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Gender and Cropping: Wheat in Sub-Saharan Africa

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In the last half century, the increased opportunity cost of women's time in Sub-Saharan Africa (SSA) has led to remarkable growth in the consumption of wheat and other easy-to-prepare staples.[1] From 1961 to 2003, consumption per capita has risen 167% in the region.[2] Yet there have been relatively minor gains in production over the same period,[1] requiring Ethiopia to import 800,000 and Kenya 400,000 metric tons of wheat yearly.[3]

Table 1. Characteristics of Wheat in SSA

History	Traditional crop in Ethiopia, production in southern and eastern Africa established in late 1800s
Uses	Flour, bread, injera, noodles, alcohol[4]
Supply/ Demand	Consumption: +2.8% (FAO '94-'03) Production: +5.8% (FAO '94-'07)
Primary Cultivation Challenges	Stem rust, leaf blotch, leaf blight, weeds, soil acidity, poor drainage, heat stress, cost of irrigation/water scarcity, low yields
Current Technology Efforts	Machinery: combine harvesters, ox plow, mechanical sprayers, seed drills, Traits: high yield, disease and insect resistance, tolerance to mineral, moisture, and heat
Inputs	Irrigation, fertilizer, farm machinery
Major Producers	Ethiopia, South Africa, Sudan, Kenya, Zimbabwe, Zambia, Tanzania

Wheat tends to be grown and processed on a large scale in SSA.[5] In Kenya, 80% of wheat is produced on large-scale mechanized farms.[6] Ethiopia (SSA's largest producer of wheat) is the exception, where smallholders are responsible for 76% of total production.[7] This is not to say that smallholder wheat production is not viable. A study comparing small- and large-scale production in the southern highlands of Tanzania found that yields were higher in large-scale farms but smallholder production had positive net profitability and benefit-cost ratios.[8] This suggests that technology improvements such as improved varieties, soil fertility management, and weed control can improve productivity for smallholder wheat farmers.[8] However, in order for the region to fully achieve wheat production potential, addressing gender-specific constraints and preferences may be necessary.

Gender has been found to influence adoption of improved wheat varieties and other technologies, as in the central highlands of Ethiopia where 30% of male-headed households (MHHs) adopted improved varieties as compared to 14% of female-headed households (FHHs) (see Table 2).[9] This fact is becoming increasingly important as more FHHs produce wheat, due largely to the increase of men's involvement in wage laboring, both in rural areas and through urban migration.[10] In Mbeya District, Tanzania, wheat farming households were almost equally likely to be female- and male-headed.[11] A similar breakdown was found in Ethiopia, with 45% of households being headed by women.[9]

Table 2. Comparison of MHHs and FHHs in Ada, Lume, and Gimbichu, Ethiopia[9]

	MHH	FHH
Percentage of total households (HHs)	55	45
Percentage of households growing improved wheat varieties	30	14
Percentage reporting extension agents as main source of information on improved varieties**	47	21
Gross output (Birr/ha)	6,456	4,776
Farm size (ha)*	3.16	2.64
Household size (no. persons)*	7.8	5.6

Number of ox plows owned*	2.2	1.6
Percentage of HH heads illiterate*	48.5	85.2

*Only Gimbichu
**Only Lume

Land Preparation

Land preparation for wheat is generally a male activity. In the Bale Highlands of Ethiopia, only 1.5 to 5.4% of women were involved in land preparation (see Table 3).[12] In three woredas (district equivalent) of the central highlands of Ethiopia, no female farmers engaged in land preparation; sons, male relatives, and nonrelatives were responsible for this task in FHHs.[9] This is perhaps a reflection of Ethiopia's strong gendered division of labor, which is more distinct than in many other African countries.[9] In this same area of Ethiopia, male-headed households owned more ox plows (see Table 2), which made preparing their land in time for planting easier.[9]

Table 3. Participation in cropping activities by family members in Bale Highlands, Ethiopia[12]

