

Evans Policy Analysis and Research (EPAR)

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**Introduction**

Fertilizer consumption in Africa is the lowest in the world.<sup>3</sup> In 2002, Sub-Saharan Africa (SSA) consumed 1 percent of the world total, and projections for 2011/12 do not suggest this percentage will rise.<sup>4,5</sup> These figures suggest that increased fertilizer use has the potential to contribute to increased productivity, food security, and economic growth in the region.<sup>6</sup>

In Mozambique, the legacies of colonial rule, socialism and civil war continue to constrain economic growth and agricultural production.<sup>7</sup> Eighty percent of Mozambique’s labor force derives its livelihood from agriculture, but the nation remains a net food importer.<sup>8</sup>

The majority of all farmland in Mozambique is cultivated by smallholders whose fertilizer usage and crop yields are among the lowest in Africa.<sup>9</sup> While Mozambique has experienced reasonable economic growth since the end of its civil war in 1992, it remains poor by most measures.<sup>10</sup>

Studies show that smallholder access to fertilizer in Mozambique is limited by lack of information, affordability, lack of access to credit, a poor business environment, and limited infrastructure.<sup>11</sup> Average fertilizer use from 2003-2005 was 5 kg per hectare, however, according to survey data from in 2005 only 5 percent of smallholders reported using fertilizer.<sup>12</sup>

**Agricultural Overview**

Smallholders cultivate 95 percent of all farmland in Mozambique, growing both export and food crops.<sup>13</sup>

**Table 1. Mozambique at a Glance**

Percentage of Agricultural Land from Total (2005)	62
Land Devoted to Cereal Production (ha)	2,306,400
Agricultural Value Added (Percent of GDP) (2007)	28
Average Size of landholding <sup>1</sup>	.3 ha
Important Crops	Cotton, cashews, tobacco, maize
Average Fertilizer Usage	2.89 kg/ha
Population Density <sup>2</sup>	26 people per sq km

Data Source: World Development Indicators, all figures from 2007 unless otherwise noted.

Food security differs greatly between households in the northern region who report one to two months of food insecurity per year and households and those in the South where five months of food insecurity is typical.<sup>14</sup> The northern region is considered Mozambique’s green belt and is a net food exporter, but infrastructure connecting the northern and southern regions of the country remains very limited.<sup>15,16</sup>

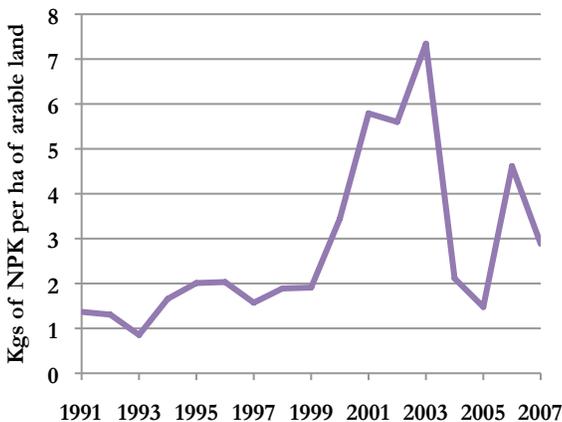
Mozambique has abundant arable land but scarce human and physical capital.<sup>17</sup> As a result, much of the arable land remains uncultivated.<sup>18</sup> Mozambique’s peak average fertilizer use from 2001-2003 (6.2 kg/ha) was well below the regional average of 9 kg/ha during that period.<sup>19,20</sup> Average fertilizer consumption in 2007 was only 2.89 kg/ha.<sup>21</sup>

*Cash Crops & Fertilizer Use*

Major export crops in Mozambique are cotton, cashews, and tobacco. Fertilizer use is highly concentrated on

these cash crops because of the configuration of the export crop market.<sup>22</sup> The credit, input, and output markets for most cash crops are linked through an outgrower system.<sup>23</sup>

Figure 1. Fertilizer Consumption in Mozambique by Year (Kilograms of NPK nutrients applied per hectare of arable and permanent crop land)



Source: Author’s calculations, FAOSTAT<sup>24</sup>

Private companies contract with smallholders, provide inputs on credit, and buy back the harvest at the end of the season.<sup>25</sup> This market structure improves smallholder incomes and productivity,<sup>26</sup> but does not facilitate access to fertilizer for non-cash crops.<sup>27</sup>

