IFPRI Discussion Paper 01605

February 2017

Can Better Targeting Improve the Effectiveness of Ghana's Fertilizer Subsidy Program?

Lessons from Ghana and Other Countries in Africa South of the Sahara

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ABSTRACT

Despite improvements to the implementation regime of Ghana's fertilizer subsidy program, this paper shows that considerable challenges remain in ensuring that the subsidy is targeted to farmers who need fertilizer the most. Currently, larger-scale and wealthier farmers are the main beneficiaries of subsidized fertilizer even though the stated goal is to target smallholder farmers with fertilizer subsidies. The experience of other African countries suggests that the effectiveness of fertilizer subsidies can improve with effective targeting of resource-poor smallholders. However, targeting smallholder farmers entails significant transaction costs and may even be infeasible in some cases. Faced with such challenges, Ghanaian policy makers must ponder the question of how to improve the targeting of input subsidy programs in the country. Further research is needed to identify more cost-effective approaches for achieving the goal of targeting.

Keywords: targeting, fertilizer subsidy, smallholder farmers, Ghana, Africa south of the Sahara; SSA

ACKNOWLEDGMENTS

The authors would like to thank IFPRI's Ghana Strategy Support Program (GSSP) Leader, Shashidhara Kolavalli, for providing valuable comments on the work. The authors acknowledge the financial support of the United States Agency for International Development (USAID) to IFPRI's GSSP under which the research has been carried out. This work was undertaken as part of, and partially funded by the CGIAR Research Program on Policies, Institutions, and Markets (PIM), which is led by the International Food Policy Research Institute (IFPRI) and funded by CGIAR Fund Donors. This paper has not gone through IFPRI's standard peer-review procedure. The opinions expressed here belong to the authors, and do not necessarily reflect those of PIM, IFPRI, CGIAR, or USAID.

1. INTRODUCTION

Although policy makers have made substantial changes to the implementation regime of Ghana's fertilizer subsidy program (FSP) since its inception in 2008, considerable challenges remain in ensuring that the subsidy is targeted to farmers who need fertilizer the most and that "additionality" in fertilizer use is achieved through the implementation of the policy. The most recent changes, introduced in 2013, have sought to provide fertilizer for only 2 hectares to staple-producing smallholder farmers. This reform was aimed at reducing the overall costs of the program and enabling it to more efficiently reach farmers who could not afford to purchase fertilizer. However, available evidence indicates that even this change did not go far enough in improving the targeting of the program to smaller-scale farmers—the benefits of the program still accrue disproportionately to large-scale farmers. Against this backdrop, this paper offers three arguments for improving the targeting of the FSP, draws lessons from the experiences of other countries in Africa south of the Sahara (SSA), and shows from the example of other subsidy and social programs in Ghana that there are available models that the FSP could adopt to become a more effective program.

The main arguments for improving Ghana's FSP are the following. First, Ghana's economic growth has recently suffered severe setbacks due in large part to the government's high spending. A better-targeted FSP would represent less of a drain on the resources of the Ministry of Food and Agriculture and of the government as a whole. Second, on equity grounds, the fact that the FSP seems to represent so little additional use of fertilizer should be a cause for concern. Some farmers are receiving subsidized fertilizer when the evidence suggests that they would have purchased fertilizer anyway. Finally, the examples of other countries that are discussed in this paper show clearly that improved targeting is possible and can lead to much more effective subsidy programs. The evidence from within Ghana also suggests that it should be possible for social programs such as the FSP to reach more of the poor with better targeting.

The rest of this paper is organized as follows. Section 2 provides a brief review of the literature on fertilizer subsidies, followed in Section 3 by an extensive review of various African countries' experiences with fertilizer subsidies and an overview of the lessons that can be drawn for Ghanaian policy makers. Section 4 discusses the economic environment in which fertilizer subsidies are provided in Ghana, and Section 5 examines the key features of the country's FSP. In Sections 6 and 7, we assess the performance of the program with respect to various indicators, especially how well the program targeted smallholder farmers. We end the paper with some concluding remarks.

2. ROLE OF FERTILIZER SUBSIDIES IN AGRICULTURAL DEVELOPMENT

Increased and improved use of agricultural inputs is an essential feature of agricultural transformation and economic development. The experience from Europe, North America, Asia, and most recently Latin America shows that agricultural transformation has occurred together with increased productivity, which was essentially achieved through the more intensive use of agricultural inputs such as fertilizer, seeds, irrigation, and mechanization, among others. But the picture is quite different in SSA. For example, fertilizer application rates have persistently been low in the subregion (7.1 kilograms per hectare) compared with other developing countries (104.8 kilograms per hectare in Latin America; 109.6 kilograms per hectare in East and Southeast Asia, excluding China and Japan; and 129.4 kilograms per hectare in South Asia) (Druilhe and Barreiro-Hurlé 2012). The big divide between the limited use of fertilizer in SSA (and its associated low agricultural productivity) and the much more intensive use of fertilizer in other developing regions, especially Asia, has led to widespread discussion among development economists about how to increase fertilizer use in SSA in the agricultural development process. Even today, scholars and policy makers continue to debate the types of policies and programs required to increase fertilizer use and achieve its potential benefits in African agriculture (Morris et al. 2007). Among the policies adopted over the past few decades to increase agricultural production and productivity, input subsidies, especially fertilizer subsidies, have invariably been a key policy tool used by governments in SSA. The provision of fertilizer subsidies enjoys a special place in the hierarchy of antipoverty measures in the subregion. However, the literature on these subsidy programs has been sharply divided with regard to their impacts (see, for example, Druilhe and Barreiro-Hurlé 2012; Dorward and Chirwa 2011; Morris et al. 2007; World Bank 2007), and policy debates over the relative merits of input subsidies, particularly fertilizer subsidies, are undoubtedly among the most contentious in Africa.

Both economic and noneconomic arguments for fertilizer subsidies are attractive on numerous grounds. On the economic front, the argument for the provision of fertilizer subsidies touts benefits such as the subsidies' ability to kick-start innovation and stimulate rapid market development, overcome nonexistent or imperfect markets for farmers (policy-induced or otherwise), and correct for negative externalities[1] (see, for example, Wiggins and Brooks 2010; Morris et al. 2007; Crawford, Jayne, and Kelly 2006). Noneconomic arguments for providing fertilizer subsidies include the goals of reducing poverty or providing a safety net for extremely poor and vulnerable populations (welfare arguments), as well as restoring soil fertility and protecting the environment (see, for example, Wiggins and Brooks 2010; Morris et al. 2007; Crawford, Jayne, and Kelly 2006). Empirically, authors such as Dorward and Chirwa (2013a) and Mkwara (2013) have shown that fertilizer subsidies have indeed helped reduce income poverty among agricultural households in Malawi.

However, Morris et al. (2007) suggest that there are arguments against fertilizer subsidies that are rooted in historical experience on the African continent and elsewhere. These arguments include the high fiscal and administrative costs, the crowding out of the private sector, rent seeking, regressive distribution of benefits, late delivery of fertilizer, inefficient use of subsidized fertilizer, substitution of crops with those that respond better to fertilizer, the creation of vested political interests, and the lack of complementary measures needed to achieve the policy objective of promoting increased agricultural productivity (see, for example, Wiggins and Brooks 2010; Morris et al. 2007; Crawford, Jayne, and Kelly 2006). For example, in Zambia, displacement, poor targeting, and late input delivery have been cited as factors affecting the effectiveness of the Fertilizer Support Program and Food Security Pack (Mason and Ricker-Gilbert 2013; Minde et al. 2008). Similarly, Haantuba, Wamalume, and Bwalya (2011) find that the emphasis of the Fertilizer Support Program on maize negatively impacted crop diversification efforts, implying that crop-specific subsidies distort crop choices by farmers.

Furthermore, the evidence suggests that returns to private input subsidies are generally lower than returns to investments in public goods (Fan, Gulati, and Thorat 2008). Government spending on

[1] Examples of negative externalities countered by increased use of fertilizer include the soil erosion from neighboring farms and deforestation that may occur in the absence of fertilizer use.

productivity-enhancing programs such as agricultural research, extension, rural roads, and irrigation produces returns that are much greater than those of spending devoted to input subsidies. Spending in these areas (agricultural research, education, and rural roads) has also been found to have the largest impact on agricultural growth and poverty reduction (Fan, Gulati, and Thorat 2008; Fan, Zhang, and Rao 2004; Fan and Rao 2003).