	Adopters of improved wheat technologies (%)			Nonadopters of improved wheat technologies (%)		
Type of activity	Men	Wo-men	Chil-dren	Men	Wo-men	Chil-dren
Land preparation	98.3	5.4	8.0	98.7	1.5	3.6
Planting	94.9	12.5	8.0	93.5	9.0	10.9
Fertilizer application	89.8	5.4	8.0	88.3	6.0	7.3
Weeding	39.0	94.6	90.0	32.5	82.1	81.8
Insecticide application	25.4	17.9	16.0	33.8	6.0	7.3
Harvesting	71.2	30.4	32.0	71.4	25.4	38.2
Threshing	54.2	57.1	56.0	53.2	55.2	69.1
Storage	47.5	73.2	76.0	40.3	80.6	85.5
Selling	47.5	30.4	14.0	52.5	52.2	32.7

Access to Land

Access to land also affects adoption of wheat varieties and productivity.[13] In Ethiopia, FHHs had smaller land holdings than MHHs (although not significantly) and for both genders, farm size was positively related to adoption of improved wheat varieties and gross value of output. In addition, for FHHs, the value of crop produced outweighed the input costs for an additional unit of land, indicating that FHH productivity could increase with more land if sufficient family or hired labor was available.[9] The large role of female-headed households in wheat production makes addressing land tenure inequalities especially crucial.

Planting

Planting is also a generally male activity in SSA wheat production. In Gimbichu, Ethiopia no female household heads were involved in planting[9] and in the Bale Highlands, only between 10 and 12% of females were involved.[12] In situations where women are involved in land preparation, however, work has been done to develop ways to lessen the strain of this activity. In India, a seed drill developed for women resulted in an 86% reduction in cardiac costs (a measure of physiological workload) associated with sowing seeds.[14] Any such technology requiring capital, however, may be difficult for women to acquire without first addressing their constrained access to cash and credit.[15] Women's weak land tenure limits possible collateral and therefore, limits credit availability.[15] Group lending, however, has had considerable success in overcoming collateral requirements through shared liability.[15]

Access to Seeds

Two thirds of the area planted to wheat in SSA was planted to modern varieties in 1997, and this figure likely continues to increase.[16] Knowledge of and access to improved seeds often differs by gender. In male-female households in Gimbichu, Ethiopia, men always purchased improved seeds, although the decision to purchase improved seeds was shared with women 75% of the time, suggesting that woman's limited access to credit prevented purchase.[9] This is not a unique finding; a number of studies in East Africa document that small farmers report lack of credit as the most major constraint to adopting new wheat technology.[11,12,17]

Limited use of improved seeds by women is also likely due to asymmetrical access to extension services. Extension agents have been shown to be the primary source of information about new wheat technology in SSA and interactions with agents are positively related to adoption of improved seeds.[18] A study exploring improved wheat variety adoption in Kenya found that the majority of farmers simply did not know of the improved varieties.[19] Because some literature has shown that male extension agents do not often visit female farmers and male farmers frequently do not share extension information with their wives,[20] efforts to

increase the number of women extension officers have been attempted. In Tanzania, a study found that female farmers preferred female extension workers and male farmers did not object to them.[20] This and other studies recommend both increasing the recruitment of female extension workers and increasing training for male extension agents on working with female farmers.[12,20]

Crop Maintenance

As with most crops in SSA, women are greatly involved in weeding wheat. In the Bale Highlands of Ethiopia, 82-94% of women were involved in weeding[12] whereas in the central highlands, all family members were involved in weeding with sons performing the largest share.[9]

Soil Fertility

Improved varieties of wheat are generally more dependent on external inputs and technologies. Because of this, access to fertilizer is crucial, but in many areas of SSA, women have less access to these resources. Women may also have a greater need for fertilizer to support high yield production, because in general, men often control the land with the best soil to produce commercial crops, and women more often farm marginal land.[21]

Most farmers in Ethiopia have a long history of fertilizer use as reflected by high fertilizer adoption rates (75-98%) found on multiple wheat sites in Ethiopia[12,17,18,22] although fertilizer application rates are almost always lower than recommended. In a few studies, gender of household head was found to be insignificant in determining fertilizer adoption only after controlling for other factors such as access to credit and hired labor.[18,23]

