



Impact of Agricultural Input Subsidy on Nutritional Outcomes in Malawi

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Abstract

The study examined the effect of agricultural input subsidy on nutrition in Malawi. The aim was to find out how Malawi's Farm Input Subsidy Programme (FISP) affects nutrition. Household panel data from the Malawi Integrated Household Panel Surveys for the years 2010 and 2013 was used. To answer the research question, we estimated Poisson and Two Stage Least Square (2SLS) regressions using instrumental variables. The results suggest a generally positive impact of the FISP on household nutritional status. A gender-disaggregated analysis indicates that while there was no difference in the direction of impact,

the magnitude was higher for female-headed households relative to male-headed households. There was also evidence of a positive impact of food price fluctuations on nutritional outcomes. The findings emphasize the relevance of farm input subsidy programmes in reshaping agricultural and nutritional outcomes in developing countries.

Introduction

Malnutrition continues to pose significant public health challenges and undermines the livelihood of individuals in developing countries. Malnutrition is considered the number one driver of morbidity and mortality in the world¹. Out of the approximately 7 billion global population, about 2 billion are estimated to be malnourished, and 800 million people are calorie deficient (International Food Policy Research Institute - IFPRI, 2016). This problem is particularly profound in Sub-Saharan Africa (SSA) where malnutrition is much more prevalent. In 2014, about 58 million children under age five in SSA were estimated to be stunted, while about 10 million were overweight IFPRI (2016). Also, about 23.2% of people living in SSA are estimated to be undernourished compared to the developing country average of 12.9% (FAO, 2015).

Like many countries in the region, Malawi suffers a significant malnutrition burden, with the country ranked 120th out of 132 countries in stunting prevalence among children under age five (prevalence rate of about 42.2%). Moreover, even though individuals mostly suffer from malnutrition, which may result in morbidity and mortality of household members, the impact of malnutrition on a country's economy cannot be overemphasized. Globally, close to 11% of the Gross Domestic Product in Africa is lost to malnutrition-related health problems (IFPRI 2016). However, in Malawi, about 147 billion Malawi Kwacha (US\$ 597) or 10.3% of GDP was lost to malnutrition-related health challenges in the year 2012.²

In recent years, several policy efforts have been directed towards improving food security and nutritional conditions in developing countries. The importance of it is evident from the inclusion of some targets and goals, in the defunct Millennium Development Goals (MDGs)³ and the now active Sustainable Development Goals (SDGs)⁴. Indeed, 12 out of the 17 SDGs are either closely or remotely related to

1 See <https://data.unicef.org/topic/nutrition/malnutrition/>.

2 See report by Government of Malawi, UN Economic Commission for Africa, World Food Programme (2015). <https://www.wfp.org/content/cost-hunger-malawi>.

3 Check MGDS Goal 1 <http://www.jo.undp.org/content/jordan/en/home/post-2015/mdgoverview/overview/mdg1/>.

4 <https://sustainabledevelopment.un.org/?page=view&nr=164&type=230&menu=2059>.

malnutrition. Particularly, the role of agriculture in reducing food security and improving malnutrition can be enormous.

In Malawi, a vital policy effort towards improving agriculture is the Farm Input Subsidy Programme (FISP). The programme was designed to provide fertilizer and seed subsidies to farmers with the primary objective of improving productivity, hence ensuring food security and improved nutrition at the household level. Available evidence suggests that since its inception, grain production has improved in Malawi, with the country experiencing significant gains (Dorward & Chirwa, 2011; Ricker-Gilbert, 2014). There is evidence⁵ showing that the programme has impacted on household economic outcomes, including household poverty reduction (Ricker-Gilbert, 2014), agricultural wages and prices (Dorward and Chirwa, 2011), fertilizer use (Ricker-Gilbert et al., 2011) and commercial distribution systems (Dorward & Chirwa, 2011). The impact of the subsidy programme on secondary outcomes such as nutrition is, however, scant in the literature.

