

Evans School Policy Analysis and Research, EPAR

*Professor C. Leigh Anderson, PI and Lead Faculty
Associate Professor Mary Kay Gugerty, Lead Faculty
Ryan Gockel, Lead Research Analyst*

January 19, 2010

Introduction

A widely quoted estimate is that women produce 70 to 80 percent of Sub-Saharan Africa's (SSA) food. Doss (2006) suggests that even these high numbers may be an underestimate.¹ Increasing farmer productivity in SSA therefore requires understanding how these women make planting, harvesting, and other decisions that affect the production, consumption, and marketing of their crops.

Women farmers' decisions are affected by the opportunities and constraints they face in cultural norms, formal laws, household roles, physical attributes, and child-bearing. Women's decisions may also be affected by risk preferences that differ on average from men's.² Hence, understanding production choices necessitates considering differences between men and women, as well as gender relations.^{3,4,5,6} A considerable literature documents institutional constraints that limit women's full access to cropping technologies including land tenure, finance, markets, and information or training. Furthermore, studies suggest women face significant labor and time constraints due to a multiplicity of household and family roles from farmer to marketer, multi-generational caregiver, and community volunteer.

Key Issues

Access to Inputs: Credit and Cash Constraints

Studies suggest that a lack of cash and credit access may limit SSA women's ability to purchase inputs like improved seed, fertilizer, herbicides, labor, and other technologies. A 1990 study in Kenya, Malawi, Sierra Leone, Zambia, and Zimbabwe found that women received less than 10 percent of the credit given to

smallholders and less than one percent of total agriculture-based credit.⁷ As Quisumbing and Pandolfelli (2009) note, limited collateral, high transportation cost, involvement in informal markets, limited education, and cultural barriers all contribute to this low access.⁸ Women's inability to meet capital needs through credit has been shown to have an adverse effect on household productivity.⁹

Women's limited involvement in formal markets may also pose a barrier to obtaining credit. A study from Zimbabwe found that access to credit was determined by showing receipts from past sales to document a marketable surplus. Because women had not sold previous harvests, they were unable to take out loans.¹⁰

Because women's limited cash and credit constraints affect their ability to adopt technologies, the gains from technology often end up accruing to men, as they are more likely to have the capital to purchase the technology. This is particularly significant for input-intensive crops like hybrid maize, for which farmers need to have both improved seeds and fertilizer to gain the full potential of yield improvements. Bourdillon et al. (2007) found that men in Zimbabwe had greater access to financial assets and formal marketing institutions, and that women were less likely to adopt high-yielding maize varieties than men, arguably because open-pollinated varieties did not require them to obtain loans for fertilizer and seeds.¹¹ In a Nigerian program where extension workers paid particular attention to the demands of women for seed and fertilizer, women actually adopted improved maize at higher rates than men.¹²

Recent efforts, most visibly by the Grameen Bank, have sought to bypass traditional collateral requirements for lending, instead utilizing women's groups to foster social

capital, aggregate capital, and pool risk. Women may use these groups as a conduit for saving, or the organization may charge a small fee to members who can then take out loans from the organization. The group can also leverage its purchasing power to secure lower prices for costly inputs like improved seed and fertilizer. In a randomized trial in South Africa, Karlan and Zinman (2007) found that lowering interest rates and more importantly, increasing loan duration, resulted in increased loan size, suggesting that women's likelihood of borrowing may be related to these features of the loan.¹³

Savings and other cash flow interventions are alternatives to addressing cash constraints. Duflo, Kremer, and Robinson (2006) found that while many farmers surveyed in Kenya planned on using fertilizer the next year, few actually did, suggesting they were unable to save the money to buy fertilizer.¹⁴ In response, the researchers set up a commitment device that allows farmers to purchase a voucher for fertilizer immediately after harvest, when money might be relatively abundant. The implementing organization then delivered the fertilizer during planting time free of charge. This program led to a significant increase in fertilizer adoption.¹⁵ These types of savings instruments could be preferable to credit if the return on investment of a technology adoption is not sufficiently great to outweigh the high interest cost and risk involved.

