent doing other household activities, and consequently young girls increased their time doing domestic work. This is an example of the unexpected and unintended impacts that may occur even in a “gender transformative” project.

CONCLUSION AND POLICY IMPLICATIONS

This impact study of CARE’s Strengthening the Dairy Value Chain Project found several positive impacts. For example, project participation had significant relative impacts on household assets’ composition: the relative value of participants’ livestock—as well as their agricultural and nonagricultural productive assets—increased in comparison to that of control groups.

Program participation increased the value of both men’s assets and jointly held assets, suggesting that women could build up assets by acquiring jointly owned assets instead of individually owned assets. Participation also increased the value of jointly held nonagricultural productive assets, consumer durables, jewelry, and large livestock.

This impact evaluation highlights the importance of considering a broad range of indicators related to poverty reduction and well-being when setting program performance targets. In the SDVCP’s case, a narrow focus on dairy income would suggest the program has limited impact. However, expanding the evaluation’s focus to other relevant indicators, such as asset portfolios, household dynamics, and gender norms, reveals a richer story with considerable positive impacts. Neglecting these other outcomes would underestimate dairy value chain projects’ potential as a catalyst for positive social change in rural areas.

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Agnes Quisumbing (a.quisumbing@cgiar.org) is a senior research fellow in the Poverty, Health, and Nutrition Division of the International Food Policy Research Institute (IFPRI), Washington DC. **Shalini D. Roy** (s.roy@cgiar.org) is a postdoctoral fellow in the Poverty, Health, and Nutrition Division of IFPRI, Washington, DC. **Jemimah Njuki** (jemimah.njuki@gmail.com) was the team leader for the poverty, gender and impact team at the International Livestock Research Institute (ILRI), Nairobi. She is currently senior program officer, Cultivate Africa's Future, at the International Development Research Centre, Nairobi. **Kakuly Tanvin** (kakuly@bd.care.org) is the project manager, Gender & Training, of the Strengthening the Dairy Value Chain Project, CARE Bangladesh, Dhaka. **Elizabeth Waithanji** (E.waithanji@cgiar.org) is a postdoctoral scientist at ILRI, Nairobi.

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The Importance of Gender in a “Gender Blind” Asset Transfer Program: Lessons from Dairy Development in Mozambique

Nancy Johnson, Jemimah Njuki, Elizabeth Waithanji, Marinho Nhambeto, Martha Rogers, and Elizabeth Hutchinson Kruger

LAND O’LAKES’ MANICA SMALLHOLDER DAIRY DEVELOPMENT PROGRAM (MSDDP) IN MANICA PROVINCE, Mozambique, has two primary objectives: 1) rebuilding Mozambique’s dairy industry to meet market demand and 2) increasing smallholder farmers’ incomes through participation in a sustainable dairy value chain.

The program provided training and improved dairy cows to households and supported the establishment of producer cooperatives and milk collection centers in communities in Manica province.

Dairy production is very limited in Mozambique because of unfavorable agroecological conditions and the civil war that ravaged the country from the late 1970s to early 1990s. Between 1980 and 2006 milk production in the country declined by 4 percent, from 71,500 to 68,800 tons. The country depends on daily imports of milk from South Africa and Europe (Dairy Mail Africa 2009).

Land O’Lakes International Development, a division of Land O’Lakes, Inc., recently completed a program in central Mozambique to help restore the country’s dairy industry. This study by the Gender, Agriculture, and Assets Project (GAAP) provides an assessment of the program’s impact, especially on women.

INTERVENTION AND STUDY SITE

In 2008, Land O’Lakes International Development was awarded a Food for Progress Project grant from the United States Department of Agriculture for an initiative to rebuild Mozambique’s dairy herd while integrating smallholder farmers into the dairy value chain. The initiative, known as the Manica Smallholder Dairy Development Program (MSDDP), was to be carried out from 2008 to 2012 in Manica province in central Mozambique.

MSDDP provided participants with Jersey cows (an exotic, high-producing breed) and training in fodder crop and pasture management and animal husbandry. It also

supported the establishment of producer cooperatives and milk-collection centers—the latter to assure that milk quality was maintained through proper handling.

Households in Manica province that (1) were willing to attend all trainings, (2) possessed adequate access to land and water, (3) were close to a milk collection center, (4) were active in a community group or cooperative, and (5) were cultivating pasture and fodder crops were encouraged to participate.

Two members of participating households were required to attend a series of trainings; it was left to the household to decide who, in addition to the household head, would receive training. About two-thirds of households chose a woman as one of the trainees. Once both household members had completed the trainings, the household was given a pregnant heifer, registered in the name of the household head. The new owners were obligated to return both heifer and bull calves to the program: the heifer calves were eventually given to another household and the bulls were used for breeding purposes. Funds paid monthly for milk delivered to the program’s milk collection center were in the name of the household head.

Although MSDDP targeted dairy households, not all household members benefitted equally because individuals within households often have different preferences for how they would like to see their own and household resources used.

Interventions such as the MSDDP that distributed assets and income to certain household members while building the human capital of others might be expected to benefit different members in different ways. In particular, the benefits might be lower, and costs higher, for women than for men.

STUDY OBJECTIVES

Land O'Lakes partnered with the International Livestock Research Institute (ILRI) to examine the gendered impacts of this "gender blind" program. The study used a mixed-methods approach to explore how the dairy program intervention benefited and impacted men and women in terms of work load, income, and asset ownership. More specifically, the study looked at women's participation in the program and the program's effects on gendered distribution of assets (such as livestock and agricultural tools) and decision-making power.

OVERVIEW OF METHODOLOGY AND DATA COLLECTION

The study's mixed-methods approach included a household survey component and focus group discussion component.

Two household surveys were administered by Land O'Lakes in 2011 and in 2012 in Manica and Gondola districts, two districts within Manica province. These surveys gathered information on household dairy production and food security, as well as sex-disaggregated demographic, asset ownership, and agricultural labor data. Data on pre-program asset levels were gathered retrospectively. In total, 125 households were surveyed in 2011 and 150 households in 2012. Because the program was open to all households in the program area that met the requirements, there is no comparable control group. The analysis focused only on beneficiary households and looked at outcomes pre- and post-program. Researchers used the 2011 data to compare outcomes for households that had completed training and received their cows with households that were still in the process. Researchers also compared households that had female trainees with households that did not.

To better understand how the program was perceived by participants and how it contributed to observed changes, Land O'Lakes and ILRI also conducted focus group discussions (FGDs) in the communities where the program took place. Fifteen FGDs were conducted in 2011 and an additional two were conducted in 2013. The groups were divided into women's groups and men's group and segregated by geographic location and whether households had already received their dairy cows. The 2011 FGDs explored the MSDDP, local understanding of assets and asset ownership, and gendered roles

in dairy production. The 2013 groups focused on gendered control of income.

RESULTS

This study revealed several impacts of the program on gendered property rights, participation in training, and control of income and investments.