The pathways through which the Malawi input subsidy may affect nutrition are not difficult to identify. There are several conceptual links from agricultural and food system policies to nutritional improvements (Kanter et al., 2015). Among others, Kanter et al. (2015) noted that input subsidy policies are likely to lead to increased agricultural production, which then provides additional income to farmers, allowing them to purchase food items that could improve the nutritional status of the household. Similarly, increased food production through input subsidies is likely to create market excesses, which brings down prices and makes food more affordable to households. Other researchers have argued that increased income from improved agricultural production may allow households to seek better health care and improve nutrition status (Jones et al., 2012; Kanter et al., 2015).

However, it is worth noting that the conceptual framework linking agricultural input subsidies and nutrition is not always positive. Potential reverse impacts are also possible. For instance, where input subsidies are directed to specific crops (say grains in the case of Malawi), farmers may shift production towards grains, and this may create shortages in other equally nutritious food items such as fruits and vegetables (Kanter et al., 2015). In this case, even though prices of grains may have declined, increased prices of fruits and vegetables may limit household dietary diversity.

While the agricultural input subsidy in Malawi is expected to improve agricultural productivity and thus food security, households in the country are also highly susceptible to various shocks that may affect nutritional status. One of these shocks is food price shocks that are likely to impact household food intake and, eventually,

5 A systematic review of the evidence is available in Jayne and Rashid (2013).

malnutrition. Food price shocks may wipe out gains from input subsidies as individuals may be unable to purchase food items. Moreover, Malawian households are generally net consumers of agricultural output and are therefore more likely to suffer from such price shocks. Indeed, Chibwana et al., (2012) and Harttgen et al., (2016) showed that nutrition and food security are greatly influenced by food price shocks. For instance, Harttgen et al. (2016) showed that price shocks rendered poor net food buyers more food insecure.

Against this backdrop, understanding the impact of the Farm Input Subsidy Programme (FISP) on household nutrition outcomes in Malawi will be crucial, especially for policy purposes. In this study, we seek to find out how Malawi's input subsidy programme affects nutrition. We also perform a gender analysis to understand the gender related dynamics in the impact of FISP on nutrition in Malawi. The gender analysis is motivated by the fact that the criteria for selection into the FISP considers gender of the household head. For instance, farm households with female heads were given preference in selection and coupon distribution. The selection criteria were designed to favour female household heads against their male counterparts. It is, therefore, appropriate to expect some differences in the impact of FISP across gender. Moreover, there are significant gender disparities in poverty levels in Malawi. Female household heads are relatively poorer than their male counterparts (Masanjala & Musa, 2015).