Many governments in SSA have recently reintroduced large-scale agricultural input subsidy programs with the aim of raising agricultural output and reducing poverty among smallholder farmers (Kelly, Crawford, and Ricker-Gilbert 2011). These current efforts have been rebranded as "smart subsidies" because they bring innovations in design (for example, targeting or vouchers) to support both the most constrained farmers and the development of input markets (Druilhe and Barreiro-Hurlé 2012). The resurgent interest in fertilizer subsidies is based on the premise that they can overcome the past shortcomings of nationwide input subsidy programs (Dorward 2009). But the evidence from various studies (for example, Jayne and Rashid 2013; Lunduka, Ricker-Gilbert, and Fisher 2013; Takeshima and Liverpool-Tasie 2013; Ricker-Gilbert and Jayne 2012) suggests that the performance of the programs is mixed, as they vary depending on the country and the nature of the program.

3. FERTILIZER SUBSIDIES IN AFRICA SOUTH OF THE SAHARA: THE RECENT EXPERIENCE

The Experience of Selected Countries in SSA

Malawi was one of the first countries in SSA to lead the introduction of the new paradigm of subsidies amid the acute hunger crises in 2005. Subsequently, countries such as Ghana, Kenya, Nigeria, and Zambia followed, mainly after the 2007/2008 food price hikes. During that time, governments assigned multiple objectives to fertilizer subsidies, including financial, economic, social, political, and/or environmental objectives (see Table 3.1). Since Ghana is the focus of this paper, we discuss its case in detail in section 5.

Table 3.1 Objectives of subsidy programs

Country	Increase productivity, production, and food security	Alleviate poverty	Improve access and affordability / input adoption	Develop private-sector input markets	Increase input use efficiency
Malawi	✓	✓	✓ (Starter Pack)	✓	
Nigeria	✓		✓	✓	
Zambia	✓	✓	✓	✓	✓
Kenya	✓	✓	✓	✓	✓
Ghana	✓		✓	✓	

Source: Sheahan et al. (2014); Mason and Jayne (2013); Kelly, Crawford, and Ricker-Gilbert (2011); Nigeria, FMARD (2011); Ricker-Gilbert, Jayne, and Chirwa (2011); Benin et al. (2013).

These objectives affect not only the program design but also exit strategies and complementary investments (Wiggins and Brooks 2010). But, according to Kelly, Crawford, and Ricker-Gilbert (2011), these objectives are often not well defined or are contradictory. For example, the objective of boosting production may not necessarily align with that of reducing poverty (Kelly, Crawford, and Ricker-Gilbert 2011). Similarly, increasing production and reducing poverty may not be best realized with fertilizer subsidies if poor farmers have poor-quality soils, which lowers the impact of fertilizer on production (Druilhe and Barreiro-Hurlé 2012).

In Malawi, the objectives of the various subsidy programs changed from social protection for vulnerable households (Starter Pack), to kick-starting agricultural production (Targeted Input Program), to national food production and self-sufficiency (Agricultural Input Subsidy Program) (Wiggins and Brooks 2010). However, these programs had only a limited and transitory impact on food security (Chinsinga and Poulton 2014), suggesting that other factors or inputs are equally important in achieving food self-sufficiency. Following severe food shortages in the country, particularly after the poor 2004/2005 production season, and in line with election manifesto commitments, the government of Malawi decided in 2005/2006 to implement a very large-scale input subsidy program known as the Farm Input Subsidy Program (FISP) (Chinsinga and Poulton 2014; Dorward and Chirwa 2011; Chinsinga 2007). A total of 131,388 metric tons (MT) of subsidized fertilizer were distributed in 2005/2006 at a cost of MK 4.5 billion (US$55.7 million) to the government, corresponding to 2.2 percent of gross domestic product (GDP) after deducting donor contributions (Minde et al. 2008). In 2008/2009, 150,000 MT of maize fertilizer and 20,000 MT of tobacco fertilizer were distributed at a cost of MK 31 billion (MK 140 = US$1), roughly 4 percent of GDP, of which 95 percent was financed through the government budget and 5 percent by development partners (Chibwana et al. 2014).

Likewise, Zambia has established a number of input subsidy programs, namely the Fertilizer Credit Program (1997/1998–2001/2002), the Fertilizer Support Program (2002/2003–2008/2009), the Farmer Input Support Program (2009/2010–present), and the Food Security Pack Program (2000/2001–present). The Farmer Input Support Program, which is cash-based, was implemented as a result of low

loan recovery rates under the loan-based Fertilizer Credit Program and severe droughts in the 2000/2001 and 2001/2002 agricultural years (Mason, Jayne, and Mofya-Mukuka 2013).

In Nigeria, the federal government has implemented several fertilizer subsidy schemes that were not successful or at best had mixed results (see, for example, Liverpool-Tasie and Takeshima 2013; Takeshima and Nkonya 2014). In 1997, the fertilizer market was liberalized, and the government withdrew from the market in order to encourage private-sector participation. But the private sector was not properly facilitated, leading to a sharp decline in fertilizer use in the country. Therefore, in 1999, the Nigerian government reintroduced a fertilizer subsidy program under the Federal Market Stabilization Program (FMSP), which lasted until 2011 (Liverpool-Tasie and Takeshima 2013). However, in 2009, the Nigerian government piloted a voucher program in Kano and Taraba States (Liverpool-Tasie and Takeshima 2013), aimed at stimulating the growth of the commercial fertilizer sector in the country (Takeshima and Nkonya 2014). This program was extended to Kwara and Bauchi States in 2010 (Olomola 2015). In 2011, the federal government launched an agricultural transformation agenda with a fertilizer strategy as one of its main components. In line with this strategy, a new fertilizer subsidy program known as Growth Enhancement Support (GES) was devised with the aim of increasing fertilizer use from the current level of 13 kilograms per hectare to 50 kilograms per hectare, withdrawing state intervention in input procurement, and developing a private-sector channel for input distribution (Nigeria, FMARD 2011). This new subsidy program was a shift from the FMSP.

In Kenya, the Ministry of Agriculture developed a proposal in 2006 for a three-year KSh 36 billion (US$525 million) input subsidy program known as the National Accelerated Agricultural Input Access Program. The program aimed to help improve the livelihoods of 2.5 million smallholder farmers by increasing crop yields and incomes and reducing poverty. In 2007/2008, a total of 36,000 households and 40 districts were targeted with a voucher value of KSh 6,500 (US$103.67). The number of households and districts targeted increased in subsequent years, to 125,883 households and 95 districts in the year 2010/2011, before decreasing in 2011/2012 to 63,737 households and 63 districts, with each household receiving a voucher value of KSh 8,000 (Mason et al. 2015).

It is clear that FSPs have become a major component of agricultural development policy in Malawi, Zambia, Nigeria, Kenya, and other countries in SSA. However, most of these programs suffer from implementation deficiencies, which weaken their potential to address subsidy objectives and yield meaningful impacts.

Implementation and Targeting

Under the Malawi FISP, recipient households receive subsidized input coupons that can be redeemed at select outlets throughout the country. The FISP is officially targeted toward the "productive poor." These are smallholder farmers who cannot afford to buy one or two bags of fertilizer at prevailing commercial prices (Dorward et al. 2008). The program's definition of these "productive poor" households has shifted somewhat over the years. Targeting has changed from an early emphasis on allocating coupons in proportion to maize and tobacco area (in the first two years of the program) to a more recent emphasis on an open system of identification of beneficiaries through community-based targeting using the farming households register (Dorward and Chirwa 2013b). In other words, vouchers are allocated to districts by the central government, and at the lower levels (that is, within villages), the extension staff of the Ministry of Agriculture allocates vouchers in collaboration with input subsidy program committees made up of village leaders who identify the "productive poor." Under the program, a beneficiary is provided with two fertilizer vouchers to procure one 50-kilogram bag of nitrogen-phosphorous-potassium (NPK) and one 50-kilogram bag of urea (Lunduka, Ricker-Gilbert, and Fisher 2013).

In the case of Zambia's FSP, the government awards tenders annually to private firms to produce subsidized fertilizer and deliver them to registered cooperatives and other delivery points. The cooperatives and extension officers subsequently allocate the fertilizer to farmers. National and local government bodies determine the scale and regions of delivery and select the beneficiary farmers (Minde et al. 2008; Xu et al. 2009). Like the FISP in Malawi, the Zambian FSP establishes criteria for targeting

farmers, including possession of or access to 1–5 hectares of land and the ability to produce maize on that area (Minde et al. 2008).

With regard to Nigeria, under the FMSP, following requests from the state governments, the federal government issues tenders to private fertilizer manufacturers to supply fertilizer, mainly NPK, and sell it to the state governments at a subsidy rate of 25 percent (Takeshima and Nkonya 2014; Banful and Olayide 2010). Each state further subsidizes fertilizer purchased through the FMSP, with additional subsidy rates ranging from zero to 50 percent, and then distributes to it farmers through outlets, mainly the Agricultural Development Project (Takeshima and Nkonya 2014; Banful and Olayide 2010). The subsidy targets all farmers, but in some states only farmers selected by local committees are allowed to purchase subsidized fertilizer. Farmers are informed of the arrival of fertilizer through radio and television announcements, through interaction with extension agents, or through frequent inquiries at the government-managed sales centers, and they are required to complete some allocation procedures to receive the fertilizer because demand is higher than supply (Banful and Olayide 2010).