Extension Services

Throughout SSA, male agents often provide extension services to male farmers, with the assumption that men will share the information with their wives and other women farmers. Research finds that this transmission of information is inefficient and often the information ignores gendered differences between farmers.^{16,17} Male extension agents may lack sensitivity to women's time and credit constraints or may ignore women with low levels of formal education, thinking them incompetent.¹⁸

Studies find that extension services that bypass women slow the adoption of new technologies, including improved seed varieties.^{19,20,21} Recruiting more women as extension agents, training male agents to meet the needs of women farmers, and making extension available at times and locations convenient to women may give women greater access to extension efforts.^{22,23} In Tanzania for example, one-third of all extension agents are now women,

and Due, Magayane, and Temu (1997) found that female farmers prefer women agents and male farmers do not object to them.²⁴ Blackden and Canagarajah (2003) reported that targeting women for extension services resulted in higher yields.²⁵

Well-intentioned interventions, however, need to consider cultural appropriateness to avoid unintended consequences. Women extension agents given motorcycles to travel to villages in Nigeria used them infrequently because driving them was culturally inappropriate for women. Instead, the agents' male relatives primarily used the motorcycles.²⁶

Division of Labor

Gender norms, as well as preferences and constraints, determine what crops women and men grow. Women are traditionally responsible for cultivating food for home consumption on household plots, whereas men usually grow the main cash crop on personal plots. Low-value crops such as millet and sorghum are typically considered women's crops. This focus on subsistence needs may limit women's ability to earn cash because household food requirements must be met first.^{27,28}

Men and women also tend to have different tasks for each crop. In general, clearing the field and plowing are considered men's work, while women are thought to be responsible for weeding and post-harvest processing, but this varies depending on the role that the crop plays.²⁹ In millet production in the Kagera Region of Tanzania, for example, women have exclusive responsibility for all activities, but in West Africa, men are often considered responsible for millet production.^{30,31,32,33}

In addition to varying by crop and location, division of labor is dynamic. Doss points out that traditional gender norms might not reflect actual practices and introducing technology might also alter responsibilities.^{34,35} In a Senegalese village, introducing a millet thresher, dehuller, and mill resulted in threshing becoming the responsibility of men, perhaps due to the heavy work required to bring bundles of millet heads to the centralized machinery.³⁶ In Burkina Faso, women traditionally cultivated and controlled inland fresh water swamp rice. However, after an irrigation system was introduced, control of rice was transferred to men.³⁷

Unfortunately, it is difficult to predict *a priori* how labor allocations might shift with the introduction of new technology. Studies suggest that technologies which increase the profitability of a crop are often appropriated by male household members, making access and control considerations relevant when these technologies are introduced. Research in our series suggests that understanding and anticipating these outcomes can be addressed in part by utilizing participatory appraisal techniques throughout the technology development process, and by paying attention to the specific nature of cultural and institutional practices and constraints.

The division of labor over the crop cycle can be expected to influence preferences over the technologies and practices that affect those activities. Farnworth and Jiggins (2006) determined that women in a region of Malawi preferred dent-type maize because of its shorter cooking time.³⁸ In developing New Rice for Africa (NERICA) varieties, the Africa Rice Center (WARDA) recently started using Participatory Varietal Selection.³⁹ In one trial in Ghana, yield was the most important trait for women because rice was the primary staple food whereas men, responsible for purchasing inputs, were more likely to choose based on how well the variety did with little fertilizer.⁴⁰ The short duration of the NERICA varieties also helps reduce weeding labor for women. These participatory techniques have partially resulted in greater productivity gains for women farmers adopting NERICA than for men (850 kg of paddy/ha compared with 517 kg for men).⁴¹