- 1. Rights to Assets.** Households significantly increased their ownership of exotic cattle and of land during the program period. The distribution of assets between men and women did not change, however, at least not as measured by number of assets. Survey data showed a high degree of joint ownership of cattle (43 percent) and other assets. According to the FGDs, much of the joint ownership consisted of women having use rights to assets that were controlled by men. Such use rights did not necessarily translate into control over milk, other livestock products, or income.
- 2. Production and Consumption.** Participant households reported higher milk production and sales than livestock-owning households that did not participate in the program. Nevertheless, increased production and sales were accompanied by high input costs—equivalent to more than a third of dairy income—and more labor hours for women, men, and children (whether the increased labor requirements affected men or women more varied depending on the measure used). The program appeared to have had a positive impact on nutrition, with participant households generally reporting higher milk consumption and dietary diversity. The amounts of milk allocated to household consumption versus sale did not differ dramatically according to whether women or men made the allocation decisions.
- 3. Gendered Control of Income and Investment.** Households that received cows dramatically increased their income from dairy production. Most of it was controlled by men: women's large labor contributions and "joint" ownership of cows did not translate directly into control over income. For example, men generally controlled the income from milk sales at milk collection centers, and they decided how to spend it—either alone or, in some cases, in consultation with their spouses. Even where women said they controlled income, they often mean that they made purchases after first consulting their husbands. To the extent both men and women had control over milk income, they tended to spend it differently. Men tended to invest in draft animal technologies and cow feed and drugs; women focused more on immediate household needs such as food, clothing, children's education, and the improvement of household members' comfort. Men

controlled the primary assets acquired: women reported that they did not purchase any assets with income generated from the sale of bull calves, whereas men reported that they bought several kinds of assets, including agricultural tools, bicycles, construction material, and livestock. Men's control of income usually led to men's spending and investment preferences receiving higher priority.

CONCLUSION AND POLICY IMPLICATIONS

The program appears to have led to a significant increase in household milk production, sales, and income. Some evidence also suggests that it was associated with an increase in milk consumption in the household and with household ownership not only of cattle but also of other non-livestock assets. Intensifying dairy production was also associated with a large increase in the use of purchased inputs and household and hired labor. While household members who have stayed in dairy production believe that the benefits of dairying outweigh the financial and labor costs that dairying requires, the increases in household labor for men, women, and children are significant and the longer-run effects of both children working and women delegating household responsibilities such as child care to other family members should be monitored to avoid unintended negative impacts.

Men and women both appear to have increased their income from dairy, and for women this may be an important income source since they were not involved in cattle husbandry or dairy production prior to the introduction of improved cows. However, men controlled the majority of household dairy income. Men also controlled more and higher-value assets than women.

Gender sensitive program implementation and partnerships with organizations that specialize in gender issues and women's empowerment could lead to fundamental changes in gender and social relations that would allow women to benefit more from program interventions. Cows were distributed mainly to men, who appeared to retain decision rights over them. Nevertheless, in some households some of the cows appeared to be jointly owned, using local ownership definitions. The value of this joint ownership to women needs to be



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better understood since it does not appear to equate directly to joint control over income.

The feasibility and practical usefulness of joint registration of a cow—with the goal of ensuring joint decision rights as well as use rights—should also be explored further. Despite the widespread recognition that, as one respondent said, “decision making is bigger than whose name the cows is registered under,” some cases where joint registration could be meaningful were mentioned. Some men's comments on what would happen if registration were joint—women's families would take the cows, people would think there was no man in the household—might reveal more about how men felt threatened by the idea than about what would actually happen. A cautionary note is warranted here since programs that make men feel threatened in their attempts to improve women's status may result in backlash and care needs to be taken to avoid this.

The MSDDP may be contributing to a change of social norms. Women reported that the important contributions they make to the care and maintenance of the cow—made possible by the technical knowledge that they acquired in the trainings—leads their husbands to consult them more in decisions. Women appreciate this recognition of their skills, and they value the sense that their household is working together on a joint livelihood strategy that is necessary to succeed in a demanding industry such as market-oriented dairy production.

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Nancy Johnson (n.johnson@cgiar.org) is a senior research fellow for the CGIAR Research Program on Agriculture for Nutrition and Health at the International Food Policy Research Institute, Washington, DC. **Jemimah Njuki** (jemimah.njuki@gmail.com) was the team leader for the poverty, gender and impact team at the International Livestock Research Institute (ILRI), Nairobi. She is currently senior program officer, Cultivate Africa's Future, at the International Development Research Centre, Nairobi. **Elizabeth Waithanji** (E.waithanji@cgiar.org) is a postdoctoral scientist at ILRI, Nairobi. **Marinho Nhambeto** (Marinho.nhambeto@idd.landolakes.com) is the national monitoring and evaluation officer at Land O'Lakes International Development, based in Chimoio-Manica, Mozambique. **Martha Rogers** (roger493@umn.edu) is a graduate student at the University of Minnesota, St. Paul, US. **Elizabeth Hutchinson Kruger** (ekruger@care.org) was a monitoring and evaluation specialist at Land O'Lakes, Minneapolis. She now works with CARE USA, Atlanta.

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An Integrated Agriculture-Nutrition Program in Burkina Faso Can Change Gender Norms on Land and Asset Ownership

Mara van den Bold, Abdoulaye Pedehombga, Marcellin Ouedraogo, Agnes Quisumbing, and Deanna Olney

THE GOAL OF HELEN KELLER INTERNATIONAL'S ENHANCED-HOMESTEAD FOOD PRODUCTION (E-HFP) program is to improve the nutritional status of infants, young children, and mothers through improved access to nutritious foods year-round and the adoption of optimal nutrition and care practices. The E-HFP program helps mothers establish homestead gardens in the Fada region of Burkina Faso. The program provides inputs (such as hens and seeds) and training in gardening, irrigation, and small animal rearing to female beneficiaries. The program also develops a system of community-level trainers who instruct women in improved nutrition and care practices.

Helen Keller International (HKI) carried out a two-year Enhanced-Homestead Food Production (E-HFP) program (2010–2012) in Gourma Province in eastern Burkina Faso. The program's goal was to improve women's and children's nutrition and health through production and nutrition interventions. One way in which the program sought to improve its production and nutrition outcomes was by directly increasing women's access to and control over productive assets. To accomplish this objective, HKI trained women and gave them inputs for raising small animals and growing nutrient-rich foods, as well as health- and nutrition-related education delivered through a behavior change communication (BCC) strategy (Dillon et al. 2012).¹

Agricultural programs seeking to transform gender norms often specifically target women in the belief that transferring control or ownership of assets to them will empower them and improve the program's agricultural, nutritional, and health impacts. However, evidence about agricultural interventions' impact on women's asset ownership and control is limited (Meinzen-Dick et al. 2011). HKI therefore partnered with the Gender, Agriculture, and Assets Project (GAAP) to measure the impact of the program's interventions on men's and women's access to and control over productive assets

(Meinzen-Dick et al. 2011). This study presents the results of this evaluation.

INTERVENTION AND STUDY SITE

Gourma Province was selected for the E-HFP program because of HKI's previous experience in the region. Villages that had access to water even during the dry season—and therefore could garden year-round—were selected for potential program participation. Selected villages were separated into three groups: 25 control villages and two groups of 15 intervention villages. The two sets of intervention villages differed only in who delivered the BCC strategy: either health committee members or older female leaders. All households in the intervention villages and control villages with children between 3 and 12 months at baseline were invited to participate in the study.

HKI worked closely with communities in the intervention villages to identify land for Village Model Farms (VMFs). The E-HFP program obtained rights to community land in the intervention villages. This land was later managed by female Village Farm Leaders who were program participants. On the VMFs female farmers learned about homestead food production and raising small animals. HKI provided inputs including seeds, seedlings, chickens, and agricultural tools and, in some cases, drip irrigation kits (Dillon et al. 2012; Olney et al. 2013; HKI 2012).