Under the 2009 voucher program in Kano State, beneficiaries are required to be members of a farmer group, and a single voucher is issued to the entire farmer group, which is then used to purchase subsidized fertilizer for all the members as a group (Liverpool-Tasie 2012). Each member is provided with two bags of NPK (15:15:15) and one bag of urea at a discount of NGN 2,000 (US$12.9) per bag that is slightly over 60 percent and 65 percent of the NPK and urea market price, respectively (Liverpool-Tasie 2012). According to Liverpool-Tasie (2012), the federal and state governments provided a total subsidy of NGN 522 million (US$335,483) under the program in 2009. The GES program is also targeted, and beneficiaries must be full-time farmers with a landholding size of 3 hectares or less. Farmers are self-declared and provide information on their landholding size at registration. The registration uses an "on demand" process in which eligible individuals register at designated centers established at the ward level. Fertilizer subsidies are delivered to the beneficiaries using their mobile phones as e-wallets (Grow Africa 2014).

The FMSP also faces questions about the effectiveness of its targeting. Liverpool-Tasie, Banful, and Olaniyan (2010) have found that the friends and relatives of the farm group president received more bags of fertilizer than those without such links. In addition, rent-seeking activities and political interference have also resulted in the diversion of subsidized fertilizer from the intended beneficiaries (Banful and Olayide 2010). Unlike the FMSP, the 2009 voucher program seems to have been targeted to poor farmers. Liverpool-Tasie (2012) finds that wealth was negatively correlated with participation, as farmers with larger landholdings and those in a household with a motorcycle were less likely to receive subsidized fertilizer. The latter also indicates that the voucher program has strengthened the links between rural farmers and private-sector agro-dealers.

With regard to the GES program which represents a sharp contrast from previous programs, there were also implementation challenges, including low phone ownership, poor network availability, and congestion and long waits at redemption centers, among other issues.[2] Evidence on the performance of the program and the extent to which it has addressed past weaknesses is limited. But Olomola (2015) indicates that the program has shown significant improvements in terms of compliance with input allocation criteria and better access to inputs by farmers due to better targeting of farmers, improved management of the supply chain, and monitoring of input distribution.

In Kenya, the FSP was targeted at resource-poor smallholder farmers (as in Zambia) and staple crops (as in Malawi). The program offered a subsidy rate of 100 percent for two bags of fertilizer (a 50-kilogram bag of basal fertilizer and a 50-kilogram bag of top dressing fertilizer) through vouchers redeemable at local shops participating in the program (Sheahan et al. 2014). Districts were chosen for the program based on their suitability for maize, sorghum, and/or millet production; high incidence of

[2] As a result, two technologies, namely the Token Administration Platform (TAP) and point-of-sale (POS) devices have been piloted to offer more effective delivery of the e-wallet (Grow Africa 2014). The TAP technology is used for electronic registration of farmers and allows farmers to redeem inputs in areas where there are no mobile networks by using Android phones as smart cards. The POS devices, in contrast, are used by agro-dealers to record electronic transactions during the redemption process, both offline and online (Grow Africa 2014).

poverty; and lack of similar programs. A participatory approach involving community members was used in the selection of beneficiary farmers (Sheahan et al. 2014). Special preference was given to farmers who did not have the capacity to purchase commercial inputs, small-scale farmers with sufficient land (at least 1 hectare) to produce maize, "vulnerable" members of society (for example, female- and child-headed households, and farmers who had not received government support in the past) (Sheahan et al. 2014).

Performance of Implementation and Targeting Designs

One significant observation emerging from the study of these programs is that in Malawi and Zambia, farmers could obtain fertilizer only from government-arranged depots (Jayne et al. 2013). This was also the case under the FMSP in Nigeria. But in Kenya, fertilizer retailers in the private sector have consistently been engaged in fertilizer distribution under the subsidy program (see, for example, Jayne and Rashid 2013). Likewise, under the voucher program and the new GES program in Nigeria, the private sector has strongly participated in fertilizer distribution (see, for example, Liverpool-Tasie 2012; Grow Africa 2014). For example, three fertilizer suppliers and more than 150 private-sector agro-dealers participated in the 2009 program in Kano State (Liverpool-Tasie 2012). In addition, the subsidies in Malawi, Zambia, and Kenya are geared toward staple crops, mainly maize, while in Malawi, tobacco, which is a cash crop, was also targeted when the FISP was introduced in the 2005/2006 growing season—though it was withdrawn starting from the 2009/2010 growing season (Chinsinga and Poulton 2014).

Implementing household targeting objectives continues to be a critical issue, as most poor and vulnerable households are not sufficiently included in these subsidy programs, considering that poverty reduction is a stated goal of the programs (see, for example, Chibwana, Fisher, and Shively 2012; Ricker-Gilbert, Jayne, and Chirwa 2011; Holden and Lunduka 2010; Houssou and Zeller 2011; Jayne et al. 2011; Morris et al. 2007). In most cases, subsidized fertilizers leak out to better-off farmers rather than reaching relatively poor farmers with low effective demand (Dorward et al. 2008; Jayne et al. 2003). Evidence from all four countries shows that subsidy beneficiaries tended to be wealthier than nonbeneficiaries. For example, in Zambia, Morris et al. (2007) show that fertilizer distributed under the subsidy program often ended up in the hands of wealthy farmers who least needed assistance. Similarly, Jayne et al. (2011) find that fertilizer subsidies are disproportionately targeted to farmers with greater assets and incomes. These authors indicate that in Zambia farm households with 10–20 hectares of land receive 14 times more subsidized fertilizer per farm than those with less than 1 hectare. Chirwa and Dorward (2014) also find that in Malawi, poor and vulnerable households, young households, and female-headed households received less compared to better-off beneficiaries. Likewise, research by Houssou and Zeller (2011) suggests that Malawi's Agricultural Input Subsidy Program was poorly targeted because only 46 percent of the poor actually received the subsidies, while the subsidies leaked to 54 percent of the nonpoor.

Elsewhere, in Nigeria, Banful and Olayide (2010) find that rent-seeking activities and political interference resulted in the diversion of subsidized fertilizer from the intended beneficiaries. However, Liverpool-Tasie (2012) finds that fertilizer subsidies are well targeted to the poor and that the distortionary effects of fertilizer subsidies were less likely to occur in the voucher program in Kano State, a program that involved a collaboration between multiple institutions (federal and state governments, private-sector suppliers and dealers, and the International Fertilizer Development Center). This suggests that improvements can be made to subsidy targeting in other countries and programs.

From the above-cited experiences and lessons in implementing targeted subsidies, a few principles can be gleaned for improving targeting in Ghana. First, it is important to note that accurate targeting is difficult to achieve and may even be infeasible in some cases. Targeting well involves significant transaction costs to design the subsidy program appropriately, and enforcing the targeting regime raises these transaction costs. While the use of information technology has allowed for some reductions in these transaction costs, for developing countries the use of such targeting technologies still requires preparatory exercises such as drawing up lists of farmers and farm sizes.

Second, for clear identification of beneficiaries, policy makers are learning to adopt inclusive targeting mechanisms, in particular the use of community leaders and local government in identifying beneficiaries (for example, the Kenya, Malawi, and Zambia models). At the same time, one must recognize that this approach does not completely eliminate the risk of nepotism or political interference undermining the targeting mechanism, as seen with the Nigerian experience. The Nigeria program also shows both the potential and the limitations of technology for targeting.

Another lesson to learn from these experiences is the difficulty of achieving additional use of fertilizer, regardless of the targeting mechanism employed by policy makers.

Impacts of FSPs in SSA

Evidence from the four countries (Kenya, Malawi, Nigeria, and Zambia) suggests that the new subsidies have had some positive impact over the short to medium term, which includes promoting input use, increasing output, and reducing poverty. However, these subsidies have not yet offered a convincing solution, as they carry over many of the problems from the past, such as inefficiencies in state-led distribution of benefits and poor design and implementation (Druilhe and Barreiro-Hurlé 2012). Likewise, most of these programs have been associated with high budgetary costs. This subsection reviews the impacts of the subsidy programs in these countries.