Labor Constraints

The extent of women's participation in the agricultural labor force varies greatly. Women's access may be limited if the market is already saturated with male laborers, but demand for women's labor in agriculture in SSA is increasing as men increase their participation in rural and urban wage labor.^{42,43} Higher demand may be beneficial for women seeking work but also puts a strain on women who are responsible for the majority of childcare and household tasks.^{44,45} Additionally, the production activities primarily undertaken by women, especially post-harvest processing, are usually the most time-consuming and arduous. Seasonal labor bottlenecks can exasperate this

strain and even lower crop yields, as is the case with late weeding of sorghum.⁴⁶

The increased yields and decreased processing time offered by many labor-saving technologies have the potential to raise women's incomes and standard of living. As previously noted, however, credit constraints and changeable divisions of labor might limit the gains, which actually accrue to women. Additionally, technology may displace women involved in wage labor if alternative sources of income are not available.

Similarly, lower levels of education and literacy among women farmers may impede women's utilization of information and thus limit their knowledge of new technologies. A study in Cameroon found that farmers who were more highly educated were more likely to use chemical fertilizer.⁴⁷ This connection between low education levels and low technology adoption suggests that increasing girls' and women's education and agricultural training is important for agricultural productivity.

Intrahousehold Dynamics

Empirical evidence rejects the theory that households function as a unit—household resource allocation decisions may vary depending on who is making the allocation decision.^{48,49} Udry (1996) found that many households in SSA do not allocate their labor resources efficiently to maximize total household gain, further challenging the idea of the unitary household.⁵⁰ Doss (2001) noted that age, status within the household, and number of adults in the household may all influence the relative power of a married woman to influence production decisions or adopt technology.⁵¹

Research indicates that women's and men's relative control of resources has significant impacts on household consumption. Studies across a range of countries consistently show that the percentage of household income controlled by women is positively correlated with the amount of money spent on household welfare, including education, health, and nutrition-related expenditures.⁵² In Côte d'Ivoire, researchers found that increasing women's cash income in the household significantly increased household spending on food and decreased spending on alcohol and cigarettes.⁵³

Bargaining power is key to intrahousehold dynamics. In some cases, women may use their labor as a bargaining tool or to maintain control over income. In Cameroon, an irrigated rice project failed when women withdrew their labor from the rice plots (for which men controlled the income) and instead used their labor to grow sorghum on their own plots outside of the irrigation project if they felt they were not being adequately compensated by their husbands.⁵⁴

Market Access

Barriers to market access may prevent women from fully capitalizing on increases in crop production. These barriers include inadequate commodity transport from farm to market, harassment by market officials, time burdens, and marital conflict.⁵⁵ Agricultural companies often assume that men are the primary producers in the household and thus contract with men more often than women. A project in Uganda and Malawi attempted to avoid this disparity by requiring that women make up 30 to 50 percent of the marketing group and that gender equality be a factor in contracting decisions. Following the introduction of this policy, women's incomes and involvement in household decision-making increased.⁵⁶

It is difficult for women farmers, like all smallholder farmers, to engage in commercial agriculture.⁵⁷ High-value procurement chains tend to source from large farmers because of their ability to consistently produce large quantities of goods.⁵⁸ Research shows that less than 10 percent of household contracts in Kenya were with women farmers. One strategy that has the potential to enhance bargaining power and market access is the organization of smallholder producers into marketing groups.⁵⁹

Land Tenure

Most researchers concur that women generally have less secure property rights in both legal and traditional land tenure systems.^{60,61} In Cameroon, Mason and Carlsson (2004) found that women provided more than 75 percent of agriculture labor, yet owned just 10 percent of the land.⁶² In Ghana, Goldstein and Udry (2005) blamed women's weak property rights for lower productivity as women risked losing their land when investing in fallow land (instead of actively farming).⁶³ Weak property and

land tenure rights such as these can limit women's ability to participate in land markets and obtain credit. Insecure tenure is also believed to discourage women's investment in land and technological innovations.⁶⁴

