

Background

The Government of Kenya (GOK) has historically encouraged its farmers to use fertilizer by financing infrastructure and supporting fertilizer markets. From 1974 to 1984, the GOK provided a fertilizer importation monopoly to one firm, the Kenya Farmers Association. Donor fertilizer aid made up over half of the fertilizer supply at this time, and pricing controls further discouraged private sector participation. The GOK saw that this monopoly impeded fertilizer market development by prohibiting competing firms from entering the market. Also at this time, the GOK was undertaking structural adjustment measures put forth by the World Bank. Thus, in the latter half of the 1980s, the GOK encouraged other firms to enter the highly regulated fertilizer market.¹

By 1993, the GOK had fully liberalized its fertilizer marketing system by decontrolling prices and decreasing the percentage of fertilizer provided by donor aid to only five percent of total supply.² By 1996, there were 12 major private importers, 500 wholesalers, and roughly 5000 retailers distributing fertilizer in the country. In 2000, the number of retailers had increased to between 7000 and 8000. Most studies of Kenya's fertilizer market find it to be well functioning and generally competitive,³ and conclude that market reform has stimulated fertilizer use mainly by improving farmers' access to the input through the expansion of private retail networks.⁴ Currently, the Ministry of Agriculture (MoA) recommends the use of hybrid seed and fertilizer because of expected increases in yield.⁵

Overall fertilizer consumption in Kenya has increased steadily since 1980. Farmers consumed, on average, 208,000 tons of fertilizer per year throughout the 1980s.

This figure increased to 263,000 tons in the 1990 to 1995 period, and increased further to nearly 300,000 tons in the 1996 to 2001 period. Survey data indicate that smallholders are using fertilizer mostly on sugar, horticulture, wheat, and maize in specific areas. In addition, the use of fertilizer among Kenya's smallholders is among the highest in Sub-Saharan Africa (SSA). Yet fertilizer consumption is still limited, especially on cereal crops, and in areas where agroecological conditions create greater risks and lower returns to fertilizer use.⁶

Recent Fertilizer Price Increases

In 2005, concern about the high prices of commercial fertilizers led the GOK to authorize its grain marketing board¹ to import fertilizers for distribution to smallholder farmers.⁷ The GOK has since been under pressure to increase input availability owing to the recent food crisis caused by high global food prices. Farmer need was exacerbated in Kenya due to post-election violence in early 2008 that displaced nearly 30 percent of its farmers. The GOK also vowed in mid-2008 to break up a domestic cartel, which was partially blamed for the increased fertilizer prices.⁸

In September 2008, the Kenya Broadcasting Corporation reported that the GOK had promised farmers that government subsidized fertilizer would be available by late October.⁹ The GOK promised to import 150,000 tons of fertilizer and sell it at a 40 percent discount, costing the GOK \$157 million. Subsidized fertilizer is

¹ Kenya's National Cereals and Produce Board (NCPB) is a Government Corporation charged with commercial grain trading. Since 2002, NCPB has diversified into marketing inputs, including fertilizer. Additional information is available on their website: <http://www.ncpb.co.ke/index.php>.

now available to Kenyan farmers through the NCPB, although it is unclear how long this program will last. Long run strategies to curb high fertilizer prices involve construction of a fertilizer plant in country. According to Kenya's Minister of Agriculture, William Ruto, this construction would be financed through the African Development Bank.¹⁰

Although fertilizer prices came down a bit for the 2009 growing season, some experts predict increased prices in 2010, largely owing to increased demand and a slowdown of the global recession.¹¹ Kenya has recently been hit hard by inclement weather. In January of 2009, the Kenyan government declared a national disaster after the failure of the previous short rains in southeastern and coastal areas.¹² Drought has already damaged much of the North Rift's wheat crop and is likely to diminish corn and bean production as well.¹³

It is unclear how recent events and fertilizer consumption are viewed in academic and peer reviewed journals. For the most part, the literature focuses on Kenya's policies pre-food crisis, thus, we maintain that focus for the remainder of the analysis.

