# Investing in Agriculture to Overcome the World Food Crisis and Reduce Poverty and Hunger

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In many parts of the world, increased agricultural growth will play a key role in addressing the current world food crisis, in contributing to overall economic growth, and in helping to achieve the first Millennium Development Goal of halving the proportion of poor and hungry people by 2015 (MDG1). The challenge of meeting MDG1 under the current circumstances is considerable, especially in Sub-Saharan Africa (SSA).

Of the means used to promote agricultural growth, sound government spending can be one of the most direct and effective. This brief presents ranges of estimates of the costs involved using two different approaches. There have been numerous attempts to estimate the costs of achieving MDG1, mostly at the global or regional level, including the United Nations' Zedillo Report and studies by the World Bank and the United Nations Development Programme. These estimates have varied widely, mostly because of different methodologies, assumptions, coverage, measures, and interpretations. The two primary methodologies used in these studies have involved unit costs and growth-poverty elasticities (determining the extent to which poverty declines as growth increases). There has been no consistent basis of analysis for the first method, and studies using the second have been limited by data availability.

We have attempted to address some of these issues by providing improved, research-based estimates of the global and regional investments required to achieve MDG1. Because this is a complex issue and each of the approaches mentioned above has distinct merits, we have decided to produce estimates based on both approaches to provide a fuller picture. Expanding on the two approaches, we also present estimates of the costs of financing the inputs required for accelerating agricultural production in SSA.

## Approach 1: Public investment requirements based on alternative scenario simulations

The unit-cost approach calculates the incremental public investment requirements of changes in key drivers affecting agricultural growth under a baseline versus an MDG1-focused scenario using IFPRI's IMPACT model. The public investment drivers considered in this brief are agricultural research, irrigation, and rural roads (public financing of the use of inputs such as fertilizers and improved seeds is considered separately below).[1] The estimates further assume continued policy reform and enhanced economic growth driven by the more rapid agricultural growth achieved through investments. The MDG1-focused scenario (a very-high investment scenario) assumes annual GDP growth of 3.31 percent compared to the baseline (3.06 percent), a 30-percent increase in livestock numbers, and a 60-percent increase in foodcrop yield growth.

Under the baseline scenario, total global annual agricultural investment requirements would amount to US$14.3 billion. Under the very-high investment scenario, requirements would basically double to US$28.5 billion per year (Table 1). The incremental spending required—the additional amount necessary to meet MDG1—would thus be US$14 billion for all developing countries.

Under the very-high investment scenario, SSA would require a total of US$5.8 billion per year or an additional US$3.8 billion annually, South Asia (SA) would require total annual spending of US$7.5 billion or an incremental amount of US$2.8 billion per year, East Asia and the Pacific (EAP) would require US$4.4 billion in total annual spending and an additional amount of US$1.9 billion per year, Latin America and the Caribbean (LAC) would require a total of US$8.5 billion or an incremental US$4.5 billion per year, and the Middle East and North Africa (MENA) would require total annual spending of US$2.3 billion or additional spending of US$1.1 billion per year.

To achieve MDG1, it would help to also invest in complementary services, such as secondary female education and access to clean water. Factoring in these two areas increases total global annual investment requirements from US$14 billion to US$32 billion under the baseline scenario, and from US$28 billion to US$53 billion under the very-high investment scenario. Total annual investments in SSA would increase from US$2 billion to US$5 billion under the baseline,

TABLE 1—Annual Total Agricultural Investment ($ billion in 2008 US$) Required to Achieve Significant Progress on MDG1 (Unit Cost/IMPACT Method) by 2015