¹ Mothers of children between 3 and 12 months of age at the time of the 2010 baseline survey were eligible for the program.

The program also provided education designed to improve health and nutrition practices through the BCC strategy. Among the behaviors targeted through the BCC strategy was the intake, especially among participating women and their young children, of nutrient-rich foods produced through E-HFP program activities.

STUDY OBJECTIVES

During the program HKI partnered with GAAP to assess the program's impacts on men's and women's assets (such as animals, land, and tools) and to qualitatively assess perceptions of and changes in men's and women's control over and use of productive assets. Results from the program's impact evaluation and associated qualitative studies were used to address three questions:

1. Did the program increase ownership of assets among men, women, or both?
2. Did the program activities influence community norms vis-à-vis women's land ownership or land rights, and if so, how?
3. Were women able to maintain control over program activities and outputs as intended? What made it difficult or easy to maintain or not maintain this control?

OVERVIEW OF METHODOLOGY AND DATA COLLECTION

Evaluating HKI's E-HFP program involved a longitudinal impact evaluation consisting of a quantitative baseline and endline household survey. In 2010, as part of the baseline study, 1,757 household surveys were completed (734 from control villages and 1,023 from intervention villages). The same households were surveyed in 2012, which resulted in 1,470 households (590 from control villages and 880 from intervention villages) that provided both baseline and endline data. Program impacts were measured at both the household and individual level and both male and female respondents were interviewed separately about issues such as assets, agricultural production, and livestock ownership.

Two separate rounds of qualitative research were also conducted during the quantitative survey period. The qualitative research was primarily designed to provide insight into why the program did or did not improve women's agricultural production and maternal and child health and nutrition outcomes, by examining issues related to the delivery and utilization of program services. In addition, it was designed to examine the gendered implications of the E-HFP program in terms of access to and control over productive assets.

In 2011, semi-structured interviews (SSIs) were conducted with five randomly selected households in each intervention village and in 15 of the 25 control villages.² Two of the five households selected from each village were chosen to complete a longer SSI. A total of 145 households from intervention villages and 75 from control villages participated in the basic SSIs. Of these households, 58 from intervention villages and 30 from control villages completed the more in-depth SSIs (Olney et al. 2013). The households that participated in the first round of qualitative research also participated in SSIs during the second round of qualitative research in 2012, if possible. If a particular household was unable to participate in the second round, a replacement was randomly selected from the list of program participants who had participated in the quantitative baseline survey.

RESULTS

Certain changes occurred during the two years of the E-HFP program's operation:

Women Made Gains in Asset Ownership

While men continued to own the majority of assets, women began to own more assets. Further, women's assets increased more in intervention villages than in control villages. The average number of agricultural assets and small animals owned by women in intervention villages increased to a statistically significant degree relative to the average number owned by women in control villages. Moreover, the proportional gap between men and women in ownership of agricultural assets narrowed more in intervention villages than in control villages.

Women Gained More Control Over Their Gardens and Profits

The qualitative research showed that women's control over productive assets increased in intervention villages. Women were primarily responsible for the care of the garden, and they were more likely to make decisions about the use of their gardens' products and the proceeds earned from these products than men. Although men generally retained control of the larger livestock (in this case, goats), women's decision-making power with regards to chickens and goats increased. Also, both men's and women's perceptions of and opinions about who could own and control certain assets appeared to have become more open to female control and ownership. This change was more pronounced in intervention villages than control villages.

² One village dropped out of the E-HFP program and related evaluation activities before the first round of qualitative research. Therefore, a total of 29 rather than 30 intervention villages were in the two rounds of qualitative research and in the endline survey of the impact evaluation.

Perceptions about Women's Ownership and Control Over Land Are Changing

Men and women across villages stated that while men could inherit land, women could not and could only obtain land through gifts or marriage. Even if their husbands died, women generally would not inherit the husbands' land. "Social considerations prevent women from inheriting land from her husband if she does not have children or if she has only girls," one woman said.

Nevertheless, half of men and women in intervention villages reported that their opinions on who could own land, use it to grow fruits and vegetables, or both, had changed. Their opinions had altered because of changing gender roles, the HKI program, and changes in consumption (the growth of vegetable consumption during the dry season, for example). "The women proved that they had the capabilities to manage the land well," said one respondent. "Thanks to HKI I realized that a woman can garden," another said.

CONCLUSION AND POLICY IMPLICATIONS

Between 2010 and 2012, the HKI program appeared to significantly improve women's ownership and control of lower-value assets such as seeds and produce. Women's control and ownership of higher-value assets such as chickens and goats also changed notably. These findings were consistent with other asset studies in Africa (Njuki et al. 2011). Additionally, women's and men's perceptions of the importance of traditions governing gender roles in agriculture and women's rights to land reportedly changed, and almost half of the



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program participants interviewed expected these traditions to continue to change.

Whether women's increased asset ownership and control will stay the same, continue to change, or revert to how they were prior to the HKI pilot program remains to be seen. Changes encouraged by the program may or may not be sustained after the program ends.

Nevertheless, the impact study and associated qualitative research demonstrate that agricultural projects can improve women's asset ownership and control and can alter perceptions of and opinions about gender norms. These changes could have longer-term positive impacts on food security, child nutrition, education, and women's own well-being (Quisumbing 2003; Smith et al. 2003; World Bank 2001).

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Mara van den Bold (m.vandenbold@cgiar.org) is a research analyst in the Poverty, Health, and Nutrition Division of the International Food Policy Research Institute (IFPRI), Washington, DC. **Abdoulaye Pedehombga** (apedehombga@hki.org) is monitoring and evaluation coordinator for the Enhanced-Homestead Food Production (E-HFP) program at Helen Keller International, Ouagadougou, Burkina Faso. **Marcellin Ouedraogo** (marouedraogo@hki.org) is the program coordinator for the E-HFP program at Helen Keller International, Ouagadougou, Burkina Faso. **Agnes Qisumbing** (a.qisumbing@cgiar.org) is a senior research fellow in the Poverty, Health, and Nutrition Division of IFPRI, Washington, DC. **Deanna Olney** (d.olney@cgiar.org) is a research fellow in the Poverty, Health, and Nutrition Division of IFPRI, Washington, DC.

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Who Decides to Grow Orange Sweet Potatoes? Bargaining Power and Adoption of Biofortified Crops in Uganda

Daniel O. Gilligan, Scott McNiven, Neha Kumar, J. V. Meenakshi, and Agnes Quisumbing

THE GOAL OF THE HARVESTPLUS REACHING END USERS (REU) ORANGE SWEET POTATO (OSP) PROJECT IS TO increase vitamin A intake and improve vitamin A status among vulnerable populations (women and children) in rural Uganda by introducing beta-carotene-rich OSP, as well as related messages concerning agronomy, nutrition, and marketing. OSP vines were disseminated through farmers groups, the majority of whose members were women. The project and this evaluation were intended to provide a “proof of concept” for a multi-million dollar effort to support biofortification as a strategy to reduce micronutrient deficiency.

Biofortification is a promising strategy for reducing micronutrient malnutrition. It involves breeding staple food crops to be a rich source of one or more key micronutrients, such as iron, zinc, vitamin A, and iodine, and disseminating these crops in areas where the rate of micronutrient deficiency is high and where poor households consume a large share of calories from staple foods. In many areas in rural Africa and South Asia, poor households grow most of their own food. In these settings, getting biofortified food into household diets means fostering broad household adoption of new crop varieties (Gilligan 2012).

