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POLICY BRIEF

IMPACTS OF USAID-SUPPORTED AGRICULTURAL PROGRAMS

HOUSEHOLD INCOME GROWTH AND COST-EFFECTIVENESS FOR POVERTY REDUCTION

James F. Oehmke

INTRODUCTION

In 2010, the Agency commissioned studies assessing the impact of the following Initiative to End Hunger in Africa and Global Food Security Response projects.

- East Africa Regional (intraregional maize trade facilitation activities): Regional Agricultural Trade Expansions Support (RATES) and Competitiveness and Trade Expansion (COMPETE) programs
- Ethiopia (food and income support activities): Productive Safety Nets Programme (PSNP) and Household Asset Building Program (HABP)
- Ghana (pineapple and mango value-chain enhancement activities): Trade and Investment Program for a Competitive Export Economy (TIPCEE)
- Kenya (dairy production and value-chain development activities): Kenya Dairy Development Program (KDDP) and Kenya Dairy Sector Competitiveness Program (KDSCP)
- Kenya (horticulture production and value chain development activities): Kenya Horticulture Development Program (KHDP)
- Kenya (maize production and value-chain development activities): Kenya Maize Development Program (KMDP)
- Rwanda (coffee value-chain development activities): Partnership for Enhancing Agriculture in Rwanda through Linkages (PEARL I & II) and Sustainable Partnership to Enhance Rural Enterprise and Agribusiness (SPREAD)

The studies were conducted by the Regional Strategic Analysis and Knowledge Support System and the Tegemeo Institute for Agricultural Policy and Development (East Africa study); the International Food Policy Research Institute (Ethiopia study); the Monitoring, Evaluation, and Technical Support Services Unit of the University of Cape Coast, Ghana (Ghana studies); the Tegemeo Institute (Kenya studies); and the

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National University of Rwanda (Rwanda study). The projects were selected on the basis of mission interest, likely data availability, and indications of project success or lessons learned. There was a deliberate effort to examine likely success stories that might be scaled up under Feed the Future (FTF) and to examine key steps in the causal pathways from project activity to poverty reduction.

The objectives of the impact studies were

- to quantify the effect of USAID-supported projects on smallholder income and poverty status or child nutritional status;
- to provide empirical validation or falsification of the causal pathways from intervention to poverty reduction, by which the projects operate; and
- to learn lessons about what has made the projects most successful in augmenting smallholder income, particularly with respect to new activities to be funded under FTF.

The impact studies (listed in the bibliography) used quasi-experimental modeling methods with difference-in-differences-based attribution of impact to USAID-supported projects. The Ghana studies were exceptions due to insufficient baseline data; they relied on changes in gross margins over time (pineapple) and livelihood descriptions (mango). Statistical specifics depend on the specific data used in the individual studies. Studies also used complementary methods to address questions posed by USAID missions related to their FTF programming needs.

The results demonstrate that successful USAID-supported activities impact significant numbers of smallholders through increased incomes, reduced poverty, and/or improved livelihood status. Successful projects are cost-effective relative to poverty reduction benchmarks and alternative investments.

The objective of this policy brief is to summarize the results of the impact assessments. In particular, it summarizes the quantitative results of the measured impacts on household income growth, household food security, and poverty. It also calculates the cost-effectiveness of poverty reduction for those programs with quantified numbers of poor emerging from poverty due to the program. The final section draws conclusions.

IMPACTS OF USAID AGRICULTURAL PROJECTS ON HEADCOUNT POVERTY AND PROXIMATE INTERMEDIATE INDICATORS

Four impact assessments provide empirical quantifications of the number of individuals emerging from poverty due to USAID agricultural programs (Table 1). Estimates range from 866

