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Fertilizer subsidies in Malawi

From past to present

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ABSTRACT

Malawi has been at the center of the debate on agricultural input subsidies in Africa ever since it significantly expanded its fertilizer subsidy program about two decades ago. When it did so, Malawi was a trailblazer, receiving international attention for seemingly leveraging the subsidy program to move the country from a situation characterized by food deficits and widespread hunger to crop production surpluses. In this paper we trace the history of Malawi's subsidy program over the past 70 years, describing how the country arrived at that watershed moment earlier this century and how the subsidy program has developed since. We show how donor support for the program has wavered and how external pressure to remove the subsidy has repeatedly been unsuccessful. We also demonstrate how over the years the program's total fiscal burden has fluctuated significantly. However, we find that since the expansion of the subsidy program in 2004, the fiscal costs of the program have shown little correlation with the maize harvest that same agricultural season. We show that the subsidy program has succeeded in raising awareness about the value of the fertilizer for increased crop productivity. However, despite its continued prominence in the country's agricultural policy, most Malawian smallholder do not manage to grow sufficient maize to feed their households throughout the year, and every year millions depend on food assistance during the worst months of the lean season.

INTRODUCTION

Higher crop productivity, particularly of maize, has been a central agricultural development objective for Malawi since the colonial period. Increasing the use by Malawian farming households of inorganic fertilizer coupled with improved crop varieties has been among the principal techniques promoted to increase crop yields. Efforts to raise awareness of the value of these commercial inputs to increase crop productivity and production have been successful. Inorganic fertilizer is now widely viewed by farming households as a critical component of their farming, necessary to ensure that they can produce sufficient maize to meet their consumption needs, in particular.

However, more problematic has been ensuring that farming households can use inorganic fertilizer on their maize crop profitably, given the relatively high, internationally-determined price they must pay for the input and the relatively low prices they receive in local markets for their fertilized maize output. Moreover, almost all crops, including fertilized maize, are grown under rainfed conditions, which can be quite variable from season to season or from place to place within the same season. The possibility of drought or flood increases the risk of financial loss when using fertilizer on rainfed maize. Because of this problematic financial analysis of fertilized maize production, the government of Malawi has regularly subsidized fertilizer and improved maize seed for a large share of its smallholder farmers. The annual fiscal costs of these programs have been up to 3.0 percent of Malawi's GDP, depending on the number of farmers benefitting, the price of inorganic fertilizer and improved seed internationally, and the level of subsidy on the price of inputs provided to beneficiary farmers. For example, in the 2022/23 rainfed farming season, the Affordable Inputs Programme targeted 2.5 million farming households nationally—about two-thirds of all farming households—at a (provisional) cost of about 1.6 percent of Malawi's GDP.[1]

In this paper, we examine the experience over the past 70 years of Malawi's national input subsidy program. Our focus is on the provision of inorganic fertilizer for use primarily in maize production, so we do not consider in detail the parallel supply of subsidized improved seed, whether of maize or other crops. We show how the objectives of the program have wavered between increasing awareness among farmers of the benefits of inorganic fertilizer application, on the one hand, and increasing national maize production and ensuring food security for smallholder farming households, on the other. In tracing this history, we detail the influence of the donor community in shaping reforms. Donors have sometimes supported the subsidy program, including financially, while at other times argued for its removal. Numerous donor-supported efforts to end the subsidy program and replace it with other approaches to achieve its objectives have been unsuccessful.

Despite over two decades of significant subsidies on the price of fertilizer used to grow maize, millions of Malawians continue to rely on food aid for several months every year, being unable to produce or otherwise access sufficient maize to meet the needs of their household members. Survey data show how only a minority of farming households produce more maize than they consume. In graphing the relation between yearly food production and the size of the subsidy program, we note that the years of

[1] OECD (2022) documents how 54 advanced and emerging economies annually spend an average of USD 817 billion on supporting agriculture, representing 0.9 percent of their total GDP. OECD views agricultural output and input subsidies as the forms of government interventions in the agricultural sector with the highest potential to distort production decisions, motivating farmers to produce specific crops where they should not be grown and to use farm inputs beyond optimal levels. Agricultural subsidies in richer economies have tended to make a small group of farmers (much) better off and a large group of consumers (a little) worse off.

highest spending on fertilizer subsidies did not consistently result in the largest national harvest levels. This suggests that a leaner subsidy program will not necessarily result in reduced production, while it would free up scarce government resources for other programs and investments.

INORGANIC FERTILIZER USE FOR MAIZE PRODUCTION IN MALAWI

Historically, smallholder agricultural systems in most areas of Malawi relied on shifting cultivation or crop-fallow systems to sustain soil nutrient levels for crop production. However, with the sharp increase in Malawi's population over the past century, there is simply not enough land in Malawi to continue using these traditional soil fertility management methods. Households now generally plant crops on the land to which they have use rights every year. With repeated maize cropping without regularly resting the land in fallow or planting the land in rotation with nitrogen-fixing leguminous crops, most of the plant nutrients in the soil, particularly nitrogen, have been exhausted. This has resulted in low productivity of around 1.0 mt/ha for unimproved local maize varieties grown without fertilizer.

However, inorganic fertilizers, particularly those with high nitrogen content, if used efficiently with locally-suited improved maize seed and good crop management, can result in maize yields that are several times higher. Already in the 1920s, some colonial settlers used inorganic fertilizers in the production of tea or tobacco on their estates. Research on fertilizer use on maize in Malawi began after World War II as a component of a significant expansion and acceleration in the agricultural development efforts of the colonial government directed toward smallholders (McCracken, 2012). Agricultural researchers by 1958 had delineated the major nutrient response patterns in the application of inorganic fertilizer to maize across Malawi, identifying where profitable use of inorganic fertilizers on maize could be obtained (Brown, 1966). Relatively strong responses in maize yield to the application of nitrogen were found in the upland plateau areas where most farming in the country is done, with lower responses seen along the lakeshore and considerably more limited responses in the Lower Shire Valley. The responses to the application of phosphate fertilizer were less clear, as they were not always seen or, if seen, were not necessarily at a level sufficient to suggest that the use of phosphate fertilizer on maize would be profitable for the farmer. This earliest delineation of the spatial distribution of maize yield response to inorganic fertilizer in Malawi remains broadly applicable.

Further work on the suitability of different types of inorganic fertilizers for use on maize led to the promotion of urea (46:0:0—$N:P_2O_5:K_2O$) as the principal source of nitrogen, given urea's relatively cheaper cost per unit of nitrogen relative to other nitrogenous fertilizers, and diammonium phosphate (DAP—18:46:0) as the source of phosphate for maize. A blanket fertilizer recommendation for maize in Malawi of 96 kgN and 40 kgP_2O_5 per hectare was promoted by the Ministry of Agriculture in the 1980s and 1990s. The fertilizer is applied to the maize in two doses—DAP at planting or soon thereafter—the basal dose—and urea about four weeks after maize seedling emergence. However, researchers subsequently found that sulfur also needed to be applied to obtain the highest maize yields. Area-specific fertilizer recommendations that emerged from extensive field trials in the mid-1990s led to the replacement of DAP with 23:21:0+4S as the basal fertilizer for maize. Subsequent work led to the recommendation that the basal fertilizer also include some potassium and zinc. Starting with the 2018/19 cropping season, 23:10:5+6S+1.0Zn and urea have been the fertilizer types used in the input subsidy program.