Fiscal Cost of FSPs

FSPs have high fiscal costs that tend to make them financially unsustainable given the limited resources of developing nations. They may crowd out public funding of other important investments that can help reduce poverty and promote agricultural growth. In Zambia, for example, over the past several years about 40 percent of the agriculture budget has been devoted to fertilizer and seed subsidies (Mason and Ricker-Gilbert 2013). In Malawi, from 2005 to 2008 the total program costs increased regularly, from more than 60 percent to about 74 percent of the national agricultural budget. This is equivalent to 2.1 percent to 6.6 percent of the country's GDP (Dorward and Chirwa 2011). Jayne and Rashid (2013) estimate that in Kenya, roughly US$61.1 million was spent on fertilizer subsidies in 2011, amounting to 25.7 percent of public expenditures on agriculture, and US$190 million was spent in Nigeria in 2010, representing 26 percent. However, several studies and reviews of these programs in SSA and elsewhere (for example, Jayne and Rashid 2013; Fan, Gulati, and Thorat 2008; Fan, Zhang, and Rao 2004) indicate that investments in education, agricultural research and development, and roads provide higher returns than input subsidy programs. Specifically, returns to subsidies tend to be lower under rainfed agriculture than in irrigated areas, where subsidies have greater impact.

Effects of FSPs on Total Fertilizer Use

Some studies suggest that FSPs have enabled beneficiary households to increase their intensity of fertilizer use. For example, Jayne et al. (2013) find that an additional ton of subsidized fertilizer increases total fertilizer use by 490 kilograms in Malawi, by 536 kilograms in Zambia, and by 239 kilograms in Kenya. Similarly, Mason and Jayne (2013) find that each additional kilogram of subsidized fertilizer distributed in Zambia increases total fertilizer use by 0.54 kilogram. A study by Chibwana et al. (2014) suggests that there are positive and statistically significant relationships between participation in Malawi's FISP and fertilizer-use intensity in the country. The study also indicates that an additional 100-kwacha increase in the value of the subsidy increased the intensity of fertilizer use by 0.50 to 0.60 kilograms per hectare. In Zambia, Xu et al. (2009) find that an increase in government subsidies of 1 kilogram per household increases total fertilizer use by 0.01 kilogram per household, but they indicate that overall fertilizer use decreases by 0.12 kilogram per household in areas with high private-sector activity.

Effects of FSPs on Crop Production and Yields

Fertilizer subsidies have generally been shown to account for increases in crop production in countries where they are implemented. For instance, in Malawi, Lunduka, Ricker-Gilbert, and Fisher (2013) find that maize production and yields have increased, though modestly, as a result of the FISP. Similarly, Ricker-Gilbert and Jayne (2011), using panel data over a six-year period, find that an additional kilogram of subsidized fertilizer increases maize production by 1.82 kilograms on average in Malawi. Chibwana et al. (2014) also indicate that maize yields have increased by 249 kilograms per hectare among recipients of subsidized fertilizer, and by 447 kilograms per hectare among those who received both subsidized fertilizer and seeds under Malawi's FISP. Likewise, Mason et al. (2015) observe a substantial increase in maize production in Kenya as a result of the FSP. In Zambia, Mason, Jayne, and Mofya-Mukuka (2013) show that an increase in the quantity of subsidized fertilizer purchased by a household increases its maize area planted, yields, and output; it has no effect on the area planted to other crops but has positive spillover effects on the yields and production of other crops, although these effects are generally small in magnitude.

Market Development and Private Input Demand

The evidence on the impact of FSPs on market development appears to differ greatly depending on program implementation (Chirwa and Dorward 2013; Druilhe and Barreiro-Hurlé 2012), with the key factor being whether vouchers were required to be redeemed at private depots, and in the case of importers and wholesalers, whether they were chosen to distribute government fertilizer (Jayne and Rashid 2013). For example, Liverpool-Tasie (2012) shows that receiving subsidized fertilizer did not appear to increase the likelihood of participating in the private fertilizer market in Kano State (Nigeria), but it did increase the quantity of fertilizer purchased from the private sector. Nonetheless, the author concluded that the voucher programs could be effective ways to stimulate the development of commercial markets in rural areas. Similarly, Liverpool-Tasie and Salau (2013) report that increased access to subsidized fertilizer has increased the probability of farmers participating in the market for improved seed in Kano State, indicating spillover effects on other inputs. In Malawi and Zambia, retail agro-dealers were not included in the subsidy programs, and evidence from Zambia shows that many private retailers completely ceased operating in areas where the subsidy program was active (Xu et al. 2009).

Crowding Out the Private Sector

Several studies have shown that subsidies crowd out demand that would normally be satisfied through commercial channels, but a few studies also document increased private-sector participation in agricultural input marketing resulting from fertilizer subsidies. Additionally, studies have indicated that within a country, the magnitude of the crowding out depends on the level of private-sector development in an area, as well as the type of subsidy beneficiaries. A recent study by Mason and Jayne (2013) in Zambia shows that 1 kilogram of subsidized fertilizer crowds out 0.13 kilogram of commercial fertilizer at the national level. But the authors show that within the country, in areas with a higher level of private-sector fertilizer retailing activities, an additional kilogram of subsidized fertilizer reduces commercial fertilizer purchases by 0.23 to 0.32 kilogram among smallholders, whereas in areas with a low level of private-sector fertilizer retailing activities, crowding out is significantly lower, at 0.07 kilogram per additional kilogram of subsidized fertilizer. Similarly, in Zambia, Xu et al. (2009) find that subsidized fertilizer almost completely crowds out commercial fertilizer in areas where the private sector is relatively active and average wealth is higher, to the point of actually lowering total fertilizer use. Conversely, in poorer areas with fewer retail outlets, the researchers suggest that subsidies help create demand and crowd in private-sector retailers.

In Malawi, Ricker-Gilbert, Jayne, and Chirwa (2011) show that between 2003 and 2007, 1 kilogram of subsidized fertilizer crowded out 0.22 kilogram of commercial fertilizer and report that crowding out ranges from 0.18 among the poorest farmers to 0.30 among relatively nonpoor farmers. Likewise, Jayne et al. (2013) report that an additional ton of subsidized fertilizer would crowd out 180 kilograms, 134 kilograms, and 431 kilograms of commercial fertilizer purchased by farmers in Malawi, Zambia, and Kenya, respectively. In areas with low fertilizer demand, an additional ton of subsidized fertilizer crowds out only 103 kilograms of commercial fertilizer, compared with 265 kilograms in areas with relatively high fertilizer demand in Malawi. Jayne et al. (2013) also indicate that the most extreme case of crowding out occurred in the high-potential areas of Western Kenya, where commercial fertilizer channels are relatively well developed. In these areas, an additional ton of subsidized fertilizer was found to crowd out 534 kilograms of commercial fertilizer. However, when considering that 33 percent of subsidized fertilizer was diverted by program authorities prior to reaching farmer beneficiaries, Jayne et al. (2013) find that an additional ton of subsidized fertilizer distributed to farmers crowded out 490 kilograms, 464 kilograms, and 761 kilograms of commercial fertilizer purchases in Malawi, Zambia, and Kenya, respectively. Elsewhere in Nigeria, Takeshima and Nkonya (2014) report that 100 kilograms of subsidized fertilizer distributed to a farm household decreased the likelihood of its participation in the commercial fertilizer market by 10 to 21 percentage points but did not affect fertilizer use upon participation.

This research suggests that the crowding-out effect of fertilizer subsidies depends on the level of private supply development across and within countries. Where there is a well-developed private channel of fertilizer distribution, fertilizer subsidies will have the most detrimental effects in terms of crowding out commercial fertilizer at both the supplier and consumer (farmer) levels. However, where there is a less developed private supply channel, fertilizer subsidies can stimulate farmers' demand for the input and crowd in private-sector supply in those areas. Hence, considering these two potential outcomes is critical when evaluating FSPs.

Effects of FSPs on Income and Poverty

The literature also suggests that fertilizer subsidies have some effects on income and poverty, but these effects depend on how well the programs are targeted. Using a partial equilibrium model, Dorward and Chirwa (2013a) estimate the impacts of Malawi's FISP on smallholder livelihoods over the period 2005/2006 to 2010/2011. The authors argue that the FISP had a direct impact on recipients through increasing their real incomes and indirectly increasing the ratio of wages to maize prices, benefiting poorer households. More conservative studies suggest, however, that the ability of subsidy programs to reduce poverty has likely been hindered because better-off households received more subsidized fertilizer than poorer households (see, for example, Holden and Lunduka 2013; Chibwana, Fisher, and Shively 2012; Ricker-Gilbert, Jayne, and Chirwa 2011). For example, Ricker-Gilbert and Jayne (2011) suggest that beneficiary households experienced only modest income gains as a result of the FISP. Similarly, Mason and Tembo (2014) indicate that while the fertilizer subsidy increases smallholder incomes in Zambia, the rise in income is not large enough to reduce the likelihood or severity of poverty. In a comparative country study, Mason et al. (2015) assert that the effects of the subsidy program in Kenya are positive and somewhat larger than those of the programs in Malawi and Zambia due to its effective targeting of relatively resource-poor farmers and its implementation via coupons redeemable at private agro-dealer shops.

