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Returns to Investment in Selected IFPRI Research

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Abstract

Funders and governments increasingly demand evidence of the returns on investment (ROI) of agri-food systems research, but many research benefits are difficult to quantify. This paper describes methods to estimate the ROI of selected Gates Foundation investments in IFPRI research on nutrition, foresight modeling, and women's empowerment. We present a conceptual framework linking research results to improved outcomes for people, then identify projects with evidence of research influence, high-quality impact estimates, and measures of reach. Two selected projects meet the impact and reach requirements: (1) an evaluation of the first phase of Alive & Thrive and (2) modeling which helped persuade Tanzania's government not to impose a maize export ban. For IFPRI's role as a research partner to Alive & Thrive, we conservatively attribute between \$43 and \$90 million in net returns to the research, suggesting a median ROI of roughly 450 percent. For the modeling research that informed decision-making on a maize export ban in Tanzania, estimated benefits are between \$64 million and \$397 million, though cost data are unavailable. The benefits of women's empowerment research could not be converted into monetary terms. The exercise shows that ROI is not always appropriate or feasible to measure and that returns may be lower when programs target women or the poor. The limitations illustrated here suggest that ROI estimates are best interpreted as part of a wider research portfolio, including benefits that cannot be calculated monetarily. The results suggest that the overall ROI of Gates Foundation investments in IFPRI research is positive.

Keywords: returns on investment, nutrition, gender, foresight

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1. INTRODUCTION

Demonstrating the returns on investment (ROI) of agri-food systems research is increasingly demanded by funders and governments seeking evidence that constrained budgets are being effectively allocated. While some aspects of returns on investment in agri-food systems research is relatively easy to quantify—for example, investments in improved seeds that make their way into farmers’ fields (e.g., Evenson and Gollin, 2003; Pardey, Alston, and Chan-Kang, 2012; Fuglie and Echeverria, 2024), much of the research in agri-food systems is much broader than that. It encompasses research into economic behavior related to value chains (e.g., de Brauw and Bulte, 2021), natural resource management, and policy influence (e.g., Hazell and Place, 2025). While returns to some types of research are likely not possible to quantify, an effort can be made to estimate returns to further types of agri-food systems research to continue to explore their aggregate benefits.

In this paper, we describe methods by which we estimate the ROI of selected investments that the Gates Foundation has made in IFPRI research. We explore three broad classes of research in which the Foundation has made significant investments: research on nutrition, research on foresight and/or using modeling, and research on women’s empowerment. In addition to estimating the monetary returns of specific projects, a key goal of this report is to clarify what requirements must be met to measure benefits, beyond considering costs. The exercise demonstrates that projects which can be measured could have vast benefits. At the same time, the returns of many projects cannot be calculated in a methodologically robust way, or returns estimated for a specific project may be small. The findings underscore that the ROI of research must be considered in the context of a wider portfolio of scientific activities to ensure all its benefits are accounted for, whether it be economic value generated or lessons that inform more effective activities.

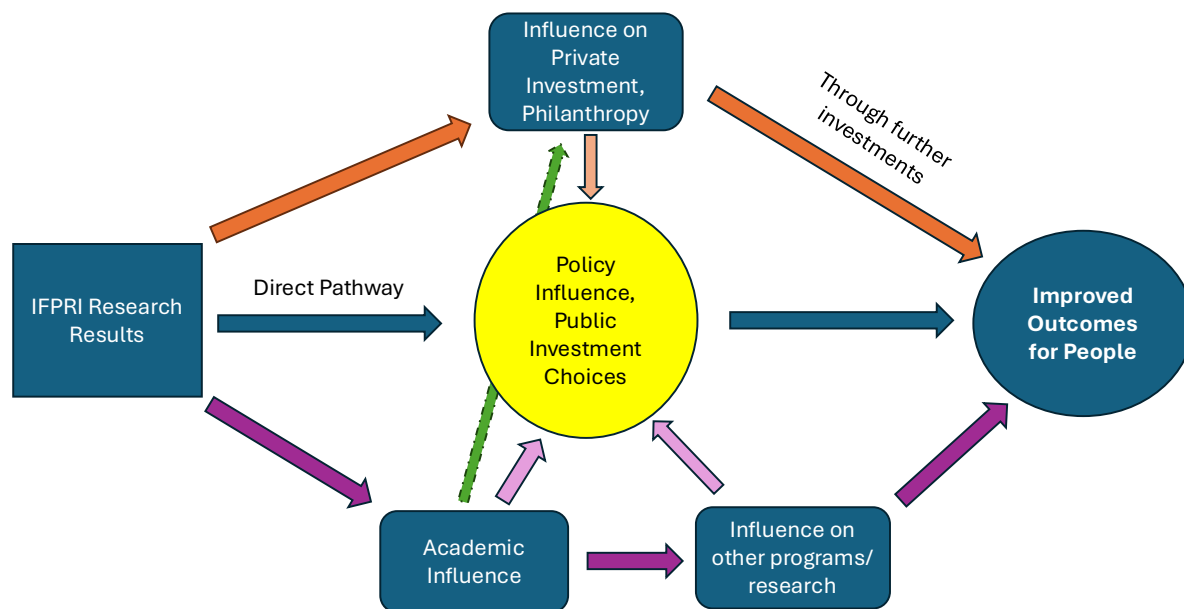
This work is informed by a recent report by CGIAR’s Standing Panel on Impact Assessment (SPIA, 2026). SPIA examined fourteen selected CGIAR innovations and determined that of those, four were both what they call “ROI appropriate” and “ROI feasible.” The report emphasizes that ROI estimation is neither universally appropriate nor always feasible for CGIAR research. Importantly, the requirements to measure ROI included measures of reach and impact. SPIA required that there was a measure of the number of people reached by each innovation and a credible impact estimate, so that benefits could be estimated. We build upon this thinking in this report; we also pinpoint ways that it is not always possible to measure returns to specific research activities.