Even where women may have legal land rights, weak or no enforcement may restrict the strength of these rights.⁶⁵ In Gambia in 1984, a project introduced irrigation to rice farming (considered a woman's crop) to give women priority in land registration in an attempt to keep women's control of the land. However, when yields improved under the new irrigation scheme, men took over control of the land.⁶⁶ Regardless of tenure, women's landholdings tend to be smaller, less fertile, and at a greater distance from the home than men's land.⁶⁷

Programs that facilitate tenure rights and legal literacy campaigns have been shown to have positive agricultural outcomes. Holden, Deininger, and Ghebru (2007) found that a low-cost land registration and certification process in Ethiopia increased land rental market participation for women.⁶⁸ In Uganda, a project educating women on land rights resulted in women's increased investment in soil conservation.⁶⁹

While secure land tenure rights may benefit many smallholders, privatization of land may actually result in some poor rural women losing their current access.⁷⁰ In situations where women maintain land only informally or through usufruct rights through their spouse or village chief, Doss (2001) notes that formal land titling may actually push these women off their land if they cannot afford to purchase the land they are already using.⁷¹

Conclusion

Gender shapes the constraints and opportunities along the agricultural production chain. The studies reviewed suggest that differential preferences and access to assets by men and women can affect adoption levels and the benefits that accrue to men and women. Findings show that women have less secure access to credit, land, inputs, extension, and markets. Similarly, women's multi-faceted role in household management gives rise to preferences that may very well be different from those of men. Yet most of the world's poorest smallholder farmers are women, stressing the importance of understanding

women's ability and willingness to invest in agricultural technologies.

Our series has highlighted the successes that are possible when gender is taken into account, especially when institutions (both formal and informal) are reshaped to be more inclusive. Participatory Breeding and Participatory Varietal Selection are two methods shown to be successful in developing technology that is more appropriate and more likely to avoid unintended consequences. Regularly collecting gender-disaggregated statistics can also result in a greater understanding of how technology has affected both men and women. Agricultural technology has the potential to enhance both men's and women's welfare and productivity, but unless gender is sufficiently integrated into every step of the development and dissemination process, efforts will only achieve a fraction of their total possible benefit.

Please direct comments or questions about this research to Leigh Anderson at eparx@u.washington.edu.