Fertilizer Use Trends in Kenya

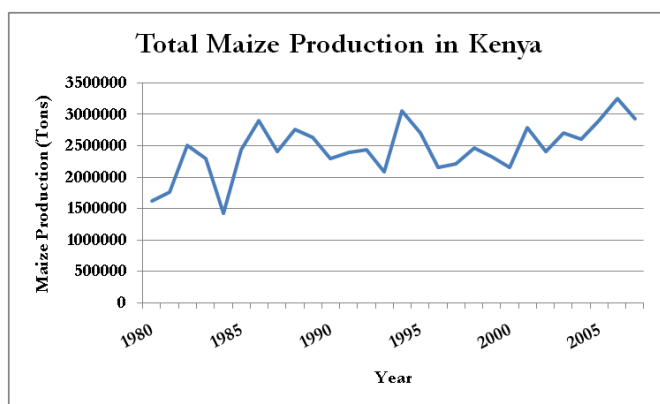
In 2002, Kenyan farmers consumed nearly 10 percent of all fertilizer consumed in SSA.¹⁴ Kenyan farmers used, on average, 28 kilograms of fertilizer per hectare farmed. In comparison, farmers in Malawi², Nigeria, and Ethiopia used 79, 5, and 14 kilograms of fertilizer per hectare, respectively.¹⁵ In part due to increased availability due to private sector development, Kenya's fertilizer consumption jumped to nearly 351,000 tons by 2004.¹⁶ In 2007, consumption had risen to just over 450,000 tons.¹⁷

Despite the MoA recommendation that smallholders use hybrid seed and fertilizer, Duflo et. al. (2008) found that only 37% of farmers sampled in a fairly poor district of Kenya reported ever having used fertilizer.¹⁸ They also found that many farmers do not consistently use fertilizer across seasons. Researchers conclude that while fertilizer use can be profitable when used correctly, farmers in this poor region of Kenya are not necessarily

able to use fertilizer correctly, meaning that use may not be profitable for farmers who improperly use fertilizer.¹⁹

In SSA, maize is generally the principal crop fertilized, however, in Kenya fertilizer availability tends to be best for cash crops like sugar and tea because of the interlinked input and output markets, and the influence of the state-owned enterprises.^{20,21} Nonetheless, Kenya's maize production has increased steadily since pre-reform times, as shown in Figure 1. The link between fertilizer use and increased production, is, however, less clear.

Figure 1: Maize Production in Kenya 1980 to 2007



Kenya's Fertilizer Approach

Strategy—Public sector facilitation of private sector fertilizer

In general, public sector facilitation of private fertilizer markets features public goods investments to support private sector entry and investment in the fertilizer sector. This could be investment in roads and other infrastructure, which facilitates fertilizer transport, or investment in special economic zones, which encourage private sector investment in large-scale projects like fertilizer production facilities. The general strategy is to improve the demand for inputs by farmers and the incentives for private companies to serve farmers' needs by engaging in activities that reduce the costs of agricultural production and marketing. Results of this approach vary widely across the continent, depending on local circumstances and the resources available for public investment.²²

Pricing

In Kenya, the state withdrew completely from direct fertilizer pricing in 1993, after fertilizer market liberalization.²³ Market reforms included elimination of

² Please see note on Malawi for more information on its Starter Pack Program and AIDSP program, which likely contributed to increased fertilizer use.

retail price controls, import licensing quotas, and foreign exchange controls. The GOK also worked to phase out donor fertilizer aid, which had previously distorted fertilizer prices.²⁴

Nonetheless the high price of fertilizer prohibits many smallholders from purchasing the input during the time when it is needed. Farmers typically have access to cash immediately after harvesting, but are more cash restricted during planting and cultivation times, which is when fertilizer is applied. Of farmers interviewed in a poor area in Western Kenya, 79 percent reported that they did not have enough money to purchase fertilizer at the time of planting.²⁵

Variation in Uptake

Fertilizer use is not constant across Kenya. A longitudinal study conducted by Egerton University and the Tegemeo Institute found that, although total smallholder uptake had increased from 56 percent in 1995 to 70 percent in 2007, the rates varied considerably throughout the country.²⁶ Drier, lowland areas saw uptake rates of around 10 percent, while smallholders surveyed in Central Province and Western Kenya (typically higher potential areas) reported uptake rates upwards of 90 percent.²⁷

Despite the disparity in uptake rates the GOK does not target particular groups; rather, it assumes the private sector will reach those who wish to use fertilizer.

Distribution

Smallholder farmers purchase fertilizer almost exclusively from commercial trading companies. These firms range from large vertically integrated firms to small, diversified traders to cooperatives and outgrower companies, and in the case of tea, a commercially oriented parastatal. As of 1999, 22 firms imported fertilizer, and there were roughly 500 wholesalers and over 7000 retailers.²⁸ Retailers are most often located in market centers and occasionally in local shops. Duflo et al. (2009) estimated that a typical farmer walks roughly 30 minutes to reach the nearest market center.²⁹

Market Forces

The International Fertilizer Development Center (IFDC) identifies four stages of input market development: 1) Subsistence, 2) Emergence, 3) Growth, and 4) Maturity.