The report proceeds as follows. First, we describe a conceptual framework that we use to measure benefits. Second, we describe our process in selecting projects on which to measure benefits. Third, we detail benefits from the two selected examples, and we provide rough cost estimates (so an ROI) for one of them. The final section concludes. This exercise contributes to scholarly literature on the difficulties and possibilities in measuring the impact of policy-oriented

research. Our results furthermore affirm the importance of sustaining funding in a diverse portfolio of agri-food systems research and displays the dividends such research provides for both funders and beneficiaries, even while the impact of some research may be unquantifiable in monetary terms.

Conceptual Framework

Before we can begin to estimate monetary benefits to research, it is first important to conceptualize how they come about. We present a conceptual framework that generalizes from Norton and Alwang (2004) in Figure 1. We illustrate pathways by which research results, on the left, can contribute to influencing outcomes among individuals, on the right. We note a main, direct pathway runs directly through the diagram, which is when research has a direct influence on policy or public investment choices, which then lead to improved outcomes for people. On this direct path, we note that there are two components that require evidence—whether the research results contributed to policy influence, and then whether the policy tangibly improved outcomes for people. In other words, to demonstrate that research influences outcomes through this direct path, we need evidence that research contributed to policy influence or public investment decisions, and reasonable evidence that the policy would improve outcomes for people.



Outcomes=Increased Agricultural Production, Income from Jobs, Nutritional Status, Reduced Poverty, Empowerment

Figure 1. Conceptual Framework Linking Research to Improved Outcomes

It is already important to note that neither of these conditions are easy to meet. There could be several reasons that it is difficult to show that research had influence on or contributed to the

policy change process. Policy research could encourage investments that research shows would have positive impacts on people's lives. If those policies are implemented, then it follows that livelihoods would improve, and the research would contribute to those impacts. On the other hand, some policies can be detrimental to livelihoods, and if implemented, they could reduce living standards. Policy research could, for example, convince policymakers to either delay the implementation of "bad" policies or to scrap such ideas altogether. In either case, for our purposes we determined we need to observe evidence from an external impact assessment that suggests policy influence took place. Further, it could be that evidence does not exist that demonstrates improved outcomes from a policy change, whether in an *ex ante* sense (as would be measured through a modeling exercise) or in an *ex post* sense, as in an impact evaluation.

Other pathways to improved outcomes for people are less direct. If the causal chain between research results and improved outcomes is too complex, generating evidence of impact can be quite difficult or impossible. For example, consider research that has a direct influence on either private investment or philanthropy. If so, then evidence is needed on those further investments to be able to measure the reach of research contributions, as well as impacts. Moreover, those investments could be in policy influence, which then could lead to improved outcomes. Here, evidence would be required to demonstrate the fact that further investments had policy influence, and then more would be required to indicate how further investments led to improved outcomes. With longer causal chains, including those working through academic influence at the bottom of the diagram, putting a monetary value on policy influence becomes difficult or impossible without large investments.

Therefore, in considering projects to study, we first evaluated whether the evidence we would need would be available; we discuss below for each specific research area. We also follow SPIA (2026) and attempt to determine a range of impacts. We do so by using a range of potential values for impacts, and we compute simulations using those ranges to estimate returns. We deviate from SPIA in that we want to clarify that that policy relevant research can make contributions to impacts, but almost certainly does not solely cause impacts. Measurable, monetary impacts from IFPRI research requires partnerships and uptake of research results in other ways, as illustrated in Figure 1. We therefore try to quantitatively estimate a share of benefits that can be attributed to the research, though we realize this is a crude estimate as well.

Our simple diagram to illustrate how benefits might occur clearly also misses benefits of specific types of activities. For example, it does not cover the creation or maintenance of global public goods for which the benefits may not be amenable to quantification. For example, IFPRI played a leading role in the creation of the Global Nutrition Report (GNR) in 2014 (and the Gates Foundation played a role in financing the production of the report; Global Nutrition Report, 2014). The GNR arguably played a role in bringing nutrition closer to the forefront of the world's development agenda, but it is particularly difficult to put a value on doing so. As we describe below, difficulties valuing benefits extend beyond global public goods to measuring the monetary benefits to targeting specific beneficiaries.