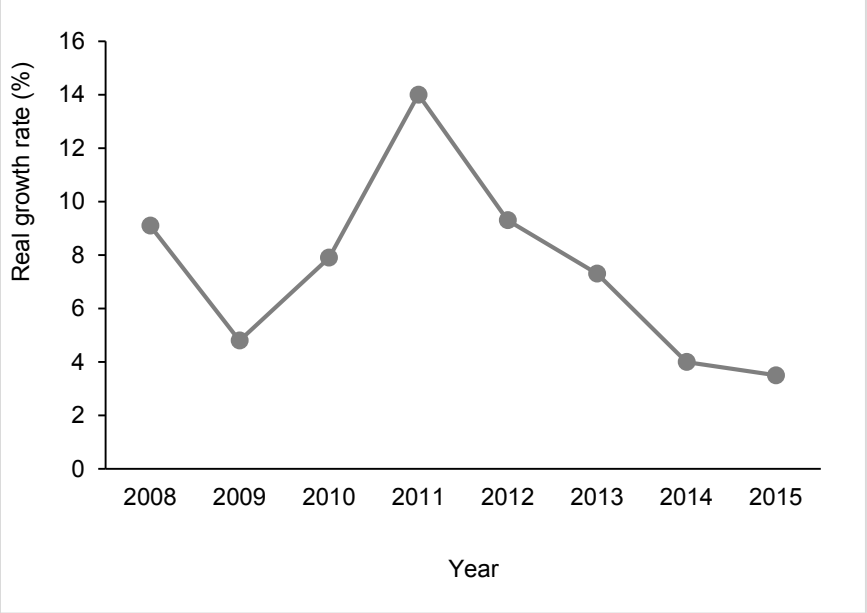
In sum, the evidence suggests that fertilizer subsidies have had some positive effects on income and poverty, but these effects could be substantially enhanced if the programs were able to better target poor households.

4. GHANA'S CURRENT ECONOMIC TRENDS AND PROSPECTS

Over the past two decades, Ghana has witnessed strong and largely inclusive growth, and its medium-term prospects are supported by rising crude oil production (IMF 2015). Ghana has also made progress toward achieving the Millennium Development Goals. For example, the poverty rate declined from 51.7 percent in 1991/1992 to 24.2 percent in 2012/2013 (GSS 2014). Nonetheless, there exists a divide between the northern and southern regions. Poverty rates in the three northern regions (Northern, Upper East, and Upper West) are higher than (more than double) the national rate and account for more than half (52.7 percent) of persons living in extreme poverty in the country (GSS 2014).

However, since 2011, the country has been experiencing declining economic growth (Figure 4.1) as a result of the severe energy crisis, unsustainable domestic and external debt burdens, and deteriorating macroeconomic and financial imbalances. In 2015, the country's GDP grew by 3.5 percent, which is less than the rate of 4.0 percent achieved in 2014 (Figure 4.1). Growth, however, is projected to increase in 2016, to 4.5 percent (IMF 2016). The drivers of growth in the country continue to be the service sector, which accounts for 54 percent of GDP, followed by industry, at 27 percent, while agriculture represents only 19 percent of GDP (GSS 2014). Macroeconomic indicators, such as consumer inflation and the budget deficit, showed considerable improvement until 2012, when they began to steadily deteriorate. After reaching 16 percent in 2008, year-on-year consumer inflation started to decline, dropping as low as 7 percent in 2012. However, consumer inflation has started rising again, reaching 17 percent in 2015 and eroding much of the macroeconomic gains made in previous years (IMF 2016).

Figure 4.1 Trends in gross domestic product growth rates, 2008–2015



Source: IMF (2016).

The gloomy macroeconomic situation in Ghana, characterized by declining growth rates, an unsustainable current account, high inflation, and strong depreciation of the cedi, implies that Ghanaian policy makers must aggressively pursue options to restore short-, medium-, and long-term stability and put the country back on its way to economic development. Improving the effectiveness of the country's spending on fertilizer subsidies and other social programs is one such option. As mentioned above, many scholars have questioned the opportunity cost of investing public resources in subsidizing a private good (fertilizer) at the expense of public goods such as infrastructure, research, education, health, or other

interventions on input and output markets that could generate higher returns. But empirical evidence on the relative returns of various sectors of the economy is limited. Fertilizer subsidies may be difficult to support on economic grounds, but they are politically appealing and they are likely to continue to be used in some African countries for the foreseeable future (Morris et al. 2007). In the context of Ghana, the fundamental question posed in this paper is not whether fertilizer subsidies should be abandoned or not, but whether there is scope for improving the effectiveness of the country's current FSP. Section 5 traces the history, scale, and implementation of Ghana's FSP.

5. FERTILIZER SUBSIDY PROGRAMS: THE GHANAIAN CONTEXT

Evolution of Ghana's FSP

In general, fertilizer policy in SSA was characterized by enormous levels of intervention in the 1960s and 1970s, liberalization of fertilizer markets in the 1980s and 1990s, and moderate interventions more recently (Dittoh et al. 2013). In Ghana, government interventions in agriculture through direct subsidies that reduced fertilizer prices were a key element in the country's agricultural policy in the 1970s and early 1980s (Resnick and Mather 2016). However, as in other countries in SSA, direct fertilizer subsidies did not lead to sustained growth in fertilizer use because of lack of capacity on the part of the government to implement them effectively, the failure to recognize the multiplicity of production systems and the range of farmers' needs, and high fiscal and administrative costs (Morris et al. 2007). As a result, many of these programs had to be abandoned in the 1990s.

Following a dramatic rise in food, energy, and fertilizer prices in 2008, Ghanaian policy makers devised a new FSP for the country (Banful 2011). In 2008, the average intensity of fertilizer use in Ghana was estimated at less than 8 kilograms per hectare of cultivated land (Benin et al. 2013; Bumb, Johnson, and Fuentes 2011). With the low intensity of fertilizer use, which has been attributed partly to high fertilizer prices (Benin et al. 2013; Morris et al. 2007), the FSP was justified as a temporary response to address the high cost of fertilizer in the country (Banful 2011). Since then—although there was some ambiguity in the targeting strategy of the program during 2010–2012, when it targeted all maize and rice farmers—it has been sustained largely on the grounds that it would reduce poverty and sustain smallholder production (Resnick and Mather 2016). Reducing the cost of fertilizer through the subsidy meant that more farmers would be able to buy and use fertilizer on their farms, which would result in increased productivity and incomes. This would in the long run trigger reinvestment of surplus income into modernizing the farm enterprise, ultimately resulting in greater consumption, reducing poverty, and improving food and nutrition security (Benin et al. 2013).

Furthermore, the FSP is intended to stimulate greater private-sector development and participation in fertilizer markets by sourcing fertilizer from private importers and leaving all aspects of distribution of subsidized fertilizer to the private sector. Baltzer and Hansen (2011) report that Ghana's FSP is one of the most liberal fertilizer support programs in SSA—it works primarily through the existing private sector for input supply, distribution, and retailing. From 2008 to date, seven rounds of the program have been implemented. According to Benin et al. (2013), the original goals of the program were to increase fertilizer use by farmers from 8 kilograms to 20 kilograms per hectare, increase crop production and yields, raise the profitability of farm production, and improve private-sector development. Currently, the program aims to increase the rate of fertilizer application to at least 50 kilograms per hectare, as recommended under the Medium Term Agriculture Sector Investment Plan (METASIP) and in line with the Abuja Declaration.

Since the program's inception, the cost of the FSP has increased from GH¢ 20.65 million (US$ 10.8 million) in 2008 to GH¢ 138 million (US$9.9 million) in 2016 (Table 5.1). In total, the government has subsidized 1,084,055 MT of fertilizer at a cost of GH¢ 570.8 million since 2008. Though the subsidy program represents a relatively small portion of total government expenditures compared to other social programs, it constitutes a considerable share of the budget of the Ministry of Food and Agriculture (MoFA) (Figure 5.1). In 2008, the fertilizer subsidy took up 24 percent of the total agricultural budget, and in 2012 this share rose to 45 percent, its highest level since the start of the program. In 2014, there was no FSP. In 2016, the program is expected to account for 28 percent of the budget of the MoFA. Interestingly, the subsidy rate has declined substantially, from 49 percent in 2008 to 26 percent in 2016. However, the volume of subsidized fertilizer shows an upward trend, which stabilized in 2011. In 2016, the amount of fertilizer subsidized was four times the quantity subsidized in 2008.