Kenya falls in the Growth stage, meaning that conditions in the country are such that food crops are increasingly commercialized. Additionally, modern seed, chemical fertilizer, and pesticide use have become more prevalent while both the private and the public sectors are involved in procurement, production, and distribution of inputs.³⁰

Impact of Program

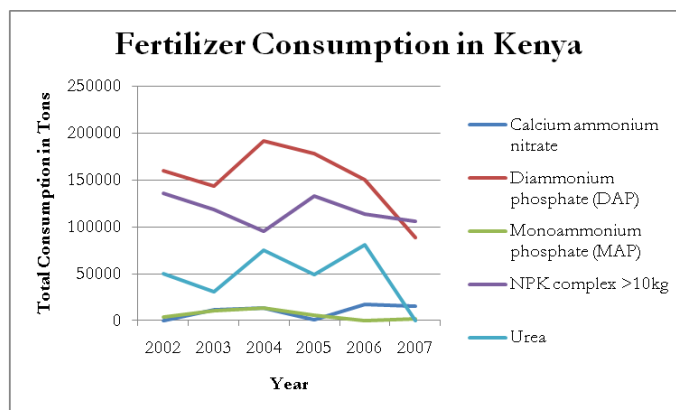
In general, supporters of Kenya's fertilizer policy tout the policy as an example of private sector success. However, it remains to be seen how the recent spike in fertilizer price will impact Kenya's fertilizer strategy. Regardless, Kenya's strategy has been widely regarded as a success in terms of encouraging fertilizer uptake

Fertilizer Uptake

Fertilizer consumption has increased substantially in recent years in Kenya. Data specific to the small-scale sector is unavailable. However, panel survey data on 1451 small-scale households covering 22 districts indicate a 16 percent increase in fertilizer consumption between 1996 and 2000. Much of the increase is due to increased consumption of top dressing fertilizer in specific parts of the main maize-producing areas of the country and increased fertilizer use on sugarcane through outgrower arrangements. In the case of outgrower arrangements, uptake is often supported by the company, which provides the fertilizer during cultivation and deducts it from the harvest payment.

The total number of small-scale farms using fertilizer increased from 61 to 65 percent.³¹ However, uptake rates vary considerably throughout the country, ranging from less than 10 percent of households surveyed in the drier lowland areas to over 90 percent in Central Province and the High-Potential Maize Zones in the North Rift.³²

Figure 2: Fertilizer Consumption in Kenya 2002-2007³³



Data Source: FAOStat, 2009

Criticisms

In general, Kenya's "Public Sector Facilitation of Private Sector Fertilizer Supply" approach has been successful in increasing private sector participation in the fertilizer market. However, generally speaking, critics of the approach say that the system relies on the ability of the public sector to invest in a range of cost-reducing public goods, which are very expensive and most likely require major donor support for a number of years. For example, the GOK has recently discussed with the African Development Bank, plans to build a fertilizer plant in country. Keeping production in house will help lower the fertilizer price to consumers in Kenya. Currently, most farmers in the drier and less fertile parts of the country cannot use fertilizer profitably and must rely on other sectors such as livestock and non-farm employment as engines of growth, or other forms of assistance.³⁴

Though fertilizer consumption has increased, uptake of the technology is by no means universal. Economists surmise that smallholders in real-world situations may not be able to obtain the same returns to fertilizer as obtained in test plots.³⁵ This uncertainty may lead some farmers to forgo the input, instead using farming techniques that they can better predict.

It is difficult to find conclusive evidence of productivity impacts from market reforms because productivity is more sensitive to weather, macro-economic reforms, exchange rate policies, and technology change than to privatization and liberalization efforts.³⁶ It is thus premature to link fertilizer adoption to either poverty reduction or food security.

Non-GOK programs

Small-Pack Program

In 1990, the Sustainable Community-Oriented Development Program (SCODP) began selling fertilizer in bags as small as one kilogram.³⁷ Previous to 1990, the GOK prohibited vendors from selling fertilizer in less than 50 kilogram bags. Under the revised law, SCODP was able to offer small-packs of fertilizer to smallholders in resource poor areas like Western Kenya. By 1996, 46 percent of fertilizer sales to smallholders were in these small-packs.

