

ETHIOPIA

Strategy Support Program II



ETHIOPIAN DEVELOPMENT
RESEARCH INSTITUTE



INTERNATIONAL
FOOD POLICY
RESEARCH
INSTITUTE
A member of the CGIAR Consortium

ESSP RESEARCH NOTE 21 • January 2013

Effects of Extension Services on Technology Adoption and Productivity among Female and Male Farmers

Summary of ESSP Working Paper 49, "Gender Differences in Access to Extension Services and Agricultural Productivity"

Catherine Ragasa, Guush Berhane, Fanaye Tadesse, and Alemayehu Seyoum Taffesse

This study contributes new empirical evidence on the gender difference in access to extension services in Ethiopia and how this translates to observed differences in technology adoption and agricultural productivity. Our results suggest that female household heads and plot managers are less likely to get extension services and are less likely to access quality services than their male counterparts. Receiving advice from development agents, as agricultural extension officers in Ethiopia are called, is strongly and positively related to adoption of improved seed and fertilizer for both female and male headed households. However, visits by or advice from development agents do not significantly affect productivity, for both females and males. The results highlight the need for closing the gender gap in the provision of extension services and in productivity.

Agricultural extension and rural education have been emphasized by development experts as crucial in achieving agricultural development, poverty reduction, and food security. In Ethiopia, the government has been actively investing in its agricultural extension system in the past years. Ethiopia's extension system has now one of the highest development agent-farmer ratios found in the world. On the gender frontier, various attempts to reach more female farmers have been implemented, including the creation of a "women's development package". However, recent reports still point to the persistence of gender inequality in rural services, including extension. Given this underlying context, there is limited understanding on how such disparities in extension services relate to improved technology adoption and productivity levels.

Data and methods

This study uses a recent unique dataset from a household survey undertaken by Ethiopia's Central Statistical Agency (CSA) in June and July 2011. The survey covers the most important agroecological regions and the four major administrative regions of Ethiopia (Tigray, Amhara, Oromia, and SNNP) and has a sample size of 7,927 households, which was designed to ensure a statistical representation of female headed households in the population.

The analytical framework used is a standard empirical agricultural production model, in which production output is expressed as a function of land, capital, inputs, and other factors. Since we are interested in the contribution of knowledge and human capital through extension services as well as in gender differences, extension variables and a gender indicator were added into the production function.

Gender differences in access to extension services

The data suggests that technology adoption by farm households remains low. For instance, only 31 percent of households used fertilizer in the last planting season, with the percentage of female headed households being only 27 percent compared to 32 percent for male headed households. Similarly, only 27 percent of the households were visited by development agents

(DAs) in the past year, with still fewer female headed households (20 percent) being visited by DAs compared to their male counterparts (30 percent). No significant difference is observed between de jure and de facto female heads in terms of access to extension services. And, there is no significant difference in the results on the key variables by using either household headship or plot decisionmaker.

Controlling for other factors, the results show a clear difference between female and male heads in access to visits and advice from DAs (male heads are about 5 percent more likely to be visited by DAs compared to female heads), as well as other channels of information. Male heads are more likely to attend community meetings and visit demonstration plots or research centers. In addition to gender, the other factors that are found to significantly affect access to extension services include education, wealth indicators (land size and livestock holdings), proportion of males in the households, distance to market, and location dummies.

Gender differences in technology adoption and input use

Simple mean comparison tests suggest strong and statistically significant differences in input use and technology adoption between female and male heads. However, after controlling for other household-, plot-, and village-level characteristics, input use and adoption of improved management practices are not significantly different between female and male heads and between female and male plot-managers (Table 1).

Extension service provision, in the form of DA advice received, is a significant factor that explains whether farmers adopt fertilizer or improved seed, and the rate of use of these inputs. Other extension variables, such as frequency of DA visit, access to radio, or attendance at community meetings are not significant. The difference in terms of access to resources (such as land size), education, and access to extension services (particularly with respect to advice on fertilizer) could be the factors leading to the observed difference in the use of fertilizer and improved seed between male and female heads.

Table 1—Correlates of fertilizer and improved seed use

Explanatory variables	Fertilizer use (yes=1) ^a	Improved seed use (yes=1) ^a	Fertilizer quantity (kg/ha) ^b	Improved seed quantity (kg/ha) ^b
Gender (omitted=male)				
<i>De jure</i> female head ^c	0.030 (0.070)	0.008 (0.069)	1.133 (3.944)	0.173 (0.404)
<i>De facto</i> female head ^c	0.012 (0.082)	0.005 (0.116)	0.224 (4.000)	-0.311 (0.387)
Access to extension services (=1)				
Attended community meetings	-0.063** (0.075)	-0.009* (0.059)	-16.506** (7.512)	-0.568 (0.395)
Received advice on fertilizer or seed from DA	0.307*** (0.134)	0.025*** (0.070)	46.260*** (8.064)	2.486*** (0.556)
Visited by DA in last 5 years	0.001 (0.077)	0.000 (0.068)	1.000 (5.984)	-0.063 (0.347)
Uses radio to get production information	0.031 (0.065)	0.006 (0.075)	3.641 (5.182)	0.424 (0.346)
Visited government office	-0.008 (0.131)	-0.003 (0.137)	12.122 (9.498)	0.258 (0.710)
Visited farmer training centers	-0.034 (0.087)	0.003 (0.097)	-7.423 (5.197)	0.106 (0.504)
Number of observations	31,450	31,450	30,160	31,104
(Pseudo) R²	0.220	0.171	0.12	0.07

Source: Authors' calculation using HICES 2004/05 survey of the CSA (2011).