While adoption of seed crops can be encouraged through marketing campaigns for biofortified seeds, for crops such as cassava and sweet potato, planting material in the form of vine cuttings cannot be stored, so markets for planting material are thin. Instead, most households obtain planting material for these crops through interaction with other households. This raises a number of important questions about the roles of social interaction, intrahousehold division of labor, and gender in determining the rates at which these biofortified crops are adopted and spread. As part of the Gender, Agriculture, and Assets Project (GAAP), this study examines the effect of women’s bargaining power, as revealed in gender-based patterns of ownership and control

of land and assets, on adoption of orange sweet potato (OSP) and vitamin A intakes among children.

INTERVENTION AND STUDY SITE

The HarvestPlus Reaching End Users (REU) project introduced biofortified orange sweet potato (OSP) to 10,000 households in Uganda from 2007 to 2009 to increase dietary intakes of vitamin A and reduce the prevalence of vitamin A deficiency. OSP is a dense source of vitamin A and is moderately higher yielding than conventional white or yellow sweet potato varieties but is more vulnerable to rot during dry periods. The REU project involved a multi-pronged intervention that targeted farmer groups in three districts—Bukeda, Kamuli, and Mukono—and included a one-time distribution of 20 kg of free OSP vines; agricultural training on OSP cultivation; training adult female members on the nutritional benefits of OSP; and training on marketing. An experimental impact evaluation of the REU project showed that REU led to OSP adoption by 65 percent of project households, compared to just 4 percent in the control group (de Brauw et al. 2012). The project also significantly increased the prevalence of adequate dietary intakes of vitamin A by children under 3 years and reduced the prevalence of low serum retinol among children ages 3–5 years (Hotz et al. 2012).

STUDY OBJECTIVES

This study examines the roles of male and female household members in the decision to adopt the OSP crop, to continue growing it over the four seasons of the project, and to distribute the crop to other households. We also explore the role of gender as a variable mediating the intervention's impacts on dietary intakes of vitamin A by young children.

OVERVIEW OF METHODOLOGY AND DATA COLLECTION

Data collection for the evaluation survey was conducted in REU project areas in two survey rounds: a baseline survey in 2007 and an endline survey in 2009. The baseline survey collected information on 1,594 households, and 1,473 of these households were re-interviewed in 2009. Each survey round included a detailed socioeconomic survey and a nutrition survey, including a detailed 24-hour dietary recall module. Each survey round also included a farmer group survey conducted with the farmer group chairperson or other leader, a community survey, and a price survey.

Measures of intrahousehold bargaining power were constructed using gender-differentiated data from the socioeconomic survey's modules on asset ownership and control over land. For each asset covered by the baseline survey asset module, respondents were asked what proportion of the value of the asset was jointly owned, owned only by the household head, or owned only by the household head's spouse.

These data were used to create estimates of the share of land and nonland assets exclusively owned by women, exclusively owned by men, or jointly owned. Data on the distribution of control over assets by gender were collected retrospectively in 2009. Similarly, respondents were asked which household member made the crop choice decisions on each plot, allowing for up to two responses. We interpret the order of responses as indicating leadership in decisionmaking.

In addition to these survey rounds, a qualitative study on gender and asset ownership and control was undertaken in project sites in Kamuli and Bukedea districts in 2011 (Behrman 2011), which guided the hypotheses tested in this study. We estimated regression models of the household decision to adopt OSP, first for all households pooled together, then for male- and female-headed households separately. Then, we examined the decision to adopt OSP for specific parcels, taking into account past experience with OSP; whether the plot was owned by a man, woman, or both jointly; and who was the primary decisionmaker on the parcel. We examined the determinants of OSP adoption within households, taking into account the possibility that adoption decisions are correlated across parcels.

RESULTS

There were clear gender differences in decisions to plant OSP on specific parcels. On nearly 60 percent of parcels, men and women jointly made the crop choice, but men took the lead in making this decision. On 20 percent of parcels, women alone made crop choices, partly reflecting the number of single-head households headed by females. Only 4.5 percent of parcels were reported to be under exclusive male control, while the remaining 16.5 percent of parcels were under joint control, with a woman taking the lead in the decisionmaking.

The relationship between female bargaining power and control over household assets and the Uganda OSP biofortification program's impact on OSP adoption and diffusion and dietary intakes of vitamin A was complex. The probability of OSP adoption was highest for parcels over which there was joint control but where women took the lead in deciding which crops were grown. The probability of adopting OSP was lowest for parcels exclusively controlled by men. Although crop choice decisions were correlated across parcels, the evidence indicated that women played an important, and often leading, role in the decision to adopt OSP but that this decision was often jointly made with their husbands.

Households in which women had a lower share of nonland assets were more likely to grow OSP on joint plots with women in primary control. Where women had a higher share of nonland assets, decisionmaking on joint plots appeared more egalitarian, but OSP adoption was significantly less likely on plots under exclusive male control. In these households women may have had other income-earning activities that provided greater access to assets and so may have been less concerned with the adoption of this new healthy technology. Alternatively, women with stronger bargaining power may have had access to other nutritious foods as a result of their stronger control over household assets.

The share of nonland assets exclusively controlled by women had a large, significant effect on child dietary intake of vitamin A. On average, the more nonland assets women controlled, the higher their children's vitamin A consumption tended to be. This effect was independent of the REU project's impact on vitamin A consumption, though. Women with relatively higher control of nonland assets did not necessarily have an advantage in using their bargaining power to increase the REU project's impact on child vitamin A consumption. Instead, the project was able to increase children's vitamin A consumption regardless of the mother's share of nonland assets.

Although the project had a large impact on vitamin A consumption, our other research on this project showed that this impact did not apparently derive from lessons learned during the project's nutrition training. These studies found

no signs that the REU had an impact on fathers' knowledge of child feeding practices in Uganda, while nutrition messages received by women appear to have had a relatively small effect on OSP adoption and dietary intakes of vitamin A (de Brauw et al. 2010, 2012).

CONCLUSION AND POLICY IMPLICATIONS

A crucial policy finding of this study is that women play an important role in the decision to adopt OSP but that this decision is often jointly made with their husbands. In this setting, project engagement with adult household members of both genders may be the best strategy to promote adoption. On average, female bargaining power or farmer group participation does not appear to affect the diffusion of the OSP crop technology. However, effects do vary by district, which suggests that extension efforts to disseminate OSP and other biofortified crops may need to be tailored to local contexts. Finally, a biofortification strategy to improve



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dietary intakes of vitamin A would be much more cost-effective if the households involved shared OSP vines with other households.

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Daniel O. Gilligan (d.gilligan@cgiar.org) is a senior research fellow in the Poverty, Health, and Nutrition Division of the International Food Policy Research Institute (IFPRI), Washington, DC. **Scott McNiven** (mcniven@primal.ucdavis.edu) is a PhD candidate at the University of California, Davis, US. **Neha Kumar** (n.kumar@cgiar.org) is a research fellow in the Poverty, Health, and Nutrition Division of IFPRI, Washington, DC. **J. V. Meenakshi** (meena@econdse.org) was head of impact and policy research, HarvestPlus, at IFPRI, Washington, DC. She is currently a professor at the Delhi School of Economics, University of Delhi, Delhi, India. **Agnes Quisumbing** (a.quisumbing@cgiar.org) is a senior research fellow in the Poverty, Health, and Nutrition Division of IFPRI, Washington, DC.