The research done in the mid-1990s on maize yield response patterns to the application of inorganic fertilizer across Malawi found that smallholder farming households in the main maize-producing areas of the country should be able to obtain around 8.0 kg of additional maize grain for every kg of fertilizer applied if the crop is planted on reasonably good land; hybrid seed and the inorganic fertilizer is obtained before the planting rains come; and the household can manage the weeds, pests, and diseases that threaten their crop and can apply sufficient labor to the crop when required in its growth cycle (Benson T. , 2021, p. 49). However, evaluations of Malawi's input subsidy program have consistently shown that beneficiary farmers obtain much lower maize yield responses to the subsidized fertilizer they apply. For example, Lunduka, Ricker-Gilbert, and Fisher (2013) computed a response rate of only 2.7 kg of maize grain per kilogram of fertilizer applied over three years of the program from 2005/06 to 2008/09. This stark difference between the potentially achievable maize production per unit of fertilizer applied and what beneficiaries of the input subsidy program achieve is largely a result of the operational challenges facing the input subsidy program and the declining health of the soils farmers use. Complex processes to procure fertilizer from overseas sources often result in late delivery of the inputs to farming households. In consequence, they are unable to use the subsidized fertilizer in an agronomically optimal manner (Jayne, Mason, Burke, & Ariga, 2018).

Nonetheless, the production benefits that farming households in Malawi receive from using inorganic fertilizer on maize are clear to them—75 percent of farming households producing improved maize varieties in 2019/20 applied inorganic fertilizer to the crop; 65 percent of those producing local (unimproved) maize also did so. Many of these households would not have been able to apply fertilizer to their maize without the input subsidy program. The maintenance of the program in Malawi over many years and at a relatively large scale—both in terms of the share of farming households benefitting and the value of the subsidy they receive—is in response to this demand from smallholder farmers. In addition, such a large-scale input subsidy program serves Malawi's leaders well in meeting the expectations of the citizens of Malawi as to how those leaders are expected to safeguard the livelihoods and food security of their constituents (Sahley, Groelsma, Marchione, & Nelson, 2005).

INPUT SUBSIDY PROGRAMS IN MALAWI

Conceptual justifications for input subsidy programs

Input subsidies were a relatively common element in the agricultural development programs of developing countries in the 1960s and 1970s and typically required significant government financing every year. While such programs were to be eliminated under the structural adjustment reforms low-income countries negotiated with international donors in the 1980s and 1990s, by the late 1990s many had elected to reestablish them, often with the support of donors. Over the past 25 years, input subsidy programs have become a common policy choice, particularly in sub-Saharan Africa, to bolster agricultural development and to address food insecurity by increasing the productivity of staple food crops (Jayne and Rashid 2013). The designs of several input subsidy programs implemented in recent years in countries in Africa, including Malawi, are presented in Annex Table 1.

In the literature on agricultural development strategies, farm input subsidies are advocated as a short to medium-term approach to increase adoption by farmers of commercial high-productivity inputs and

other technologies.[2] Such subsidies reduce the financial risks farmers face as they learn how to profitably use the commercial inputs in their farming. In the 1960s and 1970s in the agricultural development programs of developing countries, the principal justification for providing farmers with subsidies on newly introduced high-productivity technologies was to accelerate their adoption. Farmers in low-income countries generally apply lower amounts of farm inputs than is economically optimal—that level of application of the input at which the value of additional crop output is equal to the cost of an additional unit of input. This suboptimal use was attributed to farmers not having sufficient experience with and, hence, the information they required to accurately estimate the gains they could make from using the new inputs. This results in a market failure, in that farmers are not producing as much output as they profitably might produce with increased input use, resulting in reduced crop supply, higher food crop prices, and a cost to society. For agricultural development objectives, governments will provide subsidies on commercial farm inputs to temporarily reduce the costs and financial risks farmers face in using the inputs. By enabling farmers to employ the inputs at a lower cost for several seasons, farmers are expected to learn how to consistently employ them profitably and better understand the risks they must manage in doing so, even when the inputs are purchased at full cost (Ellis, 1992, p. 137ff). Where agricultural development considerations dominate the decision to provide farmers with farm input subsidies, the intent is that such subsidy programs will only be implemented for a few years to build farmers' experience with their use. Enabling farmers to better understand which components of a package of high-productivity crop inputs would work best for their particular agro-ecological and economic context was certainly an important driver in justifying input subsidy programs in Malawi until 2000, including with the Starter Pack and the Targeted Inputs Programme (TIP) between 1998/99 and 2001/02 (Mann, 1998; Levy, 2005).

However, in food-insecure countries, including Malawi, input subsidy programs have also been particularly attractive as a means to address chronic food insecurity and to reduce the risks of acute food insecurity crises. In such contexts, providing price subsidies on inputs to correct for market failures that result in socially sub-optimal levels of use generally will be a secondary motivation to the potentially important increases in food crop production associated with significantly greater use of high-productivity inputs. In farming systems with a large share of households engaged in subsistence-oriented farming, input subsidies directly increase access to food for the farming households that receive the inputs. In this, subsidized inputs also can play a role in government social protection programs by providing chronically food insecure farming households with increased access to food by raising their yields of food crops for their own consumption. In addition, the higher staple food crop production resulting from increased use of high-productivity inputs due to the subsidies should also increase the volume of food crops supplied to markets by beneficiaries of the subsidy. This increased supply serves to stabilize or reduce food prices, improving access to food for households reliant on those markets, both non-farming and farming. Through these linkages, the benefits of input subsidies on the production of staple foods, in particular, accrue to both farmers and consumers (Chirwa & Dorward, 2013). While enabling farmers to better understand how best to use high-productivity crop inputs was the explicit motivation for the earliest input subsidy programs in Malawi, since about 2000, it has been the contribution that wide distribution of subsidized farm inputs makes to food security at both household and national levels that has

[2] The farm inputs most commonly subsidized are improved seed and inorganic fertilizer, particularly for increased production of staple food crops. However, subsidies can also be applied to the costs of electricity used for irrigation water pumping, to farm machinery or fuel to power that machinery, and on pesticides for cash crops—subsidies on these types of farm inputs are most commonly seen in middle-income and advanced economies.

justified their continuation. Food security, rather than agricultural development, drives the design and implementation of such input subsidy programs.

Particularly in countries prone to food insecurity, like Malawi, but also Zambia, input subsidy programs are the largest public investments in agriculture. Moreover, such programs can constitute among the largest development expenditures made by the government, often amounting annually to several percent of the country's GDP—for example, expenditures on input subsidies constituted 49.8 percent of all public expenditures in support of food and agriculture in Malawi between 2006 and 2013 (FAO 2015). The design of such programs in food insecure countries tends also to be at a large scale with high subsidies on the market cost of the inputs provided and wide coverage across the country's farming population. In contrast, in less food insecure low-income developing countries, farm input subsidy programs are designed primarily to achieve agricultural development objectives and tend to be relatively smaller in scale and cost. The subsidies provided to farmers in such countries tend to be a smaller share of the full market costs of the inputs and there is less attention to targeting the subsidies to specific groups of farmers, such as only the food insecure. This is evident in comparing the input subsidy programs of Malawi and Zambia, which are relatively food-insecure countries, to those of the other countries listed in Annex Table 1, most of which are relatively more food-secure.

High fertilizer-to-crop price ratio makes commercial fertilized crop production unprofitable

As discussed, subsidies on the price of farm inputs have frequently been an element in efforts to increase the adoption of high-productivity cropping technologies. Such subsidies enable farmers to become more experienced in the profitable use of the inputs when they are not familiar with the technologies. While in the colonial and early post-colonial periods in Malawi, this information constraint on the profitable and effective use of inorganic fertilizer to produce crops certainly was operative, farmers now are reasonably familiar with how they might use fertilizer effectively. Rather, the major constraint preventing the increased use of fertilizer in Malawi is that farming households cannot afford it.