*SAFI Program*³⁸

International Child Support (ICS), a Dutch NGO, piloted a small fertilizer program in Western Kenya. Building off of the network of fertilizer retailers available, the Savings and Fertilizer Initiative (SAFI) program offers farmers an opportunity to purchase fertilizer in advance, right after harvest when farmers have either cash or maize on hand. The program also offered free delivery to farmers.

Participating farmers receive a voucher specifying the quantity of fertilizer purchased, and the delivery date. In the first season, 31 percent of farmers took advantage of the program, and by season two, 39 percent of farmers had purchased fertilizer in advance. In their analysis of the program, Duflo et al. (2009) found that among farmers offered the SAFI program, 45 percent used fertilizer compared to only 34 percent of farmers who were not offered the SAFI program. The success of the SAFI program suggests that a properly timed reduction in the utility cost of using fertilizer can substantially increase uptake.

Conclusion

Supporters claim that the experience of Kenya shows how a stable policy environment can foster a private sector response that supports smallholder agricultural

productivity and poverty alleviation.³⁹ Kelly and Crawford (2007) point out that the Kenya example does illustrate that commercial markets that are relatively unregulated by government policies and direct intervention can make a substantial contribution to increased fertilizer use when supported by a variety of relatively small-scale donor-funded programs like the SCODP's Small Pack Program and ICS's SAFI Program.⁴⁰ However, the evidence linking overall fertilizer use to increased food security and reduced poverty at the household level is weak. Additionally, data disaggregated by gender, ethnicity, and income level is lacking. Although it is clear that country-wide increases in maize production and fertilizer consumption have occurred, it is less clear which smallholders are benefitting from these gains.

Broadly speaking, Kenya's success in smallholder fertilizer uptake is often attributed to four main factors: 1) stable fertilizer market policies leading to rapid expansion of private sector distribution networks, 2) a reduction in the average distance between farmers and fertilizer vendors, 3) increased competition among private sector firms, and 4) high profitability in Kenya's

horticulture industry.⁴¹ Noticeably absent from this list is any mention of subsidy programs.

Yet, the subsidy-free process that has worked in Kenya may not be transferable in its totality to other countries with different cropping systems and resource endowments. Duflo et al. (2009) note that a policy of small, time-limited subsidies may be attractive to farmers and help them overcome procrastination problems. In the SOFI example, this subsidy came in the form of free delivery. No doubt the success of this program was aided by Kenya's better than average transportation network and history of post-independence capitalism and free-market enterprise that many countries in SSA simply do not have.

In addition, behavioral factors such as risk perception likely play an important role in farmers' decision to adopt improved cropping technology, including fertilizer.⁴² Further research into this area is needed, as well as a more thorough look at the program benefits realized by women and other marginalized groups.

Please direct questions or comments about this research to the Evans Policy Applied Research (EPAR) PI, Leigh Anderson, at eparx@u.washington.edu.

Appendix

Table 1: Fertilizer Prices in Kenya 2001—2008.⁴³

Prices in Kenyan Shillings for 50 Kg bags

	2001	2002	2003	2004	2005	2006	2007	2008
SSP	825	825	850	850	1,100	1,100	1,075	1,650
TSP	1,125	1,150	1,150	1,500	1,500	1,600	1,680	3,400
DAP	1,250	1,125	1,125	1,500	1,680	1,700	1,730	3,800
MAP	1,080	1,050	975	1,450	1,680	1,700	1,625	3,800
ASN	950	900	925	1,250	1,300	1,350	1,300	1,850
CAN	875	850	900	1,250	1,350	1,350	1,375	2,000
SA	700	700	750	7,250	1,300	1,300	1,125	1,850
UREA	780	750	900	1,250	1,400	1,450	1,600	3,100
NPK 20:20:0	1,100	1,075	1,100	1,350	1,600	1,600	1,630	3,000
NPK 20:10:10	1,050	1,075	1,100	1,250	1,350	1,400	1,450	3,000
NPK 25:5:5	1,270	1,250	950	1,250	1,400	1,400	1,420	3,150
NPK 17:17:17	1,200	1,200	980	1,250	1,400	1,450	1,620	3,150
KCL	1,200	1,200	1,100	1,250	1,400	1,400	1,420	2,400
KCL 23:23:0	1,100	1,075	1,065	1,400	1,600	1,600	1,630	3,050