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Do Women Control What They Grow? The Gendered Use of KickStart's Pumps for Irrigation in Kenya and Tanzania

Jemimah Njuki, Elizabeth Waithanji, Beatrice Sakwa, Juliet Kariuki, Elizabeth Mukewa, and John Ngige

THE KICKSTART INTERNATIONAL PROJECT'S OBJECTIVE IS TO INCREASE CROP PRODUCTION AND productivity through the use of human-powered, low-cost micro-irrigation pumps. Direct benefits of the project include increased incomes and improved food security for households using pumps. The Gender, Agriculture, and Assets Project collaborated with KickStart to better understand the gender dynamics of who purchases and controls pumps, as well as the intrahousehold effects of pump use on decisionmaking and use of income from irrigated crops.

The majority of Kenyan and Tanzanian households depend on rain-fed agriculture, even in arid and semi-arid regions where weather is variable and precipitation is inconsistent (Rockström et al. 2007). In such agricultural systems, irrigation can have a significant positive impact: farmers can make use of more land, plant more crops per annum, and reap higher yields while reducing their vulnerability to climate variability.

Many smallholder farmers have adopted new technologies such as motorized pumps and human-powered pumps to acquire water otherwise unavailable to them and use that water more effectively in their fields.

Today, organizations such as KickStart International are using market-based approaches to disseminate some of these technologies (treadle pumps and hand-operated pumps, specifically) to smallholder farmers. This study by the Gender, Agriculture, and Assets Project (GAAP) examines KickStart pump ownership and use by women, including their relationship to women's decisionmaking power within their households.

INTERVENTION AND STUDY SITE

KickStart International works to generate demand for and encourage adoption of their human-powered irrigation pumps through marketing, education, and awareness-building activities. KickStart works in five African countries

and sells its products to even more countries under its Global Institutional Program. KickStart has released six different pumps with varying pumping distances (the distances the pumps can transport water from its source to an irrigated field), pumping capacities, irrigable areas (the areas the pumps can irrigate daily), weights, and prices. The pump models range in price from US\$73.00 to \$155.00.

In Kenya and Tanzania, KickStart distributes these pumps through local private-sector dealers and works to build market demand for them by raising awareness about irrigation, training farmers to use the pumps, and developing local private-sector supply chains to sell both the pumps and spare parts.

Starting in the mid-2000s, KickStart began supporting women farmers' uptake of pumps through, among other avenues, female extension workers and sales representatives and demonstrations and outreach activities that include women. KickStart paid attention to gender issues for two reasons. First, women play important roles in agriculture yet face constraints in accessing and using technology. Second, gender is often neglected in irrigation programs, resulting in ineffective and inadequate options for women.

Although women are one of KickStart's targeted groups, little is known about the extent to which women benefit from the irrigation technologies.

STUDY OBJECTIVES

This study seeks to understand (1) women's ownership of and access to KickStart pumps, (2) constraints women face in purchasing and using those pumps, and (3) the implications of women's ownership of pumps (or lack thereof) for their ability to make decisions about and use the income from crops irrigated by the pumps.

OVERVIEW OF METHODOLOGY AND DATA COLLECTION

Qualitative data for the study was collected in three regions of Tanzania and three districts in Central and Western Kenya. Sites were selected to represent areas with high numbers of pump purchases (because they include agroecological areas requiring irrigation), different levels of gender stereotyping, and proximity to urban centers. Twenty-seven focus group discussions (FGDs) of 18 or fewer people were facilitated across the two countries, including 11 women-only discussions, 11 men-only discussions, and 5 mixed discussions.

During the end-term review of the project, the team decided to add in-depth individual interviews to provide more data on questions related to decisionmaking and control over income. The data collected was analyzed and has been organized by theme below.

RESULTS

Awareness, Purchase, and Perceptions of KickStart Pumps by Men and Women

Sales data showed that only 6 percent of pump sales in Tanzania and 18 percent of pump sales in Kenya were made to women between 2005 and 2013. Among common pump varieties, women liked the "MoneyMaker Hip Pump" (MMP), a hand-operated lightweight pump. The MMP was preferred because it was easy to use and had no operational cost and, in some cases, because it did not require women to use their legs to pump water, which is considered culturally inappropriate in some areas.

Ownership and Use of the KickStart Pump and Other Assets

Men dominated ownership of the pumps and the majority of other household assets. According to both men and women respondents, men owned most "big assets" (bicycles, electronic equipment, houses, land, and livestock), while women owned "smaller" assets (clothing, cooking utensils, mobile phones, and poultry). Some assets were reported to be jointly owned. These included assets shared by men and women within a household, including furniture, farm tools, and businesses.

In Tanzania the majority of participants stated that men and women decided jointly whether or not to buy a pump, although, if there was disagreement, the husband made the final decision. In some cases, men simply bought the pumps (without joint decisionmaking) and brought them home. A few women, especially from female-headed households, also bought pumps.

Women knew less about the pumps than the men did. This was because of lower levels of education, less mobility, and unequal access to information. Pump information was distributed through agricultural shows, the NGOs that sold pumps, and field days and demonstrations. Men stated that KickStart leaflets, radio, and television were important sources of information. Women stated that their husbands or other farmers were important sources of information.

KickStart pumps were used mainly to irrigate the owners' land, though some farmers leased out their pumps for a fee or payment in kind or lent them to friends or neighbors free of charge. Female respondents from central Kenya reported that men rarely lent pumps to women because, "men do not like women to progress."

Both men and women would lay irrigation pipes, sometimes with the help of children. However, men pedaled the pump because it was considered one of the more difficult tasks. Children were also involved in the pedaling because they thought of it as a fun activity.

Women reported difficulties using the treadle pumps and found them culturally inappropriate. Some of the FGD participants indicated that women took longer to irrigate the same piece of land compared to men because the women had many other work responsibilities that required them to take breaks from irrigation.

Intra-household Decisionmaking on Crop Choice and Use of Income

Men and women had several criteria for choosing which crops to grow under irrigation: the crops' potential for both home consumption and sale, the availability of a ready market, and the ability to grow with minimal labor and external inputs. In both Kenya and Tanzania, women and men had different preferences about which crops to irrigate, with women preferring leafy vegetables. In both countries FGD participants indicated men usually discussed with their spouses which crops to grow and irrigate, even though men made the final decision when there was disagreement. Women who had their own plots, or whose husbands were working or living away from the homestead, made their own decisions about which crops to grow and which crops to irrigate.

While men, women, and children jointly weeded and harvested crops, men usually conducted all sales alone. Money earned could be handled in several different ways. First, men could keep the money, but decisions about the money were made jointly. Second, men could keep the money and use it on purchases or activities that they and their spouses did not agree upon. Third, men could give the money to their spouses for safekeeping (women would not spend this money without asking their husbands' permission). Fourth, women who sold leafy vegetables (or some other "women's" crops) at the farmgate or in local markets made independent decisions on how the money was spent. Women's pump ownership did not seem to influence decisions about which crops would be irrigated and who would control and manage income earned from those crops.