The price of inorganic fertilizer relative to the price of maize in Malawi is at the center of the challenge of profitably using fertilizer. All inorganic fertilizer used in Malawi is imported. While Malawi has rock phosphate deposits in Phalombe district that could be exploited to produce phosphate fertilizer, urea, the fertilizer most important to the production of maize, given maize's high-nitrogen requirements, is produced globally in large-scale, capital-intensive production facilities in locations with access to relatively low-cost energy and to much larger markets than Malawi alone can provide. The cost of production overseas plus the cost of shipment of the fertilizer into the country results in high fertilizer prices in Malawi. In August 2021, a 50 kg bag of urea cost about MK 38,000 (Nyondo, Nyirenda, Burke, & Myuanga, 2021)—this was before an almost doubling in price after the outbreak of Russia's war in Ukraine in early 2022. In the same month, traders were selling maize to retail consumers at MK 7,000 per 50 kg bag (IFPRI-Malawi, 2021), while producers selling maize to traders almost certainly received even lower prices.

This urea (MK 38,000) to maize (MK 7,000) price ratio of about 5.4 provides a benchmark for what level of agronomic response farmers in Malawi using commercial fertilizer on their maize would have needed to obtain in 2021 to break even on the cost of any commercial fertilizer they used. As noted, farmers in

Malawi using best production practices on reasonably good cropland should be able to obtain around 8.0 kg of additional maize grain for every kg of fertilizer applied. However, evaluations of the maize yield response to fertilizer in input subsidy programs show that most do not. Many farmers will not achieve production of 5.4 kg of maize for every kg of fertilizer applied, so will incur a financial loss on their fertilized maize production if they purchase the fertilizer at the full commercial price with no subsidies applied.

Fertilizer importers in Malawi have little control over the prices they must pay for the input. While the government could intervene forcefully in agricultural markets to ensure farmers receive significantly higher prices for their maize to better cover the cost of commercial fertilizer used in producing that maize, higher maize prices will exacerbate food insecurity for many poor Malawian households. Moreover, the fiscal costs the government will incur in managing the increased stocks of maize farmers would produce in response to higher administratively determined prices—not prices determined by supply and demand levels for maize in the market—would be prohibitively high (Baulch & Botha, 2020). In choosing between higher maize prices for farmers and affordable maize prices for poor consumers, the more acceptable policy option has consistently been to adopt the latter. Given the challenges to agricultural production levels and food security posed by generally weak agronomic performance in the use of inorganic fertilizer on maize coupled with high fertilizer-to-maize price ratios, the Malawian government has primarily acted to reduce the price ratio by subsidizing the cost of fertilizer, usually quite sharply. This has been seen repeatedly in the history of input subsidy programs in Malawi over the past 75 years.

HISTORY OF INPUT SUBSIDY IN MALAWI

1952 – 1992: subsidies to increase productivity

In 1952 the colonial government started supplying subsidized fertilizer to smallholder farmers. The Director of the colonial Department of Agriculture reported “There is no doubt that fertilizers will be absolutely essential to more intensive farming. … It is therefore the policy to encourage the use of appropriate fertilizers and to assist in so doing by a small subsidy payment (Kettlewell, 1955).” The provision of subsidies on crop inputs continued in independent Malawi under the leadership of Kamuzu Banda. Between 1964 and 1970, the government of newly independent Malawi instituted a price subsidy that allowed smallholders to buy fertilizer at below the import parity price for the input through the Farmers Marketing Board. In 1971, the Farmers Marketing Board was reconstituted to become the Agricultural Development and Marketing Corporation (ADMARC). Among its principal responsibilities was maintaining an efficient system for supplying inputs to smallholder farmers. While ADMARC was not explicitly mandated to subsidize fertilizer, it did so without budget support for a time using revenues obtained from implicitly taxing cash crops produced by smallholders (Phiri C. D., 1993). However, ADMARC faced financial difficulties in the early 1980s, so it found it increasingly challenging to supply inputs to smallholders. In 1983, the government established the Smallholder Farmers Fertilizer Revolving Fund of Malawi (SFFRFM) to take over these responsibilities. This included managing a fertilizer buffer stock under commodity aid arrangements with donors.

In the 1970s and 1980s, there existed two parallel fertilizer pricing systems—one for smallholders that was managed by ADMARC and then SFFRFM and one for the agricultural estates that were supplied by commercial agricultural input firms, including Optichem, Agricultural Trading Company, and Norsk

Hydro. Smallholders received relatively small subsidies of up to 25 percent of the commercial cost that were applied to fertilizer at the point of sale (Blackie, et al., 1998). However, much of this subsidized fertilizer was diverted to estates rather than to smallholder farming households, the intended beneficiaries (Devereux, 1997). Smallholder credit schemes using group lending approaches with farmers—the government-operated Smallholder Agricultural Credit Administration (SACA) from 1988 to 1994 and the parastatal Malawi Rural Finance Company (MRFC) for several years from 1994—were the principal avenues for farming households to obtain financing to purchase the inorganic fertilizer, given that they still bore a significant share of the cost of the input even after the subsidy was applied (Dorward & Kydd, 2004). (See Annex Table 2 for a summary of input subsidy programs in Malawi from the Banda era to the present.)

Up until the 1980s, government and donors were aligned in their thinking that Malawi's fertilizer subsidies encouraged rapid adoption of the input and would contribute to sustained farm output growth. However, with the rising fiscal costs of maintaining them, Malawi's international donors became less supportive of the subsidies on fertilizer for smallholders. Starting in 1982/83 and running through 1992/93, the donors supported three successive Fertiliser Subsidy Removal Programs (FSRP) to enable the government to eliminate the subsidies over the medium term (Phiri H. H., 2013). However, surging international prices for fertilizer and domestic political concerns resulted in none of the FSRPs being successfully implemented.

1992 – 2000: subsidies to increase food security

One response to drought-induced food insecurity crises in 1992 and again in 1994 was providing free seed and fertilizer under the Supplementary Inputs Program (Devereux, 1997). While in the program's first year, only local maize seed was distributed to beneficiaries, in the 1994/95 and 1995/96 seasons, subsidized fertilizer was also supplied. This was among the first, if not the first, agricultural input distribution program in Malawi specifically directed to achieve food security objectives. Although not universal, the program was relatively large, benefiting between one-quarter and one-third of all farming households. International donors provided significant financial support to the government to cover the program's costs. Devereux notes that the suitability of input subsidies as a response to food crises was raised in discussions between the government and its development partners, since it was clear that such programs have "little sustainable impact on food security in those households which are unable to purchase inputs unless they are at least heavily subsidized". Whether or not such programs should be designed to promote "national food security objectives by targeting high-yielding areas and farmers and make no attempt at achieving household food security goals in marginal areas (1997, p. 4)" motivates similar discussions 30 years later.

The government of Malawi agreed to a package of structural adjustment reforms in the 1980s and early 1990s to maintain support from international donors. These reforms included currency devaluation, reduced government spending, and liberalizing and reducing government involvement in agricultural production, marketing, and finance. By 1996/97, with the end of the Supplementary Inputs Program and a cessation in the offer of subsidized fertilizer through ADMARC and SFFRFM, input subsidies were eliminated as part of these agreements. So, the objectives of the earlier failed FSRP efforts were achieved for one or two years. However, over this period the real costs of inorganic fertilizer rose sharply with the foreign exchange reforms. The adverse impact of the reduced access of farmers to fertilizer because of

higher prices became sharply evident with the maize harvest of the 1996/97 cropping season. Due in part to low fertilizer use, many farming households harvested far less than their annual maize requirements. Maize prices began rising sharply a few months after harvest, resulting in the government releasing maize from its strategic grain reserve (Blackie, et al., 1998).