References

- Adeleke, O. A., Adelalu, K. O., Matanmi, H. M., & Olaniyi, O. A. (2008). Gender and productivity differentials in maize production in Afijio local government area of Oyo State. *Agricultural Journal*, 3(3), 199-203.
- Adeleke, O. A., Adesiyani, O. I., Olaniyi, O. A., Adelalu, K. O., & Matanmi, H. M. (2008). Gender differentials in the productivity of cereal crop farmers: A case study of maize farmers in Oluyole local government area of Oyo State. *Agricultural Journal*, 3(3), 193-198.
- Adetoun, B. E. A. (2003). *Organization and management of extension services for women farmers in south-western Nigeria*. New Delhi: Global Development Network. Retrieved from http://www.gdnet.org/cms.php?id=research_paper_abstract&research_paper_id=9885
- Africa Rice Center (WARDA). (1997). WARDA Annual Report 1996. Mbé, Côte d'Ivoire: Africa Rice Center (WARDA). Retrieved from <http://www.warda.org/publications/wardar96.pdf>
- Alderman, H., Chiappori, P. A., & Haddad, L. (1995). Unitary versus collective models of the household: Is it time to shift the burden of proof? *World Bank Research Observer*, 10(1), 1-19. Available from <http://wbro.oxfordjournals.org/cgi/content/abstract/10/1/1>
- Alwang, J., & Siegel, P. B. (1994). *Rural poverty in Zambia: An analysis of causes and policy recommendations*. Washington, D.C.: The World Bank, Human Resources Division, Southern Africa Department.
- Awumbila, M. (1997). Women, environmental change and economic crisis in Ghana. In E. A. Gyasi & J. I. Uitto (Eds.), *Environment, biodiversity and agricultural change in West Africa: perspectives from Ghana*. Tokyo: United Nations University Press. Accessed at <http://www.unu.edu/unupress/unupbooks/80964e/80964E0f.htm>
- Barnes, C. (1983). Differentiation by sex among small-scale farming households in Kenya. *Rural Africana*, 15-16, 41-63;
- Blackden, C., & Canagarajah, R. (2003). Gender and growth in Africa: Evidence and issues. Paper presented at the UNECA Expert Meeting on Pro-Poor Growth Kampala, Uganda, June 23-24. Washington, D.C.: The World Bank.
- Bourdillon, M. F. C., Hebinck, P., Hoddinott, J. Kinsey, B., Marondo, J., Mudege, N. & Owens, T. (2007). Assessing the impact of high-yield varieties of maize in resettlement areas of Zimbabwe. In M. Adato and R. Meinzen-Dick (Eds.) *Agricultural research, livelihoods, and poverty studies of economic and social impacts in six countries* Baltimore, Md., U.S.A.: Johns Hopkins University Press.
- Carney, J., & Watts, M. (1991). Disciplining women? Rice, mechanization, and the evolution of Mandinka gender relations in Senegambia. *Signs*, 16(4), 651-681.
- Dey, J. (1981). Gambian women: Unequal partners in rice development projects? *Journal of Development Studies*, 17(3), 109-122.
- Dey, J. (1984). *Women in rice-farming systems: Focus: Sub-Saharan Africa* (Women in Agriculture No. 2). Rome: Food and Agriculture Organization of the United Nations.
- Doss, C. R. (2001). Designing agricultural technology for African women farmers: Lessons from 25 years of experience. *World Development*, 29(12), 2075-2092. doi:10.1016/S0305-750X(01)00088-2
- Doss, C. R. (2006). Engendering agricultural technology for Africa's farmers. In E. Kuiper & D. K. Barker (Eds.), *Feminist economics and the World Bank: History, theory, and policy* (pp. 79-93). Washington D.C.: The World Bank.
- Doss, C. R., & Morris, M. L. (2001). How does gender affect the adoption of agricultural innovations? The case of improved maize technology in Ghana. *Agricultural Economics*, 25(1), 27-39. doi: 10.1016/S0169-5150(00)00096-7
- Due, J. M., Magayane, F., & Temu, A. A. (1997). Gender again--views of female agricultural extension officers by smallholder farmers in Tanzania. *World Development*, 25(5), 713-725. doi:10.1016/S0305-750X(96)00129-5