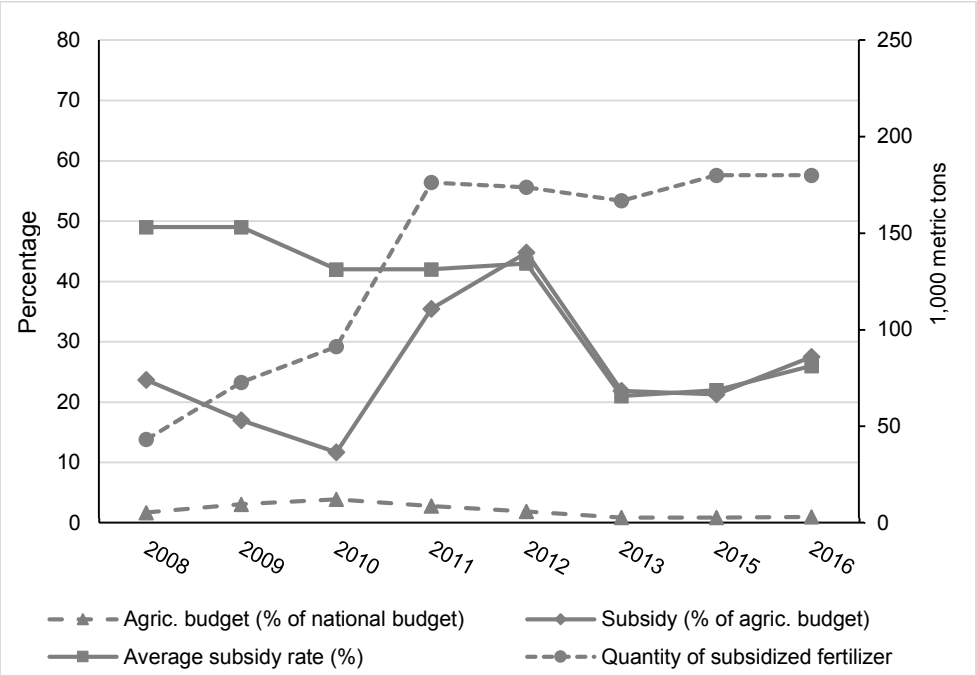
Table 5.1 Ghana's fertilizer subsidy budget, volume, and cost, 2008–2016

Item\Year		2008	2009	2010	2011	2012	2013	2014	2015	2016
National budget ('000 GH¢)		5,059,868	6,461,698	6,584,782	7,926,233	13,529,707	31,839,601	36,290,424	44,001,267	50,109,852
Ag. budget ('000 GH¢)		87,102	202,629	256,886	221,551	262,240	292,480	306,892	411,821	501,502
% of national budget		*1.7*	*3.1*	*3.9*	*2.8*	*1.9*	*0.9*	0.8	*0.9*	*1.0*
Subsidy amount ('000 GH¢)		*20,654*	*34,400*	*30,002*	*78,746*	*117,437*	*64,005*	-	*87,600*	*138,000*
% of ag. budget		*23.7*	*17.0*	*11.7*	*35.5*	*44.8*	*21.9*	-	*21.3*	*27.5*
Fertilizer subsidized (MT)		*43,176*	*72,795*	*91,244*	*176,278*	*173,755*	*166,807*	-	*180,000*	*180,000*
Disbursement methodology		Coupon	Coupon	Waybill	Waybill	Waybill	Waybill	-	Waybill	Waybill
NPK	Farmer pays (GH¢)	26	26	27	30	39	51	-	89	85
	Subsidy cost (GH¢)	25	25	17	26	37	20.5	-	26	N/A
	Subsidy rate (%)	*49*	*49*	*38*	*46*	*49*	*29*	-	*23*	*N/A*
Urea	Farmer pays (GH¢)	26	26	25	29	38	50	-	84	80
	Subsidy cost (GH¢)	26	26	16	22	N/A	18	-	21	N/A
	Subsidy rate (%)	*50*	*50*	*39*	*43*	*N/A*	*27*	-	*20*	*N/A*
SOA	Farmer pays (GH¢)	18	18	18	26	35	44	-	-	-
	Subsidy cost (GH¢)	16	16	16	15	N/A	4	-	-	-
	Subsidy rate (%)	*47*	*47*	*47*	*37*	*N/A*	*8*	-	-	-
Average subsidy rate, including transport (%)		*49*	*49*	*42*	*42*	*43*	*21*	-	*22*	*26*

Source: Budget statements from Ministry of Finance, Ministry of Food and Agriculture documents, and press releases.

Note: No fertilizer subsidy was provided by the government in 2014. N/A = not available; NPK = nitrogen-phosphorus-potassium; SOA = sulfate of ammonia.

Figure 5.1 Trends in the allocation of fertilizer subsidy budgets



Source: Budget statements from Ministry of Finance, Ministry of Food and Agriculture documents, and press releases.
Note: No national fertilizer subsidy program was implemented in 2014.

Program Implementation

In 2008 and 2009 the subsidy program was implemented through a voucher system with a subsidy rate of 50 percent of the negotiated price (Banful 2011), but in 2010 the waybill receipt system was adopted in order to address some of the weaknesses of previous programs, such as high overhead and administrative costs and diversion of fertilizer from the intended target beneficiaries (Benin et al. 2013; Baltzer and Hansen 2011). Initially, the subsidy program in Ghana did not target vouchers to farmers based on their wealth status or the crops they cultivated. Instead, all crop farmers were given the opportunity to participate in the program. At that time, the subsidy program was designed in great haste as an emergency measure to ease the adverse impacts of the extremely high fertilizer prices of 2007 (Baltzer and Hansen 2011).

With regard to the suppliers of fertilizer, the program involved four major private fertilizer companies (Yara Ghana Limited and Wienco Ghana Limited combined, Chemico Limited, Dizengoff Ghana Limited, and Golden Stork Ghana Limited) that provided the government with information on fertilizer requirements at the regional level. Based on estimated district fertilizer consumption, vouchers were allocated to regional agricultural development units, which in turn issued them to their respective district agricultural development units (Benin et al. 2013). Farmers received the subsidy in the form of fertilizer-specific and region-specific vouchers distributed by agricultural extension agents within their operational areas (Benin et al. 2013). The vouchers allowed farmers to receive NPK 15:15:15, NPK 23:10:05, urea, and sulfate of ammonia in 50-kilogram bags at a subsidy rate of approximately 50 percent of the price negotiated with the fertilizer companies (Banful 2009). Farmers used the vouchers to purchase fertilizer at participating input dealers within their region. The retailers / input dealers subsequently passed on the redeemed vouchers to an importer, who in turn transmitted an invoice for the value of the vouchers to the MoFA and received payment within a week (Banful 2009).

As indicated above, in 2010 the use of vouchers was replaced with the waybill system as a result of high administrative costs, including the time spent by MoFA officers to monitor the process. The waybill receipt system is universal, as it makes subsidized fertilizer accessible to all types of farms and farmers who can afford to buy fertilizer at the subsidized price. Under the waybill receipt system, "the government absorbed port handling, loading, and transport costs as well as agents' commissions and margins to arrive at prices that are deemed affordable to small-scale farmers but also depend on the government's budget for the subsidy" (Benin et al. 2013, page 42). Fertilizer companies participating in the program import the fertilizer, clear the fertilizer from the ports, pay all charges, and send the allocated quantities of fertilizer to the designated regions and districts for sale to farmers by their registered sales agents. Recently, farmer passbook and daily record sheets have been introduced into the program, aimed at enabling farmers to document their farm operations as well as facilitating the tracking of beneficiaries of the subsidy program.

A typical implementation issue is the delay in program implementation, resulting in late delivery of subsidized fertilizer. For example, Banful (2009) finds that only half the vouchers that were distributed were redeemed due to the late start of the program. Yawson et al. (2010) also observe several implementation challenges with the subsidy program, such as availability of fertilizer to farmers as and when needed. Benin et al. (2013) report delayed negotiations and supply of fertilizer, cumbersome and time-consuming procedures (because of the requirement that only the district agricultural officer should sign the waybill), inadequate storage facilities for fertilizer, and weak quality control as the major challenges confronting the subsidy program. Additionally, the program has been bedeviled by financial challenges, making it difficult for the government to meet its financial obligations to the input suppliers. The government owed suppliers GH¢ 64 million (US$ 27.1 million) at the end of 2013 and therefore could not implement the program in 2014. As a result, suppliers participating in the program reconsidered their decision to participate in 2015. Consequently, Yara Ghana, a company that supplied more than half the market's needs, opted out of the program in July 2015.

6. EFFICIENCY, IMPACT, AND SUSTAINABILITY OF GHANA'S FERTILIZER SUBSIDY PROGRAMS

Efficiency

Programs intended to stimulate increased use of fertilizer must be implemented only where fertilizer use is economically efficient (Morris et al. 2007). Various measures can be used to determine the economic efficiency of fertilizer use. A simple and standard measure commonly used in the literature is the value/cost ratio (VCR), which is the amount of additional output from a unit increase in fertilizer nutrients. Ratios of 2 or greater are generally considered the minimum required for fertilizer adoption to take place or to be profitable (Kelly 2006).