To respond to this intensifying chronic food crisis, in 1998/99, the government of Malawi implemented the Starter Pack program (Harrigan, 2008). Despite the structural adjustment reform commitments to end subsidies on inputs, the program involved distributing free of charge to almost all 2.8 million smallholder farming households in the country sufficient hybrid maize seed and inorganic fertilizer to plant 0.1 ha of fertilized maize—2 kg of seed and 15 kg of fertilizer. Grain legume seed was also included in the package to promote the use of nitrogen-fixing legume rotations and intercrops for sustainable soil fertility management alongside inorganic fertilizer and to improve household dietary diversity. Malawi's development partners, particularly the United Kingdom, provided significant support to the universal Starter Pack program for two years. The incremental annual maize production attributed to the program was estimated at 350,000 mt, a significant contribution to the then national maize demand of 2 million mt annually (Levy, 2005). The cost of the Starter Pack program each year was USD 26 million, about 1.5 percent of Malawi's GDP at the time.

While a food crisis prompted the Starter Pack program, in its design, the classic argument for input subsidies as a way for farmers to gain the information they require to profitably employ the inputs in their farming was used—the small packs of inputs would allow farmers to determine which production technologies were their "best bets" for profitable, high-productivity production in their particular agro-ecological and economic context (Mann, 1998). However, a rigorous review of the program found this rationale flawed since profitable production of fertilized maize by smallholders in Malawi was almost impossible to achieve, given the sharp rise in the price of fertilizer (Levy, Barahona, & Chinsinga, 2004; Levy, 2005). The program was not an effective agricultural development mechanism. However, from a food security perspective, the universal Starter Pack was found to be an effective and relatively efficient way to reduce chronic food insecurity and the adverse effects that acute food crises have on the livelihoods, assets, and welfare of households across Malawi. While a relatively costly program, the Starter Pack evaluation team asserted that the costs of not implementing it would have been much higher if both the direct cost of alternative food security interventions and the indirect costs due to macroeconomic instability caused by an ongoing food crisis were considered (Levy, Barahona, & Chinsinga, 2004).

2000 – 2004: targeting subsidies

The Starter Pack was replaced with the Targeted Inputs Program (TIP) for the 2000/01 and 2001/02 cropping seasons. Providing a similar small packet of inputs as the Starter Pack, the principal difference was that the TIP was not distributed to all farming households, but was targeted to half of all farming households in the first year and to one-third in the second. Malawi's donors continued to support the input program, but their support was conditional on it being targeted. The donors felt this was necessary to reduce the fiscal burden of the program and so that it would primarily provide support to the most vulnerable households—a social protection objective. Evaluations of TIP generally found that it was considerably more problematic to implement and had less impact on food security than the Starter Pack. The targeting required of the TIP was shown to be ineffective with very little difference between the poverty profile of TIP beneficiary households and that of smallholder farming households as a

whole. This was attributed both to no clear targeting criteria being part of the program design and to the use of a community targeting process in a socio-cultural context that promoted a strong spirit of egalitarianism and the view that all in the rural communities were poor and in need of such assistance (Chinsinga, 2005). The reduced scale of TIP compared to the Starter Pack, together with poor cropping weather conditions in both seasons, resulted in significantly lower incremental production due to the subsidized inputs—an estimated 75,000 mt from 1.5 million beneficiary households in 2000/01 and 40,000 mt from 1.0 million households in 2001/02. The design changes made in replacing the Starter Pack with TIP, coupled with the poor rainfall conditions, undermined the national food security potential of TIP (Levy, Barahona, & Chinsinga, 2004).

Despite the provision of subsidized inputs through TIP, a food crisis occurred following the 2001/02 cropping season. In part in response to this, the Extended TIP was implemented in the following two years with considerable donor support. As targeting was viewed to be an important reason for the poor performance of TIP in reaching the most food-insecure households in beneficiary communities, the Extended TIP provided free inputs to most smallholder farming households. The input package in the first year of the Extended TIP was similar to that provided for the Starter Pack, but in the second year, the inputs provided to each beneficiary increased by 150 percent—sufficient inputs for planting 0.25 ha of fertilized maize. The second year of the Extended TIP in 2003/04 was implemented just before the elections of May 2004 in which Bingu wa Mutharika replaced the term-barred Bakili Muluzi as president. That upcoming election likely was a factor in expanding the scale of the Extended TIP that year.

2004 – today: scaling up the subsidy program

In the 2004/05 cropping season following the election of President B. Mutharika, despite political promises of a universal input subsidy program being rolled out, the efforts to do so were ineffective, resulting in a poor national harvest, high maize prices, and many households facing acute food insecurity (Chirwa & Dorward, 2013). In response, for the 2005/06 season, the new president provided considerable political support to the implementation of a significantly larger input program, the Farm Input Subsidy Programme (FISP). The objectives of FISP differed somewhat from earlier input subsidy programs in that maize self-sufficiency was key. There was less emphasis in its design on directly meeting the food needs of vulnerable farming households. Rather, the emphasis was on beneficiaries as farmers and producers, rather than as consumers (Chirwa & Dorward, 2013, p. 89). In its first year, this involved providing improved open-pollinated variety (OPV) maize seed (no hybrid) and 100 kg of fertilizer suitable for maize or tobacco to 1.3 million households selected by community leaders. Beneficiaries paid 36 percent of the market cost of the inputs. At a cost of about 1.0 percent of Malawi's GDP at the time, the program generated incremental maize production estimated at 350,000 mt.

The 2004/05 input subsidy program was generally viewed as a success. The framework established through this larger-scale program in that year was further refined in the following years through at least 2011/12 to improve program performance, security, and accountability (Chirwa & Dorward, 2013). This included some changes to the targeting criteria so that vulnerable households within communities would be more likely to benefit. However, throughout FISP implementation, there remained significant ambiguity in those criteria and in the community targeting processes used (Chirwa & Dorward, 2013).

In its early years, FISP was generally viewed as a successful input subsidy program that contributed to agricultural growth and development and to food security in Malawi. The annual incremental maize production attributed to the program ranged between 350,000 and 900,000 mt between 2005/06 and 2011/12. It also provided political benefits—President B. Mutharika used the good performance of the program as an important element of his successful reelection bid in 2009. On the continental stage within the context of the African Union, he also advocated for the program to be a model for other African countries to replicate to achieve similar development advances. However, fiscally, it was an expensive program that certainly imposed opportunity costs on many other necessary human and economic development efforts in Malawi. During President B. Mutharika's second term, there was increased debate on the value of FISP for achieving the country's broader development vision. More voices expressing general dissatisfaction with the design and value of FISP were raised following his death in office in April 2012 and through the term of his successor, Joyce Banda. However, FISP continued to be implemented following the design established earlier, providing about 1.5 million farming households annually with improved seed and 100 kg of fertilizer.