Endnotes

- ¹ Jayne, T. S., Govereh, J., Wanzala, M., & Demeke, M. (2003). Fertilizer market development: a comparative analysis of Ethiopia, Kenya, and Zambia. *Food Policy*, 28(4), 293-316.
- ² Jayne, T. S., Govereh, J., Wanzala, M., & Demeke, M. (2003). Fertilizer market development: a comparative analysis of Ethiopia, Kenya, and Zambia. *Food Policy*, 28(4), 293-316.
- ³ [Arwings-Kodhek, 1996; Omamo and Mose, 2001; Wanzala et al., 2002] as quoted in Jayne, T. S., Govereh, J., Wanzala, M., & Demeke, M. (2003). Fertilizer market development: a comparative analysis of Ethiopia, Kenya, and Zambia. *Food Policy*, 28(4), 293-316.
- ⁴ [Freeman and Omiti, 2003] as quoted in Jayne, T. S., Govereh, J., Wanzala, M., & Demeke, M. (2003). Fertilizer market development: a comparative analysis of Ethiopia, Kenya, and Zambia. *Food Policy*, 28(4), 293-316.
- ⁵ Duflo, E., Kremer, M., & Robinson, J. (2008). How high are rates of return to fertilizer? Evidence from field experiments in Kenya. *American Economic Review*, 98(2), 482-488.
- ⁶ Jayne, T. S., Govereh, J., Wanzala, M., & Demeke, M. (2003). Fertilizer market development: a comparative analysis of Ethiopia, Kenya, and Zambia. *Food Policy*, 28(4), 293-316.
- ⁷ Kelly, V., & Crawford, E. (2007). *Policies and actions to stimulate private sector fertilizer marketing in sub-Saharan Africa*. Rome: Food and Agriculture Organization (FAO) p. 50.
- ⁸ the Daily Nation. 2008. Kenya to help farmers access fertilizer. Sept 25, 2008.
- ⁹ Kenya Broadcasting Corporation. 2008. Kenya promises farmers subsidized fertilizer. Sept 25, 2008.
- ¹⁰ Kenya Broadcasting Corporation. 2008. Kenya promises farmers subsidized fertilizer. Sept 25, 2008.
- ¹¹ Roelf, W. (2009, June 15). Norway's Yara sees higher fertiliser prices 2010. *Renters*.
- ¹² BBC. (2009, March 18). UN set to double Kenya food aid. *BBC online*.
- ¹³ Bii, B. (2009, July 15). Kenya: Erratic Rainfall And Lack of Markets Hit Wheat Productio. *Business Daily*, from <http://allafrica.com/stories/200907140999.html>.
- ¹⁴ Kelly, V., & Crawford, E. (2007). *Policies and actions to stimulate private sector fertilizer marketing in sub-Saharan Africa*. Rome: Food and Agriculture Organization (FAO).
- ¹⁵ Kelly, V., & Crawford, E. (2007). *Policies and actions to stimulate private sector fertilizer marketing in sub-Saharan Africa*. Rome: Food and Agriculture Organization (FAO).
- ¹⁶ Kelly, V., & Crawford, E. (2007). *Policies and actions to stimulate private sector fertilizer marketing in sub-Saharan Africa*. Rome: Food and Agriculture Organization (FAO) p. 36.
- ¹⁷ Minde, I., Jayne, T., Crawford, E., Ariga, J., & Govereh, J. (2008). *Promoting Fertilizer Use in Africa: Current Issues and Empirical Evidence from Malawi, Zambia: and Kenya*. Working Paper for Re-SAKSS/Southern Africa, Pretoria, South Africa.
- ¹⁸ Duflo, E., Kremer, M., & Robinson, J. (2008). How high are rates of return to fertilizer? Evidence from field experiments in Kenya. *American Economic Review*, 98(2), 482-488.
- ¹⁹ Duflo, E., Kremer, M., & Robinson, J. (2008). How high are rates of return to fertilizer? Evidence from field experiments in Kenya. *American Economic Review*, 98(2), 482-488.
- ²⁰ Kelly, V., & Crawford, E. (2007). *Policies and actions to stimulate private sector fertilizer marketing in sub-Saharan Africa*. Rome: Food and Agriculture Organization (FAO).
- ²¹ Kelly, V., & Crawford, E. (2007). *Policies and actions to stimulate private sector fertilizer marketing in sub-Saharan Africa*. Rome: Food and Agriculture Organization (FAO) p. 40.