Available data suggest that fertilizer use is economically efficient in Ghana, though estimates are sensitive to output prices. For example, the Food and Agriculture Organization of the United Nations (FAO 2005) uses the 2002 fertilizer and crop prices to estimate VCRs of 2.9, 10.0, 4.9, and 3.6 for maize, rice, cassava, and groundnut, respectively, and concludes that fertilizer use is profitable for these crops in the country. Likewise, the World Bank (2012) estimates a nutrient output ratio of 2.6 for maize, while Chapoto and Ragasa (2013) estimate a VCR of 4.9 and 3.6 for maize with and without fertilizer subsidy, respectively. In contrast, Jayne et al. (2015) find that VCRs for maize in Ghana were mostly below 2.0 during the period 2007–2011 but rose above 3 in 2012 and 2013, when maize prices were relatively high compared to the other years. The authors conclude that the significant increase in VCRs in 2012 and 2013 is an indication of increased profitability and demand for fertilizer, which is most likely a result of relatively high maize prices during the 2011–2013 period. Benin et al. (2013) estimated the profitability of fertilizer application by comparing the crop budget of farmers who applied fertilizer on their maize farms with the budget of those who did not apply any fertilizer. They find that farmers who used fertilizer had an estimated average profit margin of 13 percent of the total cost of production, whereas those who did not use fertilizer incurred a loss of about 22 percent of the total cost of production.

Based on the above estimates, it seems fair to suggest that private fertilizer subsidy may not be necessary for Ghanaian farmers when considering farm profitability alone. However, other factors may justify the provision of subsidized fertilizer to these farmers.

Economic Returns, Impact, and Sustainability of Ghana's FSP

To our knowledge, there are no reliable estimates of the relative return to investment in different sectors of the Ghanaian economy; hence it is not possible to compare the return to fertilizer subsidies to the return to investment in other sectors. In terms of returns to fertilizer subsidy, a study by Benin et al. (2013) assesses the overall economic viability of the 2011 fertilizer subsidy rate using the economic surplus method ex ante over a nine-year horizon, that is, from 2011 to 2020. The analyses show that the overall future economic return of the program is positive, with an estimated benefit-cost ratio of 1.7. However, this changes if prices fall, as there are no additional markets to absorb any excess supply, leading to a benefit-cost ratio of 1.2. This suggests that the program can be beneficial to the overall economy of Ghana, even though the microeconomic analyses suggest that farmers do not need fertilizer subsidy.

With regard to the impact of the FSP, Bumb et al. (2011) find that despite the increase in global fertilizer prices during the 2007–2008 period, fertilizer use decreased only marginally in 2008 and increased by more than 50 percent in 2009, which was mainly attributable to the FSP. Similarly, Jayne et al. (2015) state that since 2010 fertilizer use in Ghana has been 6 to 10 times higher than it was in the early 2000s, owing to the subsidy program, which accounted for roughly 40 percent of total fertilizer use during the period 2011–2013. Furthermore, Benin et al. (2013) show that the number of farmers using fertilizer has increased, with the amount of fertilizer used per hectare rising from 8 kilograms per hectare to 13.4 kilograms per hectare. More importantly, farmers who applied fertilizer on their farms obtained higher yields and positive net income compared to those who did not use any fertilizer, the authors report. Conversely, Wiredu (2015) finds that participation in the subsidy program has decreased labor

productivity and improved land productivity only modestly among rice farmers, and indicates that the negative effect of the subsidy program on labor productivity may be because the increase in output resulting from more fertilizer use is not large enough to compensate for the additional labor used. Nonetheless, Wiredu (2015) shows that participation in the FSP has positive impacts on food security, with the highest impact occurring during the lean period. Other authors, such as Vondolia (2011), indicate that beneficiaries of the FSP did not invest more in soil and water conservation techniques than nonbeneficiaries did, and caution against the assumption that farmers will respond to fertilizer subsidies with complementary inputs that increase the efficiency of nutrient uptake and will help develop a fertilizer market.

Sustainability is yet another important factor that must be taken into consideration in every subsidy program. According to Chirwa and Dorward (2013), short-term subsidy programs that have strict time bounds and exits do not need to be sustainable, but they should promote a sustainable change. However, experience from countries where subsidies have been implemented suggests that quick exits from large input subsidy programs are difficult and rarely achieved (Chirwa and Dorward 2013). For example, while the subsidy program in Ghana was meant to be a short-term measure, it did not have any clear exit strategy detailing the termination of the program. It was designed as an emergency response to high fertilizer prices in 2008 and was to expire by the end of that year. However, the subsidies have been extended to subsequent years, even though the crisis has subsided. Although the subsidy program has achieved some success, such as increasing fertilizer use, the program has been poorly designed, poorly implemented, very costly (see Table 5.1), and politicized, and without any strategy for phasing out. These weaknesses are likely to threaten the sustainability of the program in the medium and long term. To overcome these problems and make the program sustainable, Jayne et al. (2015) recommend a range of measures for Ghana, including endorsing a policy of gradual reduction in the subsidy rate in combination with reforms designed to create a smarter subsidy, adopting relevant aspects of the Burundi and Nigeria models, encouraging increased participation of the private sector, providing regulatory and quality control oversight, and encouraging the development of regional markets for produce and inputs.

7. POLITICAL ECONOMY AND TARGETING PERFORMANCE OF GHANA'S FERTILIZER SUBSIDY PROGRAMS

Politically, national governments find subsidies highly attractive because the problems they are intended to address remain compelling at both the national and international levels, and they offer instant and noticeable benefits that can win quick political gains (Druilhe and Barreiro-Hurlé 2012). Subsidies can be narrowly targeted at specifically favored constituents, while eliminating others, and can easily be taken away if political objectives are not met (Baltzer and Hansen 2011). Political economy difficulties arise in almost all countries where large-scale input subsidies are implemented because the programs are extremely costly, represent very significant transfers to subsidy recipients, and offer opportunities for very substantial captures of rents by stakeholders such as politicians, program administrators, input suppliers, traders, and farmers (Chirwa and Dorward 2013). For example, vouchers under Ghana's FSP were not targeted to the government's supporters, but rather were used in an attempt at vote buying. In other words, more vouchers were targeted to districts that the government had lost in the previous presidential elections, and particularly in the districts that had been lost by a wider margin (Banful 2011). Hence, subsidy programs can be politically appealing but regressive in terms of targeting.

Reaching the poor has been critical to the success of subsidy programs targeted at smallholder farmers in countries in SSA. The importance of reaching the poor is also supported by the empirical literature, which suggests that the efficiency of an input subsidy program can be increased by improving targeting mechanisms to ensure that program benefits reach the poor (those who could not afford the full price without subsidies), hence reducing input market displacement (crowding out), reducing fraud, and controlling costs (Dorward and Chirwa 2011; Houssou and Zeller 2011). After several years of FSP implementation, the program has moved from targeting all farmers regardless of the crops grown to targeting specific farmers (smallholder farmers cultivating up to 2 hectares) and crops, especially the food grain subsector (Table 7.1). In 2013, the following beneficiaries were targeted under the program (Ghana, MoFA 2013):

- Smallholder farmers cultivating maize, rice, sorghum, and millet, with priority placed on food crop farmers in the savannah areas of the country
- Outgrower farmers registered under recognized nucleus farmers/companies, and nucleus farmers/companies with verifiable lists of outgrowers cultivating maize, rice, sorghum, and millet (must apply to MoFA to procure at such rates)
- Food crop farmers, either on their own or as members of an outgrower scheme (entitled to not more than the fertilizer inputs for 2 hectares, amounting to 10 bags of compound fertilizer and 5 bags of sulfate of ammonia or urea)
- Women farmers

Under the 2015 subsidy program, the targeted measures put in place in 2013 were continued with the aim of reaching resource-poor farmers and increasing efficiency and value for money (Ghana, MoFA 2015). However, in the 2015 program, smallholder vegetable farmers and cotton farmers operating under recognized nucleus farmers in the northern part of the country were included. Farmers who qualify under these criteria, verified by extension agents, must purchase fertilizer at any registered agent shop or District Office of MoFA (in areas where private agents are not available) using only passbooks (Ghana, MoFA 2015).

Based on these guidelines and the quantity of fertilizer subsidized (see Table 5.1), we estimate that the program could have provided subsidized fertilizer to 240,000 smallholder farmers in 2015. But, following a 50 percent budget cut by the government, MoFA was able to subsidize only 90,000 MT of fertilizer, which in theory would have provided subsidized fertilizer to 120,000 smallholder farmers if the guidelines were followed.