A further difficulty is ascertaining how to consider benefits over time, rather than in a static framework. Seed varieties are easy examples; if a seed variety that is higher yielding or more resilient spreads, it is often used for a number of years. A simple calculation of the benefits of that variety would then be the difference in yields times the value to the farmer for each year, times the number of farmers that are growing it. From the perspective of the investment, the future years would need to be discounted. We would almost certainly know little about the dynamics of the diffusion of that variety, so strong assumptions have to be made about that diffusion (further, we would ideally know about the spread of its replacement, in a simple framework, to end the benefit calculation). A reasonable way to learn about diffusion or the seed stock for a specific crop is to do genetic testing as in SPIA country studies (e.g., Singla et al., 2025), but that is quite expensive.

Research Areas

We consider three areas in which the Gates Foundation has made investments in IFPRI or the CGIAR Research Programs or Initiatives that IFPRI has led: nutrition, modeling, and women's empowerment. In this section, we describe how we approached each area to attempt to find examples of impacts that we can measure.

Before we begin, we note that we are interested in finding impacts on outcomes that we can monetize, in a “return on investment” style computation. Therefore, we are interested in outcomes on people's lives that we can monetize. So, we look for projects for which we 1) have evidence from an external impact assessment that IFPRI's research had an “impact” on an outcome of interest, and 2) that we can estimate monetary benefits to people's lives from that outcome. For research related to programs and/or projects, the latter implies we need high-quality impact estimates (e.g., from randomized controlled trials [RCTs]) and an estimate of reach, or the number of people reached by the program. Finally, we attempt to estimate IFPRI's contributions to outcomes we study.

Investments in Nutrition

The Gates Foundation has been a substantial contributor to IFPRI's work on nutrition research, both directly and through contributions to CGIAR through programs such as the Agriculture for Nutrition and Health (A4NH) CGIAR Research Program, initiatives including SHiFT and FRESH, and now the Better Diets and Nutrition CGIAR Science Program. We are able to use impact assessments of A4NH's program, which included an evaluation by Behrman and Ghosh (2019) and a review by Unnevehr and McHugh (2020). We also draw upon the 50th anniversary impact assessment of IFPRI by Hazell and Place (2025), which summarizes impact assessments of IFPRI.

These sources lead us to two possibilities: investments in HarvestPlus and its breeding and dissemination activities, and IFPRI's involvement as a research partner in the first two phases of Alive & Thrive. While it would be interesting to attempt to measure the returns on investment in

HarvestPlus from several perspectives, we do not do so for the following reasons. First, there is the complexity: according to the HarvestPlus website, by 2020 there were at least 39 countries with released biofortified varieties, and another few countries in which varieties were being tested.¹ Second, there are only a few estimates of impacts of HarvestPlus dissemination activities, and even fewer that go beyond measuring outcomes like adoption and consumption to dietary intakes or other measures of nutrition outcomes (e.g., Hotz et al., 2012a; Hotz et al., 2012b).² The challenge here is that while we might be able to reasonably estimate the diffusion of biofortified crops, we have little information on how it actually affects health, which makes the benefits challenging to monetize. Given that we have few impact estimates on health outcomes, it seems like further research is required before we could come up with a rough estimate of an ROI type calculation for research associated with HarvestPlus. We can state that the research associated with HarvestPlus led to substantial new investment in biofortified crop development (Hotz et al., 2012a; Hotz et al., 2012b).

The Poverty, Health and Nutrition Division at IFPRI in the past conducted several impact evaluations of large-scale interventions related to health and nutrition. An example that comes up in all the impact assessment reports is Alive & Thrive. IFPRI was involved in evaluations of the first two phases of Alive & Thrive as a thought partner. There are measures of reach for Alive & Thrive across its initial countries, and the impact evaluations that IFPRI conducted have high-quality estimates. Moreover, we can roughly estimate the budget over the first phase. As a result, we use the first phase of Alive & Thrive as an example here.

Investments in Modeling

The Gates Foundation has also made substantial investments with IFPRI in foresight modeling. One of the goals of the modeling exercises is to predict how the agricultural economy may change in different circumstances, and as a result can be used to guide policy. Perhaps not surprisingly, it is difficult to pinpoint when these contributions take place. Moreover, they can take place indirectly (e.g., by training people in countries who then take on the modeling themselves). Additionally, documentation does not always list exactly what sources of evidence led governments to consider policy changes; governments also sometimes do not use evidence in changing policy (or select specific types of evidence while ignoring others). And policy change can take a long time to either be realized or can be implemented quite gradually, which distances the production of evidence from the policy process.

