GAAP
Gender, Agriculture, & Assets Project
Led by IFPRI & ILRI

Gender, Agriculture, and Assets: Learning from Eight Agricultural Development Interventions in Africa and South Asia

GAAP NOTE | NOVEMBER 2013

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 adoption. 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

David Spielman/International Food Policy Research Institute

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.

REFERENCES

Fisher, M.G., R.L. Warner, and W. A. Masters. 2000. "Gender and Agricultural Change: Crop-Livestock Integration in Senegal." *Society & Natural Resources* 13 (3): 203–222.

Haug, R. 1999. "Some Leading Issues in International Agricultural Extension, a Literature Review." *The Journal of Agricultural Education and Extension* 5 (4): 263–274.

Jat, M., P. Chandna, R. Gupta, S. Sharma, and M. Gill. 2006. "Laser Land Leveling: A Precursor Technology for Resource Conservation." *Rice-Wheat Consortium Technical Bulletin Series* 7. Unpublished, Rice-Wheat Consortium for Indo-Gangetic Plains, New Delhi, India.

Kondylies, F., and V. Mueller. 2013. *Seeing is Believing? Evidence from a Demonstration Plot Experiment*. Washington, DC: International Food Policy Research Institute.

Liepins, R., and R. Schick. 1998. "Gender and Education: towards a Framework for a Critical Analysis of Agricultural Training." *Sociologia Ruralis* 38 (3): 285–302.

Markelova, H., R. Meinzen-Dick, J. Hellin, and S. Dohrn. 2009. "Collective Action for Smallholder Market Access." *Food Policy* 34 (1): 1–7.

Vasilaky, K. 2013. "Female Social Networks and Farmer Training: Can Randomized Information Exchange Improve Outcomes?" *American Journal of Agricultural Economics* 95 (2): 376–383.

Zepeda, L., and M. Castillo. 1997. "The Role of Husbands and Wives in Farm Technology Choice." *American Journal of Agricultural Economics* 79 (2): 583–588.

FOR FURTHER READING

Magnan, N., D. J. Spielman, K. Gulati, and T. J. Lybbert. 2013. *Gender Dimensions of Social Networks and Technology Adoption: Evidence from a Field Experiment in Uttar Pradesh, India*. IFPRI Discussion Paper. Washington, DC: International Food Policy Research Institute, forthcoming.

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.*

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.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

A member of the CGIAR Consortium | A world free of hunger and malnutrition

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

This publication has been prepared as an output of the Gender, Agriculture, & Assets Project. It has not been peer reviewed. Any opinions stated herein are those of the author(s) and do not necessarily reflect the policies of the International Food Policy Research Institute.