Two months after the election of Peter Mutharika as president of Malawi in 2014, the Lilongwe University of Agriculture and Natural Resources convened a two-day stakeholder consultation entitled 'Eight years of FISP – Impact and what next?' (LUANAR, 2014). The symposium was held at a time when the government of Malawi was facing severe budget restrictions due to a suspension of international donor support following the revelation in 2013 of the illicit diversion of government funds—the so-called Cashgate scandal. In consequence, fiscal prudence required that the FISP program be implemented more efficiently. Discussion at the symposium, officially opened by the new Minister of Agriculture, generally agreed that FISP was an essential component of the country's overall economic development. However, participants also recognized that the program was not as efficient and effective as it might be. A recurrent point of discussion was defining the specific objective of FISP—was it primarily to provide for the welfare of the rural poor or, rather, to lay the foundation for a transformation of agriculture in Malawi? It was agreed that a single program design cannot effectively achieve both objectives. A set of recommended program design changes emerged from the symposium. At the same time, it was recognized that several complementary public investments would be needed if FISP was to contribute to achieving agricultural transformation or a broad restructuring of the economy of Malawi. These include investments in rural transport infrastructure, agricultural markets, agricultural extension services, and agricultural research. Investing in FISP alone was viewed as not sufficient to achieve these broad development objectives.

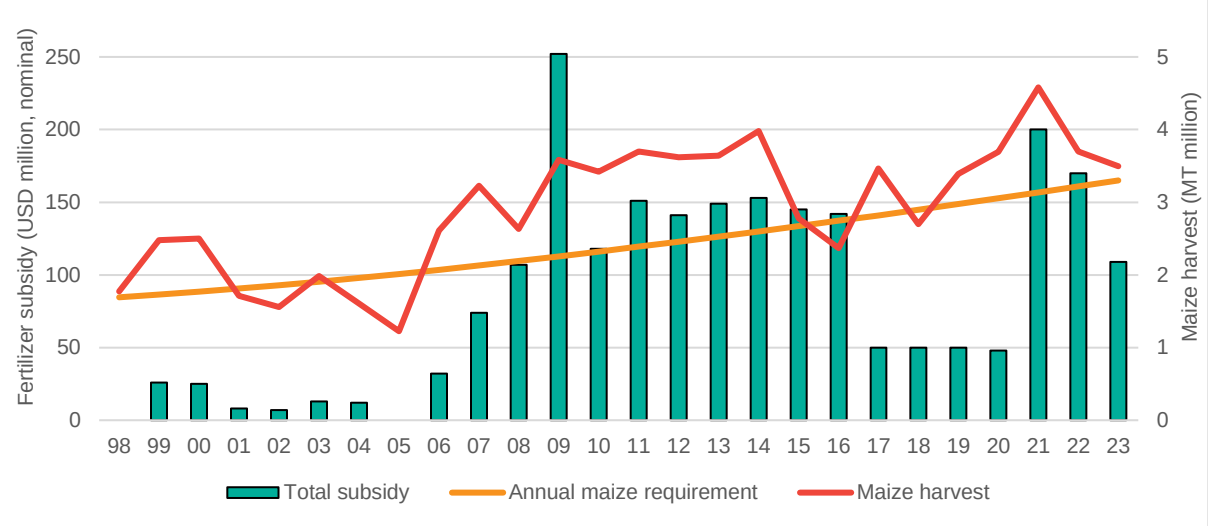
FISP was downscaled under President P. Mutharika, primarily to achieve significant reductions in cost as the government grappled with the consequences of sharply reduced donor support overall. The value of the subsidy beneficiaries received on the farm inputs was reduced from above 90 percent to under 80 percent in 2015/16 and then to 66 percent in the following years. The number of beneficiaries was also reduced from 1.5 million to 900,000. However, political considerations ended any further reforms to FISP. The three main political parties contesting the presidential election of 2019 all promised to implement a universal input subsidy program for smallholder farmers. After the 2019 results were annulled, the two main coalitions that contested the rerun of the election in 2020 both maintained the universal input subsidy on their policy platforms.

With the election of President Chakwera in June 2020, planning began to launch the Affordable Inputs Programme (AIP) in the 2020/21 cropping season. AIP combined the near-universal nature of the Starter Pack program of the late 1990s with the provision of a much larger input package similar to that received by the targeted beneficiaries of FISP: 3.8 million beneficiaries were each offered 100 kg of subsidized fertilizer plus improved seed. The cost of AIP was over 1.5 percent of Malawi's GDP in its inaugural season, representing, as was the case in the early years of FISP, one of the largest public investment programs of the government. The program was declared a success as Malawi produced a bumper harvest on the back of favorable rains, but its fiscal sustainability was questioned. In the following two years, the expenditure on the program was reduced to just under 1 percent of GDP. In 2022/23, the worldwide rise of fertilizer prices following Russia's invasion of Ukraine in early 2022 resulted in an even greater reduction in the number of AIP beneficiaries to 2.5 million and a reduction in the amount of subsidy applied to the price of fertilizer. A further reduction in the size of the program to 1.5 million beneficiaries is planned for the 2023/24 growing season.

The association between the cost of the subsidy program and the size of the subsequent harvest

Figure 1 presents a historical summary of fertilizer subsidies since they were re-introduced in Malawi in the late 1990s following their phase-out just a few years earlier as part of structural adjustment reforms. Three pieces of information are given for each year from 1999 to 2023. First, the bars represent the size of the input subsidy program during the growing season that ended that year, expressed in millions of USD. Second, total maize production in the subsidy program year is depicted by irregular line. That harvest can be compared with total maize requirements in Malawi, depicted by the smooth upward-sloping line—maize requirements in the country grow steadily with population growth.

Figure 1. Historical overview of fertilizer subsidies in Malawi, 1999 to 2023



Notes: Compiled by authors

The figure illustrates several developments in the recent history of input subsidies in Malawi: Relatively good maize harvests were realized in 1999 and 2000 when the Starter Pack program was in place. Harvests were considerably poorer between 2001 and 2004 under the (Extended) Targeted Inputs Program, and especially in 2005 when no input subsidy was provided. Maize harvests dramatically

improved starting in 2006 following the introduction of FISP. The two years in which maize harvest did not meet the national requirement saw poor rains (2016) and extensive flooding due to a tropical cyclone (2018). Harvests remained relatively good even in the four years when the program was drastically reduced (2017-2020). Except for a bumper harvest in 2020, which could be attributed to unusually favorable rains in the first year of AIP implementation, harvest levels remained similar after the re-expansion of subsidies under AIP. However, as Malawi's growing population requires more and more maize, these higher levels of production to which the subsidized fertilizer contributes may soon again be insufficient to feed the nation.

WHERE ARE WE TODAY?