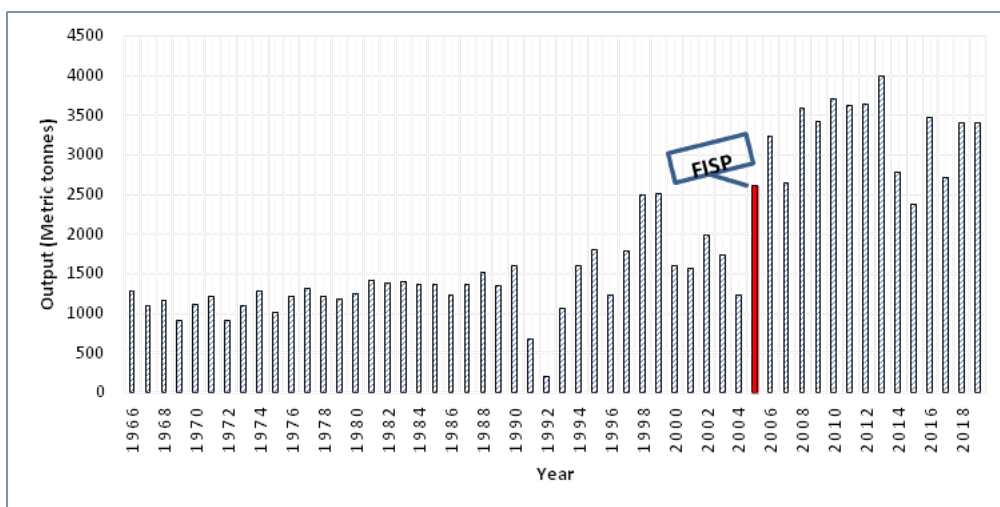
Brief country profile

Malawi is in South-Eastern Africa with an estimated population of about 17.5 million as of 2019. The country is highly agrarian and depends largely on the agricultural sector, which contributes about 29.5% of GDP (The World Bank, 2017). While tobacco is the main export commodity, maize is considered a staple across the country (FAO, 2015). Malawi continues to face significant poverty challenges, with poverty estimated to be about 51.0% in 2019, a marginal increase from 50.7% in 2010 (NSO, 2016). Moreover, Malawi's Human Development Index (HDI) value was estimated to be 0.445 in 2014 and categorized to have low human development. The country is positioned at 173 out of 188 countries in the HDI ranking (Jahan et al., 2015).

The earliest forms of input subsidies in Malawi, known as universal input subsidies, were implemented as agricultural development policies in poor rural areas. This was in the period from 1952 to the early 1980s and was aimed at improving the availability of vital agricultural inputs to increase maize productivity and maintain soil fertility. However, Chirwa and Dorward (2013) assert that the subsidies were very expensive and placed a huge demand on public coffers. The high prices, coupled with deteriorating terms of trade, contributed to the ditching of this programme in the early 1980s when the very first Structural Adjustment Programmes (SAPs) were introduced. Between 1998 and 2000, the Starter Pack (SP) programme was introduced with the

intention of increasing maize yields and food security, and countering soil nutrient depletion. In the programme, starter packs of seed and fertilizer were provided to an estimated total of 2.86 million farming households to suffice for the cultivation of one-tenth of a hectare. The programme was necessary for raising maize output in Malawi but not enough as the country experienced poor harvests in the years 2001, 2002, 2004 and 2005 as shown in Figure 1.

Figure 1: Malawi maize production from 1991 to 2019



Source: Lunduka et al. (2013) and constructed by authors using data from FAO

In 2004/5, Malawi was ranked as one of the poorest countries in the world, with 52.4% of its rural population classified as poor and 22.0% as ultra-poor (NSO, 2012). Such perilous conditions, coupled with the hunger crises at the time, led to initiation of the Farm Input Subsidy Programme (FISP) in the 2005/6 fiscal year. This targeted at least 50% of all farmers in Malawi and 1.5 million smallholder farmers to improve food security for the whole nation (Arndt, Pauw, et al., 2016). FISP involved the distribution of coupons for Open Pollinated Variety (OPV) maize and four types of fertilizers, both of which were redeemed at the parastatal outlets Agricultural Development and Marketing Corporation (ADMARC) and Smallholder Farmers Fertilizer Revolving Fund of Malawi (SFFRFM) (Chibwana et al., 2012). All fertilizers in this programme were sold at about one-third of the normal price (with maize fertilizers, for instance, sold at MK950). Under FISP, the design is such that each farmer is provided with free improved seeds and two coupons, which are redeemable for two 50kg bags of fertilizer (Chibwana et al., 2014; Dorward & Chirwa, 2013). Beneficiaries pay a small redemption fee equating to a subsidy of two-thirds or more of the commercial fertilizer price. The outcome of this was vindicated by studies showing that FISP boosted food production in the periods after the year 2005 as shown in Figure 1.

