



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*



Bureau for Economic
Growth, Agriculture,
and Trade, and
Office of Agriculture
and Food Security

POLICY SYNTHESIS

*for Cooperating USAID Offices
and Country Missions*

(<http://www.aec.msu.edu/agecon/fs2/psynindx.htm>)

Number 69

July 2003



Africa Bureau
Office of Sustainable
Development

FERTILIZER CONSUMPTION TRENDS IN SUB-SAHARAN AFRICA

by

T.S. Jayne, Valerie Kelly, and Eric Crawford

Food Security II Cooperative Agreement between U.S. Agency for International Development,
Bureau for Economic Growth, Agriculture, and Trade, Office of Agriculture and Food Security,
and the Department of Agricultural Economics, Michigan State University

INTRODUCTION: It is well understood that intensification of smallholder agriculture is critical to future economic development in most of Sub-Saharan Africa (SSA). There is a widespread view, however, that smallholders' use of agricultural inputs, notably fertilizer, has declined somewhat following the implementation of structural adjustment and agricultural reform programs in the 1990s. These concerns have led many analysts to question the premises and effectiveness of the reforms, and to suggest alternative approaches for promoting agricultural intensification in Africa. This note reviews broad fertilizer consumption trends in Africa from 1980 to 2000.

PROCEDURE: We selected Sub-Saharan African countries that consumed more than 10,000 tons of fertilizer during the 1990s. This resulted in 17 countries: Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Madagascar, Malawi, Mali, Nigeria, Senegal, Tanzania, Togo, Zambia, and Zimbabwe. South Africa was excluded to maintain the focus on smallholder agriculture as much as possible. We used FAO data to compute mean consumption levels per hectare cultivated for three periods: (1) the 1980-89 period; (2) 1990-95; and (3) 1996-2000. At the time of this writing, 2000 is the most recent year for which data is available from the FAOStat web site (<http://apps.fao.org/>).¹

MAJOR PATTERNS AND TRENDS: In 2003, SSA farmers still lag far behind other developing areas in fertilizer use. The average intensity of fertilizer use throughout SSA (roughly 8 kilograms per hectare) remains much lower than elsewhere (e.g., 54 kg/ha in Latin America, 80 kg/ha in South Asia, and 87 kg/ha in Southeast Asia).

However, it is not the case that fertilizer use in SSA has declined. Mean fertilizer consumption in SSA has risen from 1.09 million tons during the 1980-89 period to 1.26 million tons in the 1996-2000 period. If Nigeria is excluded (which accounted for a quarter of SSA's fertilizer consumption during the 1980s and experienced a large drop in fertilizer use in recent years after fertilizer subsidy rates of 80% were eliminated), mean fertilizer use rose from 0.83 million tons to 1.10 million tons over the same period, a 32.5% increase (Figure 1).

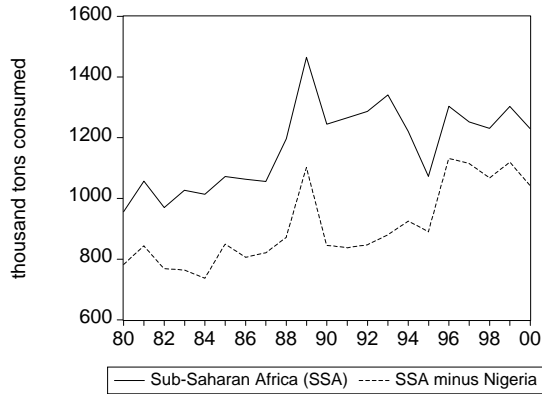
Fertilizer use per cultivated hectare also rose over the past decade, but less so than for absolute consumption because cultivated area in SSA also increased during the 1990s.² Mean fertilizer use per hectare under annual and permanent crops rose from 7.54 kgs per hectare during the 1980-89 period to 7.92 kgs per hectare during 1996-2000, a 5% increase. When Nigeria is excluded,

¹ FAO is the only consistent source of fertilizer use information for African countries, and is also the source of data used in the IFDC's recent review of fertilizer sector performance in Africa (IFDC, 2002).

² Area under annual and permanent crops expanded from 144 million hectares to 160 million hectares between the 1980-89 period and the 1996-2000 period.



Figure 1. Total Fertilizer Consumption in Sub-Saharan Africa, 1980-2000

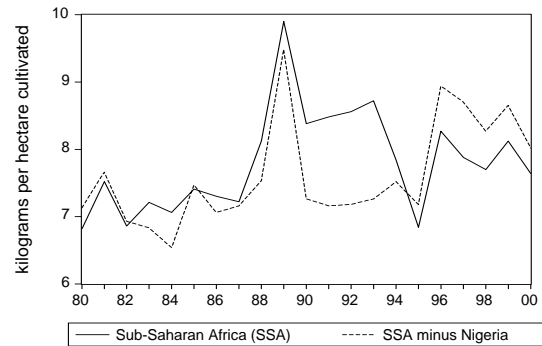


fertilizer use per cultivated hectare rose over this period by 15% (Figure 2). However, these use rates are still extremely low by international standards, and the positive trend in overall fertilizer consumption in SSA in no way implies cause for complacency.