*Food Crops & Fertilizer Use*

Three-quarters of rural household food consumption in Mozambique comes from subsistence farming.<sup>28</sup> The major food crops are maize, cassava, sorghum, groundnuts, cowpeas, and millet, with maize accounting for 36 percent of cultivated land in 2007.<sup>29,30</sup>

Government efforts to increase smallholder fertilizer use appear to be largely focused on maize production.<sup>31</sup> This may be partially explained by the lower responsiveness of cassava and sorghum to fertilizer.<sup>32</sup>

**History of the Fertilizer Market**

In the past three decades, Mozambique has progressed through colonialism, socialism, war, economic collapse, and structural adjustment. Legacies from these phases

have influenced the country’s potential for economic growth and poverty reduction.<sup>33</sup>

*Colonial Period: Pre-1975*

Mozambique was a Portuguese colony for nearly five hundred years.<sup>34</sup> Government intervention in the agricultural markets was well-established during the colonial period. Portuguese rulers set prices and marketing margins for an extensive list of goods at all stages of the production and marketing chain.

Portuguese agricultural policy focused research, extension services, and marketing on the export crop sectors, specifically cotton and cashews.<sup>35,36</sup> Infrastructure investment was concentrated on routes that could be used to move export crops. There were no networks to move grains from the food-surplus North to food-deficit South. Urban areas in the south were therefore heavily reliant on imported wheat.<sup>37</sup>

*Independence & Socialism: 1975-1977*

Mozambique declared independence from Portugal in 1975. Frelimo, the party of the Mozambican elite, came into power with a socialist nation-building agenda.<sup>38</sup> The subsequent exodus of Portuguese settlers left Mozambique with a shortage of skilled workers. As they departed, the Portuguese either exported or deliberately destroyed much of the country’s physical capital.<sup>39</sup> In rural areas, employment opportunities diminished and trade and transport infrastructure collapsed.<sup>40</sup>

The Frelimo government retained the colonial price setting and marketing system<sup>41</sup> but abolished the Portuguese-imposed forced cultivation of cash crops (cashews and cotton). This resulted in a steep decline in exports.<sup>42</sup> Between 1973 and 1975, agricultural output declined 13 percent, and GNP fell by 21 percent.<sup>43</sup>

The government collectivized agriculture in an attempt to mitigate the impact of the economic crisis in rural areas. Collectivization created state farms on land abandoned by settlers, expropriated rural peasants’ land and built communal villages. State farms grew single crops with the intention that these farms would

eventually meet all domestic food needs as well as producing export crops.<sup>44</sup>

In 1981, the government developed a 10-year Indicative Perspective Plan designed to consolidate the state-run agricultural sector. The government pursued a series of capital-intensive projects, including plants to produce fertilizer. Ultimately, Mozambique lacked the resources to realize the plan; investments did not yield returns and the country began accumulating a significant amount of foreign debt.<sup>45</sup> Seventy percent of all investment from 1975-1984 went to agriculture, however, the state farms and collectives failed and as a result the agricultural sector collapsed entirely.<sup>46</sup>

### *Civil War*

Many rural peasants opposed the government's agricultural policies. The Renamo rebel group soon emerged representing these interests.<sup>47</sup> They employed guerrilla tactics aimed to destroy state institutions. The conflict escalated into a civil war lasting from 1977 until 1992.<sup>48</sup>

The war damaged the economy, especially the agricultural sector. Fighting in the countryside destroyed cash crops as well as transportation networks to processing facilities and markets. The northern rural areas were isolated and cash crop production effectively ceased.<sup>49</sup> Food crops did not rely on those networks, and therefore fared better than the cash crop sector.<sup>50</sup>

### *Structural Adjustment & Economic Collapse*

Mozambique began a process of structural adjustment and trade liberalization in 1984.<sup>51</sup> In 1986, the country experienced a total economic collapse due to a failure to maintain monetary control, production that was overly focused on non-traded goods, and inefficient microeconomic structures.<sup>52</sup>

In response to the economic collapse in 1986, the government implemented the Economic and Social Rehabilitation Program designed to promote economic growth by shifting to a more market-based economy.<sup>53</sup> The IMF and World Bank led this effort. From 1986 to

1989, the percentage of products with government set prices fell from 70 percent to 30 percent.<sup>54</sup>

### **Recent Fertilizer Policy**

The pace of structural adjustment and stabilization quickened after the end of the civil war in 1992.<sup>55</sup> Mozambique liberalized prices and trade and privatized state enterprises.<sup>56</sup> By the end of the 1990s, agricultural input markets were entirely privatized.<sup>57</sup> The government phased out price controls and minimum producer prices for agricultural goods.<sup>58</sup> The state marketing enterprise was restructured and mandated to act as a buyer of last resort and the agricultural marketing system transitioned into the private sector. Major private agricultural markets in the central region were active by 2000.<sup>59</sup> Between 1992 and 2002 there was substantial progress: per capita income increased 70 percent, while agricultural value added increased 60 percent.<sup>60,61</sup> Recent government intervention into the fertilizer market has taken place through two programs: the Sasakawa-Global 2000 (SG 2000) program, and the PROAGRI initiative.