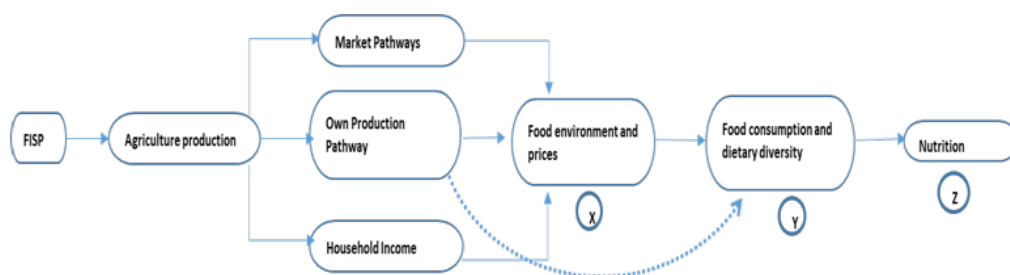
Targeting of the FISP

According to Chirwa and Dorward (2013), targeting of the programme focused on land-operating but land-poor households who have unemployed labour. This is in line with the aim of resourcing the country's productive poor to increase their production. Among these households, those classified as vulnerable were prioritized. The vulnerability criteria includes the age and gender of the households (households headed by an aged or a female are more vulnerable), chronic diseases, poverty status, orphans. These were supposed to form the guiding principles to inform the selection of beneficiary households. However, in some instances, the selection has been affected by political considerations and elite capture at the committee level (Chirwa and Dorward, 2013). But this does not affect the number of coupons to be supplied to an area because this is predetermined by the government and is fixed.

The subsidy's effect on health outcomes

In this study, the conceptual framework inspired by Kanter et al. (2015) shows the existing linkages between agriculture, the food system, and health. This is presented in Figure 2.

Figure 2: The nexus of agriculture, the food system, and health



Source: Authors' modification from Kanter et al. (2015)

In Malawi, the framework shows that a subsidy programme such as FISP, by improving agricultural production, affects the food system and ultimately health of individuals in three distinct ways. Firstly, FISP households can earn incomes through the market by providing transport, retailing and storage services for the increased agricultural output. Such incomes can be used to purchase household food items, thereby reducing household food insecurity or can be used directly for the purchase of various health services, both of which improve nutrition status. Given that a healthy population is a necessary requirement for high farm production, it can be noted that there is a bidirectional impact between these outputs from the subsidy programme. Secondly, FISP directly enhances household food security and hence members' nutrition

status by increasing own-production when the household produces for subsistence. This is the greatest path of influence for the case of Malawi. Lastly, FISP increases agricultural-based household income mainly through wages that are accrued when more people are employed in farms of FISP beneficiaries. It is worth mentioning that the focus of the current study is not on the immediate outputs (such as agricultural production, income and food security) but the potential mid-term outcome (in this case nutritional status).

Effect of subsidy on welfare from other countries

Previous studies on the impact of agricultural interventions on nutritional status and health have found mixed results. Berti et al.,(2004) synthesized evidence indicating that most agricultural interventions increased food production as per intuitive consequence but failed to significantly improve the nutritional welfare and health of the participants in such programmes, citing various studies worldwide. A critical finding was that improved diet did not necessarily imply an improvement in anthropometric, biochemical/clinical or morbidity indicators. However, the findings showed that broader interventions in different forms of capital, namely natural, physical, human, social and financial capital were more likely to influence nutritional outcomes. More importantly, projects that deal much in human capital investment, especially nutrition education, and have a consideration of gender issues are more effective in improving nutrition.

Other studies considered the efficacy of nutrition upscaling, especially for micronutrients through Animal Source Foods (ASF) by promoting Animal Production (AP). Leroy and Frongillo (2007) found this causal relationship to be somewhat inconclusive. Analyses indicated improvements in intermediate outcomes of increased production, dietary intake, and household income while the direct impact of increased animal production on nutritional improvement was rather elusive. The success of the programmes also had gender specifications, in that better outcomes were noted in groups of women who played active roles in the intervention, and those in interventions that involved nutrition education.

Studies focusing on investigating the effect of agricultural interventions in child nutrition also have little evidence to support the notion that the interventions help reduce child undernutrition. Masset et al., (2012) found that interventions targeting specific diets for the absorption of necessary nutrition for children, including Iron and Vitamin A, bared no statistical importance in as much as indicators such as wasting, stunting and underweight of children aged less than five (5) years are concerned. However, emphasis was made on the potential of methodological and statistical inadequacies of the samples used in the analysed studies not to write off the possibility

of the existence of an effect. Ruel (2001) noted that for interventions in agriculture to be effective, it is important to include strong nutrition education and behaviour change strategies. These ensure increased food and income for households leading to improved dietary quality.

