



ELSEVIER

Agricultural Economics 10 (1994) 95–99

AGRICULTURAL  
ECONOMICS

Comment

## Gendered impacts of fertilizer subsidy removal programs in Malawi and Cameroon

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(Accepted 16 July 1993)

### Abstract

Gladwin's \*\* main contention is that women provide most of the agricultural labor in sub-Saharan Africa and because much of this labor is oriented to food production for home consumption, the effects of structural adjustment programs on them and the children they work to feed are likely to be different than on men who produce crops for commercial and export production. Her specific hypothesis for Malawi is that the removal of the fertilizer subsidy affects women farmers more than men farmers because it reduces fertilizer use on local maize. As part of the structural adjustment program, a major purpose of removing the fertilizer subsidy is to reallocate resources from food production for domestic consumption to cash crop production for export. In Gladwin's analysis, men farmers produce hybrid maize and tobacco for export and women produce the subsistence food crop, local maize. Gladwin's main contention is probably correct. For the Malawi case, the presentation does not support the hypothesis because two of the major underlying assumptions are inappropriate and the evidence provided is inconclusive. This comment proceeds by discussing the two assumptions and corresponding evidence. The purpose of this comment is not to contradict the hypothesis, but to clarify the Malawi situation and to suggest that a different analytical approach is needed in that context.

### 1. Export, cash and food crops

One major assumption in Gladwin's argument is that tobacco and hybrid maize are export crops and local maize is a food crop. Although tobacco does earn a large part of Malawi's foreign ex-

change, this classification of maize in Malawi is inaccurate. First, hybrid maize is not an export crop. Malawi has occasionally exported maize in years of surplus production, but both local maize and hybrid maize are produced primarily for national consumption.

Second, hybrid and local maize are both food and cash crops. Small farmers will sell almost any food crop in an effort to balance their inter-seasonal cash flow needs. A recent review of archival evidence from the 1930s to the 1960s establishes that this has long been the case in Malawi.<sup>1</sup>

The basis for Gladwin's classification is probably that farmers have preferred to grow *flinty*

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\*\* Gladwin, C.H., 1992. Gendered impacts of fertilizer subsidy removal programs in Malawi and Cameroon. *Agric. Econ.*, 7: 141–153 [AGECON 133].

(hard) local maize for home consumption because of its superior processing and storage efficiency with on-farm methods. *Denty* (soft) hybrids, when they have been grown, have typically been produced for sale. With small farm sizes and the chronically low yields associated with continuously cropped, local maize varieties, an increasing proportion of farm households produce less maize than they need for subsistence. Maize-deficit households purchase maize on the market during the 'hungry season', when most of the maize marketed is *denty* hybrid. *Denty* hybrid maize is increasingly substituted for local maize in subsistence consumption, both by maize-deficit households and by adopters of hybrid maize seed.

Since Gladwin's work in Malawi, adoption rates for *denty* hybrid maize have also risen dramatically (Smale et al., 1991). In 1991/92, a drought year, hybrid maize was over 40% of total maize produced and of critical importance in that year for national food security (Malawi National Crop Estimates). Recently, *flinty* hybrid varieties that satisfy the consumption requirements demanded by farm households have also been released by the national research system (Smale et al., 1993).

## 2. Men's and women's crops

The principal analytical approach used by Gladwin is that because of the sexual division of labor between subsistence and cash crops and the constraints it entails, fertilizer application rates are lower for women than for men. For Malawi, she assumes that women produce local maize (the subsistence crop) and men produce tobacco and hybrid maize (the cash crops). Men supply fertilizer for application to the women's crop only after they have applied it to tobacco – with the result that women apply little or no fertilizer to subsistence (local) maize (p. 144).

The most obvious problem with applying this approach is that it describes the intra-household division of labor and resources in jointly operated farm households when the data presented in the article compare resource use by sex of household head (p. 143). Although there are some common issues, the approaches used to analyze the intra-

household division of labor and resource use differences by sex of household head should be distinct.

There are other problems associated with applying this model in Malawi. First, the sexual division of labor is often culturally-based and in Malawi, there are both matrilineal and patrilineal societies. In the matrilineal areas of the Southern Region, at least one-third of farm households are probably headed by women (Peters and Herrera, 1989; Smale et al., 1991). In the patrilineal areas of the Northern Region, about one-fifth of farm households are headed by women. One example of cultural differences is that, traditionally, the rules governing rights to land and child custody (which is also labor) after divorce or husband's death are not the same in the two zones.

Second, the nature of the agricultural economy and farming system affects the sexual division of labor in agriculture. In Malawi, "*chimanga ndi moyo*" (maize is life)<sup>2</sup> and maize production for home consumption is the foremost objective of any household member in any Malawian family. In the major maize-producing zones of Malawi, maize occupies over 85% of the average farm household's cultivable area. Maize as a proportion of calories (for direct human consumption) is higher in Malawi than in any other nation in the world. Per-capita caloric consumption is low and a large proportion of the rural population faces undernutrition each 'hungry season'. Markets for grain and particularly flint-textured maize, are unreliable.