National-level self-sufficiency

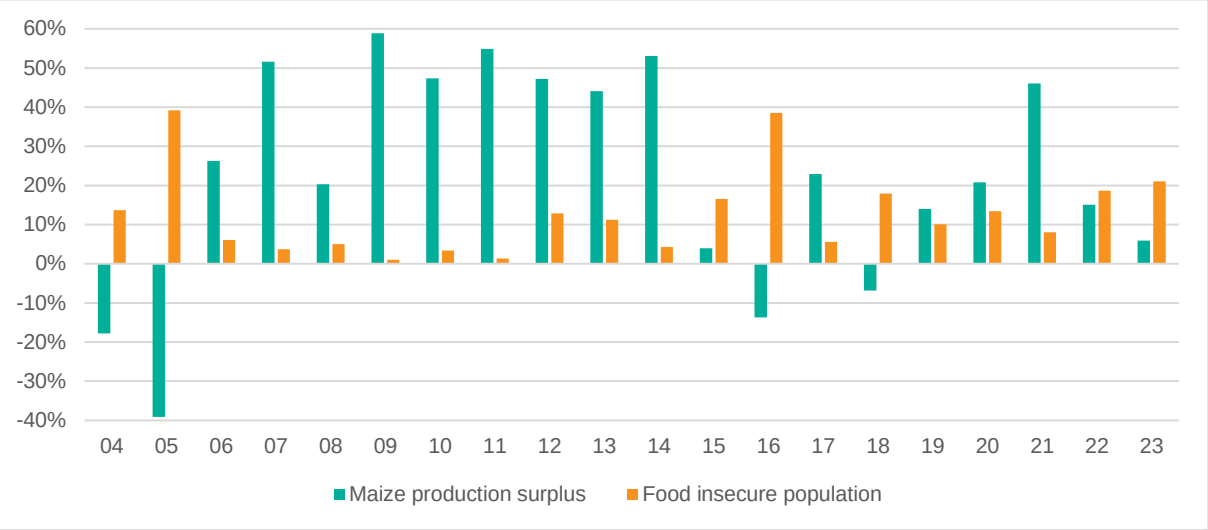
The sustained improvement in maize output following the introduction of FISP in the 2005/06 growing season suggests that a subsidy program of sufficient size can help boost maize production to levels that meet the national requirement for maize consumption. The fact that maize harvests remained, on average, unchanged when subsidies were temporarily reduced between 2017 and 2020 further suggests that increased levels of maize production can be maintained at a considerably lower cost than that of the current AIP. However, production will have to rise further to keep up with Malawi's growing population, and there is little to suggest that subsidies alone can achieve this.

Household-level self-sufficiency

The picture is more worrying at the household level. Despite the input subsidy program, most smallholder farmers do not produce enough maize to achieve self-sufficiency. This is obvious from two facts.

First, even in years with favorable rains, millions of people need food support during the 2 or 3 months that constitute the lean season before the harvest of the following crop. Figure 2 shows the yearly surplus or shortfall of maize production as a fraction of the total maize requirement in that year, along with the share of the population that needed food assistance during the following lean season. Over the past two decades, Malawi produced, on average, 23 percent more maize than it needed. However, in an average year, 13 percent of its population was food insecure during the lean season.

Figure 2. Maize production surpluses and food insecurity in Malawi, 2004 to 2023



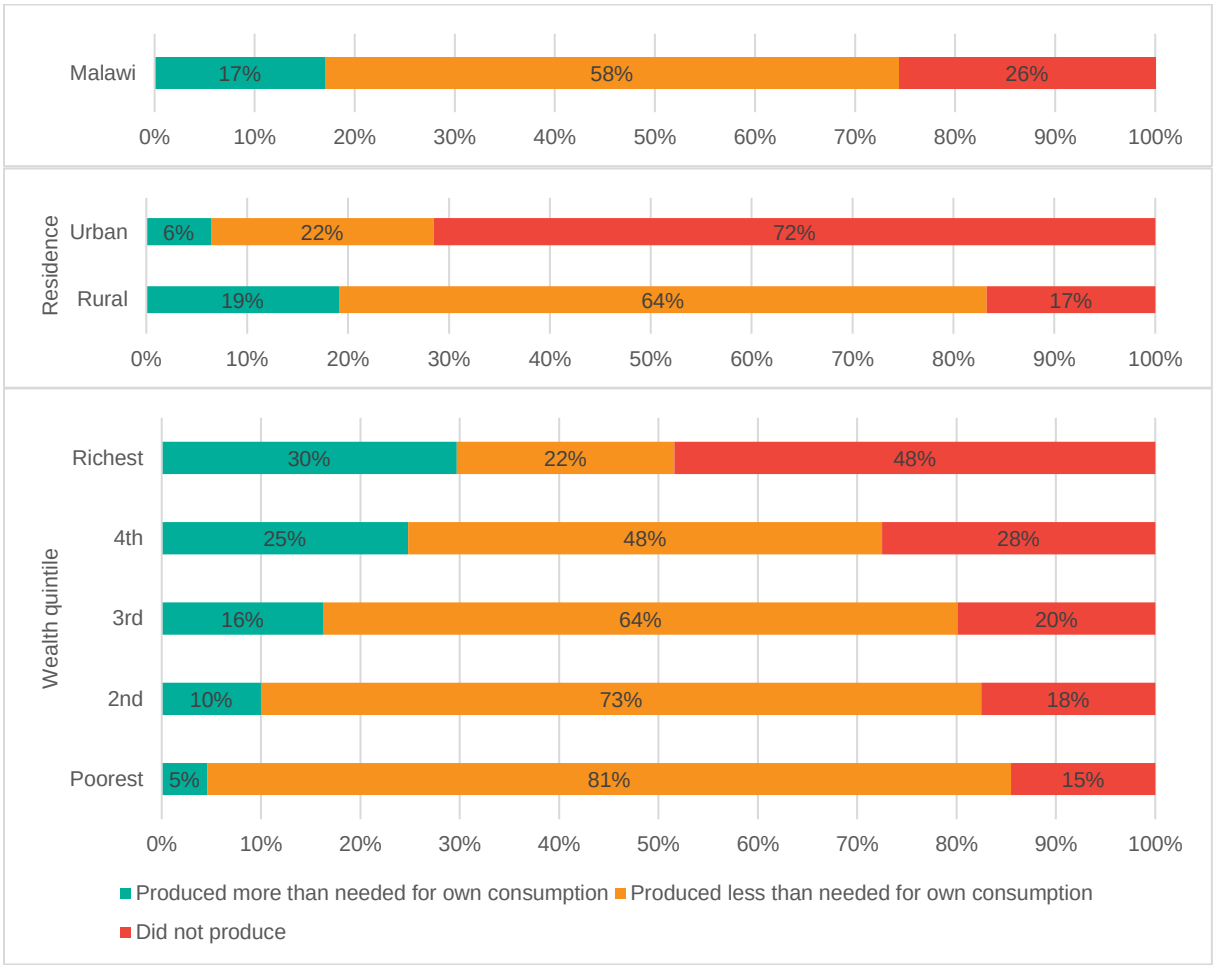
Notes: Compiled by authors from the government's Agricultural Production Estimates Survey data and Malawi Vulnerability Assessment Committee reports.

Second, most Malawian smallholder farmers do not produce enough maize to be self-sufficient. Figure 3 uses household-level data from the fifth (2019/20) round of the Integrated Household Survey to categorize households in Malawi into those not producing maize, producing maize but insufficient to feed their household for the whole year, and producing more than what is required for their own consumption needs. While 75 percent of all households in Malawi grow maize, only 17 percent grow more than they need to be self-sufficient. There is an important wealth gradient to these numbers. The poorer the household, the more likely it is to grow maize and the less likely it is to grow enough for its own food needs. Among those in the poorest quintile of households, 85 percent grow maize, but only 5 percent achieve maize self-sufficiency. Among households in the wealthiest quintile, only 52 percent grow maize, but the majority of those produce sufficient amounts to achieve self-sufficiency.[3]

It is clear, therefore, that while fertilizer subsidies have helped Malawi become self-sufficient in maize as a nation, those subsidy programs have failed to enable most households to produce enough maize for their own needs. In other words, most Malawians must supplement their own maize production with maize bought from the relatively few large surplus producers or from importers.

[3] The importance of food purchases in a variety of rural contexts in Sub-Saharan Africa was recently highlighted by Dzanku et al. (2024). These authors present survey evidence from 7 African countries, including Malawi, to show how food purchased on the market dominates rural food consumption, across a variety of agroecological zones, income levels and food products.