| | SSA | SA | EAP | LAC | MENA | DEVELOPING WORLD |
|---|---|---|---|---|---|---|
| **Baseline Scenario** | | | | | | |
| Agricultural Research | 0.65 | 0.71 | 0.21 | 1.93 | 0.42 | 3.92 |
| Rural Roads | 0.74 | 0.13 | 0.51 | 1.27 | 0.09 | 2.74 |
| Irrigation | 0.56 | 3.84 | 1.80 | 0.72 | 0.74 | 7.66 |
| **TOTAL** | **1.95** | **4.68** | **2.52** | **3.92** | **1.25** | **14.32** |
| **Very-High Investment Scenario** | | | | | | |
| Agricultural Research | 1.83 | 1.54 | 3.18 | 4.06 | 0.99 | 11.6 |
| Rural Roads | 2.90 | 0.49 | 0.43 | 3.26 | 0.32 | 7.4 |
| Irrigation | 1.02 | 5.47 | 0.81 | 1.13 | 1.03 | 9.46 |
| **TOTAL** | **5.75** | **7.50** | **4.42** | **8.45** | **2.34** | **28.46** |

Note: Only countries and regions with baseline data for public agricultural research investment and conversion information from PPP (purchasing power parity) to MER (market exchange rate) are included: 9 in EAP, 5 in SA, 39 in SSA, 11 in LAC, and 7 in MENA; Central Asia was excluded due to sparse data.

and from US$6 billion to US$11 billion under the very-high investment scenario.

## Approach 2: Public investment requirements based on growth-poverty elasticities

The second IFPRI study focuses solely on SSA, and uses growth-poverty and growth-public expenditure elasticities to estimate the resources required to meet MDG1 in SSA and three subregions.[2] Many SSA countries have pledged to increase their government support to agriculture in order to achieve an annual agricultural growth rate of 6 percent, a goal that has been adopted by the New Partnership for Africa's Development through the Comprehensive Africa Agriculture Development Programme. As part of the Maputo Declaration of 2003, for example, many African heads of state agreed to allocate 10 percent of their government budgets to agriculture. However, questions remain as to how the resources should be allocated in order to have the largest impact on agricultural growth and poverty reduction, and whether the pledged resources will be sufficient to meet the 6-percent growth and MDG1 targets.

This approach first calculates the required agricultural growth rates using elasticities of poverty reduction with respect to agricultural growth, and then uses those rates to estimate the necessary public financial resources, using growth-expenditure elasticities. Because growth in the nonagricultural sector will also contribute to poverty reduction, through growth linkages with agriculture, the additional poverty reduction effects from this sector are also considered. The components of agricultural spending that are examined are agricultural administration, agricultural research and extension, irrigation, and small rural infrastructure such as unpaved feeder roads.

Using this methodology, SSA countries will need to boost their annual agricultural growth to 7.5 percent per year in order to achieve MDG1. To reach this target, government agricultural spending will have to increase to US$13.7 billion per year (Table 2).[3]

If SSA countries fulfill their commitments to allocate 10 percent of their budgets to agriculture under the Maputo Declaration, the MDG1 target would require additional or incremental spending of US$4.8 billion per year. However, there is a large variation in investment requirements across SSA subregions.

In addition to government spending, use of inputs such as fertilizer and high-yielding seeds are required to achieve rapid productivity growth in agriculture. According to the International Fertilizer Development Center, fertilizer use is extremely low in many SSA countries, averaging

**TABLE 2—Annual Total Agricultural Spending ($ billion in 2008 US$) Required to Meet MDG1 in Africa by 2015 (Growth-Poverty Elasticities Method)**

| | Sub-Saharan Africa | West Africa | East Africa | Southern Africa |
|---|---|---|---|---|
| Total | 13.67 | 9.06 | 3.79 | 0.83 |
| Additional/Incremental | 4.77 | 2.77 | 1.96 | 0.04 |

8.8 kilograms (kg) per hectare (ha). If fertilizer use gradually rises to 50 kg/ha, a level that has already been reached by most middle-income SSA countries and which is a target established by an African Fertilizer Summit (2006), total fertilizer use will increase by 5 to 6 times. Fertilizer prices in SSA are extremely high because of inefficient distribution systems and high transportation costs. Taking all this into account, the total cost of fertilizer and improved seeds required to achieve an agricultural growth rate of 7.5 percent is estimated at more than US$9 billion a year (Table 3). Considering the current level and trend of fertilizer and seed use, the incremental cost of these inputs is about US$6.8 billion per year. It is unrealistic to expect farmers to pay this cost, or to have access to credit to facilitate market participation. Public-sector support seems to be necessary; however, a fertilizer subsidy program has to be designed in such a way that it avoids crowding out the private sector and distorting markets and farmers' incentives. A fertilizer voucher system designed to target the poorest 50 percent of farmers would likely have few such negative effects. If the subsidy component for these farmers is 60 percent of costs, the incremental public-sector cost (including operational costs) would be about $2.25 billion per year (Table 3, row 3).