These aggregate trends mask great variability in fertilizer use trends across countries. Table 1 shows fertilizer use trends for these 17 countries in Sub-Saharan Africa broken down for three periods from 1980 to 2000. Table 1 also presents trends in use for nine other countries consuming less than 10,000 tons on average over the 1990s for which data was available. Statistics in Table 1 are for total fertilizer use per hectare of arable and permanent crops, and for the countries' share in total fertilizer consumption in SSA.

Of the 17 countries consuming at least 10,000 tons during the 1990s, we find eight countries where fertilizer consumption per hectare cultivated has risen by 45% or more, on average, between 1980-89 and 1996-2000. These eight countries are Benin, Burkina Faso, Chad, Côte D'Ivoire, Kenya, Ethiopia, Togo, and Senegal. In most of these countries, the growth rates in absolute fertilizer consumption were greater than for fertilizer consumption per hectare, because of crop area expansion. In certain regions of these countries where agro-ecological and market conditions are suitable (e.g., parts of western Kenya) fertilizer is widely used and

Figure 2. Fertilizer Consumption Per Cultivated Hectare in Sub-Saharan Africa, 1980-2000



dose rates on maize are commonly close to mean levels achieved in South and Southeast Asia.

In five of these countries (Benin, Burkina Faso, Chad, Côte d'Ivoire, and Togo), the increased fertilizer consumption appears to be related to the expansion of the cotton sector, although rice and horticultural crops were also important recipients of the additional fertilizer use in a few countries. In Kenya, fertilizer consumption rose from roughly 230,000 tons per year during the late 1980s/early 1990s to nearly 300,000 tons per year after the liberalization of the fertilizer market in 1993. By 2000, there were 12 importers, 500 wholesalers, and more than 7,000 retailers who were engaged in fertilizer distribution (IFDC, 2001). Most of the increase in fertilizer use has been on tea, sugarcane, horticultural crops, and wheat, with minor increases on maize. Only in Ethiopia did food grains receive the lion's share of the increase in fertilizer use.

Fertilizer consumption per cultivated hectare declined or stagnated (less than a 10% increase) between the 1980s and the 1996-2000 period in another eight countries: Cameroon, Ghana, Madagascar, Malawi, Nigeria, Tanzania, Zambia, and Zimbabwe. In countries such as Nigeria, Tanzania, and Ghana, where the fertilizer subsidy rate throughout the 1980s was 50% or higher, the decline in fertilizer use after these subsidies were reduced was to be expected. In some cases (e.g., Ghana

**Table 1. Fertilizer Use Trends in Sub-Saharan Africa, 1980-2000**

Country/Region	Kg/ha a/			Share of Total Fert. Use (%) b/		
	1980-89	1990-95	1996-2000	1980-89	1990-95	1996-2000
Countries with > 45% increase in use per ha (1980-89 to 1996-2000)						
Benin	3.66	10.02	18.97	0.57	1.46	3.15
Burkina Faso	4.19	6.24	10.42	1.21	1.77	3.07
Chad	1.58	2.23	4.04	0.46	0.61	1.13
Côte d'Ivoire	7.65	7.69	11.30	3.41	4.01	6.55
Ethiopia c/	3.87	8.41	15.11	4.42	7.56	13.26
Kenya	21.39	23.24	31.58	8.66	8.48	11.29
Senegal	8.49	7.94	13.47	1.83	1.50	2.49
Togo	3.53	5.41	6.99	0.68	0.98	1.40
Countries with > 10% and < 45% increase in use per ha (1980-89 to 1996-2000)						
Mali	8.51	8.43	9.57	1.62	1.81	3.52
Countries with < 10% increase in use per ha (1980-89 to 1996-2000)						
Cameroon	5.74	3.33	5.83	3.75	1.93	3.30
Ghana	3.92	2.15	3.09	1.38	0.76	1.28
Madagascar	3.03	3.12	3.02	0.88	0.85	0.82
Malawi	22.58	28.18	23.39	3.76	4.45	3.92
Nigeria	8.14	11.35	5.47	23.28	29.75	13.36
Tanzania	8.42	9.02	6.13	5.69	3.28	2.28
Zambia	15.23	12.83	7.92	7.26	5.47	3.31
Zimbabwe	56.84	49.38	51.91	14.51	12.40	13.74
Countries consuming less than 10,000 tons per year during the 1990's						
Mozambique	4.59	1.32	2.17	1.36	0.40	0.71
Botswana	2.68	3.00	11.71	0.10	0.09	0.33
Gambia	13.24	4.64	6.08	0.22	0.07	0.10
Guinea	0.56	2.08	1.55	0.06	0.23	0.18
Swaziland	84.21	51.22	27.92	1.28	0.79	0.42
Lesotho	14.35	17.19	17.41	0.40	0.45	0.45
Niger	0.79	0.89	0.87	0.26	0.29	0.30
Rwanda	0.83	0.95	0.30	0.09	0.09	0.03
Uganda	0.07	0.19	0.41	0.04	0.10	0.22
Summary statistics on fertilizer use per ha						
Sub-Saharan Africa	7.54	8.14	7.92			
SSA minus Nigeria	7.39	7.26	8.51			