TABLE 1—IMPACT OF USAID AGRICULTURAL PROGRAMS ON HEADCOUNT POVERTY

Project	Sample period	Persons emerging from poverty	Remarks
Kenya Dairy Development Project (KDDP)	2004–08	42,350	Project impacts spread to nontreatment smallholders.
Rwanda Coffee Value Chain (PEARL I & II & SPREAD)	2000–10	81,695	Measured at rural poverty line (see UN). Modest poverty reduction in first five years of program. Baseline and end-of-program data matched by locality; exact household matching not available. Accelerating poverty reduction in second five years of activity. Smallholder linkage to premium coffee value chain was critical.
Ghana Pineapple Export Value Chain (TIPCEE)	2004–09	353 to 2,403; most likely estimate is 866	Collapse of European smooth cayenne pineapple market doomed the activity. With different farm structure (smallholder cooperatives vs. outgrower scheme) and stable markets, project likely would have been cost effective.
Kenya agricultural projects (aggregated KDDP, KDSCP, KHDP, and KMDP)	2004–10	3 to 8 percentage-point reduction in headcount poverty rate	Three percentage-point reduction at $1.25/day, but by eight percentage points at $2.00/day (rural poverty line); based on econometric estimations of income distributions; poverty rates calculated by author. Difference is that many formerly poor, comparison-group smallholders were able to increase incomes to $1.25/day but not to $2.00/day; treatment group had much larger income increases to more than $2.00/day. Not extrapolated to full beneficiary population due to differing program engagement levels.

TABLE 2—ESTIMATES OF IMPACT ON PROXIMATE INTERMEDIATE INDICATORS

Project	Sample period	Impact indicator and result	Remarks
East Africa regional maize trade (RATES & COMPETE)	2004–10	Income of households near official border crossings relative to distant households: no significant difference between treatment and control in incomes or difference-in-differences incomes from 2004 to 2010	Fieldwork showed that nearby rural households had little benefit because maize flows went directly to large cities; market structure is different at unofficial border crossings but income data were unavailable.
East Africa regional maize trade (RATES & COMPETE)	2004–10	Urban maize prices: 4–10% decline in urban maize prices likely due to increased trade flows; real income effect of 1.0–2.5% for poorest quartile	
Ethiopia PSNP: Public Works (cash and in-kind)	2006–10	Food gap (number of months with insufficient food): decreased by 1.05 months ($p < .001$) in five years due to public works payments under the PSNP program.	Impact by region ranges from 0.75 months in Tigray to 1.84 in Amhara (each significant at 5%). Duration of program strongly linked to impact on food security.
Ethiopia Household Asset Building Program (HABP)	2006–10	Food gap (number of months with insufficient food: combined PSNP and HABP decreased food gap by 1.53 months relative to no support ($p < .001$)	Includes effects of Other Food Security Program (OFSP) 2006–08 and HABP 2009–10. OFSP/HABP programs include credit, extension, and contact with a development agent and/or development of a business plan.
Ghana, mango value chain (TIPCEE)	2004–09	Self-reported hunger: prior to project, 30 out of 51 sometimes or rarely went to bed hungry, 21 never went to bed hungry; postproject 50 out of 51 never went to bed hungry. Livelihood description showed improvements in healthcare, children's education, and housing and/or home furnishing.	Due to lengthy project start-up in poorest areas and nature of tree crop with no harvest for first 3–5 years, most significant impacts on the poor are expected to occur in the next 1–3 years.
Kenya agricultural programs	2004–10	Household income change: 124,071 KES ≈ $1,550 ($p = .015$)	Direct beneficiaries were assessed relative to a comparison group.
		Household income change: 162,707 KES ≈ $2,000 ($p = .082$)	Indirect beneficiaries were assessed relative to a comparison group.
Kenya KHDP	2004–10	Household income change: 104,571 KES ≈ $1,300 ($p = .031$)	All beneficiaries were assessed relative to a comparison group
Kenya KDDP & KDSCP	2004–10	Household income change: 71,114 KES ≈ $900 ($p = .000$)	Direct beneficiaries were assessed relative to comparison group.
		Household income change: 74,799 KES ≈ $900 ($p = .000$)	Indirect beneficiaries were assessed relative to a comparison group.
Kenya KMDP	2004–10	Household income change: -14,682 KES ≈ $180 ($p = .828$)	All beneficiaries were assessed relative to a comparison group.
Rwanda PEARL I & II & SPREAD	2000–10	Smallholders with 100–500 coffee trees (1/16 to 1/3 ha) can use trees as collateral at bank; buy a cow under a bank loan; buy a bicycle; and/or send one or two children to school. Smallholders with 500–1,000 trees can buy more land or build a new house and subjectively do not think of themselves as poor.	Based on 2010 prices. Continued price increases through 2011 are expected to have generated further improvements in smallholder livelihoods. Many if not the majority of rural smallholders in Rwanda have coffee, so this could make a major improvement in rural livelihoods at the national level. In a sub–case study of 11 smallholders, 9 of 11 reported improvement in self-perceived poverty status due to coffee income.

for pineapple activities under TIPCEE (Ghana) to 81,695 for coffee value-chain activities under PEARL I and II and SPREAD (Rwanda). A fourth result shows a decrease of as much as 8 percentage points in smallholder headcount poverty rates due to combined Kenyan agricultural programs (KDDP, KDSCP, KHDP, and KMDP).