Effect of input subsidy on food security in Malawi

With interest in the subsidy programme placed on targeting poverty reduction, not many studies have explored its impact on the food system and health. Nevertheless, with many studies analysing the household welfare effects of farm input subsidies in Malawi, a few studies proceed to link the resulting food security with the nutrition of farm households. Some studies such as Manja, Chirwa and Kambewa (2015) actually go a step further to examine how factors such as food security influence the willingness to pay for subsidized farm inputs. In finding the impact of FISP on food security, one interesting study by Cornia et al., (2016) integrated studies of food insecurity in Malawi with regional and monthly perspectives and verified that child malnutrition is fuelled by transitory food insecurity, including seasonal and temporary features such as households' dependence on markets for food purchases in the lean season. Similarly, Dorward and Chirwa (2011) and Jones et al., (2014) found that farm production diversity, which mainly accrues to FISP in Malawi, is consistently positively associated with dietary diversity and hence improved health of household members. Other studies include (Steyn et al., 2006), who discovered that Malawi's FISP has a positive impact on child nutritional status, mainly through non-food pathways (via increases in household income); and Lunduka et al., (2013) who found the existence of a positive influence of FISP on child nutrition and food security. These studies basically attest to the significance of FISP in improving food security and health.

In terms of food choice, diversity and consumption, Snapp and Fisher (2014) examined the impact of supporting maize production on crop diversity and quality of household diets, finding the existence of a positive but weak impact. Earlier on, Ecker and Qaim (2011) showed that diets in Malawi were dominated by maize. They also found that income-related policies are not only less market distorting, but better suited than price policies to reduce dietary deficiencies. They suggest that policies that lead to income growth facilitate access to health and education services, which may improve nutritional outcomes.

Dorward and Chirwa (2011) and Chirwa and Dorward (2013) all find that FISP improves food adequacy at the household level. Chirwa and Dorward (2013) also found an overall increase in primary school enrolment and reduced probability of having sick under-five-year-old children. The study, however, found no statistically significant effect on subjective self-assessed poverty at household level. Nevertheless, a study

by Ricker-Gilbert et al., (2011) found that, on average, an additional kilogramme of subsidized fertilizer increases farm net crop income by US\$ 1.16. Additionally, Ricker-Gilbert (2014) also found increased crop incomes to richer households at the top percentiles, and no statistically significant impact on poor households at the bottom percentiles. However, none of these studies found evidence of effects of FISP on asset worth.

Our review suggests that previous studies have focused on the impact of FISP in Malawi on consumption, food security or child health (Holden & Lunduka, 2013). By employing different proxies of dietary quality, namely Household Dietary Diversity Score (HDDS), Food Variety Score (FVS) and Micronutrient sensitive Dietary Diversity Score (MSDDS), we are able to estimate the effect of the programme on nutritional quality. Thus, this study provides empirical evidence from different dimensions of dietary quality.

Data sources

We used data from two rounds of the Malawi Integrated Household Panel Survey (IHPS) collected in 2010/2011 and 2013. The dataset is a multi-topic survey of nationally representative households in Malawi. It provides comprehensive information on households' consumption, income, employment, health, education and other household characteristics. The households were selected based on two-stage sampling design. The first stage involves the identification of the enumeration areas (EAs), defined from the 2008 Population and Housing Census. At this stage, 204 out of 768 EAs were selected for the IHPS3. In the second stage, a baseline sample of 3,247 households was selected from the 204 EAs for the panel study. In all, there are 3,104 households that can be traced in both panels, leading to an attrition rate of 3.78% (NSO, 2014)⁶.

In addition to household consumption and expenditure patterns, the IHPS collected detailed information on household farming (agricultural or livestock) activities. Module E of the agriculture questionnaire contains information on the quantity, type and use of coupons that the household obtained from the FISP. Therefore, we can identify which households benefited from the programme.

This paper complements previous literature by understanding the causal effect of Farm Input Subsidy Programme (FISP) on nutritional outcomes using panel data from Malawi. Our paper further adds a gender dimension to the analysis to assess the differential impact of the programme. In general, the findings of the study are consistent with a priori expectations about the impact of the FISP.