As a result, we need to rely here on impact assessment that can document contributions to policy change. We focus on an impact assessment of modeling work conducted by the Policies,

¹ We are implicitly including the orange sweet potato here, which was turned fully over to the International Potato Center around 2010.

² An example of an adoption/consumption study is Vaiknoras et al. (2019). Harvest Plus has commissioned a number of efficacy studies that are meant to show that in a controlled setting, consumption of the biofortified crop can lead to improved micronutrient status (e.g., Afolami et al., 2021). However, the latter do not tell us how micronutrient status changes when farmers grow and consume the crop (in that case, vitamin A rich cassava).

Institutions, and Markets CGIAR Research Program, which highlighted a policy consideration by Tanzania's government that was not followed through upon, based on evidence (Somwaru, 2021).³ Specifically, IFPRI used a computable general equilibrium model to examine the potential impact of a maize export ban and found it would harm poor rural households by reducing maize producer prices and returns to land, among other effects (Diao & Kennedy, 2016). These results persuaded the government not to reinstitute the ban (Somwaru, 2021). We are hoping further impact assessments taking place in the near future can help illuminate further policy changes or adjustments informed by IFPRI evidence.

Investments in Women's Empowerment Research

The Gates Foundation has also made investments in IFPRI's leadership of the Gender, Agriculture, and Assets project (GAAP). These investments have helped IFPRI researchers make continuous improvements on women's empowerment in agriculture metrics in general, which now go far beyond the original Women's Empowerment in Agriculture Index (WEAI). Johnson (2021) conducted an impact assessment of the second phase (GAAP2), finding that the project had substantial influence on program designs and project designs. The project level WEAI (pro-WEAI) was also used and is being used to measure empowerment in academic exercises. While the former could lead to improved outcomes among women and households participating in projects influenced by the GAAP2 project, the impact assessment does not trace these potential impacts. To do so, one might need to trace data for multiple projects on both the reach of those projects and impact estimates and then would need to estimate a contribution of IFPRI's research to those projects; all these parameters are unavailable. Moreover, while there are conversions possible for health or environmental outcomes to money values of benefits, these do not exist in the same way for women's empowerment. We discuss some further considerations of the valuation of women's empowerment metrics after measuring returns to the two pieces identified above.

Summary

To summarize, we studied a long list of projects in three areas in which the Gates Foundation has supported IFPRI. We sought projects for which we could clearly estimate benefits and for which impact assessment evidence showed that IFPRI's research had impacts. We selected two projects from which to estimate returns: Alive & Thrive research and research around Tanzania's consideration of a maize export ban.

2. FINDINGS

Returns to Research on Alive & Thrive

We next selected the work conducted by IFPRI to help evaluate the Alive & Thrive interventions to strengthen health systems and community platforms to improve breastfeeding and

³ We also can point to evidence that Rwanda's government is considering IFPRI modeling work in their policy process, but we cannot point to a specific change that has been made based on that evidence.

complementary feeding, which initially took place in Bangladesh, Viet Nam, and Ethiopia between 2009 and 2014. Alive & Thrive then expanded to a larger set of countries and new intervention foci in subsequent phases. Impacts of IFPRI’s research partnership on Alive & Thrive were assessed in Behrman and Ghosh (2019) and Hazell and Place (2025). While the research was a key component in Alive & Thrive’s expansion, here we focus on the returns to the first phase, since the results are quite clear. We then discuss the program costs at the end of the section.

For the returns to research on Alive & Thrive, we follow the logic laid out by SPIA’s recent research in estimating the benefits to Alive & Thrive, as impact estimates for some important outcomes from RCTs have been published, and we can turn to program documentation for estimates of “reach” before assigning a monetary value to those benefits. Broadly, the evaluation of the first phase of Alive & Thrive shows substantial impacts on early initiation of and exclusive breastfeeding among infants under 6 months old in addition to improved meal frequency, minimum dietary diversity, minimum acceptable diet, and consumption of iron-rich foods among toddlers 6-23 months old. To monetize results from the first stage of Alive & Thrive, we take those documented results and convert them to Disability Adjusted Life Years (DALYs) saved per 100,000 individuals. We then take the estimates of “reach” to come up with an estimate of the number of DALYs saved in each country. We finally compute returns by taking an estimate of the GDP per capita for each country and multiplying by the number of DALYs saved. We finally assume that the gains that we measure to the research component of Alive & Thrive proxy for the gains that occur because the program was extended and expanded in the second phase and beyond.

Before we describe the results of this exercise, we note that we apply a relatively standard methodology in estimating the value of a DALY at the average GDP per capita for a country (e.g., Arias, Saxena, and Verguet, 2022). For economies such as Bangladesh and Viet Nam, this method of estimation is likely quite conservative. We use the GDP per capita at the end of Alive & Thrive in 2014, as reported in the World Development Indicators. But it is worth noting that both Bangladesh and Viet Nam have grown rapidly since then, so the timing of this estimate matters. Had we estimated the value of a DALY at GDP in 2025, estimates for those two countries would have close to doubled in current dollar terms.⁴

We first summarize impacts from the first phase of Alive & Thrive (Table 1). The evaluation found large effects in Bangladesh and Viet Nam on the early initiation of breastfeeding and on exclusive breastfeeding; both have positive implications for infant survival rates in the literature. We also report below on several indicators related to complementary feeding among 6- to 23-month-olds in Bangladesh, and some in Viet Nam. Note that estimates from Bangladesh and Viet

⁴ The doubling would reflect both real growth and inflation in dollar terms.