### *Sasakawa-Global 2000 Program (SG 2000)*

The Sasakawa Africa Association program SG 2000 operated in Mozambique from 1995 to 2005.<sup>62</sup> SG 2000 promoted the use of high external input technologies (HEIT) to improve crop yields by establishing demonstration plots with improved seed and fertilizer. It was implemented through a public-private partnership between the Ministry of Agriculture and several donors.<sup>63</sup>

In Mozambique, SG 2000 was focused exclusively on improving maize yields.<sup>64</sup> The program provided credit for input purchase, facilitated input access, and offered extension services to farmers willing to establish a demonstration plot on their land. The assistance package – provided on credit – consisted of 15 kg of improved maize seed, 50 kg of 12-24-12 NPK, 50 kg of urea, and a post-harvest storage insecticide. The program remained small and although yield results were promising, project evaluations did indicate that yields were consistently higher.<sup>65</sup>

Several critical issues impeded SG 2000's success. Expectations about loan repayment were unclear and the late delivery of seed and fertilizer reduced their impact.<sup>66</sup> In addition, advice and extension services were standardized even though Mozambique has ten distinct agro-ecological zones.<sup>67</sup> Project outcomes were therefore highly variable.<sup>68</sup>

Overall profit varied for participating farmers, depending significantly upon the timing of market entry. Those who sold soon after the harvest earned less than those who waited, and early sales sometimes resulted in losses.<sup>69</sup> Test site data were inconclusive; only one of the three test sites showed that HEIT's improved profitability.<sup>70</sup>

### *PROAGRI*

In 1999, the Ministry of Agriculture and Rural Development began the Agricultural Sector Public Expenditure Program restructuring initiative (PROAGRI). The plan was designed to better coordinate over 70 donor-funded projects. Its ultimate goals were to improve the impact of public expenditure in the rural agricultural sector, reduce poverty and improve food security.<sup>71</sup>

PROAGRI I, the first of three phases, lasted from 1999-2004. This phase focused on capacity building and increasing national research and policy capacity. One key outcome was a national survey.<sup>72</sup> The government of Mozambique reviewed the first phase in June 2004 and concluded that the program had succeeded in achieving many of its goals; however, poor geographical coverage of agricultural services persisted.<sup>73</sup> Major donors, including USAID, have declared PROAGRI a success but information regarding policies implemented and initial outcomes of the program are scarce.<sup>74</sup>

The second phase of the program, PROAGRI II, aims to improve the marketing of agricultural goods and development of rural markets.<sup>75</sup> This phase ended in 2009; specific policy and outcome data are not yet available.

## **Current Fertilizer Market Structure**

Little data exists on the current structure of the fertilizer market in Mozambique. The Mozambique Country Report carried out by the Alliance for a Green Revolution in Africa (AGRA) as part of their Soil Health Program in 2008 is the currently the most comprehensive resource available to identify critical actors in the fertilizer supply chain and key policies and actors influencing smallholder access.

The importation and distribution of fertilizer is conducted exclusively by the private sector with the government's role limited to regulation.<sup>76</sup> Weak regulatory and quality control contributes to a poorly organized market.<sup>77</sup> Many farmers face limited markets for their production and transaction costs, such as information gathering and bargaining, are high.<sup>78</sup> Poor infrastructure and long transport distances result in high transport costs within the country.<sup>79</sup>

### *Supply Chain*

The fertilizer supply chain in Mozambique exists exclusively within the private sector. AGRIFOCUS (multinational) and AGROQUIMICOS (national) are the two main fertilizer importers. Additionally, the Mozambique Fertilizer Company (MoZFert) imports raw fertilizer elements and blends domestically for national wholesale. Smaller distributors and retailers purchase fertilizer from one of the three importers. AGRA has identified eleven main distributors selling to smallholders and private producers.<sup>80</sup>