There are another 10 results (including some of the same activities and disaggregated results within activities) that provide information on intermediate indicators proximately related to achieving the first Millennium Development Goal of eradicating extreme poverty and hunger (Table 2). These proximate indicators of the success of USAID agricultural projects range from changes in household income and livelihoods to food gaps and self-perceived poverty. The analyses show that every project had meaningful impact on at least one intermediate indicator.

COST-EFFECTIVENESS OF USAID AGRICULTURAL PROGRAMMING FOR POVERTY REDUCTION

Empirical Cost-Effectiveness Ratios

The cost-effectiveness of USAID agricultural programming for poverty reduction is quantified by the cost per individual emerging from poverty. Three results are available to date, representing various combinations of project activity, time period, and beneficiary groups (Table 3). Costs are measured as dollar costs of the USAID program, including overhead and administrative costs. For two results (Kenya Dairy Development Project and Rwanda PEARL/SPREAD) the number of individuals emerging from poverty is quantified by rural household surveys measuring household income changes attributable to the USAID programming. For the third program (Ghana TIPCEE) the lack of baseline data on income precluded empirical measurement of household income change. Instead, changes in poverty status were inferred from changes in gross margins, and sensitivity analysis was conducted.

The cost-effectiveness results indicate that USAID agricultural programming raised individuals out of poverty at various costs, with the best result at $12 per year for USAID-Rwanda's SPREAD coffee value-chain activity (Table 3). The largest cost-effectiveness ratio was $624 per year for TIPCEE pineapple activities. Simple presentation of cost-effectiveness quantification is difficult to interpret, however. Do these numbers represent a cost-effective program and, if so, relative to what?

Cost-Effectiveness Benchmarks

Benchmark cost-effectiveness measures were calculated from the estimated cost of a "helicopter" money distribution program; distribution by helicopter means that both the nonpoor and poor receive the monetary distribution. The amount of money needed by a poor individual to emerge from poverty was estimated by the poverty gap, defined to be the difference between the mean poor income and the poverty line, measured as a percent of the poverty line. For example, the World Development Indicators report the poverty gap in Kenya is 6.7 percent at a poverty line of $1.25 per person per day; in other words, a distribution of $28 per person per year (.067 × $1.25/day × 365 days) is sufficient to bring the average poor person up to or above the poverty line.[1] Due to the helicopter distribution, the figure is adjusted to reflect the proportion of recipients who are poor, which is accomplished by dividing by the poverty rate in decimal form. That is, if one half of the population is poor then one out of two recipients is nonpoor, doubling the amount of money that needs to be distributed in order to reach the poor. The adjusted figure represents the cost-effectiveness benchmark. For example, Kenya has a poverty rate of 19.7 percent at the $1.25 per person per day poverty line, so the Kenya cost-effectiveness benchmark is $141 per person per year ($28/person/year ÷ .197). This results in a different benchmark for each country.

The country benchmarks are derived from the poverty gap; it is important to note that not all poor would emerge from poverty through receiving a distribution in the amount of the poverty gap. Consequently, using these figures as benchmarks for the cost per individual emerging from poverty is formidable. However, agricultural programming has at least three advantages relative to distributing money: (1) agricultural programming may be more cost-effective by leveraging improvements in productive assets that the smallholder already owns, (2) it may be more sustainable than handouts, and (3) it may generate larger spillovers by indirectly helping additional individuals to emerge from poverty. These advantages mean it is likely that successful agricultural programming would be more cost-effective than distributing money, meaning the presentation of aggressive benchmarks does not preclude project success. In a time of budget cutting and administration emphasis on accountability, aggressive benchmarks seem especially appropriate.