- Duflo, E., Kremer, M., & Robinson, J. (2006). Understanding technology adoption: Fertilizer in Western Kenya- evidence from field experiments. Unpublished manuscript. Available at http://www.econ.berkeley.edu/users/webfac/saez/e231_s06/esther.pdf
- Eisemon, T. O., & Nyamete, A. (1990). School literacy and agricultural modernization in Kenya. *Comparative Education Review*, 34(2), 161-176. Retrieved from <http://www.jstor.org/stable/1187951>
- FAO. (1998). *Rural women and food security: Current situation and perspectives*. Rome: Food and Agriculture Organization of the United Nations.
- FAO. (2004). *Gender and rice*. Rome: Food and Agriculture Organization of the United Nations.
- Farnworth, C. R., & Jiggins, J. (2006). *Participatory plant breeding and gender analysis*. PPB Monograph 4. Systemwide Program on Participatory Research and Gender Analysis. Cali: Consultative Group on International Agricultural Research.
- Fletschner, D. (2008). Women's access to credit: Does it matter for household efficiency? *American Journal of Agricultural Economics*, 90(3), 669-683. doi:10.1111/j.1467-8276.2008.01143.x
- Fletschner, D., Anderson, C. L., & Cullen, A. (in press). Are women as likely to take risks and compete? Behavioral findings from Central Vietnam. *Journal of Development Studies*.
- Fonjong, L. N., & Athanasia, M. F. (2007). The fortunes and misfortunes of women rice producers in Ndop, Cameroon and the implications for gender roles. *Journal of International Women's Studies*, 8(4), 133-147.
- Goldstein, M., & Udry, C. (2005). *The profits of power: Land rights and agricultural investment in Ghana* (Center Discussion Paper 0929). New Haven, CT: Economic Growth Center, Yale University. Available from <http://ssrn.com/abstract=868655>
- Gyasi, K. O., Abatania, L. N., Paulinus, T., Abdulai, M. S., & Langyintuo, A. S. (2003). A study on the adoption of improved maize technologies in northern Ghana. In B. Badu-Apraku, M. A. B. Fakorede, M. Ouedraogo, R. J. Carsky, & A. Menkir (Eds.), *Maize revolution in West and Central Africa: Proceedings of a regional maize workshop, IITA-Cotonon, Benin Republic, 14-18 May 2001* (pp. 365-381). Idaban: International Institute of Tropical Agriculture (IITA) and West and Central Africa Collaborative Maize Research Network (WECAMAN).
- Hoddinott, J., & Haddad, L. (1995). Does female income share influence household expenditures? Evidence from Côte d'Ivoire. *Oxford Bulletin of Economics and Statistics*, 57(1), 77-96. Available from <http://ideas.repec.org/a/bla/obuest/v57y1995i1p77-96.html>
- Holden, S., Deininger, K., & Ghebru, H. (2007, November). *Impact of land certification on land rental market participation in Tigray region, northern Ethiopia* (MPRA Paper No. 5211). Paper presented at the Nordic Development Economics Conference, Copenhagen, June 18 – 19. Washington, D.C.: The World Bank. Available at <http://mpa.ub.uni-muenchen.de/5211/>
- Huvio, T. (1998). *Women's role in rice farming*. Retrieved from <http://nird.ap.nic.in/clic/Rrd153.html>
- ICRISAT. (n.d.) Sorghum production practices notes. Retrieved from http://www.icrisat.org/vasat/learning_resources/crops/sorghum/sorghum_prodpractices/html/m914/index.html
- IFAD. (1999). *Assessment of rural poverty in West and Central Africa*. Rome: West and Central Africa Division.
- Improving Productivity and Market Successes (IPMS) for Ethiopian Farmers' Project. (n.d.). *Commodity gender fact sheets: Wheat- Ada, Oromiya*. Improving Productivity and Market Successes (IPMS) for Ethiopian Farmers' Project.
- Jackson, C. (1985). *The Kano River irrigation project*. West Hartford, CT: Kumarian Press.
- Jones, C. (1983). The mobilization of women's labor for cash crop production: A game theoretic approach. *American Journal of Agricultural Economics*, 65(5), 1049-1054. Retrieved from <http://www.jstor.org/stable/1240417>
- Karlan, D., & Zinman, J. (2007). Credit elasticities in less-developed economies: Implications for microfinance. *American Economic Review*, 8(3), 1040-68. doi:10.1257/aer.98.3.1040
- King, E. M., & Mason, A. D. (2001). Empirical tests of the "unitary" household. Appendix 4. In *Engendering development: Through gender equality in rights, resources, and voice* (pp. 307-312). Washington, D.C.: The World Bank; Oxford University Press.
- Lastarria-Cornhiel, S. (1997). Impact of privatization on gender and property rights in Africa. *World Development*, 25(8), 1317-1333. doi: 10.1016/S0305-750X(97)00030-2
- Loose, E. (1979). Women in rural Senegal: Some economic and social observations. *Paper prepared for the Workshop on Sahelian Agriculture*. Purdue University.
- Mason, K., & Carlsson, M. (2004). The Development Impact of Gender Equality in Land Rights. Paper presented at the Human Rights and Development: Towards mutual reinforcement conference hosted by the New York University School of Law. 1 March. New York.
- Mehra, R. & Rojas, M. H. (2008). *A significant shift. Women, food security and agriculture in a global market place*. Washington, D.C.: International Center for Research on Women. Retrieved from <http://www.icrw.org/docs/2008/a-significant-shift-women-food%20security-and-agriculture%20FINAL.pdf>
- Nkamleu, G. B., & Adesina, A. A. (2000). Determinants of chemical input use in peri-urban lowland systems: Bivariate