- ²² Crawford, E. W., Jayne, T. S., & Kelly, V. A. (2006). *Alternative Approaches for Promoting Fertilizer Use in Africa*. Washington, DC: World Bank.
- ²³ Jayne, T. S., Govereh, J., Wanzala, M., & Demeke, M. (2003). Fertilizer market development: a comparative analysis of Ethiopia, Kenya, and Zambia. *Food Policy*, 28(4), 293-316.
- ²⁴ Ariga, J., Jayne, T. S., & Nyoro, J. (2006). *Factors driving the growth in fertilizer consumption in Kenya, 1990-2005: Sustaining the momentum in Kenya and lessons for broader replicability in Sub-Saharan Africa*. Kenya: Egerton University.
- ²⁵ Duflo, E., Kremer, M., & Robinson, J. (2009). Nudging Farmers to Use Fertilizer: Evidence from Kenya. *unpublished*.
- ²⁶ Minde, I., Jayne, T., Crawford, E., Ariga, J., & Govereh, J. (2008). *Promoting Fertilizer Use in Africa: Current Issues and Empirical Evidence from Malawi, Zambia: and Kenya*. Working Paper for Re-SAKSS/Southern Africa, Pretoria, South Africa.
- ²⁷ Minde, I., Jayne, T., Crawford, E., Ariga, J., & Govereh, J. (2008). *Promoting Fertilizer Use in Africa: Current Issues and Empirical Evidence from Malawi, Zambia: and Kenya*. Working Paper for Re-SAKSS/Southern Africa, Pretoria, South Africa.
- ²⁸ Jayne, T. S., Govereh, J., Wanzala, M., & Demeke, M. (2003). Fertilizer market development: a comparative analysis of Ethiopia, Kenya, and Zambia. *Food Policy*, 28(4), 293-316.
- ²⁹ Duflo, E., Kremer, M., & Robinson, J. (2009). Nudging Farmers to Use Fertilizer: Evidence from Kenya. *unpublished*.
- ³⁰ Crawford, E. W., Jayne, T. S., & Kelly, V. A. (2006). *Alternative Approaches for Promoting Fertilizer Use in Africa*. Washington, DC: World Bank.
- ³¹ Jayne, T. S., Govereh, J., Wanzala, M., & Demeke, M. (2003). Fertilizer market development: a comparative analysis of Ethiopia, Kenya, and Zambia. *Food Policy*, 28(4), 293-316.
- ³² Jayne, T. S., Govereh, J., Wanzala, M., & Demeke, M. (2003). Fertilizer market development: a comparative analysis of Ethiopia, Kenya, and Zambia. *Food Policy*, 28(4), 293-316.
- ³³ FAOSTAT
- ³⁴ Crawford, E. W., Jayne, T. S., & Kelly, V. A. (2006). *Alternative Approaches for Promoting Fertilizer Use in Africa*. Washington, DC: World Bank.
- ³⁵ Duflo, E., Kremer, M., & Robinson, J. (2008). How high are rates of return to fertilizer? Evidence from field experiments in Kenya. *American Economic Review*, 98(2), 482-488.
- ³⁶ Kelly, V., & Crawford, E. (2007). *Policies and actions to stimulate private sector fertilizer marketing in sub-Saharan Africa*. Rome: Food and Agriculture Organization (FAO) p. 48.
- ³⁷ Kelly, V., & Crawford, E. (2007). *Policies and actions to stimulate private sector fertilizer marketing in sub-Saharan Africa*. Rome: Food and Agriculture Organization (FAO) p. 42.
- ³⁸ For more detailed analysis, see Duflo et al. (2009).
- ³⁹ Ariga, J., Jayne, T. S., & Nyoro, J. (2006). *Factors driving the growth in fertilizer consumption in Kenya, 1990-2005: Sustaining the momentum in Kenya and lessons for broader replicability in Sub-Saharan Africa*. Kenya: Egerton University.
- ⁴⁰ Kelly, V., & Crawford, E. (2007). *Policies and actions to stimulate private sector fertilizer marketing in sub-Saharan Africa*. Rome: Food and Agriculture Organization (FAO) p. 78.
- ⁴¹ Denning, G., Kabambe, P., Sanchez, P., Malik, A., Flor, R., Harawa, R., et al. (2009). Input Subsidies to Improve Smallholder Maize Productivity in Malawi: Toward an African Green Revolution. *PLoS Biology*, 7(1), e1000023.
- ⁴² Duflo, E., Kremer, M., & Robinson, J. (2009). Nudging Farmers to Use Fertilizer: Evidence from Kenya. *unpublished*.
- ⁴³ GOK Ministry of Agriculture. Q&A. Fertilizer Prices.