Nam are based on randomized controlled trials for breastfeeding and complementary feeding improvements, but for Ethiopia they are based on a before-after comparison.⁵

Table 1. Impact Estimate Summary from Alive & Thrive, 2009-2014, Bangladesh, Ethiopia, and Viet Nam

Country Indicator	Bangladesh	Ethiopia	Viet Nam
Breastfeeding Outcomes			
Early Initiation of Breastfeeding	16.7 pp (2.78, 30.57)	13.7 pp	10.0 pp (1.25, 21.40)
Exclusive Breastfeeding	36.2 pp (21, 51.5)	9.4 pp	27.9 pp (17.7, 38.1)
Complimentary Feeding Outcomes			
Minimum Dietary Diversity	16.3 pp		6.4 pp
Minimum Meal Frequencies	14.7 pp		
Minimum Acceptable Diet	22 pp		8.0 pp
Iron-rich food consumption	24.6 pp		

Note: Breastfeeding indicators for Ethiopia are based on before-after comparisons for intervention areas (Kim et al., 2016); for Bangladesh and Viet Nam, figures are for difference-in-difference estimates from randomized controlled trials (Menon et al., 2016b). Complementary feeding outcomes for Bangladesh and Viet Nam from randomized controlled trial differences between more intense and less intense intervention models (Menon et al., 2016a; Rawat et al., 2017). Ethiopia differences for complementary feeding not reported.

We then convert impact estimates to DALYs as follows. First, we start with country-specific rates of mortality in each country, from the Global Burden of Disease database (IHME, 2025). The mortality rates we use are from 2019, so they are conservative as infant and child mortality declined in general through the 2000s, at least until the COVID-19 pandemic. We use the cause of death distributions to estimate risks for different age groups, and then relative risk reductions for morbidity from the impacts of exclusive breastfeeding, early initiation of breastfeeding, and improvements in complementary feeding (through reduced incidence of diarrhea and pneumonia). We use a 3 percent discount rate, age-weighting for DALYs, and we do not include any estimated reduction due to stunting; all these choices are made to present the most conservative estimates possible. We present the results on DALYs as a range (e.g., a confidence interval) per 100,000 population.

The results, by country and type of impact, are in Table 2, presented as 95 percent confidence intervals, which we use in simulating benefits, and the average outcome in italics. We find that because it greatly reduces the chances of mortality, the largest number of DALYs saved per

⁵ A randomized trial was completed in Ethiopia during the second phase of Alive & Thrive on complimentary feeding outcomes, but in different areas of Ethiopia than the first phase (Kim et al., 2019).

100,000 population is through early initiation of breastfeeding, particularly in Ethiopia and Bangladesh. In Viet Nam, where infant mortality rates were already lower, we observed fewer DALYs saved, as expected. We observe more modest numbers of DALYs saved per 100,000 due to improvements in exclusive breastfeeding, between 587 per 100,000 population in Ethiopia to 1,644 in Bangladesh. The number of DALYs saved due to improved complementary feeding, based on impact estimates, is small in Bangladesh and Viet Nam but meaningful in Ethiopia.⁶ Note that for the latter figure we only include DALYs saved among 6 to 11-month-olds, though there could also be benefits to 12-23-month-olds.

Table 2. Estimated Disability Adjusted Life Years (DALYs) Saved per 100,000 population by Alive & Thrive, Bangladesh, Ethiopia, and Viet Nam, 2009-2014, based on Impact Evaluation Evidence

Country	DALYs saved due to Exclusive Breastfeeding	DALYs saved due to early initiation of breastfeeding	DALYs saved due to improved complementary feeding (6-11 months)
Bangladesh	953-2,339 <i>1,644</i>	946-10,415 <i>5,676</i>	820-1,180 <i>1,000</i>
Ethiopia	375-812 <i>587</i>	4,587-9,174 <i>6,983</i>	N/A
Viet Nam	402-850 <i>633</i>	0-4,051 <i>1,892</i>	Small (not included)

The final pieces we need are the population of children under 5 that are affected in each country and GDP per capita in 2015. During the intervention period in Bangladesh, 1.7 million mothers of children under 2 were reached by Alive & Thrive directly ([Menon et al. 2016a](#)), and another 8.5 million were reached through media campaigns ([Menon et al. 2016b](#)). To be conservative, we only “count” impacts among the mothers who were directly reached, rather than the larger number reached through media campaigns. In Ethiopia, about 2 million mothers were reached, and in Viet Nam, 2 million were reached directly and 1.1 million mothers of children under 6 months were reached by counseling contracts ([Kim et al. 2016](#); [Menon et al. 2016b](#)). Given that in Viet Nam, the program was delivered to mothers through contracts, we count both as contributing to reduced DALYs. According to the World Development Indicators (2026), GDP per capita was \$1,095 in Bangladesh, \$550 in Ethiopia, and \$2,546 in Viet Nam.