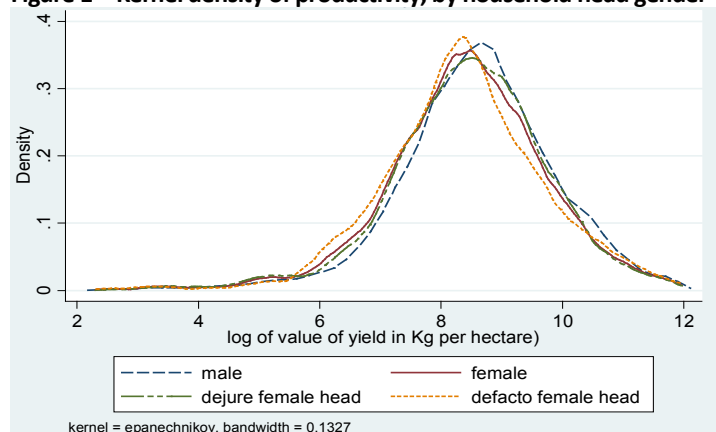
Notes: DA=development agent; /a Figures for fertilizer use and improved seed use are the marginal effects from estimating probit models; /b Estimates from ordinary least square (OLS) estimation. /c *De jure* female heads are widows, single, divorced, or separated, while *de facto* female heads are wives of male migrants or with ill spouses. Figures in parentheses are the robust standard errors.

***Significant at 1% level; **Significant at 5% level; *Significant at 10% level.

Gender differences in productivity

The value of yield per hectare of various crops is used as the measure of productivity because the majority of plots were intercropped and area estimates for each crop are difficult to calculate. On average, the value of production per hectare of a farming household was 10,942 ETB (Ethiopian Birr). Female headed households have significantly less value of production (mean=9,898 ETB/ha) than male headed households (mean=11,273 ETB/ha) (Figure 1).

Figure 1—Kernel density of productivity, by household head gender



Source: Authors' calculations

After controlling for other household-, plot-, and village-level characteristics, household head gender and plot

decisionmaker gender are nonsignificant factors in most productivity models estimated. This suggests that plots of female heads and female plot managers are as equally productive as their male counterparts, if they would face the same level of inputs and access to improved technologies and services.

As expected, other factors remaining the same, plot-level productivity differences are statistically explained by the intensity of use of traditional inputs (mainly labor and oxen—a key draft animal in Ethiopia), as well as adoption or use of modern inputs (mainly fertilizer, improved seeds, pesticides, and irrigation). On the other hand, all the extension service delivery methods (received information from DA on fertilizer, received information from DA on planting, production information through radio) are not significant in most productivity models estimated. Beyond the influence of visits or advice by DA on fertilizer and improved seed use, there is no other direct effect on productivity. It is the perceived quality of the extension service that appears to be significant for the crop productivity models, particularly for teff, enset, and permanent crops.

Conclusion

Our results suggest that there is a systematic and statistically significant gender difference in access to different channels and types of extension services. Female household heads and plot managers are less likely to get extension services through various channels and are less likely to access quality service (measured in terms of their reported perception of the usefulness of advice from DAs) than their male counterparts.

Receiving advice from DAs and the perceived usefulness of DA advice are major factors that explain the likelihood of technology adoption and rate of input use. Although we note in absolute terms a difference between females and males in input use, this difference disappears when we control for several household-, plot-, and village-level characteristics.

In contrast to most other studies, we find that visits by or getting advice from DAs are not significant in explaining productivity levels. Aside the influence of DA visits on fertilizer and improved seed use, it is the perceived quality of extension being provided and access to radio for agricultural information that are major factors directly explaining productivity levels of most crops in the four major regions surveyed in Ethiopia.

The results show that closing the gender gap in agricultural productivity in Ethiopia will require programs to reach both female and male farmers with quality extension services, as well as to close the persistent women bias in access to productive resources and inputs. Particular focus of closing the gender gap will be on expanding both coverage and quality of extension service delivery for barley, teff, enset, pulses, and fruits and vegetables for female farmers and increasing the coverage of information dissemination through radio, which seems to be a significant factor in some crop production models estimated.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

2033 K Street, NW • Washington, DC 20006-1002 USA

T: +1.202.862.5600 • F: +1.202.467.4439

Skype: ifprihomeoffice • Email: ifpri@cgiar.org • www.ifpri.org

IFPRI-ESSP II ADDIS ABABA

P.O. Box 5689, Addis Ababa, Ethiopia

T: +251.11.617.2000 • F: +251.11.646.2318

Email: mahlet.mekuria@cgiar.org • <http://essp.ifpri.info>

ETHIOPIAN DEVELOPMENT RESEARCH INSTITUTE

Blue Building, Addis Ababa Stadium

P.O. Box 2479, Addis Ababa, Ethiopia

T: +251.11.5 50.60.66; +251.11.5 53.86.33 • F: +251.11.5.50.55.88

Email: info@edri-eth.org • www.edri-eth.org

This publication has been prepared as an ESSP II output. 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 (www.ifpri.org), its partners, or its collaborators.

Copyright © 2013 International Food Policy Research Institute. All rights reserved. To obtain permission to republish, contact ifpri-copyright@cgiar.org.