A second approach to measuring the success of programs is to compare the cost-effectiveness of USAID agricultural poverty reduction with other development activities. The standard for effectiveness in development programming is the rate of return (ROR) measure, so there are very few quantifications of

TABLE 3—COST-EFFECTIVENESS OF POVERTY REDUCTION IN SUB-SAHARAN AFRICA (SUMMARY)

Project	Sample period	Cost per person climbing out of poverty	Cost-effectiveness benchmark
Estimates based on primary data collection of household poverty status			
Kenya Dairy Development Project (KDDP)	2004–08	$34/year	$164/year
Rwanda Coffee Value Chain (PEARL I & II)	2000–10	$12/year	$139/year
Estimate based on project reports of gross margins and inference of poverty status			
Ghana Pineapple Export Value Chain (TIPCEE)	2004–09	$624/year	$274/year

1. The analysis ignores the income distribution, which is usually skew right so that the mean poor income is higher than the median poor income. This implies that distribution of the poverty gap amount will not be sufficient to bring the median poor person out of poverty. The analysis also ignores indirect effects such as spillovers or multipliers, which suggest that an amount less than the reported poverty gap will be sufficient to bring the average poor person out of poverty. For benchmarking purposes, the basic calculation presented in the text suffices.

poverty-reduction cost-effectiveness for comparison. However, indirect comparisons are available. First, according to ROR measures, investments in agricultural research are the most cost-effective investment in any major development category, including roads and irrigation (Table 4). Second, the ROR results can be translated into a measure of the cost-effectiveness of poverty reduction. For African agricultural research the RORs translate into an average cost-effectiveness measure of $144 per person per year (Thirtle, Lin, and Piese).[2] This figure is used as a basis for comparisons of the USAID cost-effectiveness numbers representing successful research and development activity with USAID ratios lower than $144 per person per year indicating success; it is in the same ballpark as the benchmark figures.

Finally, these figures are benchmarks only. Projects working with the poorest of the poor or those that target especially poor districts of a country may face conditions more difficult than is typical, so country-level benchmarks may be especially aggressive for these projects.

Cost-Effectiveness of Programs Relative to Benchmarks

Of the three activities for which cost-effectiveness ratios are available, two show cost-effectiveness measures better than their constructed benchmarks and better than the $144 alternative investment cost-effectiveness (Table 3). The third activity—Ghanaian pineapple development—fails to meet either its benchmark or the $144 standard, due largely to the collapse of the targeted export market. As this activity was not considered a success story, the cost-effectiveness finding is consistent.

TABLE 4—GLOBAL COMPARISON OF RATES OF RETURN ACROSS VARIOUS INVESTMENT CATEGORIES

Investment category	Rate of return
Agricultural research and extension	35–70%
Roads	20–30%
Education	15–25%
Irrigation	10–15%
Communications	10–15%
Subsidies	Negative to 12%

Source (referring to International Food Policy Research Institute reports): Jayne, T. S. 2007. *Smallholder Farmer Behavior and Agricultural Productivity in Eastern and Southern Africa: Implications for Regional Trade and Input Promotion Strategies*. Prepared for USAID-Washington, November 8.

CONCLUSIONS

The results demonstrate that successful USAID-supported activities affect significant numbers of smallholders through increased incomes, reduced poverty, and/or improved livelihood status. Successful projects are cost-effective relative to poverty-reduction benchmarks and alternative investments. Even the relatively unsuccessful TIPCEE pineapple activity in Ghana reduced smallholder poverty, albeit not in a cost-effective manner. Although the sample of programs is small, the results (with one exception selected for expected success) nonetheless lead to the working conclusion that

- USAID agricultural programs have been successful in generating household income growth, improved household food security, and poverty reduction.

The studies provide three quantifications of the cost of USAID-supported programs per person emerging from poverty due to the programs. The two programs qualitatively considered successful were cost-effective relative to external benchmarks and other development investments. The tentative conclusion drawn from the small sample is that

- USAID-supported agricultural programs have reduced poverty cost-effectively relative to benchmarks, and, as well as can be determined from existing literature, the programs are cost-effective relative to other agricultural development investments.

2. See C. Thirtle, L. Lin, and J. Piese, "The Impact of Research-Led Agricultural Productivity Growth on Poverty Reduction in Africa, Asia and Latin America," *World Development* 31, no. 12 (2003): 1959–75. The authors present the value of $144 without discussing the time dimensions. Since research and development is a multiyear activity, it seems most appropriate to interpret this as the annual cost of removing one individual from poverty as part of a multiyear project.

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James F. Oehmke (oehmkej@gmail.com) is an economic consultant based in East Lansing, Michigan, United States.

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U.S. Agency for International Development
1300 Pennsylvania Avenue, NW
Washington, DC 20523
Tel: (202) 712-0000
Fax: (202) 216-3524
www.usaid.gov