We next use a Monte Carlo simulation to estimate the overall benefits of the first phase of Alive & Thrive, choosing an amount of DALYs saved per 100,000 in each cell above, and then multiplying by the appropriate number of mothers reached and the GDP figure by country. We present a distribution of potential benefits from the Monte Carlo, which simulated benefits

⁶ We note that because Ethiopia numbers are based on a before-after difference, we test excluding them altogether from the benefit estimates.

10,000 times (Figure 2). The median of the distribution is \$438 million, and the 90 percent confidence interval is between \$284 million and \$603 million. If we exclude Ethiopia, the median of the distribution is \$354 million, with a 90 percent confidence interval between \$202 million and \$517 million.

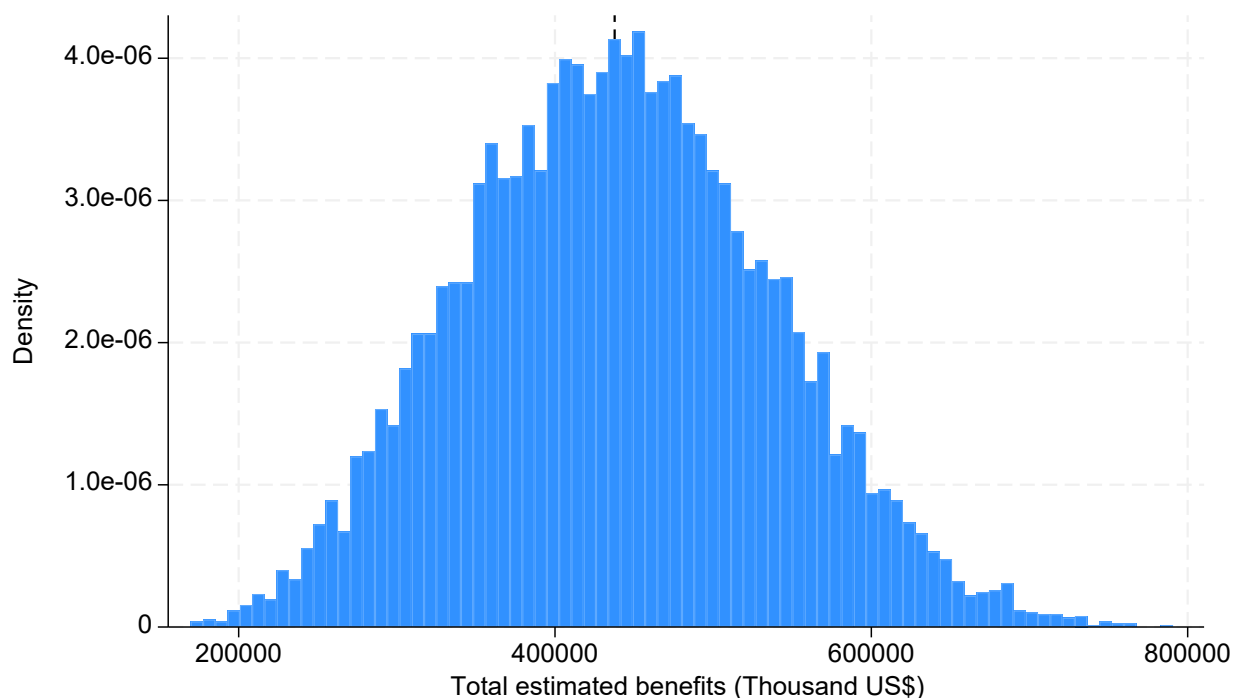


Figure 2. Histogram of Estimated Benefits from Alive & Thrive, 2009-2014, Bangladesh, Ethiopia, and Viet Nam

Though the research contributed to decisions made to continue and expand Alive and Thrive, we cannot take the full estimated benefits from Alive & Thrive and assign them to research. As a result, we attempt to measure IFPRI’s “contribution” to these benefits. One way to estimate IFPRI’s contribution would be to consider that the entire budget of the first phase of Alive & Thrive was \$80 million, and IFPRI spent around \$12 million on the research. Hence, the proportion of IFPRI’s contribution could be estimated as the cost of the research divided by the cost of the program budget, or 15 percent.

Taking 15 percent of the benefits leads to a range of between \$43 and \$90 million, with a median of \$66 million. At the median, the estimated ROI is around 450 percent, with the entire range suggesting quite high returns (258-650 percent). We note that this number is based on the conservative estimates related to GDP and the number of beneficiaries, and we do not attempt to place any value on changes in morbidity that might be associated with findings.