Source: FAO/AgroStat data.

a/ Kilograms of fertilizer applied per hectare of arable and permanent crops.

b/ Percentage share of total fertilizer consumption for Sub-Saharan Africa.

c/ Former area of Ethiopia, i.e., includes Eritrea after 1993.



and Cameroon), absolute fertilizer use in the 1996-2000 period has recovered to pre reform levels after incurring initial sharp drops after the elimination of subsidies. Malawi and Zambia have continued to intervene heavily in all aspects of input credit and distribution through programs designed to reduce food insecurity and/or reward political supporters. Input use in these countries is very erratic or declining because government is not able, and donors are increasingly unwilling to support the programs in a sustained manner and private traders are unwilling to invest in the market, given the unpredictable nature of government intervention.

In the last of the 17 countries examined, Mali, mean fertilizer consumption increased from 17,582 tons in 1980-89 to 44,560 tons between 1996-2000, but because of a large expansion in cultivated area over the same period, consumption per hectare rose only 12% between the two periods.

The information presented in Table 1 also indicates:

- the number of countries using 10 kg/ha or more rose from seven in 1980-89 to 11 in 1996-2000
- seven countries more than doubled their fertilizer use per hectare over the period
- four of the seven countries using 10 kg/ha or more in 1980-89 saw their consumption per ha drop during 1996-2000; for two countries, it fell into single digits
- fertilizer use in 1996-2000 was dominated by four countries (Ethiopia, Kenya, Nigeria, and Zimbabwe), whose collective share was roughly 50%

Some of the concerns about declining fertilizer use as a result of structural adjustment in the late 1980s and early 1990s probably stemmed from looking at localized (sub national) impacts. For example, the elimination of the *Programme Agricole* in Senegal during the late 1980s meant the end of government programs to distribute fertilizer, improved peanut seed and animal traction equipment in the Peanut Basin, a major agricultural production zone. Farmers' use of these inputs fell significantly as a result (Kelly et al., 1996). However, overall fertilizer use per cultivated hectare in Senegal rose 59% between the 1980-89 period and the 1996-2000 period.

SUMMARY: There has been great variability in national-level trends in fertilizer consumption since the 1980s. The response to the reform of agricultural markets has not been

uniform. While fertilizer use has indeed been stagnant or declined in some countries, fertilizer consumption has increased dramatically in other countries. Efforts to understand the effects of structural adjustment and reform of markets on fertilizer use must start with an empirical understanding of use patterns and trends, but must also be based on a disaggregated picture of which strata of farmers have been able to respond, on which crops, and in which regions. Such analyses will lead to a more informed debate on appropriate strategies for promoting input intensification in Sub-Saharan African countries.

References

- IFDC (International Fertilizer Development Center), 2002. Global and Regional Data on Fertilizer Production and Consumption, 1961/62 - 2000/01. Muscle Shoals, Alabama: IFDC.
- IFDC (International Fertilizer Development Center), 2001. An Assessment of Fertilizer Prices in Kenya and Uganda: Domestic Prices vis a vis International Market Prices. Muscle Shoals, Alabama: IFDC.
- Kelly, V., B. Diagona, T. Reardon, M. Gaye, and E. Crawford. 1996. *Cash Crop and Foodgrain Productivity in Senegal: Historical View, New Survey Evidence, and Policy Implications*. International Development Paper No. 20. East Lansing: Michigan State University.
- Mose, L. 1998. Factors Affecting the Distribution and Use of Fertilizer in Kenya: Preliminary Assessment. Tegemeo Institute, Egerton University. Nairobi, Kenya. online at <http://www.aec.msu.edu/agecon/fs2/kenya/index.htm>
- *Funding for this research was provided by the Food Security II/III Cooperative Agreement between MSU and USAID/EGAT/AFS. Supplemental resources were also provided by the Agriculture, Natural Resources, and Rural Enterprise Division, Office of Sustainable Development, Bureau for Africa (AFR/SD/ANRE). The authors are with the Department of Agricultural Economics, Michigan State University. The views expressed in this document are exclusively those of the authors.