Impacts of KickStart Pumps on Household and Individual Well-Being

Respondents said owning a KickStart pump led to farmers cultivating larger plots because of their improved yields. Further, some farmers focused on horticultural production, which assured them of reliable and higher income. The pumps also resulted in general improvements in household well-being: more income, better food security, and improved health status among all household members. Improved well-being was described by participants as having led to "good relationship and more love" within families. Women's labor in fetching water was reduced. Women were also able to access social capital because income from crops sold enabled them to join women's groups. Positive perceptions and self-perceptions of women grew.

Buying and using the MMP involved some trade-offs. For example, women had less time for social activities such as group meetings and church activities, leisure activities, or playing with their children. Very few negative impacts were reported, but women did report men misusing money on alcohol and extramarital relationships.

CONCLUSION AND POLICY IMPLICATIONS

KickStart's market-based introduction of human-powered pumps is improving some smallholder farm households' well-being. Their approach has not led to gender-equitable ownership of pumps, however: women account for just



Esther Havens/KickStart International

10 percent of pump buyers across Kenya and Tanzania. Also, well-intentioned technology interventions can have both positive and negative impacts. For example, while the KickStart pumps increased the land area under cultivation and household incomes, they also had some negative social impacts such as increased labor.

Some conclusions and recommendations for future work follow:

- ▶ To reach and benefit women, market-based approaches need to be accompanied by specific strategies for addressing women's information and financial constraints so that they can access the new technological asset(s) introduced.
- ▶ Technology design should take into account women's needs: by addressing their labor constraints, for example. Two major constraints faced by women in the use of KickStart's pumps were (1) the requirement for two people to operate the pump and (2) the cultural inappropriateness of women operating the pump in some areas.
- ▶ While men may own assets such as the pump, women can still benefit from user rights over these assets. Women's asset ownership is a critical indicator of their empowerment, however, and can influence their bargaining power and other outcomes for themselves and other household members including children. Therefore, the impact of women's pump ownership on their decisionmaking, bargaining power, and income expenditure requires further study.

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Jemimah Njuki (jemimah.njuki@gmail.com) was the team leader for the poverty, gender and impact team at the International Livestock Research Institute (ILRI), Nairobi. She is currently senior program officer, Cultivate Africa's Future, at the International Development Research Centre, Nairobi. **Elizabeth Waithanji** (E.waithanji@cgiar.org) is a postdoctoral scientist at ILRI, Nairobi. **Beatrice Sakwa** (Beatrice.sakwa@kickstart.org) is the director of Impact Evaluation and Monitoring at KickStart International, Nairobi. **Juliet Kariuki** (J.Kariuki@uni-hohenheim.de) was a research assistant at ILRI, Nairobi. She is currently a PhD candidate at the University of Hohenheim, Stuttgart, Germany. **Elizabeth Mukewa** (mumi0002@umn.edu) was a consultant at ILRI, Nairobi. She is currently a PhD candidate in conservation, gender and development in the Conservation Biology Graduate Program, University of Minnesota, St. Paul, US. **John Ngige** (john.ngige@kickstart.org) is the monitoring and evaluation manager for the Kenya Program, KickStart International, Nairobi.

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Gender, Caste, and Asset Control: Implications for Agricultural Projects in Rice-Wheat Systems of Eastern India

Thelma Paris, Valerien Pede, Joyce Luis, Raman Sharma, Abha Singh, and Jeffrey Estipular

THE CEREAL SYSTEMS INITIATIVE FOR SOUTH ASIA (CSISA) PROJECT WAS LAUNCHED IN 2009 TO REDUCE FOOD and income insecurity in South Asia through accelerated development and deployment of new cereal varieties, sustainable management practices for crop and resource systems, and better access to information. The project includes widespread delivery and adaptation of production and postharvest technologies to increase cereal production and raise income. It also involves promotion of (1) crop and resource management practices and (2) high-yielding, stress-tolerant and disease- and insect-resistant rice, wheat, and maize varieties. In particular, the project looks at men's and women's different degrees of ownership, access, and decisionmaking in connection with key livelihood-sustaining assets and whether the introduction of new technologies influences these differences.

Hundreds of millions of people in South Asia depend on cereal cropping and mixed crop-livestock systems for their food, employment, and income. These systems in eastern India, Nepal, and Bangladesh include cultivation of rice, wheat, and maize. The objectives of the Cereal Systems Initiative for South Asia (CSISA) project, which started in 2009, are to decrease hunger and malnutrition and increase the food and income security of resource-poor farm households in the region. CSISA did not initially design program activities to address gender-differentiated constraints on technology adoption (IRRI-CSISA 2009). However, understanding the gendered nature of asset distribution and how this influences individual and household livelihoods is essential to designing effective agricultural research and development for interventions and policies. This understanding will help strengthen, within the context of CSISA, women's access to and control over key agricultural assets. Such an understanding is the goal of this study by the Gender, Agriculture, and Assets Project (GAAP). The study focuses on Bihar and Eastern Uttar Pradesh in rural India, two areas where CSISA operates.

INTERVENTION AND STUDY AREA

CSISA, a collaborative project of the International Rice Research Institute, International Maize and Wheat

Improvement Center, International Livestock Research Institute, and International Food Policy Research Institute, takes a multipronged approach to the accelerated development and inclusive deployment of new crop varieties, sustainable management technologies, and policies.

The economy of the study area in eastern India is largely agrarian. Small and marginal farming households are engaged in crop and animal production, with assigned roles and responsibilities for men and women. Men work as agricultural and nonagricultural laborers. Poor women are more likely than richer women to be engaged in their own farm operations or earn income from off-farm work or from taking care of livestock. Large farm households are more likely than others to earn income from services, while for small and marginal farming households the contribution of income from livestock activities is more important. Some households receive remittances from male migrants.

STUDY OBJECTIVES

This study seeks to (1) identify gendered distribution and control over major assets; (2) assess the impact on the gender asset gap of adopting CSISA-promoted technology; (3) recommend strategies CSISA can use to strengthen women's

access to and control over key agricultural assets. Such access and control can foster improved livelihoods, food security, and well-being.

OVERVIEW OF METHODOLOGY AND DATA COLLECTION

In 2010, as part of CSISA's research activities, baseline socioeconomic surveys reviewed farming practices and the performance of various technologies, as well as constraints on their adoption. However, information on ownership and control of assets was not disaggregated by gender, even though asset control may affect who participates in and who benefits from the project activities. Therefore, additional qualitative research and midline surveys were conducted in three districts with large areas devoted to rice-wheat farming systems: Maharajganj and Deoria in Uttar Pradesh and East Champaran in Bihar. Focus group discussions on asset-related information were conducted with separate gatherings of men and women from upper and lower caste groups. These discussions were followed by in-depth interviews with the principal men and women in 60 households on the importance of assets. In 2012, midline surveys of 318 households in 18 villages were conducted to collect gender-disaggregated data on household composition and assets. The principal man and woman were shown pictures of assets and asked "Who owns this asset? Who uses it? Who decides to dispose of it? How was the asset acquired? What is the value of the asset if you sell it?" Other information on sources of income, labor participation in crop production, access to credit, training, and wives' participation in specific farm and nonfarm matters was also collected. Because of relatively low adoption of CSISA technologies and because the 2010 baseline surveys did not contain gender disaggregated information on assets, the findings are useful for diagnosis, but do not reflect changes in assets attributable to the project.

RESULTS

Farmland, dairy animals, houses, and cellular phones were identified as the most important assets by both men and women. Men gave significantly higher ranking to bicycles while women gave higher ranking to jewelry, reflecting that these two types of assets were most likely to be controlled by men and women, respectively.