We again want to state that the benefit estimate is derived directly from first phase results, ignoring second phase benefits from the expansion; we implicitly assume that if the first phase

benefits are solely from the program, this estimate proxies for the value of the research in contributing to the scale up. This assumption is likely conservative, as countries and areas (and target populations) expanded in the second phase. However, such benefits are particularly challenging to estimate, as the positive results certainly contributed to decisions about investments by donors and others in the program expansion.

Returns to Research on Tanzania's Proposed Maize Export Ban

We find a strong example of IFPRI's foresight modeling work influencing policy in an example from the early 2010s. Around this time, Tanzania's government considered a maize export ban, under the logic that maize prices would fall through such a ban, in theory improving consumer welfare. IFPRI analyzed how a maize export ban would affect Tanzania's economy, using a national economy-wide model (Somwaru, 2021). The results of this exercise were presented to the government and helped convince the government not to impose a maize export ban. The contribution of IFPRI's work to helping persuade the government not to make this policy change is documented in Diao et al. (2013) and Diao and Kennedy (2016).

The results of the computable general equilibrium analysis showed that a maize export ban would substantially reduce producer prices for maize without much change on consumer prices. Moreover, to the extent that a welfare transfer was occurring, it is a transfer from relatively poor rural producers to relatively well-off urban consumers. Specifically, the research finds that maize prices would decline between 7 and 26 percent under the maize export ban, depending upon region. Meanwhile, the aggregate food price index only declines between 0.6 and 2.4 percent as a result of the ban. As a result, the loss in producer surplus would dominate in the short run.

We take a farmer-oriented approach to conservatively estimate the loss that farmers would have faced with an export ban. We focus on the estimated maize price declines of between 7 and 26 percent, assuming the prices in the model are consistent with farmgate prices. We treat these regional estimates as a distribution and run a Monte Carlo that randomly selects a price reduction from a normal distribution associated with price losses with that range as a 95 percent confidence interval. We also take the median price of maize from the Tanzanian-LSMS and use that price for all maize (the majority of maize produced in Tanzania is not sold).

We next need to estimate IFPRI's contribution to this absence of policy change. The impact assessment results solely show that IFPRI's research helped the government make this decision, but it is clear that it was one of many factors that helped persuade decisionmakers. The challenge is putting a value on this contribution; we build it into the Monte Carlo and estimate a contribution of between 5 and 20 percent, selected from a uniform distribution.

We find rather large benefits to farmers in a one-year sense, using 2012 as the year we project the ban would have occurred (Figure 3). The distribution is slightly skewed to the left side of the graph, with the 90 percent confidence interval between \$64 million and \$397 million. The median of the distribution is \$200 million.