Maize is clearly a woman's crop to the extent that it is a food crop, but in any region, all members of the household, when present, work in the maize fields. Peters and Herrera conclude that there are no gender-linked crops in the way the concept is used to describe West African systems (1989). Although tobacco is associated more with men than with women, and maize is identified with women because it is food, husbands and sons worked in the maize fields and most crops were grown by both men and women (p. 45).

Third, there are major differences among female-headed households. Peters and Herrera distinguish between *de jure* (divorcees or widows),

*male absentee* (husband working elsewhere in Malawi) and *Teba* (husband working in South Africa as a migrant) female-headed households. The types differ in distribution and level of income by source. In their study, female-headed households earned less than male-headed households but the absentee households (who rely on remittances from their husbands in a contracting off-farm labor market) earned the least (p. 28). On the average, male-headed households harvested more maize, but *Teba* households (who invest their remittances in seed, fertilizer and labor) harvested twice as much maize as other female-headed households and one-third more maize than male-headed households (p. 49).

### 3. Men's and women's fertilizer use on maize

#### 3.1. Fertilizer use data

Gladwin presents data, in kg/ha, to demonstrate that fertilizer application rates are low in Malawi and that female-headed households use less fertilizer than male-headed households. The evidence provided in the article is not entirely convincing. First, the aggregate fertilizer application rate in Malawi is higher than the median for other African countries, although it is low compared to the rest of the developing world (Lele and Stone, 1989; FAO, 1989).

Second, kg/ha is not a standard unit of comparison for fertilizer application rates, since nutrient content varies by type of fertilizer and is not directly related to weight. For example, the N content of urea is 23 nutrient kilogram per 50-kg bag but the N content of CAN is only 14 kg. Much of the fertilizer applied to maize in 1987 in Malawi was low-analysis, but even among low-analysis fertilizers, the N content can vary by as much as 50%. Further, the data do not distinguish between fertilizer applied to maize and other crops, such as tobacco. The fertilizer types applied to tobacco and maize differ. The fourth problem with the table is that the data are aggregated over Blantyre, Kasungu and Lilongwe zones – which have different farming systems. In partic-

Table 1

Fertilizer use on maize by sex of household head, Blantyre, Kasungu and Mzuzu Agricultural Development Divisions, 1990–91 ( $N = 420$ )

Characteristic	Blantyre	Mzuzu	Kasungu	All <sup>a</sup>
<i>Percent using fertilizer on maize</i>				
hybrid maize				
male head	87	96	94	92
female head	100	100	100	100
local maize				
male head	56	52	56	55
female head	46	32	55	48
<i>Average N/ha, fertilizer-users</i>				
hybrid maize				
male head	75	108	67	77
female head	72	81	45	62
local maize				
male head	21	26	22	22
female head	21	14 <sup>b</sup>	11 <sup>b</sup>	15

Source: CIMMYT/MOA Maize Variety and Technology Adoption Survey, 1989–91.

<sup>a</sup> Weighted by inverse probability of selection.

<sup>b</sup> Difference of means significant at 0.05 with one-tailed *t*-test.

ular, very little tobacco is produced in the Blantyre zone as compared to parts of the Kasungu and Lilongwe zones. Given the indicator used (kg/ha), much of the difference between female and male-headed households may reflect the tobacco-producing areas of the Central Plain.

The data presented in Table 1 clarify some of these points. They are drawn from a two-year survey of 420 households, implemented jointly by the Malawi Ministry of Agriculture (MOA) and the International Maize and Wheat Improvement Center (CIMMYT) in Blantyre, Kasungu and Mzuzu Agricultural Development Divisions. Results are shown only for 1990–91 but are similar for 1989–90. Although the samples are different, the sampling frames from which the Rapid Fertilizer Survey (used by Gladwin) and this sample are drawn are similar. Both are statistical samples.

The CIMMYT/MOA data show that, among all farmers who grow hybrid maize, female household heads are probably equally likely as male household heads to apply fertilizer and on the average, they apply similar amounts of N/ha. In the survey zones for both the CIMMYT/MOA and Rapid Fertilizer Survey, almost all farmers

grow local maize – including those who grow hybrid maize. In the CIMMYT/MOA sample, the likelihood of applying fertilizer to local maize is not statistically different for female and male-headed households, but the level of N/ha applied is clearly lower for female-headed households.

The findings can be interpreted as follows. Since hybrid maize is more often grown as part of a seed-fertilizer package distributed on credit, most farmers who grow hybrid maize fertilize it at closer to recommended rates (regardless of sex of household head). Fertilizer applied to local maize is most often purchased with cash – and application rates are affected by cash constraints. As stated by Gladwin, it is nonsensical to fertilize local maize on credit if, given low local maize yields and little land, the farm family produces less local maize than the household needs to consume and has no means of loan repayment.