Figure 3. Sufficiency of the maize production of farming households in Malawi, 2019/20



Source Own calculations using data from the fifth (2019/20) round of the Malawi Integrated Household Survey.
Notes: Own consumption needs fixed at 2.8 kg per person per week, which is the average per capita maize consumption reported by IHS5 sample households. Observations: 11,434 households.

Despite a large fertilizer subsidy program, there are three main reasons why household-level self-sufficiency remains elusive.

- The first is Malawi's growing population, which increased by 28 percent during the 2010s. Most family farms have nowhere to expand, so the growing population leads to land fragmentation. The average farm size declined by 14 percent during the same period and will likely keep shrinking. A typical Malawian family must thus scrape a living from an ever smaller piece of land, making self-sufficiency in maize production increasingly difficult, even with boosted productivity (Benson & De Weerdt, 2023).

- The second challenge revolves around soil health. Omuto and Vargas (2018) have documented the occurrence of soil acidification in Malawi, showing a decline in average soil pH levels from 6.29 in 2010 to 5.61 in 2017. Concurrently, topsoil loss has increased by 10% during the same timeframe, exacerbating the overall deterioration of soil fertility. This trend diminishes the responsiveness of maize yields to fertilizer applications among smallholder farmers. Farmers with low fertilizer yield response rates are unlikely to grow enough maize to feed their families whether they receive subsidized fertilizer or not, but especially so if their farms are small.

- The third relates to logistical challenges in the roll-out of the subsidy program. Late delivery by the program of the subsidized fertilizer results in late application to the growing maize. This delay further erodes the maize yield response to the fertilizer.

Social protection

One could argue that in the absence of fertilizer subsidies, many farming households would be even less self-sufficient in maize production than they currently are and that the subsidies, therefore, serve an important social protection function. This is likely true. However, it is more helpful to ask whether the same households would not be better off if the funds currently spent to subsidize their fertilizer were used to help them meet their maize consumption requirements in a different manner.

The simplest benchmark is how well off a farming household would be if, instead of a fertilizer subsidy, the household received the equivalent value of the subsidy in cash. Suppose the subsidy reduces the fertilizer-to-crop price ratio for a household, as discussed in Section 3, below the fertilizer yield response rate for the farming household. In that case, the household will be better off with the subsidy. However, if even with the subsidy, the fertilizer-to-crop price ratio remains above the yield response rate the household can realize, the household will produce less maize with the subsidized fertilizer than it would be able to buy with the cash equivalent to the value of the subsidy. In such cases, a cash transfer would bring more benefit to the farming household and would likely be cheaper than the subsidy, even if maize had to be imported. Unfortunately, many households that benefit from the subsidy fall into this category, making the farm input subsidy programs in Malawi a poor social protection tool (De Weerdt & Duchoslav, 2022).

WAY FORWARD

Large-scale input subsidies seem to have helped boost total maize output in Malawi beyond its national requirement. During the eight years before the introduction of FISP, the country produced, on average, 1.9 million MT of maize annually. During the FISP and AIP years, the annual maize production averaged 3.4 million MT—an increase of 81 percent.

However, the scale of FISP in the initial years of its existence may have been unnecessarily large—maize production levels remained high at 3.3 million MT annually on average during the first four years of FISP (Figure 1) even as the number of FISP beneficiaries was cut by more than half. More recently, the scale of AIP could similarly be considered too large. This suggests that similar levels of maize output could be maintained with a much smaller and, thus, cheaper subsidy program. For a pared-down subsidy program to achieve the maximum possible national maize production, the subsidy should be targeted at farmers who can use fertilizer most efficiently, ideally through a pricing mechanism (Duchoslav & De Weerdt, 2023). Ensuring that farmers who can use fertilizer efficiently can access enough of it is important for the country's food security. The ability of unproductive farmers to access cheap fertilizer is less critical for national food security.

Many farmers can raise their productivity by adopting better agricultural technologies, including soil health management, irrigation, improved seed varieties, more precise fertilizer application, etc. The government can help them with this through providing effective agricultural extension services and by

ensuring that inputs are available to farmers at the right time. However, even with higher yields, many farming families will still not be able to produce enough maize to feed themselves, let alone to make a profit. These farmers will be better off growing other crops or moving out of agriculture altogether (Benson & De Weerdt, 2023). Many will need help with the transition, including through adequate social protection programs. What such programs should look like is beyond the scope of this paper. However, they should not take the form of an input subsidy program like AIP, which gives many of its beneficiaries less benefit than they would derive from an equivalent cash transfer and which effectively requires them to remain subsistence farmers, even if they are not good at growing maize.

A pivot towards a leaner subsidy program would mean giving up on the goal of household-level food self-sufficiency. However, that goal has never been achieved since Malawi reintroduced large-scale fertilizer subsidies, and it is becoming ever less attainable as the country's population grows and farm sizes shrink. Focusing on national instead of household-level food self-sufficiency would better align expectations with reality. Thankfully, the fact that not all households can grow enough maize to feed themselves does not mean that they must go hungry–quite the opposite. Every country that has achieved prosperity for all has done so by moving away from subsistence agriculture, and there is no reason to believe that Malawi should follow a different path.

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Annex

Annex Table 1. Characteristics of recent agricultural input subsidy programs in selected countries of Africa

Country	Program	Subsidy package per beneficiary	Total beneficiaries	Targeting strategy	Beneficiaries' share of costs	Total costs
Ghana	Planting for Food and Jobs, 2017 to 2022	– Maize, rice, soybean, sorghum, and vegetables. – Inputs for up to 2 ha of cropland.	Rose from 200,000 farmers to 1.95 million—two-thirds of smallholders.	Resource-poor smallholders with between 0.4 and 2.0 hectares	50% of seed and fertilizer cost.	0.25% of GDP from 2017 to 2022
Kenya	Fertilizer Subsidy Programme, 2023	– Max. 200 kg (4 bags) fertilizer per acre cropland; max. 100 bags.	5 million farmers registered; 6 million bags available	Registered farmers only; roll-out by target district	54% of fertilizer cost	0.025% of GDP
Malawi	Affordable Inputs Programme, 2020/21 to 2022/23	– 5 to 7 kg maize, sorghum, or rice seed, – 100 kg fertilizer.	Around 3.7 million in 2020/21 & 2021/22; 2.5 million in 2022/23:	Almost all smallholders in 2020/21. Two-thirds in 2022/23	33% of seed and fertilizer costs in 2020/21	1.7% of GDP in 2020/21
Nigeria	Growth Enhancement Support Scheme, 2012 to 2014	– 100 kg fertilizer.	7.2 million in 2014	"Poor" farmers, but the criteria used to identify them are not clear	50% of fertilizer cost	0.2% of GDP in 2014
Rwanda	Crop Intensification Program, 2015 to 2022	Subsidy on fertilizer applied at point of input sale	[no data]	Effectively an untargeted subsidy system.	65% to 85% of market price, depending on fertilizer type.	0.15% of GDP in 2021/22.
Zambia	Comprehensive Agricultural Support Programme, (formerly Farmer Input Support Programme)	In 2022/23: – 300 kg fertilizer – 10 kg maize; 20-25 kg groundnut or soybean seed	About two-thirds of all smallholders in 2021/22 and 2022/23.	Agricultural cooperative members. Larger landholders more likely to benefit.	Less than 10% of seed and fertilizer cost.	3.3% of GDP in 2019/20

Sources: (Chirwa & Dorward, 2013; National Cereals & Produce Board, Kenya, 2022; Nyondo, et al., 2021; Olomola, 2016; Pauw, 2022; Spielman, et al., 2022; World Bank, 2021)