Table 7.1 Characteristics of Ghana's fertilizer subsidy program

Item / Year	2008–2009	2010–2012	2013	2015	2016
System	Coupon	Waybill	Waybill	Waybill	Waybill
Package size	No standard package (first come, first served)	No standard package (first come, first served)	10 bags of NPK and 5 bags of urea	10 bags of NPK and 5 bags of urea	10 bags of NPK and 5 bags of urea
Crops targeted	Food grains	Food grains	Food grains	Food grains, vegetables, and cotton	Food grains, vegetables, and cotton
Target group	Food crop farmers	Food crop farmers	Food crop farmers with less than 2 hectares	Food crop, vegetable, and cotton farmers with less than 2 hectares	Food crop, vegetable, and cotton farmers with less than 2 hectares
Beneficiary selection	No standard mechanism/tool, AEAs select beneficiaries	No standard mechanism/tool, AEAs select beneficiaries	No standard mechanism/tool, AEAs select beneficiaries	No standard mechanism/tool, AEAs select beneficiaries	No standard mechanism/tool, AEAs select beneficiaries

Source: Ministry of Food and Agriculture implementation guidelines (MoFA, 2013; 2015).
Note: No fertilizer subsidy was provided in 2014. AEAs = agricultural extension agents; NPK = nitrogen-phosphorus-potassium.

With regard to targeting, prior to 2013 the program lacked any explicit targeting criteria and had no strict cap on the allocation of vouchers (Table 7.1). Farmers could purchase as much subsidized fertilizer as they wished. The absence of clear targeting criteria was identified as a major weakness of the program, as it led to perceptions of mismanagement and leakages (Wodon 2012). Beginning in 2013, however, the program guidelines stated that only smallholder farmers cultivating less than 2 hectares of land should receive a fixed amount of subsidized fertilizer. But the selection of these farmers is left to the extension agents, without any standard and verifiable mechanism of effectively identifying the target group of smallholder farmers.

Estimates of the targeting performance of various programs in Ghana indicate that other social programs are able to reach a higher percentage of poor households than the FSP (Table 7.2). Wodon (2012) uses the 2005/2006 Ghana Living Standards Survey to show that the program transferred only 15.8 percent of benefits to the poor, whereas the Livelihood Empowerment Against Poverty (LEAP) program, for example, transferred about 57.5 percent of benefits to the poor. Furthermore, Filipski and Taylor (2012) suggest that LEAP appears to have been more efficient than the FSP, with efficiency of 1.00 and 1.42 under imperfect and perfect market conditions, respectively, compared with only 0.22 and 0.30 for the FSP. The authors conclude that under these conditions, fertilizer subsidies are less efficient in transferring income to agricultural households, though input subsidies can be more welfare-efficient than cash transfers when input and factor supplies are elastic and input demands are constrained by limited liquidity prior to harvest. Other programs have also performed better than the subsidy program in terms of benefits transferred to the poor in the country.

Table 7.2 Share of program benefits accruing to the poor: Selected programs

Program type	% of benefits received by the poor	Targeting mechanism
LEAP (Livelihood Empowerment Against Poverty) program	57.5	Community-based and proxy means testing
National Health Insurance Scheme (NHIS)	50.0	District-level identification
General funding for primary education	32.2	Children in public schools
General funding for healthcare	22.4	Ill or injured individuals
Kerosene subsidies	20.7	Self-targeting through use of good
Fertilizer subsidies	**15.8**	**Universal voucher for fertilizer**
Tariff cut on imported rice during food price crisis	8.3	Self-targeting through use of good
Electricity subsidies embedded in tariff structure (in 2005–2006)	8.0	Inverted bloc tariff and lifeline
General funding for tertiary education	6.9	Youth enrolled in higher degree institutions

Source: Adapted from Wodon (2012).

Using more recent data from various sources, we estimate in Table 7.3 the targeting performance of different rounds of the program. The results also seem to suggest that the program has performed poorly in terms of outreach to smallholder and/or poor farmers. For example, estimates from the Ghana Living Standards Survey data for 2012 indicate that only a quarter of subsidy recipients were smallholder farmers cultivating less than 2 hectares, while 75 percent of subsidy beneficiaries were either medium- or large-scale farmers. Likewise, the survey suggests that these smallholder farmers received only 22 percent of subsidy benefits, whereas 78 percent of the benefits went to unintended program beneficiaries. An examination of the program performance in terms of welfare also suggests that less than a third of program beneficiaries were actually poor farmers, and they received only 17 percent of subsidy program benefits in 2011.

Other smaller surveys, such as the IFPRI/SARI survey (2013) and a survey by Imoru (2015) also point to similar patterns. For example, the 2013 IFPRI/SARI survey reveals that less than 5 percent of program beneficiaries were smallholder farmers, and they received only 0.4 percent of the total volume of subsidized fertilizer distributed. These results are consistent with the fact that targeting criteria are often not followed during program implementation. Imoru (2015) reported that in selected communities in West Mamprusi, Tolon, and Saboba districts, farmers could receive subsidized fertilizer based on several factors—such as local connections, network, and influence—without any pass from the extension agents, contrary to the implementation guidelines. Likewise, in his evaluation of the 2015 subsidy program, Jatoe (2016) suggests that not only were larger-scale farmers benefiting from the program, but they also acquired larger quantities of fertilizer than the standard package specified in the implementation guidelines. The persistently poor targeting performance of Ghana's FSP underscores the need to aggressively seek options to improve the program's implementation and outreach to the poor. Achieving this will have far-reaching impacts on smallholder farmers and the country's agricultural sector as a whole.

Table 7.3 Targeting performance of Ghana's fertilizer subsidy program

Data sources	GSS: GLSS 6 nationwide survey	IFPRI/SARI: Survey of eight districts	Imoru: Survey of three districts
Number of subsidy beneficiaries	112,844	496	196
Farm size among subsidy beneficiaries (%)			
Small farmers (<2 ha)	25.8	3.6	2.6
Medium farmers (2–5 ha)	41.9	26.6	88.8
Large farmers (>5 ha)	32.3	69.8	8.7
Share of subsidy benefits by farm size (%)			
Small farmers (<2 ha)	22.0	0.4	1.6
Medium farmers (2–5 ha)	21.5	8.0	82.8
Large farmers (>5 ha)	56.5	91.6	15.6
Percentage of poor farmers	28.6	-	25*
Share of subsidy benefits received by poor farmers (%)	16.9	-	20.6

Source: GSS (2012); IFPRI/SARI (2013); Imoru (2015).

Note: For the GLSS 6 survey, subsidy beneficiaries were households that received fertilizer from the Ministry of Food and Agriculture. The shares of subsidy benefits were estimated using beneficiary household expenditures on inorganic fertilizer purchases. * Estimate was based on self-assessment of welfare level.

8. CONCLUDING REMARKS

This paper reviews the experience with fertilizer subsidy programs in several countries in SSA, with a view to drawing lessons for the implementation of the FSP in Ghana. Input subsidies, especially for fertilizer, have been a key policy tool used by governments in SSA over the years. But the objectives of these FSPs have often changed with time, and most are not aligned with any long-term strategy. Furthermore, the evidence on the effectiveness of FSPs is mixed, and their overall impact is either not clear or limited. What is clear, however, is that governments will face significant challenges in maintaining subsidy programs in the long term, especially if returns are not tangible. More specifically, this paper suggests that fertilizer subsidies can yield localized, short-term effects on fertilizer use. They can crowd in private-sector activity where there is none, or crowd out the private sector where there is an effective private network of fertilizer distribution.

Regardless of the limits of the interventionist subsidy policies that have characterized the programs, evidence from many countries shows that the distributional effects of subsidies can improve with effective targeting of resource-poor smallholder farmers. Meanwhile, the current FSP in Ghana, while ostensibly aimed at smallholder farmers, is seeing larger-scale and wealthier farmers benefiting disproportionally from subsidized fertilizer. The issue of who receives the fertilizer subsidy and who does not is critical, as Ghanaian policy makers often emphasize that fertilizer inputs are expensive for the country's smallholder farmers. But the results here suggest that the subsidies are not reaching these farmers. Rather, they suggest that fertilizer input is being provided below the market price to those who could potentially afford it anyway. On top of this, commercial fertilizer use seems profitable in the country.

Poor targeting of the FSP in Ghana can be attributed to various factors, including the lack of a mechanism to ensure that subsidy benefits effectively reach the intended program beneficiaries. Other programs in the country use innovative methods such as community-based targeting and proxy means tests to successfully target their beneficiaries. Faced with differences in the performance of public subsidy programs in the country, Ghanaian policy makers must ponder the question of how to improve the targeting of the FSP in the future. Ghana's FSP is expected to continue in the foreseeable future, even though it may not be sustainable. Nonetheless, the program would be in a better position to contribute to Ghana's poverty reduction drive if the design and implementation ensured that the stated goal of reaching smallholder farmers was achieved.

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