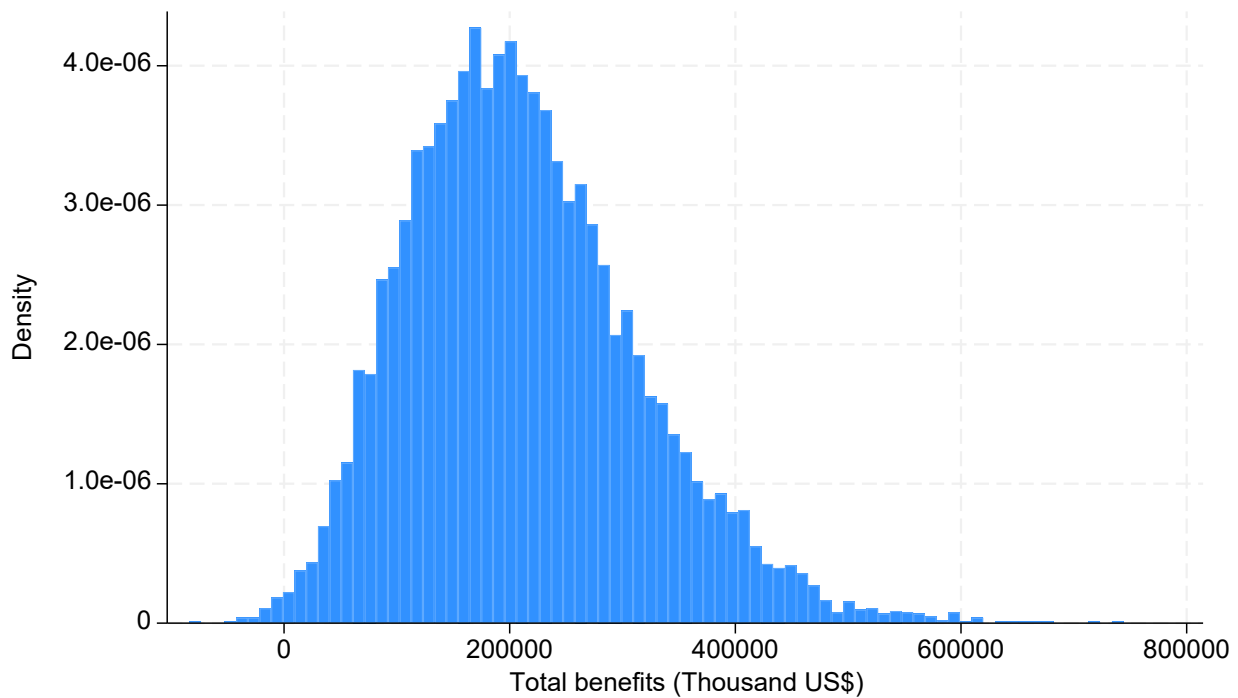


Figure 3. Estimated IFPRI Contribution to Benefits to Farmers of Avoiding Maize Export Ban, Tanzania, 2012

Note that we are sequentially estimating a partial equilibrium effect; the partial equilibrium is in the maize market, while there are certainly losses on the consumer side within Tanzania.

However, we also do not consider how the price signals would change either production or the share of production that farmers market. Diao and Kennedy (2016) suggest the reduction in production would have been 7.5 percent by 2017. By leaving the effect as a partial equilibrium effect, we likely understate general equilibrium effects. Further, our methodology implies the ban would go into effect immediately. If it was gradually introduced, initial effects would be more muted, but there would be effects over a longer time period, increasing the gains over time.

For this example, we did not attempt to collect cost data, in part because the benefits are so large relative to potential costs of individual country-level modeling research conducted by IFPRI. Further, we know that most IFPRI modeling research does not necessarily lead to policy impacts that can be traced. One big win such as this one makes the ROI positive on modeling research under almost any cost assumptions for multiple years.

3. DISCUSSION AND CONCLUSION

This exercise importantly reveals challenges in defining money-metric equivalents for some types of outcomes. Outcomes related to income are perhaps the most straightforward.

Agricultural improvements can be measured at prevailing crop prices. Nutrition outcomes are related to health outcomes and can be translated first into disability adjusted life years (DALYs), which can then be valued. Similarly, climate outcomes can be valued by converting outcomes into greenhouse gas emissions and then placing a value on greenhouse gas emissions that are averted.

However, we found that gender outcomes can be much more difficult to measure in monetary terms. There is no straightforward way to take an improvement in empowerment that occurs as the result of a program, project or policy and turn it into money-metric terms. Such programming clearly has intrinsic value, but placing a monetary value on those benefits is difficult if not impossible.

Moreover, programs or projects that target women or the poor in agricultural settings may also inherently have lower returns. Work by the LSMS-ISA team shows that even controlling for observable differences between men and women, male farmers are more productive than female farmers (e.g., Kilic, Palacios-Lopez, and Goldstein, 2015).⁷ If different constraints faced by men and women are not accounted for in program design, then returns could be lower than better targeted programs. Similarly, a large literature showing that the poor face multiple constraints in raising their productivity (e.g., Banerjee et al., 2015; Deutschmann et al., 2024). Targeting “market ready” farmers with an agricultural technology to adopt will almost certainly have a higher ROI than targeting the poor, since they lack the same exposure to constraints. In other words, any discussion of ROI by donors with objectives of helping reduce gender inequality (from an empowerment perspective), reduce poverty, or achieve similarly difficult goals must realize that returns can be lower than they would be with alternative targeting.

This logic extends to the countries in which the research takes place. It might be easier to have policy influence in countries at higher living standards, as governments will have more resources that they can invest in breeding programs, natural resource management, nutrition and health, or other programs. If a high return on investment was the primary goal of research, it would make sense to avoid countries with the highest need. However, the need for support from institutions like IFPRI is likely higher in countries that have higher needs, which is again omitted from ROI calculations.

Conclusion

In this report, we outline an approach to ROI calculations and apply that logic to some of IFPRI’s work that has been supported by the Gates Foundation using specific examples in the areas of nutrition, modeling, and women’s empowerment. We provide a method of tracing benefits to policy research that highlights when challenges take place along the causal pathway, carefully

⁷ Doss (2018) rightly points out a clear reason that this might be the case; women simply have a lot more responsibilities in rural households than men, so when they control plots for farming they do not have the same time to put into management.

defining benefits as measurable benefits on the lives of individuals residing in low- and middle-income countries in monetary terms.

In the area of nutrition, we conservatively show that there is a range of benefits between \$43 and \$90 million for the evaluation research on Alive & Thrive. This estimate is suggestive of a median ROI of 4.5. In the case of modeling, we estimate that the influence of research on Tanzania's maize export policy had benefits between \$64 million and \$397 million over time; we do not measure the ROI as we lack cost data, but we know that overall spending on modeling at IFPRI around that time is at least an order of magnitude lower. The benefits of women's empowerment research were furthermore not estimated due to limitations in converting their value into money-metric equivalents. Even including the types of research for which it is not possible to compute an ROI, the results of this exercise suggest that the overall ROI of Gates Foundation investments in IFPRI research is positive.

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