- probit analysis in Cameroon. *Agricultural Systems*, 63(2), 111-121. doi: 10.1016/S0308-521X(99)00074-8
- Norman, J. C., & Kebe, B. (2006, May 3-5). *African smallholder farmers: Rice production and sustainable livelihoods*. Paper presented at the International Rice Commission Twenty-first Session, Chiclayo, Peru.
- Nussbaum, M. (2000). *Women and human development: The capabilities approach*. New York: Cambridge University Press.
- Nwanze, K. F., Mohapatra, S., Kormawa, P., Keya, S., & Bruce-Oliver, S. (2006). Rice development in sub-Saharan Africa. *Journal of the Science of Food and Agriculture*, 86(5), 675-677. doi:10.1002/jsfa.2415
- Paris, T. R., Feldstein, H. S., & Duron, G. (2001). *Empowering women to achieve food security: Technology*. Washington, D.C.: International Food Policy Research Institute (IFPRI).
- Parpart, J., Connelly, P., & Barriteau, E. (2000). *Theoretical perspectives on gender and development*. Ottawa: International Development Research Centre.
- Phipps, S. A., & Burton, P. S. (1998). What's mine is yours? The influence of female incomes on patterns of household expenditure. *Economica*, 65, 599-613.
- Pitt, M. M., & Khandker, S. R. (1998). The impact of group-based credit programs on poor households in Bangladesh: Does the gender of participants matter? *Journal of Political Economy*, 106, 958-996.
- Quisumbing, A., & Pandolfelli, L. (2009, July). *Promising approaches to address the needs of poor female farmers* (IFPRI Discussion Paper 00882). Washington D.C.: International Food Policy Research Institute. Retrieved from <http://www.ifpri.org/sites/default/files/publications/ifpridp00882.pdf>
- Rohrbach, D. D. (1989). *The economics of smallholder maize production in Zimbabwe: Implications for food security*. East Lansing, MI: Michigan State University. Retrieved from <http://www.aec.msu.edu/fs2/papers/older/idp11.pdf>
- Saito, K. A., Mekonnen, H., & Spurling, D. (1994). *Raising the productivity of women farmers in Sub-Saharan Africa*. Washington D.C.: World Bank. Retrieved from <http://www.ingentaconnect.com/content/wb/493/1994>
- Thomas, D. (1990). Intrahousehold resource allocation: An inferential approach. *Journal of Human Resources*, 29(4), 950-988.
- Tibaijuka, A. (1994). The cost of differential gender roles in African agriculture: A case study of smallholder banana-coffee farms in the Kagera region, Tanzania. *Journal of Agricultural Economics*, 45(1), 69-81.
- Udry, C. (1996). Gender, agricultural production, and the theory of the household. *Journal of Political Economy*, 104(6), 1010-1046. Retrieved from <http://www.jstor.org/stable/2138950>
- UNIFEM. (1988). *Cereal processing: Food cycle and technology source book No.3*. Rome.
- Von Braun, J. & Webb, P. J. R. (1989). The impact of new crop technology on the agricultural division of labor in a West African setting. *Economic Development and Cultural Change*, 37(3), 513-534. doi: 10.1086/451740
- The World Bank. (2001). *Engendering development: Through gender equality in rights, resources, and voice*. World Bank Policy Research Report. Washington, D.C.: The World Bank. Available at <http://go.worldbank.org/XDIQD6VQR0>
- The World Bank/FAO/IFAD. (2009). *Gender in agriculture sourcebook*. Washington D.C.: The World Bank. Available from <http://worldbank.org/genderinag>