The differences between male and female-headed households, in general, lie behind these figures. The CIMMYT/MOA data confirm that, as stated by Gladwin, female household heads are generally less likely to grow hybrid maize, less likely to belong to credit clubs and have lower average off-farm earnings with which to purchase fertilizer (Table 2). In this sample, they do not appear to be more likely to be deficit producers of local maize, however. That may be because, in the CIMMYT/MOA sample, they have less adult labor (household members over 12 years) but also fewer dependent mouths to feed (household members under 12 years). Roughly two-thirds of *all* households produced less local maize than they needed to consume in 1989–90. A large proportion of *both* female-and male-headed households are maize-deficit.

Although analyses like those conducted by Peters and Herrera are not possible with the CIMMYT/MOA data, differences *among* female-headed households may help to explain why a certain proportion of the female-headed households in the CIMMYT/MOA sample grow hybrid maize with recommended fertilizer application rates and others grow only unfertilized local maize.

The weighted aggregates also obscure differ-

Table 2

Selected household characteristics by sex of household head, Blantyre, Kasungu and Mzuzu Agricultural Development Divisions, 1990–91 ( $N = 420$ )

Characteristic	Blantyre	Mzuzu	Kasungu	All <sup>a</sup>
<i>Percent club members</i>				
male head	27	39	56	42
female head	19	16 <sup>b</sup>	11 <sup>b</sup>	15
<i>Percent growing hybrid maize</i>				
male head	35	43	43	40
female head	22	24 <sup>b</sup>	11 <sup>b</sup>	17
<i>Percent with subsistence ratio &gt; 1<sup>c</sup></i>				
male head	77	62	52	63
female head	80	64	80 <sup>b</sup>	77
<i>Mean off-farm earnings (excludes remittances)</i>				
male head	246	169	88	162
female head	89 <sup>b</sup>	62 <sup>b</sup>	72	77

Source: CIMMYT/MOA Maize Variety and Technology Adoption Survey, 1989–91.

<sup>a</sup> Weighted by inverse probability of selection.

<sup>b</sup> Difference significant at 0.05, Chi-square or two-tailed *t*-test.

<sup>c</sup> Subsistence ratio = local maize consumption requirements for one year divided by local maize output. Requirements based on household composition and typical consumption rates by age group. Output estimated from yield subplots and measured areas.

ences within zones. In Blantyre, where farmers are more likely to be female household heads, there is no significant difference by sex of household head in the likelihood of growing hybrid maize or credit club membership. These differences emerge as farm sizes become greater (Kasungu and Mzuzu), the cultural tradition becomes patrilineal (Mzuzu) and farming systems incorporate highly remunerative cash crops (tobacco in Kasungu). In Kasungu, in particular, female-headed households are significantly more likely to produce less local maize than they need. Because Kasungu farmers also consume some of the hybrid maize they produce and female household heads are less likely to grow hybrid maize in Kasungu, female-headed households are probably much worse off in terms of food<sup>3</sup> production in that zone. Although they do not appear to have lower off-farm earnings, female-headed households in Kasungu probably have much lower total household income because male household heads are more likely to grow tobacco.

### 3.2. Regression analysis

Similar problems recur in Gladwin's regression analysis. Using weight of all fertilizer used rather than nutrient content of fertilizer applied to a particular crop may distort results – especially because club members are more likely to use high-analysis fertilizer like urea and male-headed households (especially in Kasungu and parts of Lilongwe) have greater chances for growing tobacco on credit. Sex of household head and club membership are probably associated. In fact, sex of household head may be a latent explanatory variable that affects the probability of club membership, which in turn affects N/ha for hybrid maize and tobacco. Here, we agree with Gladwin when she concludes that “gender does not matter when one holds constant access to credit and cash” (p. 146). However, her next point does not follow. The regression results say that there is no independent relationship of fertilizer level and sex of household head. If we and Gladwin are correct, what follows is not that female-headed households apply less fertilizer, but that cash- and credit-constrained farmers apply less fertilizer and female-headed households are more likely to be cash- and credit-constrained.

### 4. Conclusion

Malawi's women farmers are undoubtedly especially affected by structural adjustment programs, but a different analytical approach and supporting evidence may be required to show it. Further, targeting a fertilizer subsidy to women may also incur tremendous social and political costs if, in a nation where so many live on the margin of subsistence, the policy seeks to allocate scarce funds to a population that is not well-defined. In the best case, an evaluation of the welfare economics of targeting a subsidy through

the Women's Programme is needed before such a recommendation can be made. At least, a more precise definition of the target group is necessary. If a subsidy is to be considered, should the appropriate criterion be sex of household head, household income level or source, another criterion or some combination of criteria? Some discussion of the feasibility of implementation might also be provided.

### 5. Endnotes

<sup>1</sup> Pauline Peters, Harvard Institute for International Development, personal correspondence, January 1993. See Peters and Herrera (1989).

<sup>2</sup> A farmer's statement quoted by Peters and Herrera (1989).

<sup>3</sup> Food is maize in Malawi. In some parts of the country, the word for food (*chakudya*) and the word for maize (*chimanga*) are used interchangeably.

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