Farmlands were mainly owned by the principal male. Wives also participated in land use and decisions to sell or rent out the land but, except for *de jure* heads of households, did not have control of land. Most farms were acquired through inheritance. Since the husband was the officially registered owner of the land, he was identified as the farmer and the recipient or beneficiary of government programs.

This restricted female farmers' opportunity to receive farm inputs and participate in training activities. Without registration of joint ownership, widows were also vulnerable to loss of land to in-laws or sons.

Dairy animals were reported as owned by husbands or jointly; use of dairy products and decisions to sell or buy animals was mostly joint. The few households that raised small livestock, where both husband and wife claimed ownership, use, and control, tended to come from the lower castes.

The common agricultural machinery, including tractors, cultivators, rotavators, combines, threshers, rice mill/hullers, and water pumps, were more often rented than owned due to high costs. More upper caste than lower caste households had access to machinery. Men were the major owners of machinery and water pumps. No women owned, used, or controlled any agricultural machinery or equipment, even though these could reduce their drudgery and free time for farm- and home-based food processing activities.

Almost half of the houses were jointly owned. A slightly higher proportion of *kutchha* houses made of temporary materials than *pucca* houses made of brick were jointly owned. Husbands were the major owners of mobile phones, giving them more access to information and contacts, as well as CSISA appointments.

Aside from tangible assets, a few respondents from the lower castes mentioned the importance of remittances, savings and human capital (training and organization), and access to employment. These assets were also mostly held by men: no women participated in any training or used credit.

While there were no differences across caste in the percentages reporting access to major assets such as farm land and dairy animals, differences in quantity and value were wide. A higher proportion of the upper castes had large farms, and the values of the dairy animals, houses, expensive clothing, jewelry, television, and cellphones of the upper castes were greater than those of the lower castes. Analysis by gender showed that the values of assets owned by men were higher than those owned by women. Overall, the gender wealth gap for each of the major assets indicated that the gender gaps were more severe than suggested by the ownership incidence measures alone. Not only were women less likely, for the most part, to own assets but the assets they did own were likely to be fewer in number and less valuable than male-owned assets (the exceptions to this rule being clothing and jewelry). Thus, the challenge is to make access to assets and resources more equitable between different social groups and between men and women.

The project's promotion of mechanization for rice-based cropping systems had limited adoption and high disadap-

tion because most farms were small and lacked the capital to purchase large machinery. Thus adoption will depend on the availability of service providers and farmers' access to other sources of income. The upper castes had more access to agricultural machinery, even through rentals.

Labor-saving technologies will affect women's participation as unpaid and hired workers in seedbed preparation and transplanting of seedlings. The outcomes were reduced drudgery and health risks for women who work on their own farms and loss of income for women who work as agricultural wage laborers.

CONCLUSIONS AND POLICY IMPLICATIONS

This study provides a greater understanding of CSISA-promoted technologies' potential impacts on existing gender disparities in asset distribution and control and how gendered asset distribution can affect livelihood strategies. The study also helped identify strategies to strengthen women's access to productive assets. Gender inequalities in assets, particularly farmland, persist due to deeply embedded social norms that shape inheritance patterns. However, there are positive signs: some land is reported to be jointly owned by husbands and wives, who make joint decisions to use, sell, or mortgage the land.

Small livestock are important assets for poor women, who can use crop-livestock technologies to increase productivity from improved fodder, breeds, and management practices.

Women do not own agricultural machinery or production and postharvest equipment. To benefit fully from agricultural innovations women need increased access to agriculture-relevant physical assets (land and machinery) and human capital (education and extension services). To anticipate the displacement of labor and disruption of livelihoods due to widespread use of large machinery made available through service providers, development programs should increase women's ability to earn agricultural and nonagricultural income. Group-based programs targeting women have greater potential to address gender relations within the household and society than programs targeting women as individuals.



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To correct a lack of attention to gender concerns in the first phase of the project, a Gender Strategy Plan for phase 2 (Paris 2013) will go beyond promoting large machinery and focus more attention on crop intensification and diversification, which will increase the farm income of small farming households—women's income in particular—and improve nutrition among household members. This intensification and diversification process includes increasing women's access to training (including training in how to raise community mat nurseries for mechanical paddy transplanters) and seeds of improved varieties. It also involves introducing post-harvest and processing technologies as agribusiness ventures and conducting rigorous research on the adoption of CSISA-promoted technologies and their differential effects on the assets of men and women, within and across different social categories.

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Thelma Paris (t.paris@irri.org) is a senior scientist II (socio-economist-gender specialist) in the Social Sciences Division of the International Rice Research Institute (IRRI), Los Baños, Philippines. **Valerien Pede** (V.pede@irri.org) is a scientist (agricultural economist) in the Social Sciences Division of IRRI, Los Baños, Philippines. **Joyce Luis** (J.luis@irri.org) is an associate scientist in the Social Sciences Division of IRRI, Los Baños, Philippines. **Raman Sharma** (ra.sharma@cgiar.org) is an assistant scientist at the International Maize and Wheat Improvement Center (CIMMYT), Eastern Uttar Pradesh, India. **Abha Singh** (Abha_irri@yahoo.com) is an associate scientist in the Social Sciences Division of IRRI, Los Baños, Philippines. **Jeffrey Estipular** (J.estipular@irri.org) is a research assistant in the Social Sciences Division of IRRI, Los Baños, Philippines.

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Gender Dimensions of Social Networks and Technology Adoption: Evidence from a Field Experiment in Uttar Pradesh, India

Nicholas Magnan, David J. Spielman, Kajal Gulati, and Travis J. Lybbert

THE CEREAL SYSTEMS INITIATIVE FOR SOUTH ASIA (CSISA) PROJECT WAS LAUNCHED IN 2009 TO REDUCE FOOD and income insecurity in South Asia through accelerated development and deployment of new cereal varieties, sustainable management practices for crop and resource systems, and better access to information. The project includes widespread delivery and adaptation of production and postharvest technologies to increase cereal production and raise income. It also involves promotion of (1) crop and resource management practices and (2) high-yielding, stress-tolerant and disease- and insect-resistant rice, wheat, and maize varieties. In particular, the project looks at men's and women's different degrees of ownership, access, and decisionmaking in connection with key livelihood-sustaining assets and whether the introduction of new technologies influences these differences.

This study of the Cereal Systems Initiative for South Asia (CSISA) was motivated by an interest in how men and women in the same household acquire information through social networks about agricultural technologies. Most literature on learning and technology adoption in agriculture assumes a unitary household model. In this model, information flows into the household through the male household head via his interactions with other farmers, extension agents, and other sources of agricultural information. Guided by the information he gathers, he then selects the technology that maximizes household well-being.

However, information can be gathered by both men and women through their own distinct social networks. These different information channels are valuable assets that can greatly help in learning about new technologies and farming practices. Also, women can play a fundamental role in many production-related decisions, including technology adoption, crop portfolio, input use, and marketing choices. When technology adoption decisions are considered to be made jointly, female preferences have been shown to play a significant role in the household's technology choice (Fisher, Warner, and Masters 2000; Zepeda and Castillo 1997). This suggests the importance of including both male and female preferences and information sources when modeling technology adop-

tion. This study, conducted in partnership with the Gender, Agriculture, and Assets Project (GAAP), examines the formation and composition of men and women's social networks and how they might affect technology adoption.