Annex Table 2. Agricultural input subsidy programs in Malawi, 1990 to 2023

Cropping season	Program	Precipitating event or concern	Subsidy package per beneficiary	Total beneficiary farming households	Targeting strategy	Beneficiaries' share of costs of subsidy package	Estimated added maize from subsidized inputs	Total costs (nominal)	Degree of cost support from development partners
1980s / early-1990s	Blanket fertilizer subsidy	Agricultural development and rural economic transformation objectives	Subsidy applied to fertilizer at point of sale at agricultural marketing parastatal, ADMARC, or the smallholder fertilizer parastatal, SFFRFM	All smallholder farming households	Likely excluded poor smallholders, since most would still be unable to pay the subsidized price	80-90%	[no data]	[no data]	Some donor support
1992/93	Drought Relief Seeds Distribution Project	Food crisis due to 1991/92 drought	Seed (not hybrid) only	1.3 million	[no data]	May have been at no cost	290,000 mt	[no data]	Strong donor support
1993/94	*[No large subsidy programs]*								
1994/95	Drought Recovery Inputs Programme	– Smallholder credit system collapsed. – Significant currency devaluation. – Nominal fertilizer prices rose sharply with devaluation.	Seed and fertilizer. Maize seed, plus sorghum, cassava, sweet potato	960,000	[no data]	[no data]	225,000 mt	[no data]	Strong support
1995/96	Supplementary Inputs Project		Similar to previous year	660,000	[no data]	[no data]	160,000 mt	[no data]	Strong support
1996/97	*[No large subsidy programs]*								
1997/98									
1998/99	Starter Pack	Rising levels of chronic food insecurity, in part due to increasingly restricted access of smallholders to improved seed and inorganic fertilizers	2 kg hybrid maize seed, 15 kg fertilizer, 1 kg grain legume seed—components varied by agroecology	All smallholder farming households(2.8 million)	All smallholder farming households. Excluded 30,000 estates and other larger farmers	No cost for beneficiaries	500,000 mt	USD 26 million (1.0% GDP)	Strong support (45% of costs)
1999/00							350,000 mt	USD 25 million (1.0% GDP)	Strong support (50% of costs)
2000/01	Targeted Inputs Programme (TIP)	Social protection objectives are more prominent in this scaled-down version of the Starter Pack.	2 kg improved (hybrid and open-pollinated) maize seed, 10 kg fertilizer, 1 kg grain legume seed—a single package	1.5 million	"Most vulnerable households"	No cost for beneficiaries	75,000 mt	USD 8 million (0.3% GDP)	Significant, (70%)
2001/02				1.0 million	Same as previous year	No cost for beneficiaries	40,000 mt	USD 7 million (0.3% GDP)	Significant, (67%)
2002/03	Extended Targeted Inputs Programme	Food security (poor harvest 2001/02), social protection,	[no data]	Almost all smallholder households (2.8 million)	Excluded estates and other larger farmers	No cost for beneficiaries	350,000 mt	USD 13 million (0.3% GDP)	Significant contributions (90%)

2003/04			5 kg maize seed; 25 kg fertilizer; 1 kg legume seed	1.7 million	[No info]	No cost for beneficiaries		USD 12 million (0.3% GDP)	UK gov't engaged significantly (90%)
2004/05	Universal Fertilizer Subsidy	Ramped up subsidy program promised during election, but late input distribution. With poor rains, poor implementation	Unclear, but likely similar to previous year [No documentation]	Almost all smallholder households	[No info]	[No info]	No info, but likely quite limited—as food crisis in post-harvest period	[No info]	[No info]
2005/06	Farm Input Subsidy Programme (FISP)	– Poor harvest in 2004/05 and recurrent poor harvests over the years due to floods, drought, and input program inefficiencies—late input delivery, in particular. – Chronic food insecurity – Political promises on all sides of increased access to fertilizer for farming households	OPV maize seed (no hybrid), 100 kg fertilizer for use on maize or on tobacco	1.3 million	Beneficiary selection by community leaders	36%	350,000 mt	USD 32 million (0.6% GDP)	No direct support
2006/07			Core package was 5 kg hybrid or 6 kg OPV maize seed, 50 kg 23:21:0+4S and 50 kg urea fertilizers for maize (Compound D and Calcium ammonium nitrate (CAN) for tobacco), and 2 kg grain legume seed. Some years, maize storage chemicals, sorghum seed, rice seed, and cotton seed & chemicals (selected areas) were also included. In the last years of FISP, 23:10:5+6S+1.0Zn fertilizer was used in place of 23:21:0+4S.	1.7 million	Full-time farmers who are unable to afford unsubsidized fertilizer. Beneficiaries selected by community leaders	28%	550,000 mt	USD 74 million (2.5% GDP)	13% of costs
2007/08				2.2 million	Same as previous year	21%	450,000 mt	USD 107 million (3.1% GDP)	7% of costs
2008/09				2.0 million	– Resource-poor locally-resident farmers with at least 0.4 ha of land under production; – Vulnerable households	9%	800,000 mt	USD 252 million (6.6% GDP) – Spike in international fertilizer prices	15% of costs
2009/10				1.6 million	Same as previous year	12%	700,000 mt	USD 118 million (2.5% GDP)	15% of costs
2010/11				1.6 million	Same as previous year	9%	900,000 mt	USD 151 million (3.0% GDP)	15% of costs
2011/12				1.4 million	[No info]	8%	650,000 mt	USD 141 million (1.2% GDP)	32% of costs
2012/13				1.5 million	[No info]	7%	[no data]	USD 149 million (1.7% GDP)	[no data]
2013/14				1.5 million	[No info]	4%	[no data]	USD 153 million (1.9% GDP)	[no data]

2014/15				1.5 million	[No info]	3%	[no data]	USD 145 million (1.6% GDP)	Approx. 12% of costs (seed)
2015/16				1.5 million	[No info]	21%	[no data]	USD 142 million (1.4% GDP)	[no data]
2016/17				900,000	300,000 to be productive farmers with at least 0.5 acres of land	33%	[no data]	Approx. USD 50 million (0.6% GDP)	Approx. 10% of costs
2017/18				900,000	Likely same as previous year	35%	[no data]	[no data]	[no data]
2018/19				900,000	Likely same as previous year	34%	[no data]	[no data]	[no data]
2019/20				900,000	Likely same as previous year	34%	[no data]	USD 48 million (0.4% GDP)	[no data]
2020/21	Affordable Inputs Programme	New national leadership promising subsidy program	5 kg hybrid or 7 kg OPV maize, sorghum, or rice seed, 50 kg K23:10:5+6S+1.0Zn and 50 kg urea fertilizers. In 2022/23, plan to distribute goats to beneficiaries in selected districts.	3.8 million	All smallholder farming households.	33%	[no data]	USD 200 million (1.7% GDP)	[no data]
2021/22				3.7 million	Most smallholder farming households.	[no data]	[no data]	USD 170 million (1.3% GDP)	[no data]
2022/23		Sharp rise in international fertilizer prices		2.5 million	[No information available on beneficiary selection]	[no data]	[no data]	Approx. USD 210 million (1.6% GDP)	

Sources: (Devereux, 1997; Conroy, Blackie, Whiteside, Malewezi, & Sachs, 2006; Levy, 2005; Chirwa & Dorward, 2013; Nkhoma, 2018; Nyondo, et al., 2021; Longley, Coulter, & Thompson, 1999)

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