6 Twenty (20) households exited the panel completely between 2010 and 2013 (NSO, 2014).

There is a consistent and statistically significant positive relationship established between FISP and household nutritional outcomes. This suggests that households that participated in the FISP are generally better off in terms of nutritional outcomes. The findings of the study are consistent with previous studies that have evaluated the impact of agricultural subsidy programmes on nutrition (Dorward and Chirwa, 2011; Jones et al., 2014). Our findings further show that the intensity of the impact of the programme may depend on the gender of the household head. The results suggest a favourable impact for female-headed households relative to male-headed households. The gender disparities in the impact of FISP and prices on nutrition status is interesting. This may be justified by the gender dimensions in the level of poverty and inequality in Malawi, especially in rural Malawi. Available evidence suggests that females are generally poorer than their male counterparts, and income inequality favours males (Mussa and Masanjala, 2015). This suggests that household consumption and nutrition may be better in male-headed households than in female-headed households. The changes in nutrition due to introduction of FISP is therefore likely to be larger for female-headed households.

The findings underscore the importance of agricultural subsidies in improving nutritional outcomes of households in Malawi. Specifically, it shows that in the fight against malnutrition, it is crucial to focus on farm households and identify various ways of improving farm outputs. This is particularly relevant in developing countries where a large proportion of rural households depend on subsistence agriculture for survival. Supporting these households with such interventions as subsidised inputs will be a step in the right direction. Aside from the direct improvement in household agricultural output, our conceptual framework confirms many other channels through which such interventions could improve nutritional outcomes. These include additional income from market engagements and increased farm labour supply.

The findings also highlight the relevance of broader policy discussions on nutrition and food security. These include global goals such as the Sustainable Development Goals (SDGs). The second SDG focuses on “ending hunger, achieve food security and improve nutrition and promote sustainable agriculture” by the year 2030 (UN, 2015). Evidently, agricultural subsidies will be instrumental in achieving this goal.

The results further point to potential gains from effective policy implementation. Therefore, policy makers must improve the implementation of the subsidy programme by way of sustaining and scaling up. Incorporating nutritional objectives into the basic design of the programme and ensuring complementary policy measures could consolidate the impact. This includes deliberate efforts to enlarge the scope of the

subsidy programme to reach out to more rural farm households. The complementary policies could include education on nutrition and easy access to basic health care. Indeed, the findings indicate that education plays an important role in improving nutritional outcomes.

The results also indicate that, among others, price fluctuations are an important determinant of household nutritional outcomes. The results of the study are corroborated by previous studies, which have also found a negative impact of food price fluctuation on nutrition in Mozambique (Arndt et al., 2016) and in Malawi (Cornia, Deotti and Sassi, 2016). This is expected as many rural households are susceptible to significant price changes. While many rural households depend on subsistence agriculture, they also engage with the market in several ways, including purchasing some other food items not produced on their farms. Unregulated price fluctuations, therefore, pose a significant risk to such households, and this will limit their food consumption choices.

Moreover, for households that sell some part of their produce to generate extra income, this fluctuation limits their market prospect. This suggests that while the FISP and related agricultural policies may be relevant, efforts to minimize price fluctuations will be a step in the right direction. The gender disparities in favour of females may be justified by the fact that females and males engage differently with the market. In general, men in Malawi are more active and benefit more from bargaining. Women are disadvantaged in this regard and the impact of unstable prices may be greater compared to their male counterparts.

Conclusion and policy implications

Malawi's Farm Input Subsidy Programme (FISP) is considered one of the most important reforms in the agricultural sector. While the programme's primary objective is to improve availability of farm inputs, previous studies have assessed its impact on secondary outcomes, including food security and child health outcomes. In this paper, we assessed the impact of FISP on household nutritional outcomes. We found that households that redeemed the FISP coupon were more likely to have better nutrition outcomes. Specifically, we found that female-headed households had relatively higher magnitude of impact compared to their male counterparts. The findings suggest that farm input subsidies transcend their direct impact on farm outputs. They also enhance nutritional outcomes within households.

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Mission

To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is sustained sound management of the economy, and that such management is more likely to happen where there is an active, well-informed group of locally based professional economists to conduct policy-relevant research.

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