INTERVENTION AND STUDY SITE

During 2011-12, CSISA studied laser land leveling (LLL), a process of precisely smoothing agricultural land using a laser-guided drag scraper attached to a tractor. LLL reduces undulations much more than traditional leveling methods (Jat et al. 2006) and improves on an activity farmers already know is important and have been doing for generations. The primary benefit of LLL is a reduction in irrigation, which in turn saves on diesel fuel costs from pumping water. Agronomic trials show that LLL can improve crop establishment and growth, thereby improving fertilizer efficiency, reducing weed pressure, and increasing yields.

STUDY OBJECTIVES

In partnership with GAAP, CSISA sought to examine how men and women access information about agricultural technologies through their respective social networks. As part of the project the team assembled unique sex-disaggregated

data on social networks and household technology demand. By analyzing this data, the project examined the differences between the social networks of men and women from the same household and how these social networks impact men and women's abilities to access information about the technology.

OVERVIEW OF METHODOLOGY AND DATA COLLECTION

The study site included three districts in Eastern Uttar Pradesh, India: Maharajganj, Gorakhpur, and Deoria. These districts represented the regional spectrum of productivity in rice-wheat cropping systems. Data collection took place in several steps over the course of a full agricultural year (May 2011 to May 2012). In each district, eight villages were randomly selected for inclusion in the study. The final sample size contained 478 households, 392 of which are headed by men. From these male-headed households data was collected from 335 women who identified themselves as the primary female decisionmakers, typically the wives of the male household head. These 335 households provide a unique dataset in which individual network links are known for both the male household head and his female co-head.

The following terms are used to distinguish among different groups of individuals:

- ▶ MHH—male head of male-headed household
- ▶ FHH—female head of female-headed household
- ▶ HH—household head, either MHH or FHH
- ▶ FCH—female co-head: the primary female decisionmaker in male-headed household

The initial contact with HHs occurred in 2011 via an information session organized in each sample village to introduce them to LLL. A few days later, a baseline household survey of sample HHs was conducted. This survey included a detailed social networks module in which each HH was asked to identify all of his or her network links in the village. Most importantly, respondents were asked to identify those they discuss agriculture with. Social network surveys were conducted with FCHs several months later, in February 2012. In these surveys, the FCHs were asked to identify households that contain women with whom they discuss agriculture.

A non-competitive auction in which survey participants bid on LLL services was conducted several days after the initial information session in order to elicit HH willingness-to-pay for LLL. A second auction was conducted one year later to measure demand after a year of exposure to the technology. After this auction FCHs were resurveyed to determine their role in deciding how much the MHH would bid in the auction.

RESULTS

Intrahousehold Communication and Decisionmaking

Over half of all FCHs work on their household's own plots, though the proportion is higher for FCHs in poor households. A similar proportion of FCHs discusses agriculture with MHHs and participates in decisions about agriculture; a little over one-third discuss agricultural technology with MHHs. These percentages are also higher for FCHs in poor households: 60 percent discuss agriculture with MHHs and 42 percent discuss agricultural technology with them. Two-thirds of MHHs report discussing agricultural technologies with their wives and nearly three-quarters state that their wives' opinions on technology choices are important or very important. Consistent with these findings, LLL was a conversation topic between husbands and wives, and women were involved in the decision about how much to bid in the second auction.

Network Composition and Formation

The social networks of MHHs and FCHs in the same households overlap surprisingly little. In only about 5 percent of cases did MHHs and FCHs claim members of the same household as agricultural contacts. Men and women in the same households therefore have access to different agricultural information. MHHs are much more likely to claim an agricultural link to another MHH than to a FHH.

Further, male social networks are much more heterogeneous in wealth than female social networks. Whereas men from poor households tend to discuss agriculture with relatively wealthy men, women from poor households are much more inclined to discuss agriculture with other women from poor households. This is probably because poor women are much more involved in agriculture than their wealthier counterparts due to both social norms and economic constraints.

Exposure to LLL through Networks

Differences between MHH and FCH link formation have apparent implications for how a household might obtain agricultural technology information. Poor FCHs have significantly larger networks than poor MHHs, meaning that for poorer households FCHs provide more agricultural links than MHHs. Among wealthy households, MHHs have larger networks than FCHs: though this difference is not statistically significant, it suggests that the MHH provides as much or even more connectivity for wealthier households as the FCH.

By using willingness-to-pay data from the first LLL auction, the number of potential LLL-adopter households in each individual's social network can be compared. While MHHs in wealthy and poor households have an equal number of links to potential adopters in their networks, poor FCHs have significantly more potential adopters in their networks than

wealthier FCHs. However, poor FCHs have fewer potential adopters in their social networks than poor MHHs. This is because poor MHHs are more likely to be connected to wealthy MHHs than poor FCHs are to be connected to wealthy FCHs.

CONCLUSIONS AND POLICY IMPLICATIONS

Men and women in the same households have very distinct networks of agricultural contacts. The underlying factors that shape network linkages among male farmers are different from those shaping their wives' social networks.

Women's networks are as large as men's or, in the case of poor households, substantially larger. Women's connections, however, are more likely to be with poorer households that are less likely to adopt new technology. Therefore women's larger networks might provide less information about agricultural innovations. In contrast, poor men with smaller agricultural networks tend to be connected to wealthier and more progressive farmers who are more likely to be early technology adopters—either because being wealthy or progressive has a direct positive influence on adoption or because these factors attract extension assistance.

These findings have implications for how public extension services and private service providers can use female networks to facilitate inclusive technology dissemination. Exploiting female social networks among poor households may be one way to achieve such dissemination. Further research into how gender-specific social networks operate is needed to improve our understanding of network composition, characteristics, and architecture. Understanding how networks influence social learning processes and how social learning can be leveraged to improve agricultural productivity, natural resources management, or marketing is also necessary.

Efforts to better leverage gendered networks through rural producer organizations, cooperative societies, and self-help groups (Markelova et al. 2009, Vasilaky 2013) offer one possible avenue of intervention and investment. Another avenue



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is expanding the number and role of women in extension service provision and thus improving access to female social networks (Haug 1999; Kondylies and Mueller 2013; Liepins and Schick 1998). Other methods include designing novel business models and targeted public subsidies that leverage these social networks to promote information about and adoption of new technologies and practices among women, whether or not they are considered the primary household decisionmakers. These interventions and investments suggest the need for greater analytical attention to institutional innovation—in particular, the novel use of networks to exchange knowledge and information—as an accompaniment to technological innovation in developing-country agriculture.

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FOR FURTHER READING

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Nicholas Magnan (nmagnan@uga.edu) is an assistant professor at the University of Georgia, Athens, US. **David J. Spielman** (d.spielman@cgiar.org) is a senior research fellow in the Environment and Production Technology Division of the International Food Policy Research Institute, Washington, DC. **Kajal Gulati** (kgulati@ucdavis.edu) is a PhD candidate in agricultural economics at the University of California, Davis, US. **Travis J. Lybbert** (tlybbert@ucdavis.edu) is an associate professor in the Department of Agricultural & Resource Economics at the University of California, Davis, US.

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2033 K Street, NW, Washington, DC 20006-1002 USA | T. +1.202.862.5600 | F. +1.202.467.4439 | Skype: IFPRIhomeoffice | ifpri@cgiar.org | www.ifpri.org

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