Endnotes

- ¹ Doss, 2006
- ² Fletschner, Anderson, & Cullen, in press
- ³ Nussbaum, 2000
- ⁴ Moser, 1993
- ⁵ Parpart, Connelly, & Barriteau, 2000
- ⁶ The World Bank, 2001
- ⁷ IFAD, 1999 and FAO, 1998 as cited in Mehra & Rojas, 2008
- ⁸ Quisumbing & Pandolfelli, 2009
- ⁹ Fletschner, 2008
- ¹⁰ Rohrbach, 1989
- ¹¹ Bourdillon et al., 2007
- ¹² Adeleke, Adesiyun, Olaniyi, Adelalu, & Matanmi, 2008 and Adeleke, Adelalu, Matanmi, & Olaniyi, 2008
- ¹³ Karlan & Zinman, 2007
- ¹⁴ Duflo, Kremer, & Robinson, 2006
- ¹⁵ Ibid., p. 19
- ¹⁶ Due, Magayane, & Temu, 1997
- ¹⁷ Mehra & Rojas, 2008
- ¹⁸ Eisemon & Nyamete, 1990
- ¹⁹ Quisumbing & Pandolfelli, 2009
- ²⁰ Saito, Mekonnen, & Spurling, 1994
- ²¹ Due, Magayane, & Temu, 1997
- ²² The World Bank/FAO/IFAD, 2009
- ²³ Mehra & Rojas, 2008
- ²⁴ Due, Magayane, & Temu, 1997
- ²⁵ Blackden & Canagarajah, 2003 as cited in Mehra & Rojas, 2008
- ²⁶ Adetoun, 2003
- ²⁷ Dey, 1984
- ²⁸ Huvio, 1998
- ²⁹ Doss, 2006
- ³⁰ Carney & Watts, 1991
- ³¹ Dey, 1981
- ³² Awumbila, 1997
- ³³ Tibaijuka, 1994
- ³⁴ Doss, 2006

-
- ³⁵ Doss, 2006
- ³⁶ Loose, 1979 as cited in UNIFEM, 1988
- ³⁷ Dey, 1984
- ³⁸ Farnworth & Jiggins, 2006
- ³⁹ Nwanze, Mohapatra, Kormawa, Keya, & Bruce-Oliver, 2006
- ⁴⁰ Africa Rice Center (WARDA), 1997
- ⁴¹ Quisumbing & Pandolfelli, 2009
- ⁴² Doss, 2006
- ⁴³ Paris, 2001
- ⁴⁴ Doss, 2006
- ⁴⁵ Fonjong & Athanasia, 2007
- ⁴⁶ ICRISAT, n.d.
- ⁴⁷ Nkamleu & Adesina, 2000
- ⁴⁸ Alderman, Chiappori, & Haddad, 1995
- ⁴⁹ King & Mason, 2001
- ⁵⁰ Udry, 1996
- ⁵¹ Doss, 2001
- ⁵² See for example, Hoddinott & Haddad, 1995; Phipps & Burton, 1998; Thomas, 1990; and Pitt & Khandker, 1998.
- ⁵³ Hoddinott & Haddad, 1995
- ⁵⁴ Jones, 1983
- ⁵⁵ Quisumbing & Pandolfelli, 2009
- ⁵⁶ Quisumbing & Pandolfelli, 2009
- ⁵⁷ Mehra & Rojas, 2008
- ⁵⁸ Mehra & Rojas, 2008
- ⁵⁹ Improving Productivity and Market Successes (IPMS) for Ethiopian Farmers' Project, n.d.
- ⁶⁰ Lastarria-Cornhiel, 1997
- ⁶¹ Doss & Morris, 2001
- ⁶² Mason & Carlsson, 2004
- ⁶³ Goldstein & Udry, 2005
- ⁶⁴ Doss, 2001
- ⁶⁵ Quisumbing & Pandolfelli, 2009
- ⁶⁶ Von Braun & Webb, 1989
- ⁶⁷ See for example, Barnes, 1983, Jackson, 1985, Alwang, & Siegel, 1994, all as cited in Doss, 2001
- ⁶⁸ Holden, Deininger, & Ghebru, 2007
- ⁶⁹ Gyasi, Abatania, Paulinus, Abdulai, Langyintuo, 2003
- ⁷⁰ Lastarria-Cornhiel, 1997
- ⁷¹ Doss, 2001