Other less capital-intensive strategies for managing soil fertility may be advisable, especially for women. Crop rotation with legumes has been shown to increase wheat yields in both Zambia and Ethiopia and women's responsibility for the production of food legume crops makes involving women in such systems important.[24,25,26] Although legume rotation is less capital-intensive than fertilizer, it can also be labor- and education-intensive, significant challenges for women who may have lower education levels (see Table 2) and access to extension services, as well as already being labor-constrained. Zero-tillage systems, cover crops, and mulches also have the potential to improve soil productivity while at the same time reducing weeding labor, perhaps making them more appropriate for small-scale farming.[21]

Harvest

Due to wheat's high labor requirements, access to and ability to hire labor is of great importance in smallholder wheat production for weeding, threshing, and especially harvesting.[12] In a study in Ethiopia, harvesting was usually done by hired labor because of the increased seasonal labor demand that households were unable to meet internally.[9] In this same study, the use of hired (and family) labor was positively related to the use of improved wheat varieties and gross value of output for FHHs, but FHHs hired less labor than MHHs.[9] In Gimbichu, farmers reported the high cost of hired labor as their main constraint in wheat production.

Also, all farmers in this study were found to harvest manually with sickles, a laborious task.[9] An effort in India to ease women's workload during wheat harvest resulted in an improved, ergonomic sickle which reduced women's cardiac cost by 17.1%.[14] However, similar developments have not occurred in SSA. A 1997 IFAD study examining tool use in Burkina Faso, Senegal, Uganda, Zambia and Zimbabwe found that tool manufacturers and importers often ignored the fact that many of their users were women, and offered only heavy implements more suitable for men. In addition, they found that tools generally received less attention from extension professionals than technologies such as seeds and fertilizer; thus women were often unaware of labor-saving tools.[27]

Post-Harvest Processing

Smallholder-produced wheat is often used for household consumption in SSA, making women the primary post-harvest processers. In an Ethiopian study, women crushed all the grain by hand with a traditional grinding stone, making ease of seed coat removal and ease of crushing important traits for wheat varieties.[4] Another project in Ethiopia found that women were greatly involved in processing, making access to individual or village grain processing tools both an incentive to increase wheat production and a way do decrease workloads for women who have additional home and farm responsibilities.

Household Use

As the primary food preparers, women are often more knowledgeable about cooking qualities,[4] suggesting that consulting women on traits related to cooking and consumption could also positively impact adoption. In Kenya for example, where wheat is used mostly for making bread and injera, cooking quality has been shown to increase adoption. In central Ethiopia, cooking time was found to be an important quality trait for women because of time and fuel wood shortages.[4] In another project in Ethiopia, women preferred varieties with high yield, good bread and injera-making quality, and low price whereas men preferred high yield and market price.[28] However, despite these potentially conflicting opinions, men were generally responsible for seed selection which could create intrahousehold conflict.[28]

Market Access

Low prices, poor transport and inadequately developed markets have made wheat marketing difficult. However, as demand for wheat rises in SSA, opportunities for marketing may increase. In areas of India, one successful strategy for helping women benefit from wheat markets has been phone services that give women current grain prices or weather forecasts in the local language.[29] Also, organization of smallholder producers into marketing groups is a strategy which can enhance bargaining power.[28]

Conclusion

Many constraints exist to adoption of improved wheat varieties by women. A review of improved wheat variety adoption in the developing world found that it takes 5-10 years after breeding to the release and another 5-10 years for full adoption,[13] which can be frustrating for researchers and program developers who know the potential gains in food security and livelihoods. However, this length of time has been found to be reduced with the use of participatory breeding, varietal selection, and gender analysis.[30] By including women in every stage of development and planning of new technologies, programs can become more aware of the needs of targeted women and therefore, increase adoption rates and improve the productivity of men and women in wheat farming.

Lastly, additional research is needed to better understand women's role in SSA wheat production, both large- and small-scale. Few studies adequately explore gender labor allocation, gendered outcomes of technology introduction, or the preferences that women have for those technologies. Therefore, furthering knowledge in this area and proceeding cautiously when implementing wheat technologies is advisable.

Endnotes

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