### *Barriers to Smallholder Fertilizer Access*

Smallholder access to fertilizer in Mozambique is limited by several key factors. Demand is limited by cost, lack of information, and lack of access to credit, while supply is constrained by a poor business environment and limited infrastructure.<sup>81,82</sup> Marketing margins in Mozambique are high with farmgate prices significantly lower than purchaser prices.<sup>83</sup> Many farmers do not have access to markets for their production and rural production and urban consumption centers are not well linked.<sup>84</sup>

Poor technical knowledge on the part of fertilizer distributors and lack of information on the comparative advantage of fertilizer use for smallholders also contribute to low levels of input use.<sup>85</sup> Households with access to credit and extension services have been shown to be more likely to adopt new technologies,<sup>86</sup> but few food crop producers have access to credit<sup>87</sup> and smallholders are not well-served by traditional lenders.<sup>88</sup>

The development of farmer associations in Mozambique has been shown to help to decrease farm-level transaction costs, improve access to credit, and improve adoption of new technologies.<sup>89, 90</sup> CARE and CLUSA have worked in Mozambique to develop farmer capacity to organize and manage collective activity.<sup>91</sup> On the supply side, re-packaging fertilizer into small bags, often as small as 1kg, has been shown to improve smallholder use.<sup>92</sup>

#### *Current Fertilizer Policy Objectives & Interventions*

AGRA identifies several initiatives currently operating in Mozambique to improve the supply chain and increase the use of Integrated Soil Fertility Management (ISFM). There is a project underway to identify fertilizer distributors that are positioned to supply to smallholders in the Nacala and Beira corridors in the northern and central parts of the country, respectively.<sup>93</sup>

The International Fertilizer Development Center's Agricultural Inputs Market Strengthening (AIMS) project focuses on promoting private-sector investment in agricultural inputs and marketing.<sup>94</sup> The IFCD supports two newly formed national nonprofit organizations, AMPIA and PROESA, created to facilitate fertilizer and input supply to rural smallholder farmers at an accessible price.<sup>95</sup> AGRA also reports that the IFDC has developed a proposal on behalf of the Ministry of Agriculture to support an increase in smallholder access to improved inputs (seed and fertilizer) through a voucher system. According to the report, a pilot project will target 25,000 farmers in the Beira corridor of central Mozambique, however, there is not yet any published information regarding this project.<sup>96</sup>

#### *Potential for Domestic Production & Regional Trade*

Mozambique has no domestic fertilizer production,<sup>97</sup> but the Beira port in Mozambique is one of the few ports in Africa large enough to receive the medium-sized containers typically used for shipping fertilizer.<sup>98</sup> This port also serves as the port of entry for fertilizer headed to Zambia and Malawi. Increased trade between these three countries could improve the economic efficiency of fertilizer procurement and transport.<sup>99</sup>

Mozambique is also one of the few countries in Africa with a natural gas supply.<sup>100</sup> An ammonia/urea production unit in Mozambique could use local natural gas to profitably supply the entire Southern Africa Development Community (SADC) market. Greater regional coordination and a favorable international trade environment in the region are prerequisites to realizing this possibility.<sup>101</sup>

#### **Conclusion**

Fertilizer use and crop yields in Mozambique remain low. The analyses and data available suggest that increased investment in infrastructure is an important step to improve input and output market access for smallholders. The main government intervention to improve smallholder fertilizer use is the PROAGRI initiative, however, more data is needed to assess the impact of its policies and programs.

*Please direct comments or questions about this research to the Evans Policy Analysis & Research (EPAR) PI, Leigh Anderson, at [eparx@u.washington.edu](mailto:eparx@u.washington.edu).*

#### **Endnotes**

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  - <sup>2</sup> World Development Report, 2008, p. 335
  - <sup>3</sup> Kherallah et al., 2002, p. 26
  - <sup>4</sup> Camara & Heinemann, 2006, p. 5
  - <sup>5</sup> FAO, 2008, p. 17
  - <sup>6</sup> Dorward & Poulton, 2008, p. 1
  - <sup>7</sup> Tarp et al. 2002, p. 1
  - <sup>8</sup> The World Bank, 2008, p. viii
  - <sup>9</sup> The World Bank, 2008, p. 42.
  - <sup>10</sup> Tarp et al. 2002, p. 1
  - <sup>11</sup> Morris et al., 2007, p. 88
  - <sup>12</sup> Uaiene & Arndt, 2009, p. 8
  - <sup>13</sup> Tarp et al. 2002, p. 3

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28 Arndt et al., 2008, p. 6  
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30 Author's calculations (total agricultural land divided by land devoted to growing maize), FAOStat  
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