## Conclusion

Investing in agriculture is key to reducing poverty and hunger in developing countries and is an essential element in addressing the current food price crisis. Though numerous studies have attempted to estimate the costs involved in achieving MDG1, none includes agricultural growth requirements or quantifies the public resources needed to

**TABLE 3—Annual Cost Estimate ($ billion in 2008 US$) of Fertilizer and Improved Seeds Required to Meet MDG1 in Africa by 2015**

| | Sub-Saharan Africa | West Africa | East Africa | Southern Africa |
|---|---|---|---|---|
| Total | 9.14 | 3.81 | 3.01 | 2.31 |
| Additional/Incremental | 6.82 | 2.78 | 2.34 | 1.70 |
| Financed by public sector | 2.25 | 0.92 | 0.77 | 0.56 |

Note: Agricultural growth-to-fertilizer elasticity is about 0.2–0.3 in the literature. Setting elasticity at 0.25, fertilizer use has to grow at 10 to 40 percent annually across SSA, such that fertilizer use gradually increases from the present 10 kg/ha to 50 kg/ha by 2015. With a modest land growth rate of 2 percent a year, total fertilizer use required to achieve a 7.5 percent annual agricultural growth rate is estimated to be 8.5 million tons a year by 2015, from the present level of 1–2 million tons. The cost of fertilizer is much higher in SSA than in other regions, ranging from 2 to 4 times the cost in developed countries.

support that growth. The required growth and financial resources vary based on past progress in poverty reduction and the role of agriculture in the overall economy. Our analyses address some of these gaps by simulating required total and incremental agricultural spending using two different approaches. The estimates do not include the health and nutrition spending needed to address MDG1 in a comprehensive manner.

In sum:

- The global incremental public investment required—the additional amount necessary to meet MDG1—would be US$14 billion for all developing countries.
- In Sub-Saharan Africa, governments and development partners will need to increase their agricultural spending considerably in order to achieve MDG1. The estimated incremental annual investments required in SSA range from US$3.8 billion to US$4.8 billion according to our two estimates (with the latter being in addition to SSA countries committing 10 percent of their budget to agriculture).
- The incremental annual costs for a partly publicly funded input financing scheme that reaches the poorest 50 percent of farmers in Africa would amount to an additional US$2.3 billion per year.

[1]Expenditures for public agricultural research are based on expenditure trends and projections and their relative contribution to crop yields. Total irrigation investments are calculated by taking the projected irrigated area and multiplying with the per-hectare irrigation costs. The investments in rural roads are calculated by taking the additional expenditure of road systems necessary to support the projected increases in yield and multiplying them by unit costs for road construction. The proportion of yield growth that is attributable to road expansion and the effect of road investments on crop productivity are based on estimates from the literature. The investments in agricultural research take into account public expenditures from both national and international sources, and are calculated from the projected yield growth levels.

[2]Due to data limitations, East Africa includes Burundi, Ethiopia, Kenya, Madagascar, Rwanda, Tanzania, and Uganda. West Africa covers Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Mali, Mauritania, Niger, Nigeria, Senegal, and Togo. Southern Africa includes Lesotho, Malawi, Mozambique, Namibia, Swaziland, and Zambia.

[3]Sensitivity analyses using different growth-poverty and spending-poverty elasticities show that the total annual agricultural spending required in SSA ranges from US$10.5 billion to US$18.6 billion, and the annual incremental amount required ranges from US$2.6 billion to US$9.1billion. The results in Table 2 have the largest confidence among all estimates.

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